(200)
gA
no. 18, pt. 5
1896-97

EIGHTEENTH ANNUAL REPORT

OF THE

UNITED STATES GEOLOGICAL SURVEY

TO THE

SECRETARY OF THE INTERIOR

1896-97

CHARLES D. WALCOTT
DIRECTOR

IN FIVE PARTS

PART V.—MINERAL RESOURCES OF THE UNITED STATES, 1896
METALLIC PRODUCTS AND COAL

DAVID T. DAY, CHIEF OF DIVISION

U. S. GEOLOGICAL SURVEY
140765
LIBRARY
MAY 6 1952

WASHINGTON
GOVERNMENT PRINTING OFFICE
1897

EIGHTEENTH ANNUAL REPORT

OF THE

UNITED STATES GEOLOGICAL SURVEY.

PART V.—MINERAL RESOURCES OF THE UNITED STATES, 1896,
METALLIC PRODUCTS AND COAL.

CONTENTS.

	Page.
LETTER OF TRANSMITTAL	1
INTRODUCTION	3
SUMMARY	5
Metals	5
Fuels	7
Structural materials	8
Abrasives	9
Chemical materials	9
Pigments	10
Miscellaneous	11

IRON ORES, BY JOHN BIRKINBINE.

Production	23
The Lake Superior region	26
Iron-ore industry in various States	35
Michigan	35
Minnesota	35
Alabama	36
Pennsylvania	37
Wisconsin	37
Tennessee	37
New York	37
New Jersey	37
Colorado	38
Other States	38
Prominent iron-ore mines	38
Valuation of iron ore	40
Stocks of ore	42
Importation of foreign iron ores	44
The occurrence of iron ores in the Rocky Mountain region	45
Colorado	45
Wyoming	47
New Mexico	47

IRON AND STEEL AND ALLIED INDUSTRIES IN ALL COUNTRIES, BY JAMES M. SWANK.

United States	51
Production of pig iron	51
Production of Bessemer pig iron	51
Production of spiegeleisen and ferromanganese	52
Production of pig iron, by fuels	52
Unsold pig iron	54
Pig iron in warrant yards	54
Pig iron stored in the yards of the American Pig Iron Storage Warrant Company	55
Imports of pig iron	55
Imports for consumption of spiegeleisen, ferromanganese, and ferrosilicon	56

United States—Continued. Page.
Consumption of pig iron 56
The world's great pig-iron producers 57
The world's production of pig iron 58
Production of all kinds of crude steel 58
Production of Bessemer steel ingots 60
Production of open-hearth steel ingots 60
Production of crucible steel ingots 61
Production of all kinds of rails 62
Production of Bessemer steel rails 63
Production of street rails 64
Production and consumption of rails 64
Comparative production of Bessemer steel ingots and rails in the United States and Great Britain 66
Comparative production of open-hearth steel ingots in the United States and Great Britain 67
Total production of all kinds of crude steel in the United States and Great Britain 67
The world's production of steel 68
Production of all kinds of rolled iron 69
Production of rolled iron and steel 70
Comparative production of rolled iron and steel 70
Production of iron rails 71
Production of tin plates 71
Imports of tin plates 72
Production of cut nails 72
Production of wire nails 73
Imports of iron and steel 73
Foreign values of 74
Exports of iron and steel 74
Imports of iron ore 75
Shipments of iron ore from Cuba to the United States 75
Railroad mileage in the United States 76
Annual new railroad mileage since 1880 77
Miles of iron and steel rails in use 77
Iron and steel vessels built since 1868 78
Value of pig iron made in the United States 78
Prices of pig iron 79
Prices of charcoal pig iron 80
Prices of American and British pig iron 81
Prices of hammered bar iron 82
Average wholesale prices of cut nails 82
Prices of Russia sheet iron 83
Prices of rolled iron and steel 84
Production and prices of Bessemer steel rails 85
Prices of standard sizes of wire nails 86
Prices of wire nails of small size 86
Prices of planished, or American-Russia, sheet iron 87
Prices of foreign tin plates 87
Prices paid for tin plates at New York 88
Prices of various tin utensils 89
Production of leading articles in the United States and of pig iron in Great Britain 89
Great Britain 91
Production of iron ore 91
Imports of iron ore 91

Great Britain—Continued. Page.
Exports of iron ore 92
Production of coal 92
Exports of coal, coke, and patent fuel 93
Imports of coal 94
Production of pig iron 94
Production of Bessemer steel 95
Production of open-hearth steel 95
Total production of steel 96
Production of Bessemer steel rails 96
Exports of pig iron 97
Exports of all kinds of iron and steel, including pig iron 97
Imports of all kinds of iron and steel 98
Germany 98
Production of iron ore 99
Production of coal and lignite 100
Production of pig iron 101
Imports of pig iron 102
Exports of pig iron 102
Production of steel 103
Production of steel rails 103
Total exports of all kinds of iron and steel 103
France 104
Production of iron ore 104
Imports of iron ore 104
Exports of iron ore 105
Production of iron ore in Algeria 105
Production of coal and lignite 106
Imports of coal 106
Exports of coal 107
Production of pig iron 107
Imports of pig iron 108
Exports of pig iron 108
Production of Bessemer and open-hearth steel 108
Production of miscellaneous kinds of steel 109
Total production of steel 109
Production of steel rails 110
Imports of steel 110
Exports of steel 110
Imports of all kinds of iron and steel 111
Exports of all kinds of iron and steel 111
Belgium 112
Production of iron ore 112
Imports of iron ore 112
Exports of iron ore 113
Production of coal 113
Production of pig iron 114
Imports of pig iron 114
Exports of pig iron 115
Production of steel 115
Production of steel rails 116
Total imports of all kinds of iron and steel 116
Total exports of all kinds of iron and steel 116
Austria and Hungary 116
Production of iron ore 117
Production of coal and lignite 117

Austria and Hungary—Continued. Page.
Total production of coal and lignite 118
Imports and exports of coal and coke 119
Production of pig iron 119
Imports and exports of pig iron 119
Production of steel 120
Sweden 120
Production of iron ore 120
Exports of iron ore 121
Production of coal 121
Production of pig iron 122
Imports of pig iron and of iron and steel rails 122
Exports of pig iron and of finished iron and steel 122
Production of Bessemer steel ingots and castings 123
Production of open-hearth steel ingots and castings 123
Production of crucible and blister steel 123
Total production of steel 124
Spain 124
Production of iron ore 124
Iron ore in the Bilbao district 125
Production of coal and lignite 125
Imports and exports of coal 125
Production of pig iron 126
Exports of pig iron 126
Production of Bessemer steel 126
Production of open-hearth steel 126
Total production of steel 127
Italy 127
Production of iron ore 127
Production of iron ore in the island of Elba 127
Imports of iron ore 128
Exports of iron ore 128
Production of coal 128
Imports of coal and coke 129
Exports of coal 129
Production of pig iron 129
Imports of pig iron 129
Exports of pig iron 130
Production of steel 130
Russia 130
Production of iron ore 131
Production of coal 131
Production of pig iron 132
Production of steel 132
Production of steel rails 133
Imports and exports 133
Dominion of Canada 133
Production of iron ore 133
Exports of iron ore 133
Production of coal 134
Imports and exports of coal 134
Production of pig iron 134
Imports and exports of pig iron 134
Production of steel 135
Total value of imports and exports of iron and steel 135
Production of iron ore in all other countries 135

Page.
Production of coal and lignite in all other countries 135
Production of pig iron in all other countries 135
Production of steel in all other countries 135
The world's production of iron ore, coal, pig iron, and steel 136
The railroads of the world 137
Addenda 139

GOLD AND SILVER.

Production 141

WITWATERSRAND BANKET, WITH NOTES ON OTHER GOLD-BEARING PUDDING STONES, BY GEORGE F. BECKER.

Introductory 153
Gold deposition on the Witwatersrand 156
The gold-bearing region 156
Character of the Main Reef series 158
Marine origin of banket 160
Banket deposited in east-west currents 163
Upheaval and injection 164
Composition of banket 165
Distribution of gold in banket 168
Theories of deposition 169
Impregnation theory 170
Precipitation theory 172
Marine placer theory 173
Consequences of placer theory 176
Other pre-Tertiary gold-bearing pudding stones 177
In France 178
In Nova Scotia 178
In the United States 179
In Australia 182
In New Zealand 183
Conclusions 183

COPPER, BY CHARLES KIRCHHOFF.

General trade conditions 185
Production 187
Lake Superior mines 196
Montana 203
Arizona 205
California 205
Imports 206
Exports 212
The copper markets 215
The world's production 219
The English copper trade 223
The French copper trade 228
The German copper trade 230
The Russian copper trade 232
The leading foreign producers 234

LEAD, BY CHARLES KIRCHHOFF.

Introduction 237
Production 237
Consumption 241
Imports and exports 242
Domestic producers 251
Prices 253
The lead market 255

Page.
World's production 256
Spain 257
France 258
Great Britain 258
Germany 261
Canada 262

ZINC, BY CHARLES KIRCHHOFF.

Production 263
Stocks 265
Imports and exports 267
Prices 272
Foreign spelter production 274

ALUMINUM, BY R. L. PACKARD.

Production 281
Uses 281
Soldering 282
Plaiting 283
Alloys 283
Imports 284
Bauxite 285

QUICKSILVER.

Production 287
Quicksilver in New South Wales 290

MANGANESE ORES, BY JOHN BIRKINBINE.

Introduction 291
Production of manganese ores 292
Production of manganiferous iron ores 293
Production of manganiferous silver ores 295
Production of manganiferous zinc ores 295
Production of all classes of manganese ores 296
Imports 296
Ferromanganese and spiegeleisen 297
Occurrence of manganese ores 298
Production of manganese ores, by States 299
Alabama 299
California 300
Colorado 301
Georgia 305
Lake Superior region 308
Montana 309
New Jersey 309
North Carolina 309
Pennsylvania 310
South Carolina 310
Tennessee 310
Vermont 310
Virginia 310
Manganese and manganiferous ores in foreign countries 311
Canada 311
Cuba 312
Brazil 313
Chile 313
United States of Colombia 313

Manganese and manganiferous ores in foreign countries—Continued. Page.
Germany 316
France 317
Great Britain 317
Italy 318
Spain 318
Sweden 324
Turkey 325
India 325
Japan 325
New South Wales 326
Queensland 326
South Australia 326
New Zealand 327
The world's production of manganese ore and manganiferous iron ore 327

NICKEL AND COBALT, BY JOSEPH WHARTON.

Sources 329
Manufacture 333
Production 335
Imports 336
Uses of nickel 338
Cost 339
Investigations 341

ANTIMONY, BY EDWARD W. PARKER.

Occurrence 343
Production 343
Uses 344
Imports 345
Prices 346

PLATINUM.

Production 349

COAL, BY EDWARD W. PARKER.

Introduction 351
The coal fields of the United States 352
Production 358
Anthracite 359
Bituminous 360
Production in previous years 365
Labor statistics 375
Prices 378
Average prices at the mines since 1886 378
Prices in 1896 at points of consumption 379
Imports and exports 411
World's product of coal 414
Coal trade review 423
New York City 423
Boston, Massachusetts 426
Philadelphia, Pennsylvania 428
Local anthracite consumption 429
Local bituminous consumption 431
The export trade 431
Buffalo, New York 432
Cleveland, Ohio 435

Coal trade review—Continued. Page.
Toledo, Ohio 437
Chicago, Illinois 439
Milwaukee, Wisconsin 446
Cincinnati, Ohio 451
St. Louis, Missouri 454
Mobile, Alabama 456
Norfolk, Virginia 457
San Francisco, California 458
Seattle, Washington 460
Machine-mined bituminous coal 461
Production of coal, by States 462
Alabama 463
Alaska 469
Arkansas 469
California 472
Colorado 473
Georgia 481
Illinois 483
Indiana 506
Indian Territory 513
Iowa 515
Kansas 524
Kentucky 529
Maryland 536
Michigan 544
Missouri 545
Montana 551
Nebraska 556
Nevada 556
New Mexico 557
North Carolina 560
North Dakota 561
Ohio 562
Production, by counties 562
Oregon 570
Pennsylvania 571
Anthracite 573
Bituminous 597
Production, by counties 598
Tennessee 606
Texas 611
Utah 613
Virginia 615
Washington 617
West Virginia 621
Wyoming 629

ILLUSTRATIONS.

PLATE I. Map of the gold fields of the Transvaal 153
FIG. 1. Imbrication of pebbles in a stream bed 161

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF MINERAL RESOURCES,
Washington, D. C., September 1, 1897.

SIR: The manuscript transmitted herewith comprises the thirteenth report on the mineral resources of the United States, and bears the title Mineral Resources of the United States, 1896. In it the statistical record of the mineral developments of the United States is carried forward to December 31, 1896, but the descriptive matter has been brought up to a much later date, which was possible while the statistical compilation was in progress during the present calendar year.

In accordance with your instructions, the report for the calendar year 1897 is already in preparation.

Very respectfully, your obedient servant,

DAVID T. DAY,
Geologist in Charge.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

INTRODUCTION.

This is the thirteenth report of the series, Mineral Resources of the United States. It covers the calendar year 1896, and its scope and the arrangement of the subjects treated are practically the same as in the preceding volumes.

Sources of information.—The method of obtaining the information used in the volumes which has been practiced since 1890, that of a census of each industry, has prevailed in the preparation of this report.

The statistics of the production of gold and silver, are, as usual, those of the Director of the Mint, which are accepted as official in this report. The statistics of the imports and exports are obtained through the courtesy of the Chief of the Bureau of Statistics of the Treasury Department. The names of the experts who contribute to this report are given at the heads of the papers which they have prepared. It is impossible to acknowledge here, otherwise than by brief mention, the invaluable assistance which has been freely rendered by producers of minerals, and the voluntary contributions of many local experts.

Advance publication.—The publication of this volume has been anticipated to a greater extent than any of the preceding numbers of the series by the issuance in advance, in pamphlet form, of the several reports which compose it. At the time of writing there have been thus issued editions of fourteen of these reports, including those on iron and steel, stone, sulphur and pyrites, gypsum, clayworking industries, precious stones, mineral paints, cement, soapstone, abrasive materials, etc., while those on coal, coke, petroleum, natural gas, copper, lead, zinc, iron ores, manganese, etc., are in press, and will be delivered in a short time.

A brief review of the principal statistical results shown by the report is given in the pages which immediately follow.

MINERAL RESOURCES OF THE UNITED STATES, 1896.

DAVID T. DAY, *Chief of Division.*

SUMMARY.

Totals.—Instead of a normal increase of at least $25,000,000, the mineral product of 1896 showed only a slight increase in its total value, from $622,628,685 in 1895 to $623,717,288 in 1896. There were nine substances of which the product was not only increased but for which the value was the greatest ever attained. Among these the important ones are gold, copper, aluminum, and petroleum. On the other hand, the product of many substances was increased in amount, but the value was less than that of the smaller product yielded the year before. This includes such important substances as lead, bituminous coal, building stones, mineral waters, salt, and pyrites.

The principal factors in this total are given in detail below.

METALS.

Iron and steel.—During the whole of the year 1896 there was a serious reaction from the activity of 1895 in all branches of the iron and steel industries of the United States, except in open-hearth steel. The production of pig iron in 1896 decreased 823,181 tons as compared with 1895, or 8.7 per cent; spiegeleisen and ferromanganese, 39,784 tons, or 23.1 per cent; Bessemer steel ingots, 989,222 tons, or 20.1 per cent. Open-hearth steel increased 161,518 tons, or 14.2 per cent. All kinds of steel decreased 833,145 tons, or 13.6 per cent; structural shapes, 22,349 tons, or 4.3 per cent; plates and sheets, 25,683 tons, or 2.5 per cent; Bessemer steel rails, 182,670 tons, or over 14 per cent; wire rods, 167,144 tons, or 21.1 per cent; all rolled iron and steel, including rails, 673,733 tons, or 10.8 per cent; iron and steel cut nails, 514,024 kegs, or 24.1 per cent; iron and steel wire nails, 1,121,543 kegs, or 19.1 per cent. Included in the production of all kinds of rails in 1896 were 145,210 tons of street and electric rails, against a production in 1895 of 163,109 tons, showing a decrease in 1896 of 17,899 tons. In 1896 the United States made 8,623,127 tons of pig iron, 3,919,906 tons of Bessemer steel ingots, 1,298,700 tons of open-hearth steel, and 5,281,689 tons of steel of all kinds, and rolled in all 5,515,841 tons of finished iron and steel, including rails.

The total value of all kinds of steel produced in the United States in 1896 was $105,565,000, as compared with $117,500,000 in 1895. Of this total, $31,300,000 was for steel rails and $74,265,000 for all other partly finished forms.

Gold.—The product of gold was valued at $53,088,000. This was not only the greatest product of gold ever obtained in the United States, but it was a percentage gain of 12⅕ over 1895 and more than 25½ over 1894. The product from 1880 to 1892 fluctuated only slightly, between thirty and thirty-three million dollars; but in 1893 the rise began and has continued, with no prospect of a decline. The increase from $46,610,000 in 1895 to $53,088,000 in 1896 has been due to the further development of the unusually productive regions of Cripple Creek, Colorado; Mercur, Utah, and the Deadwood district in South Dakota.

Silver.—The coining value of the silver product in 1896 was $76,069,236, or a commercial value of $39,655,000. This is an increase in the coining value of $4,018,236 over 1895, and of more than $12,000,000 over the product of 1894.

Copper.—The industry is in a flourishing condition. The product aggregated 460,061,430 pounds, or 205,384 long tons, valued at $49,456,603—the greatest product ever obtained in the United States, and greater than the gold product in any year prior to 1896. In addition the copper obtained from imported pyrites amounted to 5,900,000 pounds; from other imports, 11,496,933 pounds. The exports amounted to 281,355,221 pounds, or 58.93 per cent of the total supply.

Lead.—The value showed a decline, with a gain in total quantity. In 1896, 188,000 short tons of lead were produced, worth $10,528,000. In 1895 the product was 170,000 tons, worth $11,220,000.

Zinc.—This metal also shows a decline in quantity from 89,686 to 81,499 short tons, but a gain in the value of the product from $6,278,020 in 1895 to $6,519,920 in 1896.

Quicksilver.—In 1881 the product was 60,851 flasks (4,655,101 pounds, or 2,328 short tons), but ten years later production had fallen to about one-third of this. Since then the product has gained slowly to 36,104 flasks in 1895, valued at $1,337,131. In 1896 the product declined, but not significantly, to 30,765 flasks, worth $1,075,449. The industry is still practically confined to California, but is slowly extending into Oregon. No development has been made of the deposit recently found in Texas.

Aluminum.—The product of aluminum and the variety of its uses continue to increase. In 1895, 920,000 pounds were produced, and this increased to 1,300,000 pounds in 1896. Meanwhile, with more efficient work in producing and cheaper cost of power, the price has declined, so that the total value of $464,600 in 1895 increased to only $520,000 in 1896.

Antimony.—The product increased to 601 short tons in 1896, worth $84,290, from 450 tons in 1895, worth $68,000. The metal was obtained principally from foreign ores smelted in New Jersey.

Nickel.—The United States still contributes a small by-product, which amounted to 17,170 pounds in 1896, worth $4,464. In 1895 the product was 10,302 pounds, valued at $3,091. The Canadian mines still furnish the principal supply.

Manganese.—The product showed a slight increase, from 9,547 long tons in 1895, worth $71,769, to 10,088 tons in 1896, valued at $90,927. The sources remained the same, but the imports increased.

Platinum.—Product, 163 ounces; worth, crude, $944; all from the Pacific Coast.

FUELS.

Coal.—The total amount of coal of all kinds produced in 1896 was 171,416,390 long tons, equivalent to 191,986,357 short tons, against 172,426,366 long tons, or 193,117,530 short tons, in 1895, a decrease of 1,009,976 long tons, or 1,131,173 short tons, or about three-fifths of 1 per cent. The production in 1896 included 48,523,287 long tons, or 54,346,081 short tons, of Pennsylvania anthracite, against 51,785,122 long tons in 1895 and 46,358,144 long tons in 1894. The value of the anthracite product in 1896 was $81,748,651; in 1895, $82,019,272, and in 1894, $78,488,063. The bituminous product in 1896 was 122,893,104 long tons, or 137,640,276 short tons, valued at $114,891,515. The bituminous product in 1895 was 120,641,244 long tons, equivalent to 135,118,193 short tons, valued at $115,779,771, and in 1894, 106,089,647 long tons, or 118,820,405 short tons, valued at $107,653,501. The product of bituminous coal includes a small amount of anthracite coal mined in Colorado and New Mexico; also semianthracite mined in Arkansas and Virginia, lignite coals mined in Colorado, North Dakota, Texas, and on the Pacific Slope, and semibituminous, cannel, and block coals.

As in 1895, the production of coal, particularly in the bituminous fields, was much larger than the market could profitably absorb, and the year was marked by low prices and little, if any, profit to the operators. While the production of bituminous coal in 1896 was more than 2,500,000 tons in excess of that of the preceding year, the value fell off nearly $900,000. The average price obtained for anthracite coal marketed in 1896 was $1.85 per long ton, against $1.72 in 1895. The increase in price in anthracite during 1896 was not due to any increased demand for coal, but to the fact that the anthracite coal operators' association was stronger than in the preceding year and was able to maintain prices upon a basis more satisfactory to itself. In arriving at the average price of anthracite coal only the amount of coal marketed is considered. The amount consumed at the collieries is not taken into consideration, for the reason that this consists of culm or slack, which would otherwise be thrown on the dump or wasted. The average price per ton for bituminous coal in 1896, obtained by dividing the total value by the total product, was 83 cents, which shows a decline of 3 cents from 86 cents in 1895. As in the preceding year, the decline in value was general throughout the United States.

Coke.—The total product of coke in the United States in 1896 was 11,788,773 short tons, as compared with 13,333,714 tons in 1895 and 9,203,632 tons in 1894. The output of coke in 1895 was the largest ever obtained, while the product in 1894 was the smallest since 1889. While the output in 1896 was less by 1,544,941 tons than in 1895, it was larger than in any previous year except 1892, and about 900,000 short tons larger than the average product for the seven years from 1889 to 1895, inclusive.

An interesting feature of the coke industry in 1896 was the increase in value, for, while the product was less than in 1895, the value increased $2,426,410. The average price per ton realized increased from $1.44 in 1895 to $1.837 in 1896. The increase in price and the decrease in production were entirely due to the higher prices set by the larger producers of Connellsville coke. The large concerns in the Connellsville region put the price of their product early in 1896 at $2 per ton for furnace, $2.30 for foundry, and $2.35 for crushed, maintaining these prices throughout the year at the expense of a decrease of 2,718,689 tons in the amount of coke made.

Petroleum.—The product increased from 52,892,276 barrels (of 42 gallons each) in 1895 to 60,960,361 barrels in 1896, while, owing to a decline in price in 1896, the total value for the larger product in 1896, $58,518,709, was only $886,413 more than that of the smaller product of 1895, i. e., $57,632,296.

Natural gas.—This product declined again, but only slightly, i. e., from $13,006,650 in 1895 to $13,002,512 in 1896.

STRUCTURAL MATERIALS.

Stone.—The total value of stone of all kinds declined from $34,688,816 in 1895 to $31,346,171 in 1896. The principal features of the year were the considerable increase of the exports of slate, on account of the strikes in Wales, and the increased amount of marble used for exterior building.

Clays.—The general volume of the industry remained about equal to that of 1895, when the value of the brick clays aggregated $9,000,000 in the crude state, and that of all other clays $800,000. The production of improved brick in fancy colors has increased noticeably. In the pottery industry much ground for encouragement is shown in the quality of new art products in Trenton, N. J., and East Liverpool and Zanesville, Ohio.

The total value of the wares made from clay in 1896 aggregated $62,341,853, against $65,319,806 in 1895.

Cement.—Natural rock cement showed the same slight increase which it did in 1895, from 7,741,077 barrels (of 300 pounds each), worth $3,895,424, in 1895, to 7,970,450 barrels, worth $4,049,202, in 1896. Meanwhile, the Portland cement industry progressed markedly, from a product of 990,324 barrels (of 400 pounds each), worth $1,586,830, in

1895, to 1,543,023 barrels, worth $2,424,011, in 1896. The number of Portland cement works increased from 22 to 26, and those of natural rock cement from 67 to 71.

ABRASIVES.

Millstones.—The product showed little change from 1895, i. e., $22,542 in 1895 and $22,567 in 1896. The industry is supplied chiefly by imported stones.

Grindstones.—The product nearly regained the position it held in 1893, when its value was $338,787. In 1896 the value was $326,826. In 1895 it was only $205,768.

Corundum and emery.—The product showed little change in quantity or value; 2,102 short tons, worth $100,256, were produced in 1895, chiefly from Massachusetts, New York, North Carolina, and Georgia. In 1896 the 2,120 short tons produced were sold for $113,246.

Oilstones.—The value of the product declined from $155,881 in 1895 to $127,098 in 1896.

Infusorial earth.—There was a slight decrease in product, to a value of $16,042 in 1896, against $20,514 in 1895.

CHEMICAL MATERIALS.

Phosphate rock.—In spite of efforts of the Florida producers to greatly restrict production, the result was 930,779 long tons as the total for the United States, compared with 1,038,551 long tons in 1895. The prices were again low, the total value in 1896 being $2,803,372.

In addition to the phosphate deposits lately found in Hickman, Lewis, and Perry counties, Tennessee, further valuable discoveries were made at Mount Pleasant, Maury County. Here the leaching of phosphatic limestone in some instances, and the replacement of limestone by phosphate in others, have left quite high-grade rock, which has been mined at exceptionally low cost.

Gypsum.—The product declined sharply. In 1895 265,503 short tons were produced, and in 1896 only 224,139. The value fell from $797,447 in 1895 to $572,344 in 1896, and the average price decreased from $3 to $2.55 per ton. Over 43 per cent of the product in 1896 was from Western States—Iowa, Kansas, Indian Territory, South Dakota, and Texas.

Salt.—Increased production and continued large importation had a demoralizing effect upon prices in 1896. Domestic production increased from 13,669,649 barrels in 1895 to 13,850,726 in 1896. The value declined from $4,423,084 in 1895 to $4,040,839 in 1896. The average price realized by producers in 1895 was 32 cents per barrel of 280 pounds, a decline of 4½ cents per barrel from the price in 1894. In 1896 the average price per barrel was 29 cents, a little over one-tenth of 1 cent per pound. The principal feature of interest outside of the decline in value was the increase of more than 100 per cent in the production of Ohio, which

replaced about an equal amount from Michigan and New York, the product in those States having decreased about the same amount as the product of Ohio increased.

Bromine.—The industry is chiefly in the hands of the sales syndicate, and showed a slight increase, to 546,580 pounds, in 1896, valued at the works at $144,501. In 1895, 517,421 pounds were made, worth $134,343. The product in 1896 includes the bromine in potassium bromide made directly.

Sulphur.—The industry shows some life, increasing from 1,800 tons in 1895 to 5,260 tons in 1896. The increase was due to success in operating the Louisiana deposits by Frasch's process. The increased price, due to the Sicilian sulphur combination, excited search for other deposits, with the result of attracting some attention to the deposits in Texas.

Pyrites.—The product increased slightly, but the total value shows a decline. The product was 115,483 long tons in 1896, worth $320,163, while 99,549 long tons were mined in 1895, worth $322,845. In spite of low prices, search for a more extended supply of pyrite in the United States is quite active in consequence of the higher price of sulphur.

Borax.—The product went up to the normal level of 13,508,000 pounds, worth $675,400, all from California and Nevada.

Fluorspar.—The product is small, but shows a satisfactory increase from 4,000 short tons in 1895, worth $24,000, to 6,500 tons in 1896, worth $52,000. During the year a new deposit was opened at Marion, Kentucky.

Chrome iron ore.—The chief interest in the industry lies in the development of a new deposit in Newfoundland, from which shipments have been made to Pittsburg for use as a refractory furnace lining. The higher-grade portion was sent to Baltimore and Philadelphia for the manufacture of bichromates. The United States product came from California, and aggregated 786 long tons, the smallest product in years.

PIGMENTS.

Metallic paint.—The product was 24,465 short tons, of which 9,660 tons went into mortar colors. This is the smallest product yet recorded.

Ocher, umber, and sienna.—The product of ocher increased from 12,045 short tons in 1895 to 14,074 short tons in 1896, but the value of the product decreased from $139,328 to $136,458. The output of umber decreased from 320 short tons, worth $4,350, in 1895 to 165 short tons, worth $2,646, in 1896. Sienna increased in amount from 275 short tons in 1895 to 395 short tons in 1896, with a decline in value from $6,950 to $5,416.

Venetian red.—This product decreased from 4,595 short tons in 1895 to 4,138 short tons in 1896, with a slight increase in the average price per ton, from $22.40 to $22.68.

Zinc white.—This paint remained practically stationary at 20,000 short tons, worth $1,400,000.

Barytes.—The product declined from 21,529 long tons, worth $68,321, in 1895 to 17,068 tons, worth $46,513, in 1896. This was less than in any year since 1887. The value has decreased 66 per cent in four years.

Cobalt oxide.—The product declined from 14,458 pounds, worth $20,675, in 1895 to 10,700 pounds, worth $15,301, in 1896. It is entirely a by-product in this country.

MISCELLANEOUS.

Fuller's earth.—This product is practically limited to Quincy, Florida, though extensive beds have been found in other parts of Florida and in Georgia, which will lead to further developments in the industry. The product was 9,872 short tons, worth $59,360, compared with 6,900 tons, worth $41,400, in 1895.

Precious stones.—The product declined again. The value in 1895 was $113,621, and in 1896 only $97,850. Blue sapphires were discovered in Montana during the year.

Mica.—The production continues to be dominated by the foreign trade, but increased slightly, from $55,831 in 1895 to $67,191 in 1896.

Feldspar.—Product in 1896, for potters' use, 7,614 long tons, worth $30,700.

Flint.—This is chiefly quartz ground for potters' use. The product aggregated 12,274 long tons, worth $21,038, unground.

Asphaltum.—There was a considerable increase in the product and value of bituminous rock, which is included in this report, bringing the total product from 68,163 short tons in 1895 to 80,503 in 1896, and the value from $348,281 to $577,563.

Asbestos.—The product is small—504 tons in 1896, worth $6,100.

Magnesite.—The California product decreased from 2,200 short tons in 1895, worth $17,000, to 1,500 tons, worth $11,000, in 1896.

Graphite.—The product of graphite in 1896 declined to $48,460; in 1895 it was $52,582.

Soapstone.—Product, 22,183 short tons, worth $354,065, compared with 21,495 tons, worth $266,495, in 1895. The difference in the value is due to difference in the class of manufactured articles for which part of the soapstone was prepared before it left the quarries. The product of fibrous talc increased from 39,240 short tons, worth $370,897, in 1895 to 46,089 short tons, worth $399,443, in 1896.

Mineral waters.—In this industry there was a slight increase in quantity, from 21,463,543 gallons in 1895 to 25,795,312 gallons in 1896. The general decline in prices was evident in a decline of the total value from $4,254,237 in 1895 to $4,136,192 in 1896.

Metallic products of the United States in 1896.

Product.		Quantity.	Value.
Pig iron	long tons	8,623,127	$90,250,000
Silver	troy ounces	58,834,800	76,069,236
Gold	do	2,568,132	53,088,000
Copper	pounds	460,061,430	49,456,603
Lead	short tons	188,000	10,528,000
Zinc	do	81,499	6,519,920
Quicksilver	flasks	30,765	1,075,449
Aluminum	pounds	1,300,000	520,000
Antimony	short tons	601	84,290
Nickel	pounds	17,170	4,464
Platinum	troy ounces	163	944
Total			287,596,906

Nonmetallic products of the United States in 1896.

Product.		Quantity.	Value.
Bituminous coal	short tons	137,640,276	$114,891,515
Pennsylvania anthracite	long tons	48,523,287	81,748,651
Petroleum	barrels	60,960,361	58,518,709
Building stone			31,346,171
Natural gas			13,002,512
Brick clay			9,000,000
Cement	barrels	9,513,473	6,473,213
Mineral waters	gallons sold	25,795,312	4,136,192
Salt	barrels	13,850,726	4,040,839
Phosphate rock	long tons	930,779	2,803,372
Limestone for iron flux	do	4,120,102	2,060,000
Zinc white	short tons	20,000	1,400,000
Clay (all other than brick)	long tons	360,000	800,000
Borax	pounds	13,508,000	675,400
Asphaltum	short tons	80,503	577,563
Gypsum	do	224,139	572,344
Mineral paints	do	48,032	530,455
Fibrous talc	do	46,089	399,443
Soapstone	do	22,183	354,065
Grindstones			326,826
Pyrites	long tons	115,483	320,163
Bromine	pounds	546,580	144,501
Oilstones, etc			127,098
Corundum and emery	short tons	2,120	113,246
Precious stones			97,850

Nonmetallic products of the United States in 1896—Continued.

Product.		Quantity.	Value.
Manganese ore	long tons	10,088	$90,927
Sulphur	short tons	5,260	87,200
Mica			67,191
Fuller's earth	short tons	9,872	59,360
Fluorspar	do	6,500	52,000
Graphite			48,460
Bauxite	long tons	18,364	47,338
Barytes	short tons	17,068	46,513
Feldspar	long tons	7,614	30,700
Marls	short tons	60,000	30,000
Millstones			22,567
Flint	long tons	12,274	21,038
Infusorial earth	short tons	2,796	16,042
Cobalt oxide	pounds	10,700	15,301
Magnesite	short tons	1,500	11,000
Chromic iron ore	long tons	786	6,667
Asbestos	short tons	504	6,100
Monazite	pounds	30,000	1,500
Rutile	do	100	350
Total			335,120,382

Résumé of the mineral products of the United States in 1896.

Total value of metallic products	$287,596,906
Total value of nonmetallic products	335,120,382
Estimated value of mineral products unspecified	1,000,000
Grand total	623,717,288

Mineral products of the United States

	Products.	1880.	
		Quantity.	Value.
	METALLIC.		
1	Pig iron, value at Philadelphia.....long tons..	3,375,912	$89,315,569
2	Silver, coining value.....troy ounces..	30,320,000	39,200,000
3	Gold, coining value.....do....	1,741,500	36,000,000
4	Copper, value at New York City.....pounds..	60,480,000	11,491,200
5	Lead, value at New York City.....short tons..	97,825	9,782,500
6	Zinc, value at New York City.....do....	23,239	2,277,432
7	Quicksilver, value at San Francisco.....flasks..	59,926	1,797,780
8	Nickel, value at Philadelphia.....pounds..	329,968	164,984
9	Aluminum, value at Pittsburg.....do....	.....	.....
10	Antimony, value at San Francisco....short tons..	50	10,000
11	Platinum, value (crude) at San Francisco, troy ounces.....	100	400
12	Total value of metallic products.....	.....	190,039,865
	NONMETALLIC (spot values).		
13	Bituminous coal.....long tons..	38,242,641	53,443,718
14	Pennsylvania anthracite.....do....	25,580,189	42,196,678
15	Building stone.....	.....	18,356,055
16	Petroleum.....barrels..	26,286,123	24,183,233
17	Lime.....do....	28,000,000	19,000,000
18	Natural gas.....	.....	.....
19	Cement.....barrels..	2,072,943	1,852,707
20	Salt.....do....	5,961,060	4,829,566
21	Phosphate rock.....long tons..	211,377	1,123,823
22	Limestone for iron flux.....do....	4,500,000	3,800,000
23	Mineral waters.....gallons sold..	2,000,000	500,000
24	Zinc white.....short tons..	10,107	763,738
25	Potters' clay.....long tons..	25,783	200,457
26	Mineral paints.....short tons..	3,604	135,840
27	Borax.....pounds..	3,692,443	277,233
28	Gypsum.....short tons..	90,000	400,000
29	Grindstones.....	.....	500,000
30	Fibrous talc.....short tons..	4,210	54,730
31	Pyrites.....long tons..	2,000	5,000
32	Soapstone.....short tons..	8,441	66,665
33	Manganese ore.....long tons..	5,761	86,415
34	Asphaltum.....short tons..	444	4,440
35	Precious stones.....	.....	100,000
36	Bromine.....pounds..	404,690	114,752
37	Corundum.....short tons..	1,044	29,280
38	Barytes (crude).....long tons..	20,000	80,000
39	Graphite.....pounds..	.....	49,800
40	Millstones.....	.....	200,000
41	Novaculite.....pounds..	420,000	8,000
42	Marls.....short tons..	1,000,000	500,000
43	Flint.....long tons..	20,000	80,000
44	Fluorspar.....short tons..	4,000	16,000
45	Chromic iron ore.....long tons..	2,288	27,808
46	Infusorial earth.....short tons..	1,833	45,660
47	Feldspar.....long tons..	12,500	60,000
48	Mica.....pounds..	81,669	127,825
49	Cobalt oxide.....do....	7,251	24,000
50	Slate ground as a pigment.....short tons..	1,000	10,000
51	Sulphur.....do....	600	21,000
52	Asbestos.....do....	150	4,312
53	Rutile.....pounds..	100	400
54	Lithographic stone.....short tons..	.....	.....
55	Total value of nonmetallic mineral products.	.....	173,279,135
56	Total value of metallic products.....	.....	190,039,865
57	Estimated value of mineral products unspecified..	.....	6,000,000
58	Grand total.....	.....	369,319,000

for the calendar years 1880 to 1895.

1881.		1882.		1883.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
4, 144, 254	$87, 029, 334	4, 623, 323	$106, 336, 429	4, 595, 510	$91, 910, 200	1
33, 077, 000	43, 000, 000	36, 197, 695	46, 800, 000	35, 733, 622	46, 200, 000	2
1, 676, 300	34, 700, 000	1, 572, 186	32, 500, 000	1, 451, 249	30, 000, 000	3
71, 680, 000	12, 175, 600	91, 646, 232	16, 038, 091	117, 151, 795	18, 064, 807	4
117, 085	11, 240, 160	132, 890	12, 624, 550	143, 957	12, 322, 719	5
26, 800	2, 680, 000	33, 765	3, 646, 620	36, 872	3, 311, 106	6
60, 851	1, 764, 679	52, 732	1, 487, 042	46, 725	1, 253, 632	7
265, 668	292, 235	281, 616	309, 777	58, 800	52, 920	8
.....	.....	.....	.....	83	875	9
50	10, 000	60	12, 000	60	12, 000	10
100	400	200	600	200	600	11
.....	192, 892, 408	.....	219, 755, 109	.....	203, 128, 859	12
48, 179, 475	60, 224, 344	60, 861, 190	76, 076, 487	68, 531, 500	82, 237, 800	13
28, 500, 016	64, 125, 036	31, 358, 264	70, 556, 094	34, 336, 469	77, 257, 055	14
.....	20, 000, 000	.....	21, 000, 000	.....	20, 000, 000	15
27, 661, 238	25, 448, 339	30, 510, 830	24, 065, 988	23, 449, 633	25, 790, 252	16
30, 000, 000	20, 000, 000	31, 000, 000	21, 700, 000	32, 000, 000	19, 200, 000	17
.....	.....	.....	215, 000	.....	475, 000	18
2, 500, 000	2, 000, 000	3, 250, 000	3, 672, 750	4, 190, 000	4, 293, 500	19
6, 200, 000	4, 200, 000	6, 412, 373	4, 320, 140	6, 192, 231	4, 211, 042	20
266, 734	1, 980, 259	332, 077	1, 992, 462	378, 380	2, 270, 280	21
6, 000, 000	4, 100, 000	3, 850, 000	2, 310, 000	3, 814, 273	1, 907, 136	22
3, 700, 000	700, 000	5, 000, 000	800, 000	7, 529, 423	1, 119, 603	23
10, 000	700, 000	10, 000	700, 000	12, 000	840, 000	24
25, 000	200, 000	30, 000	240, 000	32, 000	250, 000	25
6, 000	100, 000	7, 000	105, 000	7, 000	84, 000	26
4, 046, 000	304, 461	4, 236, 291	338, 903	6, 500, 000	585, 000	27
85, 000	350, 000	100, 000	450, 000	90, 000	420, 000	28
.....	500, 000	.....	700, 000	.....	600, 000	29
5, 000	60, 000	6, 000	75, 000	6, 000	75, 000	30
10, 000	60, 000	12, 000	72, 000	25, 000	137, 500	31
7, 000	75, 000	6, 000	90, 000	8, 000	150, 000	32
4, 895	73, 425	4, 532	67, 980	6, 155	92, 325	33
2, 000	8, 000	3, 000	10, 500	3, 000	10, 500	34
.....	110, 000	.....	150, 000	.....	207, 050	35
300, 000	75, 000	250, 000	75, 000	301, 100	72, 264	36
500	80, 000	500	80, 000	550	100, 000	37
20, 000	80, 000	20, 000	80, 000	27, 000	108, 000	38
400, 000	30, 000	425, 000	34, 000	575, 000	46, 000	39
.....	150, 000	.....	200, 000	.....	150, 000	40
500, 000	8, 580	600, 000	10, 000	600, 000	10, 000	41
1, 000, 000	500, 000	1, 080, 000	540, 000	972, 000	486, 000	42
25, 000	100, 000	25, 000	100, 000	25, 000	100, 000	43
4, 000	16, 000	4, 000	20, 000	4, 000	20, 000	44
2, 000	30, 000	2, 500	50, 000	3, 000	60, 000	45
1, 000	10, 000	1, 000	8, 000	1, 000	5, 000	46
14, 000	70, 000	14, 000	70, 000	14, 100	71, 112	47
100, 000	250, 000	100, 000	250, 000	114, 000	285, 000	48
8, 280	25, 000	11, 653	32, 046	1, 096	2, 795	49
1, 000	10, 000	2, 000	24, 000	2, 000	24, 000	50
600	21, 000	600	21, 000	1, 000	27, 000	51
200	7, 000	1, 200	36, 000	1, 000	30, 000	52
200	700	500	1, 800	550	2, 000	53
50	1, 000	.....	.....	.....	.....	54
.....	206, 783, 144	.....	231, 340, 150	.....	243, 812, 214	55
.....	192, 892, 408	.....	219, 755, 109	.....	203, 128, 859	56
.....	6, 500, 000	.....	6, 500, 000	.....	6, 500, 000	57
.....	406, 175, 552	.....	457, 595, 259	.....	453, 441, 073	58

Mineral products of the United States for

	Products.	1884. Quantity.	1884. Value.
	METALLIC.		
1	Pig iron, value at Philadelphia.....long tons..	4,097,868	$73,761,624
2	Silver, coining value.....troy ounces..	37,744,605	48,800,000
3	Gold, coining value.....do....	1,489,949	30,800,000
4	Copper, value at New York City.....pounds..	145,221,934	17,789,687
5	Lead, value at New York City.....short tons..	139,897	10,537,042
6	Zinc, value at New York City.....do....	38,544	3,422,707
7	Quicksilver, value at San Francisco.....flasks..	31,913	936,327
8	Nickel, value at Philadelphia.....pounds..	64,550	48,412
9	Aluminum, value at Pittsburg.....do....	150	1,350
10	Antimony, value at San Francisco....short tons..	60	12,000
11	Platinum, value (crude) at San Francisco, troy ounces.....	150	450
12	Total value of metallic products.....	.....	186,109,599
	NONMETALLIC (spot values).		
13	Bituminous coal.....long tons..	73,730,539	77,417,066
14	Pennsylvania anthracite.....do....	33,175,756	66,351,512
15	Building stone.....	.....	19,000,000
16	Petroleum.....barrels..	24,218,438	20,595,966
17	Lime.....do....	37,000,000	18,500,000
18	Natural gas.....	.....	1,460,000
19	Brick clay.....	.....	.....
20	Clay (all other than brick).....long tons..	35,000	270,000
21	Cement.....barrels..	4,000,000	3,720,000
22	Salt.....do....	6,514,937	4,197,734
23	Phosphate rock.....long tons..	431,779	2,374,784
24	Limestone for iron flux.....do....	3,401,930	1,700,965
25	Mineral waters.....gallons sold..	10,215,328	1,459,143
26	Zinc white.....short tons..	13,000	910,000
27	Mineral paints.....do....	7,000	84,000
28	Borax.....pounds..	7,000,000	490,000
29	Gypsum.....short tons..	90,000	390,000
30	Grindstones.....	.....	570,000
31	Fibrous talc.....short tons..	10,000	110,000
32	Pyrites.....long tons..	35,000	175,000
33	Soapstone.....short tons..	10,000	200,000
34	Manganese ore.....long tons..	10,180	122,160
35	Asphaltum.....short tons..	3,000	10,500
36	Precious stones.....	.....	222,975
37	Bromine.....pounds..	281,100	67,464
38	Corundum.....short tons..	600	108,000
39	Barytes (crude).....long tons..	25,000	100,000
40	Graphite.....pounds..	.....	.....
41	Millstones.....	.....	150,000
42	Oilstones, etc.....pounds..	800,000	12,000
43	Marls.....short tons..	875,000	437,500
44	Flint.....long tons..	30,000	120,000
45	Fluorspar.....short tons..	4,000	20,000
46	Chromic iron ore.....long tons..	2,000	35,000
47	Infusorial earth.....short tons..	1,000	5,000
48	Feldspar.....long tons..	10,900	55,112
49	Mica.....pounds..	147,410	368,525
50	Cobalt oxide.....do....	2,000	5,100
51	Slate ground as a pigment.....short tons..	2,000	20,000
52	Sulphur.....do....	500	12,000
53	Asbestos.....do....	1,000	30,000
54	Rutile.....pounds..	600	2,000
55	Lithographic stone.....short tons..	.....	.....
56	Total value of nonmetallic mineral products.	.....	221,879,506
57	Total value of metallic products.....	.....	186,109,599
58	Estimated value of mineral products unspecified..	.....	5,000,000
59	Grand total.....	.....	412,989,105

the calendar years 1880 to 1895—Continued.

1885.		1886.		1887.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
4,044,425	$64,712,400	5,683,329	$95,195,760	6,417,148	$121,925,800	1
39,910,279	51,600,000	39,445,312	51,000,000	41,269,240	53,350,000	2
1,538,376	31,800,000	1,881,250	35,000,000	1,596,500	33,000,000	3
170,962,607	18,292,999	161,235,381	16,527,651	185,227,331	21,115,916	4
129,412	10,469,431	130,629	12,200,749	145,700	13,113,000	5
40,688	3,539,856	42,641	3,752,408	50,340	4,782,300	6
32,073	979,189	29,981	1,060,000	33,825	1,429,000	7
277,904	179,975	214,992	127,157	205,566	133,200	8
283	2,550	3,000	27,000	18,000	59,000	9
50	10,000	35	7,000	75	15,000	10
250	187	50	100	448	1,838	11
.....	181,586,587	.....	214,897,825	.....	248,925,054	12
64,840,668	82,347,648	73,707,957	78,481,056	87,887,360	98,004,656	13
34,228,548	76,671,948	34,853,077	76,119,120	37,578,747	84,552,181	14
.....	19,000,000	.....	19,000,000	.....	25,000,000	15
21,847,205	19,198,243	28,064,841	19,996,313	28,278,866	18,877,094	16
40,000,000	20,000,000	.....	.....	.....	.....	17
.....	4,857,200	.....	10,012,000	.....	15,817,500	18
.....	.....	.....	6,200,000	.....	7,000,000	19
36,000	275,000	40,000	325,000	43,000	340,000	20
4,150,000	3,492,500	4,500,000	3,990,000	6,692,744	5,674,377	21
7,038,653	4,825,345	7,707,081	4,736,585	7,831,962	4,093,846	22
437,856	2,846,064	430,549	1,872,936	480,558	1,836,818	23
3,356,956	1,678,478	4,717,163	2,830,297	5,377,000	3,226,200	24
9,148,401	1,312,845	8,950,317	1,284,070	8,259,609	1,261,463	25
15,000	1,050,000	18,000	1,440,000	18,000	1,440,000	26
3,950	43,575	18,800	315,000	22,000	330,000	27
8,000,000	480,000	9,778,290	488,915	11,000,000	550,000	28
90,405	405,000	95,250	428,625	95,000	425,000	29
.....	500,000	.....	250,000	.....	224,400	30
10,000	110,000	12,000	125,000	15,000	160,000	31
49,000	220,500	55,000	220,000	52,000	210,000	32
10,000	200,000	12,000	225,000	12,000	225,000	33
23,258	190,281	30,193	277,636	34,524	333,844	34
3,000	10,500	3,500	14,000	4,000	16,000	35
.....	209,900	.....	119,056	.....	163,600	36
310,000	89,900	428,334	141,350	199,087	61,717	37
600	108,000	645	116,190	600	108,000	38
15,000	75,000	10,000	50,000	15,000	75,000	39
327,883	26,231	415,525	33,242	416,000	34,000	40
.....	100,000	.....	140,000	.....	100,000	41
1,000,000	15,000	1,160,000	15,000	1,200,000	16,000	42
875,000	437,500	800,000	400,000	600,000	300,000	43
30,000	120,000	30,000	120,000	32,000	128,000	44
5,000	22,500	5,000	22,000	5,000	20,000	45
2,700	40,000	2,000	30,000	3,000	40,000	46
1,000	5,000	1,200	6,000	3,000	15,000	47
13,600	68,000	14,900	74,500	10,200	61,200	48
92,000	161,000	40,000	70,000	70,000	142,250	49
68,723	65,373	35,000	36,878	18,340	18,774	50
1,975	24,687	.....	.....	.....	.....	51
715	17,875	2,500	75,000	3,000	100,000	52
300	9,000	200	6,000	150	4,500	53
600	2,000	600	2,000	1,000	3,000	54
.....	.....	.....	.....	.....	.....	55
.....	241,312,093	.....	230,088,769	.....	270,989,420	56
.....	181,586,587	.....	214,897,825	.....	248,925,054	57
.....	5,000,000	.....	800,000	.....	800,000	58
.....	427,898,680	.....	445,786,594	.....	520,714,474	59

Mineral products of the United States

	Products.	1888.	
		Quantity.	Value.
	METALLIC.		
1	Pig iron, value at Philadelphia ..... long tons..	6,489,738	$107,000,000
2	Silver, coining value ..... troy ounces..	45,783,632	59,195,000
3	Gold, coining value ..... do....	1,604,927	33,175,000
4	Copper, value at New York City ..... pounds..	231,270,622	33,833,954
5	Lead, value at New York City ..... short tons..	151,919	13,399,256
6	Zinc, value at New York City ..... do....	55,903	5,500,855
7	Quicksilver, value at San Francisco ..... flasks..	33,250	4,113,125
8	Aluminum, value at Pittsburg ..... pounds..	19,000	65,000
9	Antimony, value at San Francisco.... short tons..	100	20,000
10	Nickel, value at Philadelphia..... pounds..	204,328	127,632
11	Tin ..... do....	.....	.....
12	Platinum, value (crude) at San Francisco, troy ounces	500	2,000
13	Total value of metallic products.....	.....	253,731,822
	NONMETALLIC (spot values).		
14	Bituminous coal ..... short tons..	102,039,838	101,860,529
15	Pennsylvania anthracite..... long tons..	41,624,611	89,020,483
16	Building stone	.....	25,500,000
17	Petroleum ..... barrels..	27,612,025	17,947,620
18	Natural gas	.....	22,629,875
19	Brick clay	.....	7,500,000
20	Clay (all other than brick) ..... long tons..	36,750	300,000
21	Cement ..... barrels..	6,503,295	5,021,139
22	Mineral waters ..... gallons sold..	9,578,648	1,679,302
23	Phosphate rock ..... long tons..	448,567	2,018,552
24	Salt ..... barrels..	8,055,881	4,374,203
25	Limestone for iron flux ..... long tons..	5,438,000	2,719,000
26	Zinc white ..... short tons..	20,000	1,600,000
27	Gypsum ..... do....	110,000	550,000
28	Borax ..... pounds..	7,589,000	455,340
29	Mineral paints ..... short tons..	26,500	405,000
30	Grindstones	.....	281,800
31	Fibrous talc ..... short tons..	20,000	210,000
32	Asphaltum ..... do....	53,800	331,500
33	Soapstone ..... do....	15,000	250,000
34	Precious stones	.....	139,850
35	Pyrites ..... long tons..	54,331	167,658
36	Corundum ..... short tons..	589	91,620
37	Oilstones, etc ..... pounds..	1,500,000	18,000
38	Mica ..... do....	48,000	70,000
39	Barytes (crude) ..... long tons..	20,000	110,000
40	Bromine ..... pounds..	307,386	95,290
41	Fluorspar ..... short tons..	6,000	30,000
42	Feldspar ..... long tons..	8,700	50,000
43	Maganese ore ..... do....	29,198	279,571
44	Flint ..... do....	30,000	127,500
45	Graphite ..... pounds..	400,000	33,000
46	Bauxite ..... long tons..	.....	.....
47	Sulphur ..... short tons..	.....	.....
48	Marls ..... do....	300,000	150,000
49	Infusorial earth ..... do....	1,500	7,500
50	Millstones	.....	81,000
51	Chromic iron ore ..... long tons..	1,500	20,000
52	Cobalt oxide ..... pounds..	8,491	15,782
53	Magnesite ..... short tons..	.....	.....
54	Asbestos ..... do....	100	3,000
55	Rutile ..... pounds..	1,000	3,000
56	Ozocerite (refined) ..... do....	43,500	3,000
57	Total value of nonmetalic mineral products.	.....	286,150,114
58	Total value of metallic products.....	.....	253,731,822
59	Estimated value of mineral products unspecified.	.....	900,000
60	Grand total	.....	540,781,936

for the calendar years 1880 to 1895—Continued.

1889.		1890.		1891.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
7, 603, 642	$120, 000, 000	9, 202, 703	$151, 200, 410	8, 279, 870	$128, 337, 985	1
51, 354, 851	66, 396, 988	54, 500, 000	70, 464, 645	58, 330, 000	75, 416, 565	2
1, 590, 869	32, 886, 744	1, 588, 880	32, 845, 000	1, 604, 840	33, 175, 000	3
231, 246, 214	26, 907, 809	265, 115, 133	30, 848, 797	295, 812, 076	38, 455, 300	4
156, 397	13, 794, 235	143, 630	12, 668, 166	178, 554	15, 534, 198	5
58, 860	5, 791, 824	63, 683	6, 266, 407	80, 873	8, 033, 700	6
26, 484	1, 190, 500	22, 926	1, 203, 615	22, 904	1, 036, 386	7
47, 468	97, 335	61, 281	61, 281	150, 000	100, 000	8
115	28, 000	129	40, 756	278	47, 007	9
252, 663	151, 598	223, 488	134, 093	118, 498	71, 099	10
.....	.....	.....	.....	125, 289	25, 058	11
500	2, 000	600	2, 500	100	500	12
.....	267, 247, 033	.....	305, 735, 670	.....	300, 232, 798	13
95, 685, 543	94, 504, 745	111, 320, 016	110, 420, 801	117, 901, 237	117, 188, 400	14
40, 714, 721	65, 879, 514	41, 489, 858	66, 383, 772	45, 236, 992	73, 944, 735	15
.....	42, 809, 706	.....	47, 000, 000	.....	47, 294, 746	16
35, 163, 513	26, 963, 340	45, 822, 672	35, 365, 105	54, 291, 980	30, 526, 553	17
.....	21, 097, 099	.....	18, 742, 725	.....	15, 500, 084	18
.....	8, 000, 000	.....	8, 500, 000	.....	9, 000, 000	19
294, 344	635, 578	350, 000	756, 000	400, 000	900, 000	20
7, 000, 000	5, 000, 000	8, 000, 000	6, 000, 000	8, 222, 792	6, 680, 951	21
12, 780, 471	1, 748, 458	13, 907, 418	2, 600, 750	18, 392, 732	2, 996, 259	22
550, 245	2, 937, 776	510, 499	3, 213, 795	587, 988	3, 651, 150	23
8, 005, 565	4, 195, 412	8, 776, 991	4, 752, 286	9, 987, 945	4, 716, 121	24
6, 318, 000	3, 159, 000	5, 521, 622	2, 760, 811	5, 000, 000	2, 300, 000	25
16, 970	1, 357, 600	.....	1, 600, 000	23, 700	1, 600, 000	26
267, 769	764, 118	182, 995	574, 523	208, 126	628, 051	27
8, 000, 000	500, 000	9, 500, 000	617, 500	13, 380, 000	869, 700	28
34, 307	483, 766	47, 732	681, 992	49, 652	678, 478	29
.....	439, 587	.....	450, 000	.....	476, 113	30
23, 746	244, 170	41, 354	389, 196	53, 054	493, 068	31
51, 735	171, 537	40, 841	190, 416	45, 054	242, 264	32
12, 715	231, 708	13, 670	252, 309	16, 514	243, 981	33
.....	188, 807	.....	118, 833	.....	235, 300	34
93, 705	202, 119	99, 854	273, 745	106, 536	338, 880	35
2, 245	105, 565	1, 970	89, 395	2, 265	90, 230	36
5, 982, 000	32, 980	.....	69, 909	1, 375, 000	150, 000	37
49, 500	50, 000	60, 000	75, 000	75, 000	100, 000	38
19, 161	106, 313	21, 911	86, 505	31, 069	118, 363	39
418, 891	125, 667	387, 847	104, 719	343, 000	54, 880	40
9, 500	45, 835	8, 250	55, 328	10, 044	78, 330	41
6, 970	39, 370	8, 000	45, 200	10, 000	50, 000	42
24, 197	240, 559	25, 684	219, 050	23, 416	239, 129	43
21, 113	89, 730	13, 000	57, 400	15, 000	60, 000	44
.....	72, 662	.....	77, 500	.....	110, 000	45
728	2, 366	1, 844	6, 012	3, 593	11, 675	46
1, 150	7, 850	.....	.....	1, 200	39, 600	47
139, 522	63, 956	153, 620	69, 880	135, 000	67, 500	48
3, 466	23, 372	2, 532	50, 240	.....	21, 988	49
.....	35, 155	.....	23, 720	.....	16, 587	50
2, 000	30, 000	3, 599	53, 985	1, 372	20, 580	51
13, 955	31, 092	6, 788	16, 291	7, 200	18, 000	52
.....	.....	.....	.....	439	4, 390	53
30	1, 800	71	4, 560	66	3, 960	54
1, 000	3, 000	400	1, 000	300	800	55
50, 000	2, 500	350, 000	26, 250	50, 000	7, 000	56
.....	282, 623, 812	.....	312, 776, 503	.....	321, 767, 846	57
.....	267, 247, 033	.....	305, 735, 670	.....	300, 232, 798	58
.....	1, 000, 000	.....	1, 000, 000	.....	1, 000, 000	59
.....	550, 870, 845	.....	619, 512, 173	.....	623, 000, 644	60

Mineral products of the United States

	Products.	1892.	
		Quantity.	Value.
	METALLIC.		
1	Pig iron, value at Philadelphia.....long tons..	9, 157, 000	$131, 161, 039
2	Silver, coining value.....troy ounces..	63, 500, 000	82, 099, 150
3	Gold, coining value.....do....	1, 596, 375	33, 000, 000
4	Copper, value at New York City.....pounds..	352, 971, 744	37, 977, 142
5	Lead, value at New York City.....short tons..	173, 654	13, 892, 320
6	Zinc, value at New York City.....do....	87, 260	8, 027, 920
7	Quicksilver, value at San Francisco.....flasks..	27, 993	1, 245, 689
8	Aluminum, value at Pittsburg.....pounds..	259, 885	172, 824
9	Antimony, value at San Francisco....short tons..	.....	56, 466
10	Nickel, value at Philadelphia.....pounds..	92, 252	50, 739
11	Tin.....do....	162, 000	32, 400
12	Platinum, value (crude) at San Francisco, troy ounces.....	80	550
13	Total value of metallic products.....	.....	307, 716, 239
	NONMETALLIC (spot values).		
14	Bituminous coal.....short tons..	126, 856, 567	125, 124, 381
15	Pennsylvania anthracite.....long tons..	46, 850, 450	82, 442, 000
16	Building stone.....	.....	48, 706, 625
17	Petroleum.....barrels..	50, 509, 136	26, 034, 196
18	Natural gas.....	.....	14, 800, 714
19	Brick clay.....	.....	9, 000, 000
20	Clay (all other than brick).....long tons..	420, 000	1, 000, 000
21	Cement.....barrels..	8, 758, 621	7, 152, 750
22	Mineral waters.....gallons sold..	21, 876, 604	4, 905, 970
23	Phosphate rock.....long tons..	681, 571	3, 296, 227
24	Salt.....barrels..	11, 698, 890	5, 654, 915
25	Limestone for iron flux.....long tons..	5, 172, 114	3, 620, 480
26	Zinc white.....short tons..	27, 500	2, 200, 000
27	Gypsum.....do....	256, 259	695, 492
28	Borax.....pounds..	13, 500, 000	900, 000
29	Mineral paints.....short tons..	51, 704	767, 766
30	Grindstones.....	.....	272, 244
31	Fibrous talc.....short tons..	41, 925	472, 485
32	Asphaltum.....do....	87, 680	445, 375
33	Soapstone.....do....	23, 908	437, 449
34	Precious stones.....	.....	312, 050
35	Pyrites.....long tons..	109, 788	305, 191
36	Corundum.....short tons..	1, 771	181, 300
37	Oilstones, etc.....pounds..	.....	146, 730
38	Mica.....do....	75, 000	100, 000
39	Barytes (crude).....long tons..	32, 108	130, 025
40	Bromine.....pounds..	379, 480	64, 502
41	Fluorspar.....short tons..	12, 250	89, 000
42	Feldspar.....long tons..	15, 000	75, 000
43	Manganese ore.....do....	13, 613	129, 586
44	Flint.....do....	20, 000	80, 000
45	Monazite.....pounds..	.....	.....
46	Graphite.....do....	.....	104, 000
47	Bauxite.....long tons..	10, 518	34, 183
48	Sulphur.....short tons..	2, 688	80, 640
49	Fuller's earth.....do....	.....	.....
50	Marls.....do....	125, 000	65, 000
51	Infusorial earth.....do....	.....	43, 655
52	Millstones.....	.....	23, 417
53	Chromic iron ore.....long tons..	1, 500	25, 000
54	Cobalt oxide.....pounds..	7, 869	15, 738
55	Magnesite.....short tons..	1, 004	10, 040
56	Asbestos.....do....	104	6, 416
57	Rutile.....pounds..	100	300
58	Ozocerite (refined).....do....	60, 000	8, 000
59	Total value of nonmetallic mineral products.	.....	339, 958, 842
60	Total value of metallic products.....	.....	307, 716, 239
61	Estimated value of mineral products unspecified..	.....	1, 000, 000
62	Grand total.....	.....	648, 675, 081

for the calendar years 1880 to 1895—Continued.

1893.		1894.		1895.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
7, 124, 502	$84, 810, 426	6, 657, 388	$65, 007, 247	9, 446, 308	$105, 198, 550	1
60, 000, 000	77, 575, 757	49, 501, 122	64, 000, 000	55, 727, 000	72, 051, 000	2
1, 739, 081	35, 950, 000	1, 910, 816	39, 500, 000	2, 254, 760	46, 610, 000	3
339, 785, 972	32, 054, 601	364, 866, 808	33, 141, 142	392, 639, 964	38, 682, 347	4
163, 982	11, 839, 590	159, 331	9, 942, 254	170, 000	11, 220, 000	5
78, 832	6, 306, 560	75, 328	5, 288, 026	89, 686	6, 278, 020	6
30, 164	1, 108, 527	30, 416	934, 000	36, 104	1, 337, 131	7
339, 629	266, 903	550, 000	316, 250	920, 000	464, 600	8
250	45, 000	200	36, 000	450	68, 000	9
49, 399	22, 197	9, 616	3, 269	10, 302	3, 091	10
8, 938	1, 788	.....	.....	.....	.....	11
75	517	100	600	150	900	12
.....	249, 981, 866	.....	218, 168, 788	.....	281, 913, 639	13
128, 385, 231	122, 751, 618	118, 820, 405	107, 653, 501	135, 118, 193	115, 749, 771	14
48, 185, 306	85, 687, 078	46, 358, 144	78, 488, 063	51, 785, 122	82, 019, 272	15
.....	33, 885, 573	.....	37, 055, 030	.....	34, 688, 816	16
48, 412, 666	28, 932, 326	49, 344, 516	35, 522, 095	52, 892, 276	57, 632, 296	17
.....	14, 346, 250	.....	13, 954, 400	.....	13, 006, 650	18
.....	9, 000, 000	.....	9, 000, 000	.....	9, 000, 000	19
400, 000	900, 000	360, 000	800, 000	360, 000	800, 000	20
8, 002, 467	6, 262, 841	8, 362, 245	5, 030, 081	8, 731, 401	5, 482, 254	21
23, 544, 495	4, 246, 734	21, 569, 608	3, 741, 846	21, 463, 543	4, 254, 237	22
941, 368	4, 136, 070	996, 949	3, 479, 547	1, 038, 551	3, 606, 094	23
11, 816, 772	4, 054, 668	12, 967, 417	4, 739, 285	13, 669, 649	4, 423, 084	24
3, 958, 055	2, 374, 833	3, 698, 550	1, 849, 275	5, 247, 949	2, 623, 974	25
24, 059	1, 804, 420	19, 987	1, 399, 090	20, 710	1, 449, 700	26
253, 615	696, 615	239, 312	761, 719	265, 503	807, 447	27
8, 699, 000	652, 425	14, 680, 130	974, 445	11, 918, 000	595, 900	28
37, 724	530, 384	41, 926	498, 093	50, 695	621, 552	29
.....	338, 787	.....	223, 214	.....	205, 768	30
35. 861	403, 436	39, 906	435, 060	39, 240	370, 895	31
47, 779	372, 232	60, 570	353, 400	68, 163	348, 281	32
21, 071	255, 067	23, 144	401, 325	21, 495	266, 495	33
.....	264, 041	.....	132, 250	.....	113, 621	34
75, 777	256, 552	105, 940	363, 134	99, 549	322, 845	35
1, 713	142, 325	1, 495	95, 936	2, 102	106, 256	36
.....	135, 173	.....	136, 873	.....	155, 881	37
66, 971	88, 929	.....	52, 388	.....	55, 831	38
28, 970	88, 506	23, 335	86, 983	21, 529	68, 321	39
348, 399	104, 520	379, 444	102, 450	517, 421	134, 343	40
12, 400	84, 000	7, 500	47, 500	4, 000	24, 000	41
18, 391	96, 553	17, 200	98, 900	23, 200	133, 400	42
7, 718	66, 614	6, 308	53, 635	9, 547	71, 769	43
29, 671	103, 848	38, 000	145, 920	36, 800	117, 760	44
130, 000	7, 600	546, 855	36, 193	1, 573, 000	137, 150	45
843, 103	63, 232	918, 000	64, 010	.....	52, 582	46
9, 179	29, 507	11, 066	35, 818	17, 069	44, 000	47
1, 200	42, 000	500	20, 000	1, 800	42, 000	48
.....	.....	.....	.....	6, 900	41, 400	49
75, 000	40, 000	75, 000	40, 000	60, 000	30, 000	50
.....	22, 582	.....	11, 718	4, 954	20, 514	51
.....	16, 645	.....	13, 887	.....	22, 542	52
1, 450	21, 750	3, 680	53, 231	1, 740	16, 795	53
8, 422	10, 346	6, 763	10, 145	14, 458	20, 675	54
704	7, 040	1, 440	10, 240	2, 200	17, 000	55
50	2, 500	325	4, 463	795	13, 525	56
.....	.....	150	450	100	350	57
.....	.....	.....	.....	None.	None.	58
.....	323, 318, 020	.....	307, 975, 593	.....	339, 715, 046	59
.....	249, 981, 866	.....	218, 168, 788	.....	281, 913, 639	60
.....	1, 000, 000	.....	1, 000, 000	.....	1, 000, 000	61
.....	574, 299, 886	.....	527, 144, 381	.....	622, 628, 685	62

IRON ORES.

By John Birkinbine.

PRODUCTION.

The iron-ore-mining industry has felt severely the continued business depression. During 1896 there were fewer producing mines than in former years, but the total output was above the average.

Twenty-three States contributed to the production of 16,005,449 long tons for the United States in 1896. The relation which the record of 1896 bore to that of preceding years for which data has been collected by the Division of Mineral Resources is set forth in the following table:

Production of iron ores in the United States from 1889 to 1896.

[Maximum in italic figures.]

Year.	Production.	Year.	Production.
	Long tons.		*Long tons.*
1889	14,518,041	1893	11,587,629
1890	16,036,043	1894	11,879,679
1891	14,591,178	1895	15,957,614
1892	*16,296,666*	1896	16,005,449

So many mines have been idle that the collection of statistics has been extraordinarily difficult. Managers are absent from mines, or, where work has been suspended, no one is accessible from whom reliable information can be secured. Lessees who have the record of production, if any, are not at hand or have not the books within reach. This condition is specially noted at many of the smaller mines, whose aggregate product, however, is important in a statistical review.

The number of States and Territories contributing to the output of iron ore in the various years has been as follows:

Number of States and Territories producing iron ore from 1889 to 1896.

Year.	Number of States.	Year.	Number of States.
1889	28	1893	25
1890	25	1894	24
1891	25	1895	25
1892	24	1896	23

The following table will show the production of the various classes of iron ore in 1896, by States. It will be seen that the production of the red hematite variety of iron ore aggregated 12,576,288 long tons, or 78.58 per cent of the total output, as against 12,513,995 tons, or 78.42 per cent, in 1895. The percentage of brown hematite was also greater, rising from 2,102,358 long tons, or 13.17 per cent, in 1895 to 2,126,212 long tons, or 13.28 per cent, in 1896. There was, however, a falling off in the magnetite class, but 1,211,526 long tons, or 7.57 per cent, being produced in 1896, as compared with 1,268,222 long tons, or 7.95 per cent, in 1895. The carbonate variety also increased from 73,039 long tons, or 0.46 per cent, in 1895 to 91,423 long tons, or 0.57 per cent, in 1896. It will thus be seen that the amounts and approximate proportions of red and brown hematite and carbonate ores were greater in 1896 than 1895, the magnetite ores alone showing a decline.

The total amount produced, viz, 16,005,449 long tons, is 47,835 long tons, or 0.30 per cent, greater than the output in 1895, viz, 15,957,614 long tons. In the total is also included iron ores which carry manganese varying from 3.1 to 35 per cent, amounting, according to the chapter on manganese and manganiferous ores,[1] to 467,719 long tons.

Production of different varieties of iron ore in the United States in the year 1896.

[Maxima in italic figures.]

State.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Michigan	*5,635,997*	.....	70,739	.....	*5,706,736*
Minnesota	4,283,880	.....	.....	.....	4,283,880
Alabama	1,694,948	346,845	.....	.....	2,041,793
Virginia	31,271	*828,195*	.....	.....	859,466
Pennsylvania	24,030	226,669	*494,517*	2,568	747,784
Wisconsin	607,405	.....	.....	.....	607,405
Tennessee	207,752	326,932	.....	800	535,484
New York	10,789	12,288	346,015	16,385	385,477
New Jersey	.....	.....	264,999	.....	264,999
Colorado	14,274	189,943	11,602	.....	215,819
Georgia and North Carolina	46,756	121,506	7,069	.....	175,331
Ohio	.....	.....	.....	*58,480*	58,480
Montana, New Mexico, Utah, and Wyoming	13,287	14,724	16,585	.....	44,596
Kentucky	1,824	26,584	.....	1,688	30,096
Connecticut and Massachusetts	.....	27,289	.....	.....	27,289
Maryland	.....	.....	.....	11,502	11,502
Texas	.....	4,777	.....	.....	4,777
Missouri	4,075	460	.....	.....	4,535
Total	12,576,288	2,126,212	1,211,526	91,423	16,005,449
Percentages of total	78.58	13.28	7.57	0.57	.....

[1] See report on Production of Manganese Ores in 1896, published by the Survey.

The amounts of the four general classes of iron ore produced in the eight years embraced in these reports are set forth in the following table:

Kinds of iron ore produced from 1889 to 1896.

[Maxima in italic figures.]

Year.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1889	9,056,288	2,523,087	2,506,415	*432,251*	14,518,041
1890	10,527,650	2,559,938	*2,570,838*	377,617	16,036,043
1891	9,327,398	*2,757,564*	2,317,108	189,108	14,591,178
1892	11,646,619	2,485,101	1,971,965	192,981	*16,296,666*
1893	8,272,637	1,849,272	1,330,886	134,834	11,587,629
1894	9,347,434	1,472,748	972,219	87,278	11,879,679
1895	12,513,995	2,102,358	1,268,222	73,039	15,957,614
1896	*12,576,288*	2,126,212	1,211,526	91,423	16,005,449

In 1896, 44,953 long tons of franklinite residuum, valued at $20,455, or 46 cents per ton, were produced. The total amount of concentrates obtained by treating lean or impure iron ores in the year 1896 was 53,717 long tons.

As in previous years, the production of the various iron-ore mines and the stocks of ore in hand are given to indicate the status of the industry. These figures may be subject to modification, because in mines from which the ore is removed by skip cars or buckets the prevailing method is to estimate the production from the average capacity of the receptacle multiplied by the number of cars or buckets handled. When shipments are made the actual weight of ore removed is deducted from the estimated product to determine the stock on hand. The tendency of such method is to make the production and stocks credited to a mine less than they would show by actual weight, but where a mine has been in operation for a number of years the management by experience is able to very closely approach the actual weight of ore by the method indicated. Any tendency to underestimation would also be combated by the miners, most of whom are paid by the ton, and few managers would consider the overestimation of product as a good business procedure. It is therefore safe to assert that the figures of both production and stocks are very close to the actual weights, and therefore reliable. At mines wrought by steam shovel and at some underground workings where the ore is handled from the deposit direct to cars for shipment the production and shipments agree, but at a majority of the mines this is not the case, for the bulk of the ore mined is obtained from districts where the shipments are greatly curtailed or entirely suspended during the winter, mining being carried forward and stocks of greater or less extent accumulated to await the shipping season.

THE LAKE SUPERIOR REGION.

The entire product of Michigan, of Minnesota, and of Wisconsin (except some fossil ores mined in the eastern central portion of Wisconsin) was obtained from what is generally considered the Lake Superior district, all the ores being marketed as Lake Superior ores, and designated by various characteristics, such as specular, magnetic, hematite, hard or soft, or by the names of specific mines, etc. At a number of mines several grades of ore are mined, to each of which a special trade name is given. The quantity of Lake Superior ores produced in 1896 reached a total of 10,566,359 long tons, valued at the mines at an average of $1.57 per long ton. Compared with the production of previous years, this is the largest reported, as will be seen from the following table:

Iron ore product of the Lake Superior region from 1889 to 1896.

Year.	Production.	Year.	Production.
	Long tons.		*Long tons.*
1889	7,519,614	1893	6,594,620
1890	8,944,031	1894	7,682,548
1891	7,621,465	1895	10,268,978
1892	9,564,388	1896	10,566,359

As explained in previous reports, the bulk of the Lake Superior ores are sent to ore docks on the upper lake by local railroads, and the freight charges for such transportation on the product of 1896 were in excess of $6,000,000. From the ore docks the ore is carried by vessels to receiving docks on the lower lakes, the cost for water transportation on the output of 1896 approximating the aggregate rail freights from mines to the shipping docks. The market prices for these ores are based upon delivery at the lower lake receiving docks, and in addition consumers pay transportation from these receiving docks to blast furnaces in various States, a drawback being allowed on ores which are forwarded to the furnaces direct from vessel without being stored on docks. The average rail and water haul of Lake Superior ores between the mines producing and the blast furnaces smelting them approximates 800 miles.

Of the total Lake Superior product in 1896, Michigan supplied 54.01 per cent, Minnesota 40.54 per cent, and Wisconsin 5.45 per cent. Divided locally according to ranges, the output in tons and the percentage which each bore to the total Lake Superior product is set forth in the following table:

Production in the Lake Superior region by ranges in 1896.

Range.	Production.	Per cent of total.
	Long tons.	
Mesabi	3,082,973	29.18
Marquette	2,418,846	22.89
Gogebic	2,100,398	19.88
Menominee	1,763,235	16.69
Vermilion	1,200,907	11.36
Total	10,566,359	100.00

U. S. GEOLOGICAL SURVEY LIBRARY

These figures show an advance over those of 1895 in the Mesabi, Marquette, and Vermilion ranges, and a decline from the records of the previous year in the Menominee and Gogebic ranges.

With the exception of 70,739 long tons of magnetite, all of the ores won from the Lake Superior mines are classed in this report as red hematite, although some brown hematite is reported from a number of localities. Since the brown ores mined in 1896 were local hydrations of the red hematite deposits, both being obtained from the same excavation, and since they differ from the generally accepted limonite of central Wisconsin and of the eastern and southern States, it has been thought best not to attempt any such distinction in this report.

In Mineral Resources for 1895, page 28 et seq., is discussed the location of the various ranges in the Lake Superior region, their rail connection to ore-shipping docks, etc. Taking the average of shipments from the ranges, their advantage in length of haul from the mines to shipping ports rank as follows from shortest to longest: Marquette range, Gogebic range, Menominee range, Vermilion range, and Mesabi range. A similar statement of the advantages of water transportation, as far as distance is concerned, between shipping and receiving docks gives the Menominee range the preference, followed by the Marquette range, the Gogebic range, the Vermilion range, and the Mesabi range, the last two using in part the same shipping port.

A complete series of determinations, prepared for the Ore Association at Cleveland, Ohio, showing the average cargo analyses of iron ore from various mines in the Lake Superior region during the season of 1896 has been arranged alphabetically according to ranges. These analyses exhibit the average of the ore as shipped, and are indicative of the high grade of the mineral produced in this district. The analyses are of the iron ores dried at 212°, the amount of natural moisture

being added. Those which are marked with an asterisk are from test samples of stock piles, and are expected to represent the cargo analyses for 1897:

Cargo analyses of Lake Superior iron ores.

GOGEBIC RANGE.

Source of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Organic and volatile matter.	Moisture.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Anvil	62.74	4.09	0.055	0.82	0.92	0.47	0.11	0.018	2.25	12.36
Anvil, east vein	61.00	5.25	.058	2.18	.86	.05	Trace	.014	.....	12.75
Atlantic	62.27	4.59	.040	1.11	1.15	.18	.07	.023	3.13	10.48
Ashland	62.91	4.33	.036	.21	1.92	.12	.14	.021	.....	10.70
Aurora	62.94	4.02	.029	.48	1.10	.37	.01	.022	.....	9.68
Brotherton	62.60	7.05	.037	.46	1.10	.30	.10	.004	1.50	11.11
Cary Empire *	58.50	3.65	.055	4.55	1.25	.16	.10	.015	.....	8.28
Colby	56.80	3.20	.071	5.75	.98	.24	.18	.010	2.10	9.30
Cromwell	60.00	3.75	.032	3.10	.75	.10	.13	.010	.....	9.58
Eureka	61.65	6.75	.066	1.40	.95	.52	.22	.011	1.97	9.80
Iron Belt	62.54	5.05	.042	.54	1.65	.10	.02	.015	.....	10.67
Lawrence	60.40	8.90	.057	.45	1.30	.09	.02	.023	.....	9.72
Melrose	63.07	2.96	.029	1.08	.78	.10	.08	.016	.....	9.11
Montreal	64.88	4.10	.042	.33	1.02	.10	.05	.025	.....	8.57
Newport	55.70	3.30	.040	7.40	.98	.30	.07	.016	.....	9.44
Norrie	63.18	3.62	.041	.34	1.74	.19	.13	.017	.....	9.86
Pabst Ex *	64.00	.....	.035	.....	.....	.....	.....	.....	.....	9.19
Palms *	63.50	3.62	.045	.88	1.11	.16	.10	.013	3.50	11.58
Pearce	58.60	11.44	.062	.64	.81	.22	.13	.014	2.07	7.60
Rand	59.62	5.25	.033	3.21	1.07	.66	.60	.017	.....	9.15
Shores	65.23	.....	.029	.....	.....	.....	.....	.....	.....	7.50
Sunday Lake *	62.05	8.80	.022	.54	.77	.15	.06	.010	.54	13.20
Tilden	63.56	3.97	.043	.78	1.38	.22	.21	.009	.....	12.46

Cargo analyses of Lake Superior iron ores—Continued.

MARQUETTE RANGE.

Source of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Organic and volatile matter.	Moisture.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Angeline, hard	66.19	.....	0.014	.....	.....	.....	.....	.....	.....	3.99
Angeline, hematite	66.03	.....	.042	.....	.....	.....	.....	.....	.....	8.69
Angeline, south	62.87	.....	.128	.....	.....	.....	.....	.....	.....	11.02
Barnum	65.50	3.49	.075	0.36	1.80	0.32	0.26	0.026	.....	.89
Beacon	46.00	29.75	.043	.07	2.50	1.00	.80	.030	.....	.84
Bessemer, Old Mine, hematite *	63.00	3.23	.065	.65	1.80	.42	.21	.011	.....	9.75
Blue	63.40	5.20	.118	.25	1.96	.55	.72	.010	1.80	10.55
Buffalo	61.80	6.60	.127	.55	1.84	.86	1.16	.003	2.10	10.70
Buffalo, south	61.95	5.70	.115	.39	1.75	.92	.71	.005	1.70	10.90
Cambria	61.40	9.60	.046	.34	1.92	.74	.30	.012	1.65	10.10
Champion No. 1 *	65.00	3.80	.048	.07	1.70	.75	.55	.005	.....	.80
Cleveland Bessemer	67.32	2.75	.044	.11	.20	.25	.24	.017	.....	.84
Cliffs Shaft	62.42	3.65	.113	.35	1.70	1.15	1.00	.020	2.20	1.06
Comrade	59.37	.....	.105	.....	.....	.....	.....	.....	.....	.....
East End Bessemer	61.06	7.48	.046	.33	2.09	.23	.30	.014	2.94	10.33
Essex	60.00	10.25	.110	.30	2.20	.53	.20	.020	.....	.74
Foster	51.45	18.45	.142	.27	1.10	.18	.39	.020	5.18	3.63
Foster Silica	42.00	27.00	.122	3.86	1.36	.20	3.67	.002	6.56	3.00
Harvard, hematite *	65.50	2.85	.050	.67	1.70	.47	.25	.018	.....	10.00
Humbolt	65.00	3.85	.150	.13	1.88	.88	.24	.....	.....	.....
Ishpeming	57.41	10.35	.072	.57	2.62	.38	.36	.030	3.50	9.89
Jackson, South Side	43.97	30.81	.050	2.12	2.00	.....	.....	.....	.....	.....
Jackson, pit 7	57.77	11.00	.063	2.15	2.00	.....	.....	.....	.....	.....
Lake	60.85	5.67	.088	.60	2.10	.41	.32	.013	3.50	12.10
Lake Bessemer No. 1	65.44	.....	.030	.....	.....	.....	.....	.....	.....	9.97
Lake Bessemer No. 2	64.01	5.50	.038	.24	1.40	.35	.21	.019	1.78	9.63
Lake Silica	48.27	25.40	.042	.43	1.69	.36	.47	.035	1.65	9.07
Lake Superior No. 1	65.00	3.40	.100	.23	2.10	.26	.24	.013	.....	1.15
Lillie	61.75	5.60	.077	.39	1.92	.37	.08	.010	2.79	9.60
Marquette	43.50	34.09	.051	.26	.97	.17	.17	.021	1.97	6.12

Cargo analyses of Lake Superior iron ores—Continued.

MARQUETTE RANGE—continued.

Source of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Organic and volatile matter.	Moisture.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Michigamme ..	66.50	4.67	0.130	0.23	0.07	0.25	0.62	0.050	.....	0.75
Missabe Friend	39.54	.....	.020	.....	.....	.....	.....	.....	.....	.92
Negaunee, non-Bessemer ...	62.30	4.30	.115	.30	2.90	.92	.20	.025	.....	10.67
Negaunee	63.53	4.55	.057	.25	2.64	.75	.15	.025	.....	10.67
Non-Bessemer, Old Mine, hematite	62.00	5.00	.130	.45	2.75	.53	.21	.020	.....	7.78
Norfolk	56.00	13.75	.050	.09	2.50	1.10	1.05	.030	.....	1.12
Oxford.....	64.50	4.45	.075	.32	1.80	.25	.23	.020	.....	1.14
Peninsula.....	59.00	9.20	.118	.31	1.92	.82	.41	.007	1.47	10.80
Platt	58.70	.....	.038	.....	.....	.....	.....	.....	.....	8.78
Prince of Wales	61.55	6.10	.122	.36	1.72	1.40	.46	.012	2.20	10.40
Queen.....	62.40	6 80	.110	.22	1.40	.86	.72	.002	1.64	10.65
Regent.....	62.30	7.27	.048	.23	1.95	.33	.09	.008	1.27	10.50
Republic, special *	67.38	.....	.020	.....	.....	.....	.....	.....	.....	1.02
Republic, specular	67.62	2.23	.034	Trace.	.68	.30	.09	.018	.20	1.31
Republic, Kingston ...	64.73	5.28	.036	.09	1.30	.36	.16	.030	.....	1.31
Salisbury	62.10	4.91	.113	.30	1.42	.36	.19	.017	3.76	12.12
Salisbury, Bessemer	63.04	5.80	.049	.21	1.83	.21	.40	.022	2.10	11.93
Salisbury, silica.....	49.31	24.10	.054	.36	2.20	.35	.18	.016	2.30	11.10
Savoy.....	62.05	7.75	.078	.34	1.85	.27	.17	.025	.....	1.82
Sawmill *	60.00	.....	.060	.....	.....	.....	.....	.....	.....	.84
Sec. 16, No. 1 Bessemer * ..	65.39	3.13	.014	.23	1.65	.24	.17	.015	.....	3.99
Sec. 16, No. 2 Bessemer * ..	62.00	7.75	.032	.23	1.70	.17	.19	.015	.....	2.14
Sec. 16, New Shaft *	64.50	5.43	.035	.27	1.49	.27	.18	.016	.....	2.08
Sec. 21, hematite	62.00	5.25	.130	.40	1.10	.22	.21	.021	.....	9.48
Sheffield	62.08	.....	.018	.....	.....	.....	.....	.....	.....	3.50
Tilden, silica..	45.40	33.10	.039	.....	1.00	.....	.....	.....	.....	3.00
Volunteer.....	55.83	.....	.063	.....	.....	.....	.....	.....	.....	.....
Winthrop.....	61.25	6.88	.135	.71	1.34	.44	.38	.027	2.62	11.37

Cargo analyses of Lake Superior iron ores—Continued.

MENOMINEE RANGE.

Source of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Organic and volatile matter.	Moisture.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Appleton	63.30	4.61	0.018	0.27	1.30	0.52	0.47	0.019	.....	8.50
Aragon	63.60	3.25	.030	.10	.98	.20	.11	.011	.....	6.75
Badger	59.20	4.83	.131	.42	2.76	1.10	2.89	.110	.....	9.07
Chapin *a*	62.00	3.16	.066	.39	1.16	1.07	2.79	.013	2.52	6.72
Clifford	41.87	37.80	.011	.10	1.00	.35	.34	.012	.....	2.14
Crystal Falls	58.55	4.25	.721	.20	1.16	2.64	.77	.008	2.92	7.20
Davidson	56.06	6.33	.170	.37	3.41	1.54	2.97	.101	.....	8.40
Dunn	58.61	3.88	.573	.58	1.88	1.80	.83	.033	5.44	8.70
Elmwood	58.10	5.91	.172	.42	3.06	1.03	2.38	.096	.....	9.05
Florence	57.60	4.67	.343	.....	2.65	1.20	1.53	.214	5.54	7.59
Hemlock	60.20	4.71	.309	.39	2.81	1.87	1.32	.010	.....	6.62
Homestead	54.87	4.68	.086	.38	2.05	3.48	4.87	.003	.....	.....
Keel Ridge	40.64	37.42	.046	.20	.90	1.35	1.00	.006	.....	2.90
Lincoln	60.86	3.86	.240	.45	1.67	2.14	1.73	.010	.....	6.50
Loretto	60.50	8.82	.017	.29	1.92	.15	.47	.077	1.54	8.69
Ludington	65.60	.....	.024	.....	.....	.....	.....	.....	.....	7.06
Mastodon	61.00	4.50	.350	.30	2.75	.50	.30	.075	.....	9.00
Millie	62.10	.....	.027	.....	.....	.....	.....	.....	.....	5.47
Pewabic	64.36	3.85	.009	.19	.48	1.10	1.35	.003	.....	6.46
Pewabic Genoa	42.79	35.28	.007	.10	.96	.52	.95	.....	.....	4.32
Rex	57.68	5.65	.063	.81	1.21	1.48	4.39	.016	3.44	6.53
San Jose	65.41	3.23	.013	.24	1.24	.16	.25	.043	.78	7.60
Sheridan	58.50	6.50	.130	.50	4.00	.60	.70	.250	.....	9.12
Star Ludington	63.50	2.50	.086	.40	1.00	.50	.40	.010	2.15	7.00
Toledo	53.55	18.23	.010	.18	.65	1.20	1.57	.003	.....	6.28
Tyrone	62.00	3.91	.106	.19	.72	1.50	1.90	.003	.....	.....

a Expected analyses for season of 1897.

MESABI RANGE.

Ætna	64.00	3.50	.045	.52	1.60	.35	.15	.010	.....	11.00
Adams	64.18	2.80	.035	.40	.80	.21	.10	.007	3.80	7.29
Auburn	65.04	2.25	.047	.39	1.47	.68	.15	Trace.	.....	9.56
Audrey	62.69	2.64	.071	.66	1.52	.25	.14	Trace.	.....	12.07
Beaver	64.44	2.20	.081	.17	1.50	.20	.10	.012	3.42	10.61
Berringer	61.16	4.55	.065	.35	1.59	.11	.07	.012	.....	8.91
Biwabik	64.61	3.00	.033	.25	.50	.24	.15	.005	3.40	7.71
Burt	65.48	3.17	.034	.49	1.43	.56	.20	.006	.....	8.97
Canton	60.80	4.25	.048	.49	.93	.71	.07	Trace.	.....	9.97
Cincinnati	61.50	6.32	.037	.59	.98	.34	.15	.015	.....	8.00
Cincinnati Silica	59.00	8.00	.030	.60	1.00	.34	.15	.015	.....	8.00

Cargo analyses of Lake Superior iron ores—Continued.

MESABI RANGE—continued.

Source of ore.	Iron.	Silica.	Phosphorus.	Manganese.	Alumina.	Lime.	Magnesia.	Sulphur.	Organic and volatile matter.	Moisture.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Climax	63.64	1.94	0.036	0.87	0.60	0.88	Trace.	Trace.	.....	8.65
Cloquet	62.07	4.00	.033	.37	1.60	.28	0.30	.....	.....	13.13
Commodore	63.60	4.10	.038	.12	.90	.37	.04	0.011	3.40	10.25
Fayal	62.55	3.06	.037	1.00	1.30	.26	.14	Trace.	.....	9.55
Franklin	62.79	4.12	.036	.69	.81	.30	.26	.021	3.61	6.26
Genoa	62.70	3.75	.033	.65	1.16	.60	.19	None.	.....	11.29
Hale	60.00	5.00	.100	.55	.52	1.58	.....	.016	.....	9.00
Helmer	64.00	3.65	.051	.48	1.80	.15	.10	.015	.....	11.15
Hull	65.52	2.43	.024	.19	.79	.02	.14	.018	.....	10.79
Juniata	62.40	3.30	.085	.67	4.62	.05	Trace.	.013	.....	10.00
Mahoning	64.28	2.75	.050	.33	1.50	.21	.14	.020	3.00	10.34
Mangan	59.80	5.50	.034	.68	1.52	.32	.10	.....	.....	13.55
McKinley	62.30	8.36	.026	.37	.93	.48	.23	.016	.....	8.75
Minnewas	65.63	2.35	.047	.35	1.14	.20	.03	.008	2.05	9.00
Mountain Iron	64.08	3.68	.043	.42	1.80	.18	.10	.010	.....	12.27
Norman	62.15	3.75	.069	.90	1.82	.52	.13	Trace.	.....	8.41
Ohio	61.53	.....	.082	.....	.....	.....	.....	.....	.....	6.95
Ohio Katonah	64.41	2.95	.053	.40	1.34	.37	.25	.006	2.42	8.35
Roberts	62.00	7.57	.030	.23	.66	.15	.12	.002	.....	7.00
Rust	65.00	2.50	.030	.25	1.25	.25	.15	.012	.....	9.25
Saxon	64.29	3.75	.039	.56	1.21	.12	.04	.....	.....	8.00
Sellers	64.23	3.66	.036	.38	.95	.19	.12	.019	2.66	8.73
Shenango	64.07	2.69	.060	.30	1.62	.20	.16	.020	3.11	10.53
South Side	61.05	4.22	.070	.....	3.40	.25	.10	.013	.....	9.68
Tubal	63.25	4.50	.065	.45	1.75	.20	.08	.013	.....	11.54
Valley	61.03	5.66	.041	.31	.....	.....	.....	.....	.....	12.76
Vega	61.99	5.40	.040	.26	1.45	.33	.18	.....	.....	11.57
Williams	60.40	9.20	.036	.77	.95	.42	.12	.011	3.60	9.70

VERMILION RANGE.

Chandler	64.70	4.26	.036	.13	1.37	.33	.10	Trace.	.....	5.79
Long Lake	60.59	7.80	.040	.13	1.85	.72	.20	.004	.....	7.55
Minnesota	67.74	1.55	.048	None.	.90	.27	.12	None.	.....	2.00
Pilot	61.20	9.96	.030	.66	1.62	.21	.10	.006	.....	8.50
Pioneer	64.91	4.50	.035	.21	1.60	.16	.07	.020	.....	8.11
Red Lake	64.41	3.74	.108	None.	1.81	.35	.11	Trace.	.....	.....
Soudan	65.31	4.36	.104	None.	.68	.62	.28	Trace.	.....	.....
Vermilion	67.36	1.68	.156	None.	.62	.60	.25	None.	.....	.....
Zenith	66.02	2.95	.050	.14	1.61	.12	.07	.009	.79	5.52

The discussion of iron-ore statistics, while including the value of iron ore at mines, has not extended to the commercial value of the ores at points of consumption or distribution, nor is it the intention here to take up this feature in a comprehensive manner. But in view of what has been accomplished by the miners and shippers of ore it has been considered as appropriate to introduce some figures of the general selling prices of some Lake Superior iron ores. The prices quoted below are for ores taken from mines, carried by cars to shipping docks, loaded into vessels, and by them transported to lower lake ports, where they are delivered on docks or on railroad cars to be taken to blast furnaces. The control of some of the large producers of Bessemer ores on the Mesabi range by pig-iron manufacturers and the breaking of the "iron ore pool," formed two years ago to maintain prices, has resulted in a readjustment, and in trade circles the generally accepted price schedule fixed for 1897 by the old range interests (omitting the Mesabi ores) is practically as follows, delivered on dock at lower lake ports:

Old range prices of iron ores at lower lake docks for 1897.

	Per ton.
No. 1 specular and magnetic ores, Bessemer quality	$3.00 to $3.50
No. 1 specular and magnetic ores, non-Bessemer quality	2.50 to 2.75
Red hematite, Bessemer quality	2.50 to 3.00
Red hematite, non-Bessemer quality	2.00 to 2.50

The problem of values has been carefully worked out for each of the various ores which are produced, upon an assumed Bessemer ore basis, containing 63 per cent iron, about 10 per cent moisture, and 0.045 per cent phosphorus. The similar basis price for Mesabi Bessemer ore is $2.40 per ton, with non-Bessemer ores proportionately lower. To mine and deliver ore at these prices will require the use of all possible economies and labor-saving devices at the mines and in the transportation of the ores, both by rail and water.

While it is not the province of this report to discuss the cost of winning ore at individual mines nor the average cost on each of the ranges, one feature which influences the relative expense of producing iron ore may be mentioned in addition to the transportation distances noted in the report of 1895. This feature is the royalty paid by lessees to owners of property for each ton of iron ore taken out, an annual minimum amount being demanded in most cases. In Minnesota some of the important mines are owned in fee, but a majority of those now wrought pay from 20 to 30 cents per ton royalty, and in some instances subroyalties increase this to as much as 50 cents per ton. Mines located on lands owned by the State pay a royalty of 25 cents per ton of ore taken out, but late legislation, with the object of encouraging industries, remits this royalty on ore taken from mines on State lands and smelted in the State. No ore is now smelted in Minnesota, but there is a blast-furnace plant ready to be operated. In the older ranges of Michigan the proportion of fee properties is greater than in Minnesota, but a number are wrought under royalty. Most of the royalties in force have been modified in later years, the average royalty now paid at some of the

mines being based on a sliding scale, approximating from 6 to 8 per cent of the market value of the ore at lower lake ports.

Competition has been so active and the available supply of iron ore has been so much in excess of the demand as to encourage those who mine and handle the Lake Superior ores to determine definitely the relative prices which should be commanded by the ore from various mines, and in a number of cases by different grades of ore from the same mine. These values are based upon the chemical composition of the ore, the most prominent elements entering into the estimate being iron, phosphorus, and moisture, and in some cases manganese.

Starting with the basis of an ore containing, when dried at 212° F., 63 per cent of iron, 0.045 per cent of phosphorus, and 10 per cent of natural moisture, the freight is added to a central distributing point to obtain the value of the ore at the furnace, which, according to the Iron Trade Review, is fixed for the season of 1897 at $3.15. An ore with 63 per cent of iron and 10 per cent of moisture gives an actual yield of 56.7 per cent of iron, which, divided into the cost of the ore at the furnace, makes the unit price of this ore 5.555 cents. This calculation omits the consideration of the phosphorus content, and to determine the relative values of ore with different percentages of phosphorus, a basis as above of 0.045 per cent of phosphorus is taken and an arbitrary value of 0.75 cent placed on an ore containing this amount of phosphorus, the price of the ore increasing or decreasing 0.05 cent for the first 0.001 per cent of phosphorus, thus adding 0.8 cent for an ore containing 0.044 per cent of phosphorus, or deducting this amount if it contained 0.046 per cent of phosphorus, and then increasing or diminishing by a system of arithmetical progression, the increments or rates of progression (consisting of 0.05 cent for each 0.001 per cent of phosphorus) being added together to form the basis of value for the next one-thousandth, the price of the 0.043 per cent phosphorus ore being 1.65 cents per ton higher, or, vice versa, that for an ore containing 0.047 per cent of phosphorus being 1.65 cents per ton lower than the standard of 0.045 per cent phosphorus. Similarly the price for an ore containing 0.042 per cent of phosphorus would be 2.55 cents per ton above the basis price, or for an ore analyzing 0.048 per cent of phosphorus 2.55 cents below the basis price. The equation of selling prices of ores upon the difference of 0.001 of 1 per cent of phosphorus or 0.36 ounce in a long ton of ore seems to be reducing this subject to a fine art, and great nicety of determination will be necessary to have the analyses of an ore by two chemists agree. It must be borne in mind that the system of valuing iron ore is constantly changing, and the above is given merely as an illustration to show the great care which is taken to arrive at a correct and equitable scale of prices.

Having discussed the Lake Superior region as a producer of nearly two-thirds of the iron ores mined in the United States, attention may be directed to the contributions of some of the States, three of which are included in the foregoing statement.

IRON-ORE INDUSTRY IN VARIOUS STATES.

The details of production of the more important States are presented below.

MICHIGAN.

This State, as in previous years, stands first as an iron-ore producer, 5,706,736 long tons having been mined in that State in the year 1896 against 5,812,444 tons in 1895. This is equivalent to 35.65 per cent of the total for the United States, and indicates a decline from the previous year of 1.82 per cent. Of this output 5,635,997 long tons was red hematite, giving the State first position as a producer of this character of ore, and 70,739 tons was magnetite.

The general depression in the iron trade and the increasing output of the operations on the Mesabi range in Minnesota influenced the restriction of production on the older ranges of the Lake Superior region, but this restriction has not verified the prophecies of those who proclaimed the early abandonment of important producers. The record of 1896 would rather suggest continued active competition between some of the older mines in Michigan and the later developments in Minnesota. Shorter rail and lake transportation from and ownership of property of Michigan mines offset in part the apparently cheap mining costs of exploitations on the Mesabi range of Minnesota.

The completion of the Lake Superior and Ishpeming Railroad, giving an additional competitive connection from most of the mines in the Marquette range to the new ore docks on Lake Superior, the use of the large locks on the United States and Canadian sides of the St. Marys River, and continued operations toward the improvement of river channels, have materially bettered the facilities for distributing the ores from Michigan and from the other States forming the Lake Superior region.

MINNESOTA.

This State continues to hold second place as a miner of iron ore, with an output of 4,283,880 long tons in 1896, or 26.77 per cent of the total for the United States. This shows an increase of 417,427 long tons, or 10.80 per cent, over the State's production in 1895 of 3,866,453 tons. All of the iron ore reported was of the red hematite class, and in this variety Minnesota also ranked as second. The increase in production in this State was obtained from the Mesabi range, where soft and relatively cheaply mined ores were able to compete successfully with the ores obtained from the older ranges.

During the latter part of 1896 and the earlier part of 1897 negotiations were entered into by which the control of some of the largest Bessemer iron ore mines on the Mesabi range became vested in the steel companies in the vicinity of Pittsburg. As these companies refused to limit their output, the combination known as the "Bessemer iron ore

pool," which had been in existence for about two years, was broken, and a new basis of prices, above specified, will prevail in 1897, which approximates $2.40 per ton at lower lake ports for Mesabi Bessemer ore.

While in 1896 the Mesabi range was the largest producer in the Lake Superior region, there are many valuable deposits which have not yet been exploited, and with a greater demand for ore of this character the output can be largely increased.

The remarkable developments on the Mesabi range will appear from the following statement of the position which it bore as a producer in the ranges of the Lake Superior region and the quantities of iron ore taken from its mines:

Production and rank of the Mesabi range, 1892 to 1896.

Year.	Rank.	Production.
		Long tons.
1892	Fifth	29,245
1893	Fifth	684,194
1894	Second	1,913,234
1895	First	2,839,350
1896	First	3,082,973
Total		8,548,996

ALABAMA.

This State is noted as a producer of large quantities of iron ores mined at low cost, which, not being of Bessemer grade, are used chiefly in the manufacture of foundry iron. The State held third rank as a producer in 1896, mining 2,041,793 long tons of iron ore, of which 1,694,948 tons was red hematite and 346,845 tons brown hematite. This total indicates a decline of 157,597 tons, or 7.17 per cent, from the output of 1895, which was 2,199,390 long tons.

The leading pig-iron manufacturer in this State has for some time been making experiments in the production of basic steel, and thus enlarging the local market for pig iron, which can be here cheaply produced, the iron ores, coking coal, and limestone being found close together in large quantities. Liberal expenditures have also been made in beneficiating some of the ores by roasting them and by separating the barren material from the oxide of iron.

With but a limited local consumption for pig iron, commendatory efforts have been made to market the surplus production, the cost of making pig iron being so reduced as to permit of long railroad hauls to domestic markets, and some of the excess has been shipped to foreign countries.

The contiguity of the raw materials entering into the manufacture of pig iron gives to portions of Alabama advantages which permit the pro-

duction of iron at a cost lower than is at present possible elsewhere in this country, and below the minimum reached at most of the foreign works.

PENNSYLVANIA.

The keen competition among the producers of iron ore in the Lake Superior region, the cheap lake transportation, and the low cost which characterizes the production of some grades of iron in Alabama have caused a decline in the exploitation of all the various classes of iron ore in the Keystone State. All of the four general varieties of iron ore were produced in 1896, the magnetite mined amounting to 494,517 tons, in which class the State ranked first. This quantity has been practically doubled in previous years, and in 1895 it was 134,482 long tons greater, viz, 628,999 tons. The brown hematite operations contributed 226,669 long tons in 1896, against 239,153 tons in 1895. The red hematite mines produced 24,030 tons in 1896, as compared with 29,606 tons in 1895, and the carbonate but 2,568 tons, a decline from the 1895 total of 2,582 tons. The total for the State in 1896 amounted to 747,784 long tons, a decline of 152,556 tons, or 16.94 per cent, from that of 1895 (900,340 tons).

WISCONSIN.

The iron ore produced in this State in 1896 was all of the red hematite variety, in which class of ore it occupied fourth place. The amount of ore mined in Wisconsin, 607,405 long tons, was 41,946 tons, or 6.46 per cent, less than the 1895 product of 649,351 tons. Most of the iron ore is mined in the Lake Superior region, but some is obtained from the fossil deposits in the eastern portion of the State.

TENNESSEE.

This State produced in 1896 three different varieties of iron ore—326,932 long tons of brown hematite, 207,752 tons of red hematite, and 800 tons of carbonate ore, the total, 535,484 tons, showing an increase of 15,688 tons, or 3.02 per cent, over the product of 1895, viz, 519,796 tons.

NEW YORK.

This State, like Pennsylvania, mined all four classes of iron ore, but the magnetite produced in the Lake Champlain region and in Putnam and Orange counties contributed by far the larger proportion, 346,015 long tons being of this character of ore, giving New York second place as a magnetite producer. During the year 16,385 tons of carbonate, 12,288 tons of brown hematite, and 10,789 tons of red hematite complete the total for the State, 385,477 long tons, an advance of 78,221 tons, or 25.46 per cent, over the total of 307,256 tons for 1895.

NEW JERSEY.

This State has felt severely the effect of the relatively cheap Lake Superior and foreign iron ores on her mining industry. Some of the mines which were large producers have, owing to the increasing depth

and greater cost of winning the ore, entirely suspended mining, while others show a decreased output. In 1896 the total iron ore produced amounted to but 264,999 long tons, a decrease of 17,434 long tons, or 6.17 per cent, from the 1895 total of 282,433 tons. The State, however, occupied the same relative position as in 1895, viz, ninth.

COLORADO.

In Colorado, besides the iron ore which is smelted in the blast furnaces for the production of pig iron, considerable argentiferous iron ores and manganiferous iron ores are utilized as fluxes in smelting the precious metals and for the manufacture of spiegeleisen or ferromanganese. As quite a number of these silver smelters were closed in 1896 and mining operations in one important district (Leadville) were interfered with by a disastrous and extended strike, the production for 1895 (240,937 long tons) declined 10.43 per cent in 1896, or to 215,819 tons. The total for 1896 was made up of three different varieties, viz, the brown hematite contributing 189,943 tons, the red hematite 14,274 tons, and the magnetite 11,602 tons. More detailed reference to the iron-ore deposits of Colorado appears further on in this report, and the manganese ores are referred to in the paper on manganese.

OTHER STATES.

Ohio's total of 58,480 tons was entirely of the carbonate variety, in which class the State occupied first place. In the western States and Territories the iron ore produced was used as a flux in the smelters. Kentucky, like the eastern States, felt the keen competition from Michigan and Minnesota, and shows a decreased output in 1896. The brown hematites of Connecticut and Massachusetts are used in the local blast furnaces, and as most of these were inactive during a portion of the year owing to the decreased pig-iron production, the iron-ore exploitation shows a similar decline. Maryland uses carbonate ores in the production of special grades of pig iron in local furnaces, and Texas utilizes a small amount of brown hematite in the manufacture of charcoal pig iron. Missouri, which was formerly a prominent iron-ore producer, has fallen to the bottom of the list, owing to the exhaustion of the red hematite deposits and the use of richer Lake Superior ore at blast furnaces on the Ohio and Mississippi rivers. The small amount of brown hematite mined was used as a flux in the smelters of producers.

PROMINENT IRON-ORE MINES.

As in previous years, the greater proportion of the total production of iron ore in the United States in 1896 came from a limited number of prominent iron-ore mines, i. e., those producing over 50,000 tons each. Seventy-five operations contributed 13,062,990 long tons in 1896, or 81.62 per cent of the total for the United States, 16,005,449 tons, or an

average of 174,173 long tons per operation. This is below that of 1895, when 84.01 per cent was obtained from the larger mines, but with this exception it is the highest percentage yet reached.

Of these 75 operations 30 are located in Michigan, 19 in Minnesota, 7 in Alabama, 4 each in Virginia and Tennessee, 3 each in Wisconsin and New York, 2 each in Pennsylvania and New Jersey, and the remaining one in Colorado. Three contributed over 500,000 tons, 4 from 400,000 to 500,000 tons, 5 from 300,000 to 400,000 tons, 7 from 200,000 to 300,000 tons, 25 from 100,000 to 200,000 tons, and 31 from 50,000 to 100,000 tons. Of these mines 56 were red hematite operations, yielding a total of 11,159,964 long tons, 11 supplied brown hematite, producing 768,629 long tons, 6 produced magnetite amounting to 868,019 long tons, and the remaining 266,378 tons were furnished by two mines whose output was mixed red hematite and magnetite, the former predominating.

The following table gives the name, State in which located, and the production in 1896 of such of the larger mining operations, the managers of which expressed no objection to such publication:

Mines producing 50,000 tons or over of iron ore in the year 1896.

Name of mine.		Production.
		Long tons.
Alice, Fossil, Muscado, Redding, and Ware's (group), Alabama *a*		945,805
Lone Jack and Messabe Mountain, Minnesota		808,291
Chandler, Minnesota		551,310
Chapin, Michigan		499,780
Cornwall, Pennsylvania		463,059
Minnesota Iron Company (group), Minnesota		427,797
Lake Superior, Michigan		424,641
Metropolitan Iron and Land Company (group), Michigan:		
East Norrie	87,741	
Norrie	213,252	
North Norrie	81,081	
		382,074
Cleveland Iron Mining Company, Michigan:		
Cleveland Hard Ore	10,346	
Cleveland Lake Ore	322,754	
		333,100
Fayal, Minnesota		325,000
Queen Mining Company, Michigan		312,910
Pittsburg and Lake Angeline, Michigan		301,050
Pewabic, Michigan		273,742
Adams, Minnesota		249,551

Mines producing 50,000 tons or over of iron ore in the year 1896—Continued.

Name of mine.	Production.
	Long tons.
Biwabik, Minnesota	242,000
Penn Iron Mining Company (group), Michigan	240,070
Sloss, Alabama	220,768
Tilden, Michigan	215,913
Pioneer, Minnesota	198,982
Aurora, Michigan	190,051
Mahoning No. 3, Minnesota	167,245
Auburn, Minnesota	153,254
Champion, Michigan	138,239
Salisbury, Michigan	135,850
Aragon, Michigan	133,923
Sellers, Minnesota	131,334
Brown Mining Company, Tennessee	131,059
Ashland, Michigan	130,095
Pabst, Michigan	128,779
Republic and West Republic, Michigan	128,139
Irondale, Alabama	127,749
Mountain Iron, Minnesota	120,193
Richards, New Jersey	107,241
Cary, Wisconsin	104,156
Sunday Lake, Michigan	91,331
Iron Belt, Wisconsin	91,166
Norman, Minnesota	86,938
Canton, Minnesota	79,812
Greeley, Alabama	74,690
Burt, Minnesota	68,762
Orient, Colorado	66,620
34 other operations not mentioned by name, aggregating *b*	3,060,521
Total for 75 operations	13,062,990

a This group of mines is not contiguous, as is the case with most of those marked as groups, but the mines are under one management and are reported in the aggregate.

b This aggregate comprises the amounts reported by mines whose operators objected to the publication of figures showing output.

VALUATION OF IRON ORES.

The total iron ore production of the United States in 1896, viz, 16,005,449 long tons, was valued at $22,788,069 at the mines, or $1.42 per ton. This was an increase on the average value per ton in 1895 ($1.14) of 28 cents per ton, or 24.56 per cent. The highest recorded average value per ton was in Missouri, where but a comparatively small amount of rich red hematite and a small quota of brown hematite (used as a flux in the smelters) gave an average of $2.82.

Colorado came second, the average value of the 215,819 tons being $2.43 per ton, the price being enhanced by the percentage of manganese and silver carried by some of the ores, which were used as fluxes in smelting the precious metals.

The Lake Superior region also shows a decided advance in value in 1896, the average value of the product of Michigan being $1.78, of Minnesota $1.23, and of Wisconsin $1.76, against $1.45, $0.73, and $0.98, respectively, in 1895. The breaking of the pool formed to control prices in the early part of 1897 subsequently caused a decided decline in selling prices as compared with 1896.

The following table gives the total and average value of iron ore at the mines, together with the production for each State, and it should be borne in mind that these do not include transportation charges, which will account for the seemingly lower value of richer ores that are farther removed from the market as compared with other leaner but more accessible ores. These values represent the estimate for the ore when ready to be shipped from the mines:

Production and valuation of iron ores in 1896, by States.

State.	Production.	Total valuation at mines.	Value per ton.
	Long tons.		
Michigan	5,706,736	$10,143,918	$1.78
Minnesota	4,283,880	5,286,664	1.23
Alabama	2,041,793	1,417,451	.69
Virginia	859,466	1,220,619	1.42
Pennsylvania	747,784	920,916	1.23
Wisconsin	607,405	1,071,511	1.76
Tennessee	535,484	432,932	.81
New York	385,477	780,932	2.03
New Jersey	264,999	528,759	2.00
Colorado	215,819	524,915	2.43
Georgia and North Carolina	175,331	150,018	.86
Ohio	58,480	72,019	1.23
Montana, New Mexico, Utah, and Wyoming	44,596	96,486	2.16
Kentucky	30,096	38,256	1.27
Connecticut and Massachusetts	27,289	63,286	2.32
Maryland	11,502	23,004	2.00
Texas	4,777	3,583	.75
Missouri	4,535	12,800	2.82
Total	16,005,449	22,788,069	1.42

STOCKS OF ORE.

The stocks of ore reported at the mines on December 31, 1896, amounted to 3,405,302 long tons, an increase of 428,808 long tons, or 14.41 per cent, over the total on hand December 31, 1895. As in previous years, the States constituting the Lake Superior region, viz, Michigan, Minnesota, and Wisconsin, have the largest stocks of ore on hand, and this is to be expected, as most of the product is shipped by water to lower lake ports, and all ore taken out of the mines after the close of navigation (usually about December 1) must be stocked. In most of the southern States little if any ore is carried in stock, the ore being shipped as mined; and the same is true of the majority of the other iron ore producing States.

The following table shows the stocks of ore on hand in each State on December 31, 1895 and 1896; and an examination will show that with the exception of the Lake Superior region and Ohio the States show either a decline in the stock of ore on hand December 31, 1896, or but little advance:

Stock of ore on hand at mines December 31, 1895 and 1896.

State.	Stock.	
	1896.	1895.
	Long tons.	*Long tons.*
Michigan	1,697,963	1,460,238
Minnesota	816,963	517,975
Alabama	9,850	17,496
Virginia	28,995	51,941
Pennsylvania	39,856	62,180
Wisconsin	418,985	326,661
Tennessee	16,660	61,118
New York	88,534	144,384
New Jersey	61,663	68,897
Colorado	575	250
Georgia and North Carolina	3,423	7,092
Ohio	55,371	38,115
Montana, New Mexico, Utah, and Wyoming	6,055	3,185
Kentucky	24,602	22,282
Connecticut and Massachusetts	3,680	3,156
Maryland	7,006	7,646
Texas	11,000	8,010
Missouri	114,121	175,868
Total	3,405,302	2,976,494

The greater portion of the iron ore mined in the Lake Superior region is sent by water to lower lake ports, and the stocks of ore at these ports have considerable influence on the immediate demands for iron ore. According to the Iron Trade Review the stock of ore on hand May 1, 1897, is the largest on record, being 3,256,497 long tons. The stock on hand December 1, 1896 (the close of navigation), and May 1, 1897 (the opening of navigation), by ports is as follows:

Stock of ore at lower lake ports December 1, 1896, and May 1, 1897.

Port.	Stock December 1, 1896.	Stock May 1, 1897.
	Long tons.	*Long tons.*
Cleveland	1,419,311	979,705
Ashtabula	1,441,666	926,865
Fairport	773,905	480,984
Erie	355,222	153,261
Conneaut	275,800	207,034
Lorain	231,288	180,605
Huron	200,075	162,292
Toledo	115,959	66,337
Buffalo	82,267	50,477
Sandusky	59,491	48,937
Total	4,954,984	3,256,497

To show the constant improvement in the methods of handling iron ore, the figures below are given in relation to the conveying machinery used at one of the blast-furnace plants of the Illinois Steel Company in unloading vessels by swinging booms. The ore buckets are lifted from the holds of the boats and dumped into cars running on trestles over the ore yards. There are at present 53 hoists on the south slip. At the north slip there are 16 cantilever hoists and conveyors. The best records, according to the Iron Age, for these two slips in 1895, 1896, and 1897 are as follows:

	North slip.		South slip.	
	1895.	1896.	1895.	1897.
Cargo (tons)	2,008	2,639	2,750	4,000
Men, including signal boys	44	81	95	158
Hoists in use	4	9	7	12
Time (hours)	10	6¼	6⅛	8½
Tons handled per hour	201	422	435	471
Tons per hour per man	4.6	5.2	4.6	3

On another occasion 42 men unloaded a boat of 1,600 tons in the morning, and in the afternoon another of 1,750 tons, or 3,350 in all in twelve hours. This is equivalent to 80 tons per man, or $6\frac{2}{3}$ tons per man per hour. In seven months 1,600,000 tons of ore have been received at these two docks.

IMPORTATION OF FOREIGN IRON ORES.

As in previous years, Mr. Worthington C. Ford, Chief of the Bureau of Statistics of the Treasury Department, has furnished data in regard to the importation of foreign iron ores into the United States during the year ending December 31, 1896, by countries, and also by customs districts, together with the values of the same, as follows:

Quantity and value of iron ores imported into the United States in 1896.

Country.	Amount.	Total value.
	Long tons.	
Cuba	380,551	$463,570
Spain	121,132	230,879
French Africa	79,661	163,517
Italy	29,882	85,661
Greece	33,750	34,520
Newfoundland and Labrador	20,800	20,965
United Kingdom	8,528	23,155
Colombia	3,150	5,800
Portugal	1,101	2,327
Other countries	4,251	6,523
Total imports	682,806	1,036,917

The total importation of 682,806 long tons is valued at $1,036,917, or $1.52 per ton. This is an advance of 158,653 long tons, or 30.27 per cent, over the total for 1895 of 524,153 tons, which was valued at $1.50 per ton.

The imports by customs districts were as follows:

Imports of iron ore into the United States in 1896 by customs districts.

Port.	Quantity.	Value.
	Long tons.	
Baltimore, Md	368,761	$577,135
Philadelphia, Pa	308,217	444,687
New York, N. Y	4,199	10,499
Boston, Mass	78	216
Total Atlantic ports	681,255	1,032,537
Cuyahoga, Ohio	1,033	1,911
Detroit, Mich	Not given.	10
Total lake ports	1,033	1,921
Paso del Norte, Tex	257	159
Total gulf ports	257	159
Puget Sound, Wash	126	350
Total Pacific ports	126	350
Pittsburg, Pa. (interior port)	135	1,950
Total imports	682,806	1,036,917

THE OCCURRENCE OF IRON ORES IN THE ROCKY MOUNTAIN REGION.

COLORADO.

The following information concerning the occurrence of iron ores in Colorado was collected during a reconnoissance made by the writer in this region in 1896.

What is claimed to be the most remarkable deposit of iron ore in the State of Colorado occurs above timber line, at an altitude of 13,000 feet, in the counties of Pitkin and Gunnison, about 20 miles from Aspen. These ores are high-grade magnetite, which contain from 65 to 68 per cent of iron, from 0.03 to 0.05 per cent of phosphorus, and about the same amount of sulphur. Mr. W. B. Devereux, of Glenwood Springs, Colorado, who used at Aspen, as a flux for smelting, about 1,000 tons from this Ashcroft deposit, says it is a large deposit of magnetite, yielding 69 per cent of iron, 0.007 to 0.023 per cent of phosphorus, and 1 per cent of silica. The ore is reported to outcrop on both sides of the range and is remarkably well exposed, as it is not covered by vegetation, float, or other matter to interfere with its superficial examination. The portion on the Pitkin County side, showing a width of ore at one place of 160 feet, is owned by the Colorado Fuel and Iron Company.

Mr. H. H. Taft considers this ore to be a product of surface oxidation of pyrite or pyrrhotite, an opinion which could be easily confirmed or confuted by means of a diamond drill. The same authority says that at White Pine, in Gunnison County, a vein of magnetite between 40 and 50 feet in thickness, yielding 52 per cent in iron, could be readily mined, and that in several other places in Gunnison County magnetite ore is found that might be developed to be of considerable importance. There are a number of smaller gossan deposits, which, however, can not be depended upon as a supply for a blast furnace. There is also in Gunnison County a large bog of iron ore reported as carrying but little phosphorus.

Messrs. Hugh Kennedy and Charles L. Taylor in 1889 reported upon the White Pine iron ore property, located about 43 miles east of Gunnison, and at an elevation of 2,500 feet above that place. It is claimed that there are two, and probably three, distinct veins of ore. A tunnel about 95 feet long was driven through the upper vein, which, measured perpendicularly through its plane, would represent a thickness of about 70 feet. Samples of ore taken from this tunnel and from the outcrop where exposed along the hillside for over half a mile showed it to be largely of a magnetic character and of the following chemical composition:

Analyses of White Pine, Colorado, iron ores.

Sample.	Metallic iron.	Manganese.	Phosphorus.	Silica.	Copper.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
No. 1	57.10	0.44	0.014	9.60	.....
No. 2	61.80	.75	.013	6.40	.....
No. 3	56.70	.171	.017	9.77	.....
No. 4	46.40	.51	.015	13.95	.....
No. 5	46.20	.57	.032	18.05	0.288
No. 6	68.50	.42	.021	1.00	.....
No. 7	64.90	.07	.048	3.10	.....
No. 8	68.80	Trace.	.023	1.00	.....
No. 9	62.70	Trace.	.096	4.55	.....
No. 10	60.10	Trace.	.084	12.20	.....

Sample No. 2 was taken from 31 feet at front of tunnel; No. 3 from 22 feet at the back of tunnel; No. 4 from about 22 feet in middle of vein. No. 5 was selected throughout the entire length of tunnel and with special reference to determining the maximum copper in deposit. No. 6 was from outcrop of hard ores just above tunnel, and No. 7 from outcrop 1,500 feet southeast of tunnel. No. 8 represented hard lump ore from outcrop 1,800 feet southeast of tunnel. No. 9 was from the same locality, but represented soft ore, and No. 10 was a selected sample of ore from a 30-foot vein 500 feet down the mountain from the Iron King.

On Cebolla Creek, in Hinsdale County, is a series of soda springs, both hot and cold, which are depositing in one or two places a little iron and manganese. It is believed that in former times these springs were more active, and that they produced what are known as the Iron Hills. Subsequently a flow of intrusive rock (porphyries, basalt, etc.) altered to limonite and hematite on the surface, near the contact, the siderites deposited by the springs. These ores are high in phosphorus and silica. Picked samples can be obtained giving 60 per cent in iron and above, also high percentages in manganese, but a series of general samples give more silica than iron. They will average about 40 per cent of silica and 35 per cent of iron.

Leadville produces considerable brown hematite, much of which carries too much silver and gold values to make it admissible for iron smelting, but it is liberally used for fluxing. Much of this ore is manganiferous, and is reported upon in detail in the paper on manganese in this volume.

A low-grade limonite is found in the San Luis Valley, which carries a percentage of lime.

The Colorado Fuel and Iron Company owns a large deposit of magnetic ore at Calumet, which, upon increasing depth, has become so sulphurous as to require roasting. There are also calcareous low-grade (40 per cent) iron ores in the San Luis Valley.

WYOMING.

Wyoming possesses iron-ore resources which, by quality and quantity, give promise for the maintenance of an important iron industry in the future.

In northeastern Wyoming the Hartville district has developed red hematite ores of superior quality, and in the western and central portions of the State there are red hematites, magnetites, and carbonate ores.

NEW MEXICO.

Among the deposits of iron ore which at the present time are unwrought or exploited but slightly, but which appear to offer encouragement as future reserves, may be mentioned those in Hanover Gulch, Grant County, New Mexico, where the extent of ore "in sight" and boldly outcropping is described as "vast." The so-called vein, in some places as much as 400 to 500 feet in thickness, is traceable for several miles, the ore bodies decreasing from the maximum above mentioned to a few feet in width, and, indeed, often disappearing to reappear farther on in or close to the same geological position.

Mr. D. M. Barringer, M. E., of Philadelphia, states that "the occurrence of the ore is usually, but not always, with eruptive granite and limestone (probably Carboniferous); the vein, being vertical or dipping at a steep angle, is quarried, not mined," and he believes that it will

not be necessary to do mining for a number of years. He asserts that in mineralogical character, as in quality, the ore varies at different localities, but in a general sense it is mixed magnetic and specular. There is a large amount of pure specular ore in one part of this region, but the majority of the ore deposits are composed of either mixed magnetic and specular ore, or strictly magnetic ore, the former being more common. At one place there is a large deposit of brown hematite ore, which is merely an ore body more or less similar in geological position to the others, which for some reason has escaped the influences which have converted the others into magnetic or specular ore. The ore, generally speaking, is of high grade Bessemer quality, as is shown by the analyses given below. It is remarkable that the deposit should be not only of enormous magnitude, but that it should also yield such uniformly high-grade ore.

The ore has been shipped in considerable quantities, the chief consumers being the silver smelters in the southwest, where it is used as a flux.

Mr. Barringer states that shipments to the various smelters of many thousand tons have shown an average of 61 per cent to 62 per cent excess of iron over insoluble matter, the "silica" of the smelters. In other words, the ore contains about 64 to 64.5 per cent of iron and from 2 per cent to 3.5 per cent insoluble matter. This ore is mixed specular and magnetic, giving at places a red streak and at other places a black streak, and usually a purplish streak. It often has a beautiful appearance, owing to the large size of crystals.

The following analyses by Messrs. Booth, Garrett & Blair are of samples taken by Mr. Barringer, each being a sampling across the vein of about 25 pounds in weight. The subsequent shipment of 20,000 or 30,000 tons of ore has verified the corectness of the samples:

Analyses of samples of iron ore taken from the Hanover mines, New Mexico, supplied by D. M. Barringer, M. E.

Number.	Metallic iron.	Silica.	Phosphorus.	Character of ore.
	Per cent.	*Per cent.*	*Per cent.*	
1	64.623	3.93	0.021	Specular.
2	63.673	.75	.021	Do.
3	65.979	2.43	.017	Do.
4	65.655	1.16	.028	Specular and magnetic.
5	64.258	1.10	.018	Do.
6	65.167	1.33	.017	Do.
7	62.450	.36	.019	Do.
8	64.578	1.20	.028	Do.
9	64.20	.49	.014	Do.
10	67.311	.63	.001	Magnetic.
11	60.132	2.42	.004	Do.

The sulphur determinations have been made in a few instances only, giving an average of 0.041 per cent, but this element is present in such small proportion that it was not considered necessary to have many determinations made. The ore contains no titanium or any other deleterious ingredient. It carries from 0.5 to 1.5 per cent of manganese, some lime, some alumina, and some magnesia, there being rather more of the latter than of lime or alumina. Some of the strictly specular ore, however, contains considerable quantities of lime. Some 4,000 tons of iron ore which were shipped to the Colorado Fuel and Iron Company, at Pueblo, Colorado, showed the following composition, being the average of 80 carloads:

Analysis of 80 carloads of Hanover, New Mexico, iron ore.

	Per cent.
Iron peroxide	76.00
Iron protoxide	12.85
Phosphoric acid	.041
Titanic acid	Nil.
Manganese oxide	.95
Alumina	.73
Lime	.58
Sulphur	.020
Combined water	2.32
Copper	.085
Iron	63.20
Phosphorus	.018
Silica	4.32
Manganese	.60

Highest ten cars 65.50, lowest ten cars 60.05, per cent of iron.
Highest ten cars 0.018, lowest ten cars 0.015, per cent of phosphorus.
Highest ten cars 8.85, lowest ten cars 1.65, per cent of silica.

Mr. T. W. Robinson, M. E., of Pueblo, Colorado, also made an examination of this deposit, and analyses of samples which he took from nearly all parts of the property are as follows:

Analyses of iron ores from Hanover, New Mexico.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Ferric oxide	72.21	.....	86.00	90.43	81.00	76.07	71.20	69.00	61.86
Ferrous oxide	.....	.....	.....	.....	8.48	11.05	.....	16.07	17.48
Phosphoric acid	.332	.....	.12	.112	.041	.256	.....	.121	.13
Water	10.02	.....	4.24	2.60	3.39	2.62	.....	2.59	.....
Alumina	.78	.....	2.69	2.10	1.95	.75	.....	1.67	.....
Magnesia	1.25	.....	1.06	1.05	1.50	.95	.....	6.20	.....
Lime	.37	.....	.40	.34	.15	.16	.....	.31	.....
Peroxide of manganese	2.61	.....	1.26	1.49	.55	2.42	.....	.79	1.07
Silica	12.89	.....	4.36	2.19	2.46	4.74	.....	2.90	.....
Titanium oxide	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Trace.	Trace.
Zinc	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
Copper	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	.11	Nil.	Nil.
Total	100.462	.....	100.13	100.312	99.521	99.016	.....	99.651	80.54
Iron	50.55	54.00	60.20	63.30	63.30	61.85	63.35	60.80	56.90
Phosphorus	.145	.058	.057	.049	.018	.112	.033	.053	.057
Sulphur	.009	.....	.019	.018	.070	.015	.....	.05	.....

It is the intention to supplement the foregoing data by information concerning other explored or known deposits of iron ore which represent reserves for future extensions of the iron-ore industry.

IRON AND STEEL AND ALLIED INDUSTRIES IN ALL COUNTRIES.[1]

By James M. Swank,
General Manager of the American Iron and Steel Association.

UNITED STATES.

PRODUCTION OF PIG IRON.

The total production of pig iron in the United States in the past eighty-six years is shown in the following table:

Total production of pig iron in the United States from 1810 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1810....	53, 908	1865.....	831, 770	1881.....	4, 144, 254
1820....	20, 000	1866.....	1, 205, 663	1882.....	4, 623, 323
1830....	165, 000	1867.....	1, 305, 023	1883.....	4, 595, 510
1840....	286, 903	1868.....	1, 431, 250	1884.....	4, 097, 868
1850....	563, 755	1869.....	1, 711, 287	1885.....	4, 044, 526
1854....	657, 337	1870.....	1, 665, 179	1886.....	5, 683, 329
1855....	700, 159	1871.....	1, 706, 793	1887.....	6, 417, 148
1856....	788, 515	1872.....	2, 548, 713	1888.....	6, 489, 738
1857....	712, 640	1873.....	2, 560, 963	1889.....	7, 603, 642
1858....	629, 548	1874.....	2, 401, 262	1890.....	9, 202, 703
1859....	750, 560	1875.....	2, 023, 733	1891.....	8, 279, 870
1860....	821, 223	1876.....	1, 868, 961	1892.....	9, 157, 000
1861....	653, 164	1877.....	2, 066, 594	1893.....	7, 124, 502
1862....	703, 270	1878.....	2, 301, 215	1894.....	6, 657, 388
1863....	846, 075	1879.....	2, 741, 853	1895.....	9, 446, 308
1864....	1, 014, 282	1880.....	3, 835, 191	1896.....	8, 623, 127

PRODUCTION OF BESSEMER PIG IRON.

The statistics of the production of Bessemer pig iron were not collected separately from the statistics of other kinds of pig iron until 1887. The production since that year is given on the next page.

[1] This comprehensive summary of the progress of the iron and steel industries of the United States for a long series of years, including tables of production and prices and of imports and exports, and also including a comparison of the progress of the iron and steel industries of the United States with that of other countries, is submitted without present comment.

Production of Bessemer pig iron in the United States from 1887 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1887....	2,875,462	1891.....	3,472,190	1895.....	5,623,695
1888....	2,637,859	1892.....	4,444,041	1896.....	4,654,955
1889....	3,151,414	1893.....	3,568,598		
1890....	4,092,343	1894.....	3,808,567		

PRODUCTION OF SPIEGELEISEN AND FERROMANGANESE.

The production of spiegeleisen and ferromanganese is included in that of pig iron already given. It has been as follows since 1872:

Production of spiegeleisen and ferromanganese in the United States from 1872 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1872....	4,072	1881.....	18,827	1890.....	133,180
1873....	3,930	1882.....	19,610	1891.....	127,766
1874....	4,070	1883.....	21,941	1892.....	179,131
1875....	6,993	1884.....	30,262	1893.....	81,118
1876....	5,907	1885.....	30,956	1894.....	120,180
1877....	7,897	1886.....	42,841	1895.....	171,724
1878....	9,530	1887.....	42,498	1896.....	131,940
1879....	12,438	1888.....	48,901		
1880....	17,503	1889.....	76,628		

PRODUCTION OF PIG IRON, BY FUELS.

The following table gives the production of pig iron in the United States from 1854 to 1896, classified according to the fuel used. In the anthracite column is included pig iron made with mixed anthracite and coke, and in the bituminous column is included pig iron made with both raw coal and coke:

Production of pig iron in the United States, by fuels.

Year.	Anthracite.	Charcoal.	Bituminous.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1854.....	303,067	305,623	48,647	657,337
1855 *a*	340,952	303,502	55,705	700,159
1856.....	395,637	330,777	62,101	788,515
1857.....	348,558	294,929	69,153	712,640
1858.....	322,705	254,744	52,099	629,548
1859.....	421,201	253,608	75,751	750,560

a Anthracite passes charcoal.

Production of pig iron in the United States, by fuels—Continued.

Year.	Anthracite.	Charcoal.	Bituminous.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1860	463, 581	248, 510	109, 132	821, 223
1861	365, 383	174, 355	113, 426	653, 164
1862	419, 924	166, 661	116, 685	703, 270
1863	515, 748	189, 290	141, 037	846, 075
1864	610, 730	215, 940	187, 612	1, 014, 282
1865	428, 177	234, 234	169, 359	831, 770
1866	669, 078	296, 946	239, 639	1, 205, 663
1867	713, 070	307, 447	284, 506	1, 305, 023
1868	797, 322	330, 357	303, 571	1, 431, 250
1869 *a*	867, 098	350, 134	494, 055	1, 711, 287
1870	830, 357	325, 893	508, 929	1, 665, 179
1871	854, 114	343, 750	508, 929	1, 706, 793
1872	1, 223, 047	446, 953	878, 713	2, 548, 713
1873	1, 172, 102	515, 732	873, 129	2, 560, 963
1874	1, 073, 343	514, 783	813, 136	2, 401, 262
1875 *b*	810, 755	366, 956	846, 022	2, 023, 733
1876	709, 445	275, 579	883, 937	1, 868, 961
1877	834, 640	283, 789	948, 165	2, 066, 594
1878	975, 777	261, 963	1, 063, 475	2, 301, 215
1879	1, 136, 629	320, 422	1, 284, 802	2, 741, 853
1880	1, 613, 974	479, 963	1, 741, 254	3, 835, 191
1881	1, 548, 627	570, 391	2, 025, 236	4, 144, 254
1882	1, 823, 338	623, 130	2, 176, 855	4, 623, 323
1883	1, 683, 568	510, 469	2, 401, 473	4, 595, 510
1884	1, 416, 476	409, 301	2, 272, 091	4, 097, 868
1885	1, 298, 562	357, 004	2, 388, 960	4, 044, 526
1886	1, 874, 640	410, 319	3, 398, 370	5, 683, 329
1887	2, 087, 847	516, 234	3, 813, 067	6, 417, 148
1888	1, 719, 401	534, 633	4, 235, 704	6, 489, 738
1889	1, 714, 602	575, 268	5, 313, 772	7, 603, 642
1890	2, 186, 411	628, 145	6, 388, 147	9, 202, 703
1891	1, 866, 108	576, 964	5, 836, 798	8, 279, 870
1892	1, 797, 113	537, 621	6, 822, 266	9, 157, 000
1893	1, 347, 529	386, 789	5, 390, 184	7, 124, 502
1894	914, 742	222, 422	5, 520, 224	6, 657, 388
1895	1, 270, 899	225, 341	7, 950, 068	9, 446, 308
1896	1, 146, 412	310, 244	7, 166, 471	8, 623, 127

a Bituminous passes charcoal. *b* Bituminous passes anthracite.

UNSOLD PIG IRON.

The following table gives the quantity of unsold pig iron which was in the hands of manufacturers or under their control in warrant yards and elsewhere, and which was not intended for their own consumption, at the close of each year since 1874. Stocks in second hands in warrant yards are not included.

Stocks of unsold pig iron in the United States from 1874 to 1896.

Year.	Long tons.	Per cent of production.	Year.	Long tons.	Per cent of production.
1874	710,521	29.5	1886	225,629	4.0
1875	679,382	33.5	1887	301,913	4.7
1876	613,213	33.0	1888	300,144	4.6
1877	573,528	28.0	1889	247,679	3.2
1878	513,004	22.0	1890	608,921	6.6
1879	126,495	5.0	1891	596,333	7.2
1880	407,730	11.0	1892	506,116	5.5
1881	188,300	5.0	1893	662,068	9.2
1882	383,655	8.0	1894	597,688	8.9
1883	476,607	10.0	1895	444,332	4.7
1884	529,464	13.0	1896	711,649	8.2
1885	371,886	9.0			

PIG IRON IN WARRANT YARDS.

The stocks of pig iron in the yards of the American Pig Iron Storage Warrant Company, which were not controlled by the manufacturers and are not included above, were as follows at the close of each year since 1889:

Stocks of pig iron in warrant yards not controlled by the makers from 1889 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1889	36,200	1892	29,500	1895	61,800
1890	52,937	1893	45,250	1896	136,037
1891	30,900	1894	63,640		

PIG IRON STORED IN THE YARDS OF THE AMERICAN PIG IRON STORAGE WARRANT COMPANY.

The American Pig Iron Storage Warrant Company was organized in 1889. The following table shows the quantities of pig iron stored in the yards of this company at the dates given:

Pig iron stored in yards of the American Pig Iron Storage Warrant Company.

Date.	Long tons.	Date.	Long tons.
December 31, 1889..	36,200	June 30, 1894.....	101,200
June 30, 1890.....	63,500	September 30. 1894...	102,800
December 31, 1890..	64,200	December 31, 1894...	111,200
June 30, 1891.....	49,800	March 31, 1895.....	121,800
December 31, 1891..	51,900	June 30, 1895.....	122,200
June 30, 1892.....	72,900	September 30, 1895...	112,400
September 30, 1892..	84,200	December 31, 1895...	106,200
December 31, 1892..	79,700	March 31, 1896.....	107,700
March 31, 1893.....	77,900	June 30, 1896.....	112,000
June 30, 1893.....	76,200	September 30, 1896...	184,800
September 30, 1893..	77,700	December 31, 1896...	200,700
December 31, 1893..	85,800	March 31, 1897.....	216,900
March 31, 1894.....	96,100	June 30, 1897.....	221,600

IMPORTS OF PIG IRON.

The following table gives the imports of pig iron into the United States in the calendar years from 1871 to 1896. The imports of spiegeleisen, ferromanganese, and ferrosilicon are included in the table:

Imports of pig iron from 1871 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1871.....	219,228	1880.....	700,864	1889.....	148,759
1872.....	264,256	1881.....	465,031	1890.....	134,955
1873.....	138,132	1882.....	540,159	1891.....	67,179
1874.....	54,612	1883.....	322,648	1892.....	70,125
1875.....	74,939	1884.....	184,269	1893.....	54,394
1876.....	74,171	1885.....	146,740	1894.....	15,582
1877.....	59,697	1886.....	361,768	1895.....	53,232
1878.....	66,504	1887	467,522	1896.....	56,272
1879.....	304,171	1888.....	197,237		

IMPORTS FOR CONSUMPTION OF SPIEGELEISEN, FERROMANGANESE, AND FERROSILICON.

From 1883 to 1886, inclusive, the figures given are for fiscal years, ending on June 30; from 1887 to 1896 they are for calendar years, ending on December 31. Ferrosilicon was not separately enumerated until 1891. All the articles named in the table are included in the importations of pig iron, already given:

Imports for consumption of spiegeleisen, ferromanganese, and ferrosilicon from 1883 to 1896.

Year.	Spiegeleisen and ferro.	Ferrosilicon.	Total.	Year.	Spiegeleisen and ferro.	Ferrosilicon.	Total.
	Long tons.	*Long tons.*	*Long tons.*		*Long tons.*	*Long tons.*	*Long tons.*
1883.	67,880	.....	67,880	1890..	101,167	.....	101,167
1884.	94,210	.....	94,210	1891..	41,449	.....	41,449
1885.	65,406	.....	65,406	1892..	47,310	158	47,468
1886.	99,425	.....	99,425	1893..	37,199	154	37,353
1887.	157,279	.....	157,279	1894..	9,722	228½	9,950½
1888.	71,605	.....	71,605	1895..	39,582	1,544	41,126
1889.	99,482	.....	99,482	1896..	39,311	941	40,252

CONSUMPTION OF PIG IRON.

The consumption of pig iron in the United States since 1871, including all importations and an allowance in some earlier years for foreign stocks and in most years for domestic exports, and counting all unsold stocks in the whole period mentioned, has been as follows, in long tons:

Consumption of pig iron in the United States from 1871 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1871....	1,925,000	1880.....	3,990,415	1889.....	7,755,093
1872....	2,810,000	1881.....	4,982,565	1890.....	8,943,338
1873....	2,690,000	1882.....	4,963,278	1891.....	8,366,728
1874....	2,500,000	1883.....	4,834,740	1892.....	9,303,315
1875....	2,000,000	1884.....	4,229,280	1893.....	6,982,607
1876....	1,900,000	1885.....	4,348,844	1894.....	6,694,478
1877....	2,150,000	1886.....	6,191,354	1895.....	9,628,572
1878....	2,500,000	1887.....	6,808,386	1896.....	8,275,774
1879....	3,432,534	1888.....	6,674,380		

THE WORLD'S GREAT PIG-IRON PRODUCERS.

For the United States and Great Britain long tons of 2,240 pounds are used in the following table, and for Germany and Luxemburg metric tons of 2,204 pounds.

Production of pig iron in the United States, Great Britain, and Germany and Luxemburg from 1869 to 1896.

Year.	United States.	Great Britain.	Germany and Luxemburg.
	Long tons.	*Long tons.*	*Metric tons.*
1869	1,711,287	5,445,757	1,409,429
1870	1,665,179	5,963,515	1,391,124
1871	1,706,793	6,627,179	1,563,682
1872	2,548,713	6,741,929	1,988,394
1873	2,560,963	6,566,451	2,240,574
1874	2,401,262	5,991,408	1,906,262
1875	2,023,733	6,365,462	2,029,389
1876	1,868,961	6,555,997	1,846,345
1877	2,066,594	6,608,664	1,932,725
1878	2,301,215	6,381,051	2,147,641
1879	2,741,853	5,995,337	2,226,587
1880	3,835,191	7,749,233	2,729,038
1881	4,144,254	8,144,449	2,914,009
1882	4,623,323	8,586,680	3,380,805
1883	4,595,510	8,529,300	3,469,719
1884	4,097,868	7,811,727	3,600,612
1885	4,044,526	7,415,469	3,687,434
1886	5,683,329	7,009,754	3,528,657
1887	6,417,148	7,559,518	4,023,953
1888	6,489,738	7,998,969	4,337,121
1889	7,603,642	8,322,824	4,524,558
1890	9,202,703	7,904,214	4,658,450
1891	8,279,870	7,406,064	4,641,217
1892	9,157,000	6,709,255	4,937,461
1893	7,124,502	6,976,990	4,986,003
1894	6,657,388	7,427,342	5,380,038
1895	9,446,308	7,703,459	5,464,501
1896	8,623,127	*a* 8,563,209	6,374,816

a British Iron Trade Association.

THE WORLD'S PRODUCTION OF PIG IRON.

The following table shows the world's production of pig iron from 1800 to 1895:

World's production of pig iron.

Year.	Tons.	Year.	Tons.	Year.	Tons.
1800	825,000	1873	14,675,000	1885	19,100,000
1830	1,825,000	1874	13,500,000	1886	20,386,000
1850	4,750,000	1875	13,675,000	1887	22,171,000
1856	7,000,000	1876	13,475,000	1888	23,575,000
1865	9,250,000	1877	13,675,000	1889	25,345,000
1866	9,300,000	1878	14,118,000	1890	27,157,000
1867	9,850,000	1879	13,950,000	1891	25,718,000
1868	10,400,000	1880	17,950,000	1892	26,474,000
1869	11,575,000	1881	19,400,000	1893	24,813,000
1870	11,900,000	1882	20,750,000	1894	25,600,000
1871	12,500,000	1883	21,000,000	1895	28,871,000
1872	13,925,000	1884	19,475,000		

PRODUCTION OF ALL KINDS OF CRUDE STEEL.

Steel was manufactured in a small way in several of the American colonies, either "in the German manner" or by the cementation process. The first steel produced in this country was probably made in Connecticut, in 1728, by Samuel Higley and Joseph Dewey. Crucible steel was first successfully produced in the United States in 1832, at the works of William and John H. Garrard, at Cincinnati, Ohio. Bessemer steel was first made in this country in September, 1864, by William F. Durfee, at an experimental plant at Wyandotte, Michigan, and in 1868 open-hearth steel was first produced in the United States at Trenton, New Jersey, by the New Jersey Steel and Iron Company.

The production of steel in the United States in the census year 1810 is returned at 917 long tons. We have no further steel statistics until the census year 1860, when 11,838 long tons are reported to have been made. No additional steel statistics are of record until 1863, when the total production is estimated to have fallen to 8,075 tons. In 1864 the production is estimated to have been 9,258 tons; in 1865, 13,627 tons; and in 1866, 16,940 tons. From 1867 until 1896 the production of all kinds of crude steel is shown in the table on the next page. Direct castings are included with ingots.

Production of crude steel in the United States from 1867 to 1896.

Year.	Bessemer ingots.	Open-hearth ingots.	Crucible ingots.	All other steel.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1867	2,679	.....	16,964		19,643
1868	7,589	.....	19,197		26,786
1869	10,714	893	19,643		31,250
1870	37,500	1,339	29,911		68,750
1871	40,179	1,785	31,250		73,214
1872	107,239	2,679	26,125	6,911	142,954
1873	152,368	3,125	31,059	12,244	198,796
1874	171,369	6,250	32,436	5,672	215,727
1875	335,283	8,080	35,180	11,256	389,799
1876	469,639	19,187	35,163	9,202	533,191
1877	500,524	22,349	36,098	10,647	569,618
1878	653,773	32,255	38,309	7,640	731,977
1879	829,439	50,259	50,696	4,879	935,273
1880	1,074,262	100,851	64,664	7,558	1,247,335
1881	1,374,247	131,202	80,145	2,720	1,588,314
1882	1,514,687	143,341	75,973	2,691	1,736,692
1883	1,477,345	119,356	71,835	4,999	1,673,535
1884	1,375,531	117,515	53,270	4,563	1,550,879
1885	1,519,430	133,376	57,599	1,515	1,711,920
1886	2,269,190	218,973	71,973	2,367	2,562,503
1887	2,936,033	322,069	75,375	5,594	3,339,071
1888	2,511,161	314,318	70,279	3,682	2,899,440
1889	2,930,204	374,543	75,865	5,120	3,385,732
1890	3,688,871	513,232	71,175	3,793	4,277,071
1891	3,247,417	579,753	72,586	4,484	3,904,240
1892	4,168,435	669,889	84,709	4,548	4,927,581
1893	3,215,686	737,890	63,613	2,806	4,019,995
1894	3,571,313	784,936	51,702	4,081	4,412,032
1895	4,909,128	1,137,182	67,666	858	6,114,834
1896	3,919,906	1,298,700	60,689	2,394	5,281,689

PRODUCTION OF BESSEMER STEEL INGOTS.

The following table shows the yearly production of Bessemer steel ingots in Pennsylvania, Illinois, Ohio, and other States from 1874 to 1896. Direct castings are included with ingots.

Production of Bessemer steel ingots in the United States since 1874.

Year.	Pennsylvania.	Illinois.	Ohio.	Other States.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1874	76,451	55,796	22,334	16,788	171,369
1875	132,477	121,746	37,609	43,451	335,283
1876	230,761	153,538	44,355	40,985	469,639
1877	293,392	99,374	45,470	62,288	500,524
1878	380,787	160,268	57,970	54,748	653,773
1879	459,076	224,089	79,563	66,711	829,439
1880	574,905	271,977	99,799	127,581	1,074,262
1881	754,019	335,503	105,363	179,362	1,374,247
1882	833,599	354,854	98,214	228,020	1,514,687
1883	932,496	244,040	108,929	191,880	1,477,345
1884	920,968	302,739	72,721	79,103	1,375,531
1885	990,213	327,374	101,545	100,298	1,519,430
1886	1,346,051	478,216	199,435	245,488	2,269,190
1887	1,564,683	765,637	232,532	373,181	2,936,033
1888	1,421,990	554,336	258,560	276,275	2,511,161
1889	1,762,094	660,715	295,802	211,593	2,930,204
1890	2,253,057	757,814	361,933	316,067	3,688,871
1891	2,048,330	605,921	333,666	259,500	3,247,417
1892	2,397,984	879,952	409,855	480,644	4,168,435
1893	2,126,220	314,829	348,141	426,496	3,215,686
1894	2,334,548	581,540	363,974	291,251	3,571,313
1895	2,978,924	866,531	719,954	343,719	4,909,128
1896	2,292,814	780,105	568,535	278,452	3,919,906

PRODUCTION OF OPEN-HEARTH STEEL INGOTS.

In the following table is shown the production of open-hearth steel ingots and direct castings in the United States from 1874 to 1896:

Production of open-hearth steel ingots in the United States since 1874.

Year.	Eastern States.	Pennsylvania.	West and South.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1874	4,732	1,518	.....	6,250
1875	2,687	3,786	1,607	8,080
1876	5,433	6,738	7,016	19,187
1877	5,939	6,938	9,472	22,349

Production of open-hearth steel ingots in the United States since 1874—Continued.

Year.	Eastern States.	Pennsylvania.	West and South.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1878	7,346	10,921	13,988	32,255
1879	13,089	17,478	19,692	50,259
1880	20,797	42,860	37,194	100,851
1881	26,429	56,574	48,199	131,202
1882	27,622	60,555	55,164	143,341
1883	18,664	61,904	38,788	119,356
1884	14,911	72,769	29,835	117,515
1885	16,306	84,731	32,339	133,376
1886	20,877	153,700	44,396	218,973
1887	16,466	241,706	63,897	322,069
1888	12,212	255,123	46,983	314,318
1889	17,337	312,225	44,981	374,543
1890	27,635	417,512	68,085	513,232
1891	32,815	472,607	74,331	579,753
1892	38,131	551,010	80,748	669,889
1893	42,350	616,516	79,024	737,890
1894	47,567	659,969	77,400	784,936
1895	68,936	904,352	163,894	1,137,182
1896	80,175	1,009,608	208,917	1,298,700

PRODUCTION OF CRUCIBLE STEEL INGOTS.

In the following table is shown the production of crucible steel ingots in the United States from 1874 to 1896. Direct castings are included.

Production of crucible steel ingots since 1874.

Year.	Pennsylvania.	Other States.	Total.	Year.	Pennsylvania.	Other States.	Total.
	Long tons.	*Long tons.*	*Long tons.*		*Long tons.*	*Long tons.*	*Long tons.*
1874	20,794	11,642	32,436	1886	55,172	16,801	71,973
1875	23,764	11,416	35,180	1887	58,719	16,656	75,375
1876	25,194	9,969	35,163	1888	52,960	17,319	70,279
1877	24,985	11,113	36,098	1889	56,592	19,273	75,865
1878	27,308	11,001	38,309	1890	54,009	17,166	71,175
1879	38,941	11,755	50,696	1891	53,716	18,870	72,586
1880	50,961	13,703	64,664	1892	64,834	19,875	84,709
1881	59,188	20,957	80,145	1893	51,704	11,909	63,613
1882	58,160	17,813	75,973	1894	39,257	12,445	51,702
1883	56,863	14,972	71,835	1895	49,889	17,777	67,666
1884	37,764	15,506	53,270	1896	43,107	17,582	60,689
1885	40,883	16,716	57,599				

PRODUCTION OF ALL KINDS OF RAILS.

The following table shows the production of all kinds of rails in the United States, by years, from 1867 to 1896:

Production of all kinds of rails.

Year.	Bessemer steel rails.	Open-hearth steel rails.	Total steel rails.	Iron rails.	Total iron and steel rails.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1867	2,277	.....	2,277	410,319	412,596
1868	6,451	.....	6,451	445,972	452,423
1869	8,616	.....	8,616	521,372	529,988
1870	30,357	.....	30,357	523,214	553,571
1871	34,152	.....	34,152	658,467	692,619
1872	83,991	.....	83,991	808,866	892,857
1873	115,192	.....	115,192	679,520	794,712
1874	129,414	.....	129,414	521,848	651,262
1875	259,699	.....	259,699	447,901	707,600
1876	368,269	.....	368,269	417,114	785,383
1877	385,865	.....	385,865	296,911	682,776
1878	491,427	8,390	499,817	288,295	788,112
1879	610,682	8,168	618,850	375,143	993,993
1880	852,196	12,157	864,353	440,859	1,305,212
1881	1,187,770	22,515	1,210,285	436,233	1,646,518
1882	1,284,067	20,325	1,304,392	203,459	1,507,851
1883	1,148,709	8,202	1,156,911	57,994	1,214,905
1884	996,983	2,384	999,367	22,821	1,022,188
1885	959,471	4,279	963,750	13,228	976,978
1886	1,574,703	4,692	1,579,395	21,142	1,600,537
1887	2,101,904	17,145	2,119,049	20,591	2,139,640
1888	1,386,277	4,698	1,390,975	12,725	1,403,700
1889	1,510,057	2,988	1,513,045	9,159	1,522,204
1890	1,867,837	3,588	1,871,425	13,882	1,885,307
1891	1,293,053	5,883	1,298,936	8,240	1,307,176
1892	1,537,588	3,819	1,541,407	10,437	1,551,844
1893	1,129,400	968	1,130,368	6,090	1,136,458
1894	1,016,013	1,085	1,017,098	4,674	1,021,772
1895	1,299,628	697	1,300,325	5,810	1,306,135
1896	1,116,958	705	1,117,663	4,347	1,122,010

PRODUCTION OF BESSEMER STEEL RAILS.

The manufacture of Bessemer steel rails in the United States as a commercial product dates from 1867, although they had been made experimentally in the two preceding years. The first Bessemer steel rails ever made in this country were rolled at the Chicago Rolling Mill, Chicago, Illinois, on May 24, 1865, from ingots made at the experimental steel works at Wyandotte, Michigan. Some of the rails were still in use in 1875. The following table gives the production of Bessemer steel rails by States in the United States from 1874 to 1896:

Production of Bessemer steel rails.

Year.	Pennsylvania.	Illinois.	Other States.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1874	59,734	43,107	26,573	129,414
1875	100,753	99,276	59,670	259,699
1876	181,920	119,387	66,962	368,269
1877	223,688	79,928	82,249	385,865
1878	275,083	128,380	87,964	491,427
1879	328,738	176,680	105,264	610,682
1880	442,604	229,984	179,608	852,196
1881	614,532	309,172	264,066	1,187,770
1882	678,146	300,109	305,812	1,284,067
1883	731,736	206,567	210,406	1,148,709
1884	681,449	259,094	56,440	996,983
1885	657,609	275,216	26,646	959,471
1886	992,117	384,799	197,787	1,574,703
1887	1,140,040	650,470	311,394	2,101,904
1888	830,482	436,285	119,510	1,386,277
1889	1,019,062	466,120	24,875	1,510,057
1890	1,312,937	524,587	30,313	1,867,837
1891	901,159	364,725	27,169	1,293,053
1892	961,987	450,553	125,048	1,537,588
1893	728,231	233,697	167,472	1,129,400
1894	714,935	226,306	74,772	1,016,013
1895	864,499	327,618	107,511	1,299,628
1896	674,096	311,347	131,515	1,116,958

PRODUCTION OF STREET RAILS.

Included in the rail statistics given two pages back is the production of street and electric rails from 1874 to 1896, as follows:

Production of street rails.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1874....	6,017	1882.....	19,898	1890.....	98,529
1875....	14,589	1883.....	17,357	1891.....	81,302
1876....	11,684	1884.....	27,997	1892.....	111,580
1877....	6,263	1885.....	32,134	1893.....	133,423
1878....	8,240	1886.....	42,865	1894.....	157,457
1879....	7,720	1887.....	51,216	1895.....	163,109
1880....	15,084	1888.....	44,951	1896.....	145,210
1881....	19,245	1889.....	70,120		

PRODUCTION AND CONSUMPTION OF RAILS.

The consumption of rails in the United States is approximately ascertained by adding the quantity imported to the total production. The following table gives the approximate consumption, in long tons, of all kinds of rails from 1867 to 1896, no allowance being made for the small quantity of rails exported prior to 1890. Including that year all exports have since been deducted:

Production and consumption of all kinds of rails.

Year.	Production.			Importation.	Consumption.
	Iron.	Steel.	Total.		
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1867.....	410,319	2,277	412,596	145,580	558,176
1868.....	445,972	6,451	452,423	223,287	675,710
1869.....	521,372	8,616	529,988	279,609	809,597
1870.....	523,214	30,357	553,571	356,387	909,958
1871.....	658,467	34,152	692,619	505,537	1,198,156
1872.....	808,866	83,991	892,857	473,973	1,366,830
1873.....	679,520	115,192	794,712	231,046	1,025,758
1874.....	521,848	129,414	651,262	96,706	747,968
1875.....	447,901	259,699	707,600	17,364	724,964
1876.....	417,114	368,269	785,383	256	785,639
1877.....	296,911	385,865	682,776	31	682,807
1878.....	288,295	499,817	788,112	9	788,121
1879.....	375,143	618,850	993,993	39,417	1,033,410
1880.....	440,859	864,353	1,305,212	259,543	1,564,755

Production and consumption of all kinds of rails—Continued.

Year.	Production.			Importation.	Consumption.
	Iron.	Steel.	Total.		
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1881	436, 233	1, 210, 285	1, 646, 518	344, 929	1, 991, 447
1882	203, 459	1, 304, 392	1, 507, 851	200, 113	1, 707, 964
1883	57, 994	1, 156, 911	1, 214, 905	34, 801	1, 249, 706
1884	22, 821	999, 367	1, 022, 188	2, 829	1, 025, 017
1885	13, 228	963, 750	976, 978	2, 189	979, 167
1886	21, 142	1, 579, 395	1, 600, 537	41, 587	1, 642, 124
1887	20, 591	2, 119, 049	2, 139, 640	137, 830	2, 277, 470
1888	12, 725	1, 390, 975	1, 403, 700	63, 037	1, 466, 737
1889	9, 159	1, 513, 045	1, 522, 204	6, 217	1, 528, 421
1890	13, 882	1, 871, 425	1, 885, 307	204	1, 868, 564
1891	8, 240	1, 298, 936	1, 307, 176	253	1, 296, 190
1892	10, 437	1, 541, 407	1, 551, 844	347	1, 544, 209
1893	6, 090	1, 130, 368	1, 136, 458	2, 888	1, 119, 470
1894	4, 674	1, 017, 098	1, 021, 772	300	1, 008, 516
1895	5, 810	1, 300, 325	1, 306, 135	1, 447	1, 291, 983
1896	4, 347	1, 117, 663	1, 122, 010	7, 796	1, 056, 675

The year of largest consumption of rails was 1887, which was also the year of largest production. It was also the year of largest mileage of new railroad construction in the United States, 12,984 miles of new railroad having been built in that year. The decline in the production and consumption of rails in the United States in recent years is primarily due to the great decline which has taken place in railroad construction. More than one-half of the rails annually produced in late years have been used for repairs and extensions of the tracks of steam railroads and for street and electric lines.

The heavy decline in the imports of rails from 1873 to 1879 was caused by the panic of 1873 and the business depression which followed and continued until 1879. The almost complete cessation of the imports of rails since 1887 is due chiefly to the cheapening of the prices of domestic rails.

COMPARATIVE PRODUCTION OF BESSEMER STEEL INGOTS AND RAILS IN THE UNITED STATES AND GREAT BRITAIN.

The production of Bessemer steel ingots (including Clapp-Griffiths steel) and of Bessemer steel rails in the United States from 1867 to 1896, and in Great Britain during a large part of the same period, was as follows, in long tons:

Comparative production of Bessemer steel ingots and rails in the United States and Great Britain.

Year.	United States.		Great Britain.	
	Ingots.	Rails.	Ingots.	Rails.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1867	2,679	2,277	.....	.....
1868	7,589	6,451	110,000	.....
1869	10,714	8,616	160,000	.....
1870	37,500	30,357	215,000	.....
1871	40,179	34,152	329,000	.....
1872	107,239	83,991	410,000	.....
1873	152,368	115,192	496,000	.....
1874	171,369	129,414	540,000	.....
1875	335,283	259,699	620,000	.....
1876	469,639	368,269	700,000	400,000
1877	500,524	385,865	750,000	508,400
1878	653,773	491,427	807,527	622,390
1879	829,439	610,682	834,511	520,231
1880	1,074,262	852,196	1,044,382	732,910
1881	1,374,247	1,187,770	1,441,719	1,023,740
1882	1,514,687	1,284,067	1,673,649	1,235,785
1883	1,477,345	1,148,709	1,553,380	1,097,174
1884	1,375,531	996,983	1,299,676	784,968
1885	1,519,430	959,471	1,304,127	706,583
1886	2,269,190	1,574,703	1,570,520	730,343
1887	2,936,033	2,101,904	2,089,403	1,021,847
1888	2,511,161	1,386,277	2,032,794	979,083
1889	2,930,204	1,510,057	2,140,791	943,048
1890	3,688,871	1,867,837	2,014,843	1,019,606
1891	3,247,417	1,293,053	1,642,005	662,676
1892	4,168,435	1,537,588	1,500,810	535,836
1893	3,215,686	1,129,400	1,493,454	579,386
1894	3,571,313	1,016,013	1,535,384	598,530
1895	4,909,128	1,299,628	1,535,225	604,338
1896	3,919,906	1,116,958	1,815,842	817,476

COMPARATIVE PRODUCTION OF OPEN-HEARTH STEEL INGOTS IN THE UNITED STATES AND GREAT BRITAIN.

The following table gives, in long tons, the production of open-hearth steel ingots in the United States from 1869 to 1896 and in Great Britain from 1873 to 1896:

Comparative production of open-hearth steel ingots in the United States and Great Britain.

Year.	United States.	Great Britain.	Year.	United States.	Great Britain.
	Ingots.	Ingots.		Ingots.	Ingots.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
1869....	893	.....	1883...	119, 356	455, 500
1870....	1, 339	.....	1884...	117, 515	475, 250
1871....	1, 785	.....	1885...	133, 376	583, 918
1872....	2, 679	.....	1886...	218, 973	694, 150
1873....	3, 125	77, 500	1887...	322, 069	981, 104
1874....	6, 250	90, 500	1888...	314, 318	1, 292, 742
1875....	8, 080	88, 000	1889...	374, 543	1, 429, 169
1876....	19, 187	128, 000	1890...	513, 232	1, 564, 200
1877....	22, 349	137, 000	1891...	579, 753	1, 514, 538
1878....	32, 255	175, 500	1892...	669, 889	1, 418, 830
1879....	50, 259	175, 000	1893...	737, 890	1, 456, 309
1880....	100, 851	251, 000	1894...	784, 936	1, 575, 318
1881....	131, 202	338, 000	1895...	1, 137, 182	1, 754, 737
1882....	143, 341	436, 000	1896...	1, 298, 700	2, 317, 555

TOTAL PRODUCTION OF ALL KINDS OF CRUDE STEEL IN THE UNITED STATES AND GREAT BRITAIN.

The following table gives, in long tons, the production of all kinds of crude steel in the United States from 1867 to 1896 and in Great Britain from 1873 to 1896. Until the last few years a very active rivalry in the total production of steel existed between the United States and Great Britain. In 1886 and 1887 the total production in the United States for the first time exceeded that of Great Britain, but in 1888 and 1889 the United States fell to the second place. In 1890 it again took the first place, and is now far in the lead:

Total production of all kinds of crude steel in the United States and Great Britain.

Year.	United States.	Great Britain.	Year.	United States.	Great Britain.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
1867....	19, 643	.....	1882...	1, 736, 692	2, 189, 649
1868....	26, 786	.....	1883...	1, 673, 535	2, 088, 880
1869....	31, 250	.....	1884...	1, 550, 879	1, 854, 926
1870....	68, 750	.....	1885...	1, 711, 920	1, 968, 045
1871....	73, 214	.....	1886...	2, 562, 503	2, 344, 670
1872....	142, 954	.....	1887...	3, 339, 071	3, 150, 507
1873....	198, 796	653, 500	1888...	2, 899, 440	3, 405, 536
1874....	215, 727	710, 500	1889...	3, 385, 732	3, 669, 960
1875....	389, 799	788, 000	1890...	4, 277, 071	3, 679, 043
1876....	533, 191	908, 000	1891...	3, 904, 240	3, 256, 543
1877....	569, 618	967, 000	1892...	4, 927, 581	3, 019, 640
1878....	731, 977	1, 063, 027	1893...	4, 019, 995	3, 049, 763
1879....	935, 273	1, 089, 511	1894...	4, 412, 032	3, 210, 702
1880....	1, 247, 335	1, 375, 382	1895...	6, 114, 834	3, 389, 962
1881....	1, 588, 314	1, 859, 719	1896...	5, 281, 689	4, 233, 397

THE WORLD'S PRODUCTION OF STEEL.

The following table, which has been compiled from the most reliable information obtainable, gives the world's production of steel from 1877 to 1895:

World's production of steel from 1877 to 1895.

Year.	Tons.	Year.	Tons.	Year.	Tons.
1877....	2, 400, 000	1884.....	5, 743, 000	1891.....	11, 891, 000
1878....	3, 021, 000	1885.....	6, 147, 000	1892.....	12, 998, 000
1879....	3, 375, 000	1886.....	7, 504, 000	1893.....	12, 750, 000
1880....	4, 274, 000	1887.....	9, 688, 000	1894.....	14, 039, 000
1881....	5, 387, 000	1888.....	9, 783, 000	1895.....	16, 449, 000
1882....	6, 095, 000	1889.....	10, 948, 000		
1883....	6, 088, 000	1890.....	12, 231, 000		

PRODUCTION OF ALL KINDS OF ROLLED IRON.

Hammered or forged products are not included in the following table. Complete statistics of rolled steel were not collected until 1887.

Production of all kinds of rolled iron in the United States from 1856 to 1886.

Year.	Iron rails.	All other rolled iron.	Total.
	Long tons.	*Long tons.*	*Long tons.*
1856	160, 730	355, 525	516, 255
1864	299, 436	479, 427	778, 863
1865	318, 118	446, 471	764, 589
1866	384, 623	531, 528	916, 151
1867	410, 319	517, 713	928, 032
1868	445, 972	534, 185	980, 157
1869	521, 372	573, 589	1, 094, 961
1870	523, 214	629, 465	1, 152, 679
1871	658, 467	633, 929	1, 292, 396
1872	808, 866	841, 064	1, 649, 930
1873	679, 520	961, 043	1, 640, 563
1874	521, 848	991, 202	1, 513, 050
1875	447, 901	980, 238	1, 428, 139
1876	417, 114	930, 448	1, 347, 562
1877	296, 911	1, 021, 624	1, 318, 535
1878	288, 295	1, 100, 612	1, 388, 907
1879	375, 143	1, 452, 968	1, 828, 111
1880	440, 859	1, 641, 880	2, 082, 739
1881	436, 233	1, 924, 416	2, 360, 649
1882	203, 459	2, 023, 176	2, 226, 635
1883	57, 994	2, 039, 214	2, 097, 208
1884	22, 821	1, 724, 775	1, 747, 596
1885	13, 228	1, 597, 956	1, 611, 184
1886	21, 142	2, 017, 806	2, 038, 948

PRODUCTION OF ROLLED IRON AND STEEL.

The total production of rolled iron and steel in the United States from 1887 to 1896 is given in detail in the following table. In 1887 the production of wire rods was not ascertained separately, and it is therefore included for that year with bars, hoops, skelp, and shapes.

Production of rolled iron and steel in the United States from 1887 to 1896.

Year.	Iron and steel rails.	Bars, hoops, skelp, and shapes.	Wire rods.	Plates and sheets, except nail plate.	Cut nails.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1887....	2, 139, 640	2, 184, 279	.....	603, 555	308, 432	5, 235, 706
1888....	1, 403, 700	2, 034, 162	279, 769	609, 827	289, 891	4, 617, 349
1889....	1, 522, 204	2, 374, 968	363, 851	716, 496	259, 409	5, 236, 928
1890....	1, 885, 307	2, 618, 660	457, 099	809, 981	251, 828	6, 022, 875
1891....	1, 307, 176	2, 644, 941	536, 607	678, 927	223, 312	5, 390, 963
1892....	1, 551, 844	3, 033, 439	627, 829	751, 460	201, 242	6, 165, 814
1893....	1, 136, 458	2, 491, 497	537, 272	674, 345	136, 113	4, 975, 685
1894....	1, 021, 772	2, 155, 875	673, 402	682, 900	108, 262	4, 642, 211
1895....	1, 306, 135	3, 005, 765	791, 130	991, 459	95, 085	6, 189, 574
1896....	1, 122, 010	2, 731, 932	623, 986	965, 776	72, 137	5, 515, 841

COMPARATIVE PRODUCTION OF ROLLED IRON AND STEEL.

The following table gives the total production of all kinds of rolled steel in the United States in the years 1888, 1889, and 1890, compared with the total production of all kinds of rolled iron in the same period. Previous to 1888 statistics of the production of rolled steel, as classified in the table, were not collected, and after 1890 rolled steel was not separated from rolled iron.

Comparative production of rolled iron and steel in the United States in 1888, 1889, and 1890.

Articles.	1888.		1889.		1890.	
	Iron.	Steel.	Iron.	Steel.	Iron.	Steel.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Rails.....	12, 725	1, 390, 975	9, 159	1, 513, 045	13, 882	1, 871, 425
Cut nails.....	96, 879	193, 012	79, 378	180, 031	80, 631	171, 197
Plates and sheets.	419, 029	190, 798	420, 708	295, 788	451, 466	358, 515
Wire rods.....	13, 010	266, 759	12, 911	350, 940	17, 677	439, 422
Other rolled.....	1, 611, 620	422, 542	1, 787, 116	587, 852	1, 954, 538	664, 122
Total	2, 153, 263	2, 464, 086	2, 309, 272	2, 927, 656	2, 518, 194	3, 504, 681

PRODUCTION OF IRON RAILS.

Prior to 1867 all rails produced in the United States were made of iron. The following table shows the total production since 1849:

Production of iron rails in the United States from 1849 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1849	21, 712	1865	318, 118	1881	436, 233
1850	39, 360	1866	384, 623	1882	203, 459
1851	45, 181	1867	410, 319	1883	57, 994
1852	55, 784	1868	445, 972	1884	22, 821
1853	78, 450	1869	521, 372	1885	13, 228
1854	96, 443	1870	523, 214	1886	21, 142
1855	123, 816	1871	658, 467	1887	20, 591
1856	160, 730	1872	808, 866	1888	12, 725
1857	144, 570	1873	679, 520	1889	9, 159
1858	146, 171	1874	521, 848	1890	13, 882
1859	174, 513	1875	447, 901	1891	8, 240
1860	183, 070	1876	417, 114	1892	10, 437
1861	169, 480	1877	296, 911	1893	6, 090
1862	190, 993	1878	288, 295	1894	4, 674
1863	246, 221	1879	375, 143	1895	5, 810
1864	299, 436	1880	440, 859	1896	4, 347

PRODUCTION OF TIN PLATES.

The following table gives the production of tin plates and terne plates in the United States in the fiscal years from July 1, 1891, to June 30, 1896:

Production of tin plates and terne plates.

Articles.	1892.	1893.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Tin plates	4, 539, 590	45, 743, 107	81, 609, 765	120, 327, 949	212, 589, 181
Terne plates	9, 107, 129	54, 076, 095	57, 613, 702	73, 473, 124	94, 639, 440
Total	13, 646, 719	99, 819, 202	139, 223, 467	193, 801, 073	307, 228, 621

IMPORTS OF TIN PLATES.

The following table gives the quantities and foreign values of the tin plates imported into the United States in the calendar years from 1871 to 1896:

Imports of tin plates into the United States, by years, since 1871.

Year.	Long tons.	Value.	Year.	Long tons.	Value.
1871....	82, 969	$9, 946, 373	1884.....	216, 181	$16, 858, 650
1872....	85, 629	13, 893, 450	1885.....	228, 596	15, 991, 152
1873....	97, 177	14, 240, 868	1886.....	257, 822	17, 504, 976
1874....	79, 778	13, 057, 658	1887.....	283, 836	18, 699, 145
1875....	91, 054	12, 098, 885	1888.....	298, 238	19, 762, 961
1876....	89, 946	9, 416, 816	1889.....	331, 311	21, 726, 707
1877....	112, 479	10, 679, 028	1890.....	329, 435	23, 670, 158
1878....	107, 864	9, 069, 967	1891.....	327, 882	25, 900, 305
1879....	154, 250	13, 227, 659	1892.....	268, 472	17, 102, 487
1880....	158, 049	16, 478, 110	1893.....	253, 155	15, 559, 423
1881....	183, 005	14, 886, 907	1894.....	215, 068	12, 053, 167
1882....	213, 987	17, 975, 161	1895.....	219, 545	11, 482, 380
1883....	221, 233	18, 156, 773	1896.....	119, 171	6, 140, 161

PRODUCTION OF CUT NAILS.

The production of iron and steel cut nails in the United States, not including wire nails, has been as follows, from 1856 to 1896, in kegs of 100 pounds:

Production of cut nails in the United States, by years, since 1856.

Year.	Kegs.	Year.	Kegs.	Year.	Kegs.
1856....	1, 824, 749	1880.....	5, 370, 512	1889.....	5, 810, 758
1872....	4, 065, 322	1881.....	5, 794, 206	1890.....	5, 640, 946
1873....	4, 024, 704	1882.....	6, 147, 097	1891.....	5, 002, 176
1874....	4, 912, 180	1883.....	7, 762, 737	1892.....	4, 507, 819
1875....	4, 726, 881	1884.....	7, 581, 379	1893.....	3, 048, 933
1876....	4, 157, 814	1885.....	6, 696, 815	1894.....	2, 425, 060
1877....	4, 828, 918	1886.....	8, 160, 973	1895.....	2, 129, 894
1878....	4, 396, 130	1887.....	6, 908, 870	1896.....	1, 615, 870
1879....	5, 011, 021	1888.....	6, 493, 591		

PRODUCTION OF WIRE NAILS.

The estimated production of iron and steel wire nails in the United States in 1886 was 600,000 kegs, in 1887 1,250,000 kegs, and in 1888 1,500,000 kegs. The production by States since 1889 has been definitely ascertained as follows; in kegs of 100 pounds:

Production of wire nails in the United States, by years, since 1889.

Year.	New England.	New York and New Jersey.	Pennsylvania.	Ohio.	Indiana and Illinois.	Other States.	Total.
	Kegs.	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*	*Kegs.*
1889..	110,000	170,000	816,000	944,000	46,000	349,000	2,435,000
1890..	167,135	168,460	1,061,639	1,115,320	47,507	575,850	3,135,911
1891..	193,668	128,159	1,460,252	1,659,396	381,950	290,960	4,114,385
1892..	107,477	91,470	1,676,684	1,800,742	796,406	246,745	4,719,524
1893..	129,108	147,930	2,177,495	1,556,160	802,106	283,146	5,095,945
1894..	121,283	78,043	2,396,482	1,830,000	950,507	305,486	5,681,801
1895..	168,365	144,657	2,129,951	1,534,690	1,479,465	384,275	5,841,403
1896..	189,981	201,652	1,579,946	907,983	1,391,910	448,388	4,719,860

The "other States" which manufactured wire nails in 1896 were Maryland, West Virginia, Wisconsin, Missouri, Kansas, Washington, and California.

IMPORTS OF IRON AND STEEL.

In the following table the total quantities of imported pig, bar, band, plate and sheet iron, rails, old iron, and tin plates are given for every year mentioned, and for 1884 and succeeding years the weight of other iron and steel which were not collected for preceding years is added. In none of the years named, however, is the weight of machinery, hardware, cutlery, firearms, and similar manufactured products included. The years mentioned are calendar years.

Imports of iron and steel into the United States, by years, since 1871.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1871....	1,141,933	1880.....	1,886,019	1889.....	748,550
1872....	1,183,066	1881.....	1,180,749	1890.....	665,771
1873....	640,858	1882.....	1,192,296	1891.....	557,882
1874....	301,647	1883.....	694,330	1892.....	494,468
1875....	239,712	1884.....	654,696	1893.....	438,495
1876....	204,211	1885.....	578,478	1894.....	309,249
1877....	211,408	1886.....	1,098,565	1895.....	378,208
1878....	211,102	1887.....	1,783,256	1896.....	265,500
1879....	769,984	1888.....	914,940		

FOREIGN VALUES OF IMPORTS OF IRON AND STEEL.

The following table gives the foreign values of all our imports of iron and steel, including firearms, hardware, machinery, cutlery, etc., in the calendar years from 1871 to 1896:

Foreign values of imports of iron and steel since 1871.

Year.	Value.	Year.	Value.	Year.	Value.
1871..	$57, 866, 299	1880...	$80, 443, 362	1889...	$42, 027, 742
1872..	75, 617, 677	1881...	61, 555, 077	1890...	44, 540, 413
1873..	60, 005, 538	1882...	67, 075, 125	1891...	41, 983, 626
1874..	37, 652, 192	1883...	47, 506, 306	1892...	33, 882, 447
1875..	27, 363, 101	1884...	37, 078, 122	1893...	29, 656, 539
1876..	20, 016, 603	1885...	31, 144, 552	1894...	20, 843, 576
1877..	19, 874, 399	1886...	41, 630, 779	1895...	25, 772, 136
1878..	18, 013, 010	1887...	56, 420, 607	1896...	19, 506, 587
1879..	33, 331, 569	1888...	42, 311, 689		

EXPORTS OF IRON AND STEEL.

The following table gives the total value of our exports of iron and steel and manufactures thereof in the calendar years from 1871 to 1896. These exports embrace chiefly machinery, builders' hardware, sewing machines, saws, tools, locomotives, firearms, scales and balances, pig iron, steel rails, wire, miscellaneous castings, and engines and boilers, but do not include agricultural implements.

Exports of iron and steel from the United States, by years, since 1871.

Year.	Value.	Year.	Value.	Year.	Value.
1871..	$14, 185, 359	1880...	$15, 156, 703	1889...	$23, 712, 814
1872..	12, 595, 539	1881...	18, 216, 121	1890...	27, 000, 134
1873..	14, 173, 772	1882...	22, 348, 834	1891...	30, 736, 507
1874..	17, 312, 239	1883...	22, 716, 040	1892...	27, 900, 862
1875..	17, 976, 833	1884...	19, 290, 895	1893...	30, 159, 363
1876..	13, 641, 724	1885...	16, 622, 511	1894...	29, 943, 729
1877..	18, 549, 922	1886...	14, 865, 087	1895...	35, 071, 563
1878..	15, 101, 899	1887...	16, 235, 922	1896...	48, 670, 218
1879..	14, 223, 646	1888...	19, 578, 489		

IMPORTS OF IRON ORE.

The following table gives the imports of iron ore for consumption in the United States in the fiscal years from June 30, 1871, to June 30, 1879, and the total imports in the calendar years from January 1, 1879, to December 31, 1896. In 1879 this country for the first time imported iron ore largely from Europe. Prior to that year such iron ore as was imported came chiefly from Canada. This was notably the case in 1873, 1874, and 1875, in which years more than one-half the iron ore imported came from Canadian mines.

Imports of iron ore into the United States since 1872.

Fiscal year.	Long tons.	Calendar year.	Long tons.	Calendar year.	Long tons.
1872....	23,733	1880.....	493,408	1889.....	853,573
1873....	45,981	1881.....	782,887	1890.....	1,246,830
1874....	57,987	1882.....	589,655	1891.....	912,856
1875....	56,655	1883.....	490,875	1892.....	806,585
1876....	17,284	1884.....	487,820	1893.....	526,951
1877....	30,669	1885.....	390,786	1894.....	168,541
1878....	28,212	1886.....	1,039,433	1895.....	524,153
1879 *a* ..	150,197	1887.....	1,194,301	1896.....	682,806
1879 *b* ..	284,141	1888.....	587,470		

a Ending June 30. *b* Calendar year.

SHIPMENTS OF IRON ORE FROM CUBA TO THE UNITED STATES.

The first shipment of iron ore from Cuba to the United States was made by the Juragua Iron Company in August, 1884. In October, 1892, the Sigua Iron Company commenced to ship iron ore from Cuba to the United States, 7,830 long tons being shipped by this company in 1892 and 14,022 tons in 1893. In 1895 the Spanish-American Iron Company commenced to ship iron ore from Cuba to the United States, its shipments amounting to 74,992 tons in 1895 and to 111,584 tons in 1896. The imports of Cuban iron ore into the United States from August, 1884, to the close of 1896 were as follows. They are included in the total imports of iron ore given above.

Iron ore shipped from Cuba to the United States since 1884.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1884....	21,798	1889.....	256,278	1894.....	150,439
1885....	81,106	1890.....	362,068	1895.....	386,044
1886....	111,710	1891.....	266,377	1896.....	409,883
1887....	97,711	1892.....	330,357		
1888....	198,048	1893.....	362,685		

RAILROAD MILEAGE IN THE UNITED STATES.

The number of miles of railroad in operation in the United States in each calendar year from 1830 to 1895, not including street railways, is given below, allowance being made for abandoned mileage. The length of the railroad lines only is given, without regard to the number of tracks or miles of sidings.

Railroad mileage in the United States, by years, from 1830 to 1895.

Year.	Miles in operation.	Net increase.	Year.	Miles in operation.	Net increase.
1830	23	.....	1863	33,170	1,050
1831	95	72	1864	33,908	738
1832	229	134	1865	35,085	1,177
1833	380	151	1866	36,801	1,716
1834	633	253	1867	39,250	2,449
1835	1,098	465	1868	42,229	2,979
1836	1,273	175	1869	46,844	4,615
1837	1,497	224	1870	52,922	6,078
1838	1,913	416	1871	60,293	7,379
1839	2,302	389	1872	66,171	5,878
1840	2,818	516	1873	70,268	4,097
1841	3,535	717	1874	72,385	2,117
1842	4,026	491	1875	74,096	1,711
1843	4,185	159	1876	76,808	2,712
1844	4,377	192	1877	79,088	2,280
1845	4,633	256	1878	81,767	2,679
1846	4,930	297	1879	86,584	4,817
1847	5,598	668	1880	93,296	6,712
1848	5,996	398	1881	103,143	9,847
1849	7,365	1,369	1882	114,712	11,569
1850	9,021	1,656	1883	121,455	6,743
1851	10,982	1,961	1884	125,379	3,924
1852	12,908	1,926	1885	128,361	2,982
1853	15,360	2,452	1886	136,379	8,018
1854	16,720	1,360	1887	149,257	12,878
1855	18,374	1,654	1888	156,169	6,912
1856	22,016	3,642	1889	161,353	5,184
1857	24,503	2,487	1890	166,698	5,345
1858	26,968	2,465	1891	170,769	4,071
1859	28,789	1,821	1892	175,188	4,419
1860	30,626	1,837	1893	177,465	2,277
1861	31,286	660	1894	179,393	1,928
1862	32,120	834	1895	181,021	1,628

ANNUAL NEW RAILROAD MILEAGE SINCE 1880.

The following table gives the mileage of new railroad actually constructed in the United States in each year from 1880 to 1895, the figures denoting only the length of the railroad lines, without regard to the number of tracks or miles of siding:

Miles of new railroad annually built in the United States from 1880 to 1895.

Year.	Miles.	Year.	Miles.	Year.	Miles.
1880	7,174	1886	8,128	1892	4,584
1881	9,779	1887	12,984	1893	2,789
1882	11,599	1888	7,066	1894	2,264
1883	6,819	1889	5,700	1895	1,922
1884	3,974	1890	5,657		
1885	3,131	1891	4,620		

MILES OF IRON AND STEEL RAILS IN USE.

The following table gives the number of miles of steam-railroad track in the United States from 1880 to the end of 1895 which had been laid with steel rails and iron rails. In the figures given all tracks of steam railroads are included; also, with the exception of 1895, the tracks of elevated railroads.

Miles of steel and iron rails in use on steam railroads in the United States since 1880.

Year.	Miles of steel rails.	Miles of iron rails.	Total miles.	Percentage of steel rails.
1880	33,680	81,967	115,647	29.1
1881	49,063	81,473	130,536	37.5
1882	66,691	74,269	140,960	47.3
1883	78,491	70,692	149,183	52.7
1884	90,243	66,254	156,497	57.6
1885	98,102	62,495	160,597	61.0
1886	105,724	62,324	168,048	62.9
1887	125,459	59,588	185,047	67.7
1888	138,516	52,981	191,497	72.3
1889	151,723	50,513	202,236	75.0
1890	167,606	40,697	208,303	80.4
1891	174,931	39,756	214,687	81.5
1892	182,858	38,641	221,499	82.6
1893	191,857	37,155	229,012	83.8
1894	197,653	35,266	232,919	84.8
1895	206,546	28,652	235,198	87.8

IRON AND STEEL VESSELS BUILT SINCE 1868.

The following table gives the number and gross tonnage of all iron and steel vessels, except those for the Navy, built in the United States in the fiscal years from 1868 to 1896. Nearly all were steam vessels.

Number and tonnage of iron and steel vessels built in the United States since 1868.

Fiscal year.	No.	Tons.	Fiscal year.	No.	Tons.	Fiscal year.	No.	Tons.
1868....	....	2,801	1878.....	32	26,960	1888...	43	36,719
1869....	....	4,584	1879.....	24	22,008	1889...	48	53,513
1870....	....	8,281	1880.....	31	25,582	1890...	63	80,378
1871....	....	15,479	1881.....	42	28,392	1891...	76	105,618
1872....	20	12,766	1882.....	43	40,097	1892...	55	51,374
1873....	26	26,548	1883.....	35	39,646	1893...	65	94,532
1874....	23	33,097	1884.....	34	35,631	1894...	39	51,470
1875....	20	21,632	1885.....	48	44,028	1895...	43	48,594
1876....	25	21,346	1886.....	26	14,908	1896...	60	113,220
1877....	7	5,927	1887.....	29	34,354			

VALUE OF PIG IRON MADE IN THE UNITED STATES.

For 1880 the figures given in the following table are for the census year ending on May 31; for the remainder of the table they are for calendar years.

Value of pig iron produced in the United States from 1880 to 1896.

Year.	Production.	Value.	Year.	Production.	Value.
	Long tons.			*Long tons.*	
1880..	3,375,912	$89,315,569	1889...	7,603,642	$120,000,000
1881..	4,144,254	87,029,334	1890...	9,202,703	151,200,410
1882..	4,623,323	106,336,429	1891...	8,279,870	128,337,985
1883..	4,595,510	91,910,200	1892...	9,157,000	131,161,039
1884..	4,097,868	73,761,624	1893...	7,124,502	84,810,426
1885..	4,044,526	64,712,400	1894...	6,657,388	65,007,247
1886..	5,683,329	95,195,760	1895...	9,446,308	105,198,550
1887..	6,417,148	121,925,800	1896...	8,623,127	90,250,000
1888..	6,489,738	107,000,000			

PRICES OF PIG IRON.

The following table shows the average annual prices of standard grades of pig iron in the United States since 1842:

Average prices per long ton of pig iron in the United States from 1842 to 1896.

Year.	No. 1 foundry pig iron, at Philadelphia.	Year.	No. 1 foundry pig iron, at Philadelphia.	Gray forge pig iron, at Philadelphia.	Gray forge pig iron, lake ore, at Pittsburg.	Bessemer pig iron, at Pittsburg.
1842	$25.60	1870	$33.25	.....	.....	.....
1844	25.75	1871	35.12	.....	.....	.....
1845	29.25	1872	48.88	.....	.....	.....
1846	27.88	1873	42.75	.....	$35.80	.....
1847	30.25	1874	30.25	.....	27.16	.....
1848	26.50	1875	25.50	.....	23.67	.....
1849	22.75	1876	22.25	.....	21.74	.....
1850	20.88	1877	18.88	.....	20.60	.....
1851	21.38	1878	17.63	.....	18.09	.....
1852	22.63	1879	21.50	.....	22.15	.....
1853	36.12	1880	28.50	.....	27.98	.....
1854	36.88	1881	25.12	.....	22.94	.....
1855	27.75	1882	25.75	$22.60	23.84	.....
1856	27.12	1883	22.38	19.33	19.04	.....
1857	26.38	1884	19.88	17.71	17.17	.....
1858	22.25	1885	18.00	15.58	15.27	.....
1859	23.38	1886	18.71	16.40	16.58	$18.96
1860	22.75	1887	20.92	17.79	19.02	21.37
1861	20.25	1888	18.88	16.21	15.99	17.38
1862	23.88	1889	17.75	15.48	15.37	18.00
1863	35.25	1890	18.40	15.82	15.78	18.85
1864	59.25	1891	17.52	14.52	14.06	15.95
1865	46.12	1892	15.75	13.54	12.81	14.37
1866	46.88	1893	14.52	12.73	11.77	12.87
1867	44.12	1894	12.66	10.73	9.75	11.38
1868	39.25	1895	13.10	11.49	10.94	12.72
1869	40.63	1896	12.95	11.09	10.39	12.14

PRICES OF CHARCOAL PIG IRON.

From 1799 to 1827 the prices given in the following table are for the best charcoal pig iron, at Philadelphia, per long ton; from 1827 to 1833 they are for an average of all grades; from 1833 to 1840 they are for gray iron; and from 1840 to 1849 they are for No. 1 foundry pig iron.

Average prices per long ton of charcoal pig iron at Philadelphia from 1799 to 1849.

Year.	Average price.	Year.	Average price.	Year.	Average price.
1799	$36.25	1816	$50.25	1833	$38.25
1800	35.75	1817	47.00	1834	30.25
1801	32.75	1818	42.25	1835	30.25
1802	30.75	1819	36.50	1836	41.50
1803	29.25	1820	35.00	1837	41.25
1804	29.75	1821	35.00	1838	32.25
1805	30.75	1822	35.00	1839	30.00
1806	35.75	1823	35.25	1840	32.75
1807	38.75	1824	40.00	1841	28.50
1808	40.00	1825	46.75	1842	28.00
1809	40.00	1826	46.50	1843	26.75
1810	38.00	1827	39.25	1844	28.25
1811	44.00	1828	35.00	1845	32.25
1812	47.50	1829	35.00	1846	31.25
1813	47.25	1830	35.00	1847	31.50
1814	46.00	1831	35.00	1848	28.50
1815	53.75	1832	35.00	1849	24.50

PRICES OF AMERICAN AND BRITISH PIG IRON.

In the following table are given the prices of two grades of American and two grades of British pig iron since 1873:

Prices of American and British pig iron from 1873 to 1896.

Year.	American pig iron.		British pig iron.	
	Gray forge at Pittsburg.	No. 1 foundry at Philadelphia.	Cleveland pig iron, f. o. b.	West Coast Bessemer, f. o. b.
			£ s. d.	£ s. d.
1873	$35.80	$42.75	5 15 0	8 9 3
1874	27.16	30.25	3 15 6	5 9 7
1875	23.67	25.50	3 0 0	4 1 7
1876	21.74	22.25	2 13 0	3 14 2
1877	20.60	18.88	2 5 6	3 12 9
1878	18.09	17.63	2 2 3	3 0 0
1879	22.15	21.50	2 1 2	2 17 6
1880	27.98	28.50	2 10 6	4 4 6
1881	22.94	25.12	1 19 2	3 1 2
1882	23.84	25.75	2 3 6	2 18 6
1883	19.04	22.38	1 19 6	2 11 9
1884	17.17	19.88	1 16 8	2 6 10
1885	15.27	18.00	1 13 0	2 4 6
1886	16.58	18.71	1 10 8	2 3 7
1887	19.02	20.92	1 14 2	2 6 2
1888	15.99	18.88	1 12 9	2 4 8
1889	15.37	17.75	2 3 7	2 12 3
1890	15.78	18.40	2 7 11	.....
1891	14.06	17.52	2 0 1	.....
1892	12.81	15.75	1 18 7	2 9 7
1893	11.77	14.52	1 14 11	2 6 0
1894	9.75	12.66	1 15 10	2 5 6
1895	10.94	13.10	1 16 3	2 6 6
1896	10.39	12.95	.....	.....

PRICES OF HAMMERED BAR IRON.

The following table gives the average yearly prices of hammered bar iron at Philadelphia from 1794 to 1844. Owing to the competition of rolled bar iron the manufacture of hammered bar iron declined prior to 1844, although it was made for some time after the year named.

Average yearly prices of hammered bar iron at Philadelphia from 1794 to 1844, per long ton.

Year.	Average price.	Year.	Average price.	Year.	Average price.
1794	$77.50	1811	$105.00	1828	$100.00
1795	82.50	1812	106.00	1829	97.00
1796	106.50	1813	106.00	1830	87.50
1797	101.50	1814	133.00	1831	85.00
1798	97.50	1815	144.50	1832	85.00
1799	98.50	1816	127.00	1833	82.50
1800	100.50	1817	114.00	1834	82.50
1801	117.50	1818	110.00	1835	81.50
1802	99.00	1819	110.00	1836	100.00
1803	97.50	1820	103.50	1837	111.00
1804	98.50	1821	90.50	1838	93.50
1805	101.00	1822	94.50	1839	96.50
1806	108.50	1823	90.00	1840	90.00
1807	110.50	1824	82.50	1841	85.00
1808	104.00	1825	97.50	1842	83.50
1809	107.50	1826	101.50	1843	77.50
1810	108.00	1827	100.00	1844	75.00

AVERAGE WHOLESALE PRICES OF CUT NAILS.

The prices in the table on the next page from 1835 to 1849, inclusive, are taken from the Report of the Secretary of the Treasury for 1849, and were furnished by Nahum Stetson, of Bridgewater, Massachusetts; from 1850 to 1859, inclusive, they have been compiled by the American Iron and Steel Association from the books of the Duncannon Iron Company; from 1860 to the present time they have been compiled by W. E. S. Baker, secretary of the Duncannon Iron Company. Early in 1893 the base price and schedule of extras of cut nails were changed to correspond with the wire-nail schedule, and in December, 1896, the schedule of extras was again changed. A comparison of prices since 1893 with those for 1892 and previous years would therefore be misleading.

Wholesale prices of cut nails since 1835, per keg of 100 pounds.

Year.	Price.	Year.	Price.	Year.	Price.
1835	$6.00	1856	$3.92	1877	$2.57
1836	6.00	1857	3.72	1878	2.31
1837	6.00	1858	3.53	1879	2.69
1838	6.00	1859	3.86	1880	3.68
1839	6.12	1860	3.13	1881	3.09
1840	5.50	1861	2.75	1882	3.47
1841	5.25	1862	3.47	1883	3.06
1842	4.75	1863	5.13	1884	2.39
1843	4.25	1864	7.85	1885	2.33
1844	4.50	1865	7.08	1886	2.27
1845	4.75	1866	6.97	1887	2.30
1846	4.50	1867	5.92	1888	2.03
1847	4.50	1868	5.17	1889	2.00
1848	4.25	1869	4.87	1890	2.00
1849	4.00	1870	4.40	1891	1.86
1850	3.71	1871	4.52	1892	1.83
1851	3.28	1872	5.46	1893	1.44
1852	3.13	1873	4.90	1894	1.08
1853	4.85	1874	3.99	1895	1.47
1854	4.76	1875	3.42	1896	2.32
1855	4.10	1876	2.98		

PRICES OF RUSSIA SHEET IRON.

The following table gives the average yearly prices, per pound, of Russia sheet iron from 1869 to 1896, as charged by American importers:

Average annual prices of Russia sheet iron since 1869.

Year.	Price.	Year.	Price.	Year.	Price.
1869	$0.15¾	1879	$0.13	1889	$0.09½
1870	.13½	1880	.12¾	1890	.10
1871	.15	1881	.11	1891	.10½
1872	.21	1882	.11¾	1892	.11⅝
1873	.21	1883	.11¾	1893	.11⅝
1874	.18½	1884	.11	1894	.10¾
1875	.15¾	1885	.10¾	1895	.08¾
1876	.13¼	1886	.10¼	1896	.08¾
1877	.11¼	1887	.09½		
1878	.11¼	1888	.09½		

PRICES OF ROLLED IRON AND STEEL.

The following table shows the average annual prices of rolled iron and steel in the United States from 1844 to 1896:

Average annual prices per long ton of rolled iron and steel since 1844.

Year.	Best refined rolled bar iron, from store, at Philadelphia.	Iron rails, at mills, in Pennsylvania.	Year.	Best refined rolled bar iron, from store, at Philadelphia.	Iron rails, at mills, in Pennsylvania.	Best refined rolled bar iron, at Pittsburg.	Steel billets, at mills, at Pittsburg.
1844....	$85.62	.....	1871...	$78.54	$70.38	.....	.....
1845....	93.75	.....	1872...	97.63	85.13	.....	.....
1846....	91.66	.....	1873...	86.43	76.67	.....	.....
1847....	86.04	$69.00	1874...	67.95	58.75	.....	.....
1848....	79.33	62.25	1875...	60.85	47.75	.....	.....
1849....	67.50	53.88	1876...	52.08	41.25	.....	.....
1850....	59.54	47.88	1877...	45.55	35.25	.....	.....
1851....	54.66	45.63	1878...	44.24	33.75	.....	.....
1852....	58.79	48.38	1879...	51.85	41.25	.....	.....
1853....	83.50	77.25	1880...	60.38	49.25	.....	.....
1854....	91.33	80.13	1881...	58.05	47.13	.....	.....
1855....	74.58	62.88	1882...	61.41	45.50	$54.51	.....
1856....	73.75	64.38	1883...	50.30	.....	44.24	.....
1857....	71.04	64.25	1884...	44.05	.....	38.45	.....
1858....	62.29	50.00	1885...	40.32	.....	36.59	.....
1859....	60.00	49.38	1886...	43.12	.....	38.08	$31.75
1860....	58.75	48.00	1887...	49.37	.....	43.59	32.55
1861....	60.83	42.38	1888...	44.99	.....	39.67	28.78
1862....	70.42	41.75	1889...	43.40	.....	38.30	29.45
1863....	91.04	76.88	1890...	45.92	.....	41.25	30.32
1864....	146.46	126.00	1891...	42.56	.....	38.38	25.32
1865....	106.38	98.63	1892...	41.81	.....	36.79	23.63
1866....	98.13	86.75	1893...	38.08	.....	33.53	20.44
1867....	87.08	83.13	1894...	29.96	.....	26.86	16.58
1868....	85.63	78.88	1895...	32.29	.....	28.09	18.48
1869....	81.66	77.25	1896...	31.36	.....	27.22	18.83
1870....	78.96	72.25					

PRODUCTION AND PRICES OF BESSEMER STEEL RAILS.

The following table gives the annual production in long tons of Bessemer steel rails in the United States since 1867, together with their average annual price at works in Pennsylvania and the rates of duty imposed on foreign steel rails:

Annual production of Bessemer steel rails in the United States from 1867 to 1896.

Calendar year.	Production.	Price in currency.	Duty.
	Long tons.		
1867	2,277	$166.00	45 per cent ad valorem to January 1, 1871.
1868	6,451	158.50	
1869	8,616	132.25	
1870	30,357	106.75	
1871	34,152	102.50	$28 per ton from January 1, 1871, to August 1, 1872; $25.20 from August 1, 1872, to March 3, 1875; $28 from March 3, 1875, to July 1, 1883.
1872	83,991	112.00	
1873	115,192	120.50	
1874	129,414	94.25	
1875	259,699	68.75	
1876	368,269	59.25	
1877	385,865	45.50	
1878	491,427	42.25	
1879	610,682	48.25	
1880	852,196	67.50	
1881	1,187,770	61.13	
1882	1,284,067	48.50	
1883	1,148,709	37.75	$17 per ton from July 1, 1883, to October 6, 1890.
1884	996,983	30.75	
1885	959,471	28.50	
1886	1,574,703	34.50	
1887	2,101,904	37.08	
1888	1,386,277	29.83	
1889	1,510,057	29.25	
1890	1,867,837	31.75	$13.44 from October 6, 1890, to August 28, 1894.
1891	1,293,053	29.92	
1892	1,537,588	30.00	
1893	1,129,400	28.12	
1894	1,016,013	24.00	$7.84 from August 28, 1894.
1895	1,299,628	24.33	
1896	1,116,958	28.00	

The lowest average annual price at which Bessemer steel rails have been sold in this country was reached in 1894, namely, $24, but sales were made at Pittsburg in February, 1897, at $17, and perhaps at even lower figures.

PRICES OF STANDARD SIZES OF WIRE NAILS.

The following table gives the average monthly *base* prices of standard sizes of wire nails, per keg of 100 pounds, in car-load lots, free on board at Chicago, from September, 1886, to December, 1896. Regular quotations for standard wire nails were not made until 1886.

Average monthly prices of wire nails per keg since 1886.

Month.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
January	.....	$3.50	$2.70	$2.55	$2.90	$2.22	$1.82	$1.57	$1.17	$0.95	$2.42
February	.....	3.65	2.60	2.40	2.95	2.27	1.87	1.55	1.20	.95	2.42
March	.....	3.65	2.65	2.35	2.75	2.22	1.85	1.65	1.15	1.00	2.57
April	.....	3.45	2.70	2.35	2.40	2.12	1.75	1.65	1.00	.95	2.55
May	.....	3.20	2.60	2.30	2.30	2.05	1.70	1.60	1.07	1.10	2.70
June	.....	3.00	2.50	2.30	2.40	2.02	1.57	1.50	1.20	1.50	2.70
July	.....	2.95	2.35	2.30	2.40	2.07	1.70	1.47	1.20	1.95	2.70
August	.....	3.00	2.45	2.25	2.50	2.02	1.70	1.47	1.15	2.20	2.70
September	$3.50	3.00	2.55	2.35	2.55	2.00	1.67	1.47	1.10	2.40	2.70
October	3.50	2.90	2.55	2.55	2.40	1.90	1.57	1.40	1.05	2.40	2.70
November	3.55	2.75	2.55	3.15	2.30	1.85	1.60	1.30	1.05	2.42	2.70
December	3.50	2.75	2.40	3.00	2.25	1.80	1.60	1.27	1.00	2.42	*a*1.60
Average	$3.51	$3.15	$2.55	$2.49	$2.51	$2.04	$1.70	$1.49	$1.11	$1.69	$2.50

a New schedule of extras adopted in December, 1896; $1.60 equivalent to $1.10 on the old schedule.

PRICES OF WIRE NAILS OF SMALL SIZE.

The following table gives the average yearly wholesale net prices of wire nails, per keg of 100 pounds, from 1877 to 1896. The prices are for nails 1¼ inches long, made from No. 16 wire, and have been furnished by the American Wire Nail Company, of Anderson, Indiana. The quotations on this size can be carried much further back than for the larger sizes.

Average annual prices of wire nails of small size, per keg, since 1877.

Year.	Price.	Year.	Price.	Year.	Price.
1877	$12.14	1884	$7.00	1891	$3.99
1878	10.85	1885	5.91	1892	3.43
1879	10.23	1886	6.32	1893	3.10
1880	10.40	1887	5.51	1894	2.93
1881	9.94	1888	5.39	1895	3.81
1882	9.75	1889	4.75	1896	4.55
1883	9.38	1890	4.60		

PRICES OF PLANISHED, OR AMERICAN-RUSSIA, SHEET IRON.

The following table gives the average yearly prices per pound charged by the manufacturers for planished, or American-Russia, sheet iron from 1878 to 1896:

Prices of planished sheet iron, per pound, since 1878.

Year.	Best grade.	Second grade.	Year.	Best grade.	Second grade.
1878	$0.09½	$0.08½	1888	$0.08	$0.07⅛
1879	.09	.08	1889	.08	.07⅛
1880	.09½	.08½	1890	.08	.07⅛
1881	.09	.08	1891	.08	.07⅛
1882	.09	.08	1892	.08	.07⅛
1883	.09	.08	1893	.08	.07⅛
1884	.09	.08	1894	.08	.07⅛
1885	.08	.07⅛	1895	.08	.07⅛
1886	.08	.07⅛	1896	.08	.07⅛
1887	.08	.07⅛			

PRICES OF FOREIGN TIN PLATES.

The following table gives the wholesale quoted prices, per box of "full weight" (108 pounds), imported coke Bessemer tin plates, I. C., 14 by 20, at New York, freight and duty paid, from January, 1890, to December, 1896:

Quoted prices of foreign tin plates at New York, by months, from January, 1890, to December, 1896.

Month.	Price.	Month.	Price.	Month.	Price.
1890—		1891—		1892—	
January	$4.72	January	$5.35	January	$5.30
February	4.61	February	5.47	February	5.30
March	4.46	March	5.36	March	5.30
April	4.42	April	5.26	April	5.30
May	4.42	May	5.17	May	5.30
June	4.43	June	5.35	June	5.29
July	4.49	July	5.28	July	5.25
August	4.66	August	5.39	August	5.21
September	5.17	September	5.43	September	5.20
October	5.49	October	5.37	October	5.27
November	5.44	November	5.31	November	5.45
December	5.24	December	5.30	December	5.49

Quoted prices of foreign tin plates at New York, by months, from January, 1890, to December, 1896—Continued.

Month.	Price.	Month.	Price.	Month.	Price.
1893—		1894—		1895—	
January	$5.35	May	$5.15	September	$3.95
February	5.35	June	5.14	October	4.00
March	5.44	July	5.12	November	3.95
April	5.50	August	5.12	December	3.82
May	5.50	September	5.10	1896—	
June	5.41	October	4.09	January	3.86
July	5.31	November	4.10	February	3.88
August	5.30	December	4.00	March	3.85
September	5.26	1895—		April	3.80
October	5.37	January	3.96	May	3.72
November	5.35	February	3.87	June	3.70
December	5.32	March	3.80	July	3.70
1894—		April	3.80	August	3.70
January	5.27	May	3.80	September	3.82
February	5.22	June	3.80	October	3.80
March	5.20	July	3.82	November	3.87
April	5.19	August	3.90	December	3.90

PRICES PAID FOR TIN PLATES AT NEW YORK.

The following table gives the prices actually paid at New York, per box of 108 pounds, for an average grade of Melyn charcoal tin plates and an average grade of Grafton or J. B. coke tin plates:

Prices actually paid for tin plates at New York from 1879 to 1896.

Year.	Price at New York.		Year.	Price at New York.	
	Charcoal.	Coke.		Charcoal.	Coke.
1879	$7.25	$6.25	1888	$5.45	$4.55
1880	8.00	6.75	1889	5.45	4.55
1881	6.40	5.45	1890	6.05	5.15
1882	6.20	5.30	1891	6.20	5.30
1883	6.00	5.10	1892	6.06	5.34
1884	5.65	4.70	1893	5.87	5.15
1885	5.35	4.40	1894	5.13	4.57
1886	5.25	4.30	1895	4.39	3.66
1887	5.50	4.60	1896	4.45	3.63

PRICES OF VARIOUS TIN UTENSILS.

The following table gives the wholesale prices in the United States at one leading establishment of various tin utensils from 1884 to 1896:

Wholesale prices of tin utensils.

Date.	Tin cups, 1-pint, per gross.	Water buckets, 10-quart, per gross.	Coffeepots, 2-quart, per gross.	Covered buckets, 2-quart, per gross.	Pie plates, 9-inch, per gross.	Dairy pans, 6-quart, per gross.	Rinsing pans, 14-quart, per gross.	Stamped saucepans, 5-quart, per gross.	Dripping pans, sheet-iron, per pound.
July, 1884 ...	$2.60	$18.00	$12.50	$7.50	$2.75	$9.00	$31.80	$24.00	$0.07
July, 1885 ...	2.38	17.00	11.75	7.25	2.50	8.00	24.50	20.00	.06
July, 1886 ...	2.35	16.50	11.00	7.00	2.40	7.20	24.00	17.35	.05¼
July, 1887 ...	2.35	16.50	11.00	7.00	2.25	6.72	23.52	16.50	.06¼
July, 1888 ...	2.30	15.50	10.50	6.75	2.40	6.72	23.50	16.50	.06
July, 1889 ...	2.25	15.50	10.00	6.75	2.25	6.50	22.50	16.00	.05
July, 1890 ...	2.20	15.00	9.75	6.50	2.35	6.39	22.76	15.21	.05
July, 1891 ...	2.40	16.50	10.50	7.25	2.85	7.40	24.70	16.44	.04¾
July, 1892 ...	2.25	16.00	10.25	7.00	2.75	7.10	23.52	15.62	.04¾
July, 1893 ...	2.25	15.00	10.25	6.85	2.70	7.06	21.75	15.21	.04¾
July, 1894 ...	2.10	14.50	9.50	6.75	2.50	6.72	20.58	14.06	.04⅜
July, 1895 ...	1.75	12.00	8.75	5.50	2.15	5.75	18.11	11.99	.03¾
July, 1896 ...	1.70	11.50	8.50	5.40	2.15	5.72	19.06	11.99	.03¾

PRODUCTION OF LEADING ARTICLES IN THE UNITED STATES AND OF PIG IRON IN GREAT BRITAIN.

The table on the next page gives carefully compiled statistics showing the annual growth of the iron and steel industries of the United States from 1860 to 1896; also the progress of the pig-iron industry of Great Britain during the same period. The maximum production of pig iron in Great Britain was reached in 1882, namely, 8,586,680 long tons. In the United States the maximum production was reached in 1895, when 9,446,308 tons were produced. The production of pig iron in the United States first exceeded that of Great Britain in 1890.

Production of leading articles in the United States and of pig iron in Great Britain since 1860.

Calendar year.	Total shipments of Lake Superior iron ore.	Production of pig iron in the United States.	Production of all kinds of steel in the United States.	Production of iron and steel rails in the United States.	Production of pig iron in Great Britain.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1860....	114, 401	821, 223	11, 838	183, 070	3, 826, 752
1861....	49, 909	653, 164	.....	169, 480	3, 712, 390
1862....	124, 169	703, 270	.....	190, 993	3, 943, 469
1863....	203, 055	846, 075	8, 075	246, 221	4, 510, 040
1864....	243, 127	1, 014, 282	9, 258	299, 436	4, 767, 951
1865....	236, 208	831, 770	13, 627	318, 118	4, 825, 254
1866....	278, 796	1, 205, 663	16, 940	384, 623	4, 523, 897
1867....	473, 567	1, 305, 023	19, 643	412, 596	4, 761, 023
1868....	491, 449	1, 431, 250	26, 786	452, 423	4, 970, 206
1869....	617, 444	1, 711, 287	31, 250	529, 988	5, 445, 757
1870....	830, 940	1, 665, 179	68, 750	553, 571	5, 963, 515
1871....	779, 607	1, 706, 793	73, 214	692, 619	6, 627, 179
1872....	900, 901	2, 548, 713	142, 954	892, 857	6, 741, 929
1873....	1, 162, 458	2, 560, 963	198, 796	794, 712	6, 566, 451
1874....	919, 557	2, 401, 262	215, 727	651, 262	5, 991, 408
1875....	891, 257	2, 023, 733	389, 799	707, 600	6, 365, 462
1876....	992, 764	1, 868, 961	533, 191	785, 383	6, 555, 997
1877....	1, 015, 087	2, 066, 594	569, 618	682, 776	6, 608, 664
1878....	1, 111, 110	2, 301, 215	731, 977	788, 112	6, 381, 051
1879....	1, 375, 691	2, 741, 853	935, 273	993, 993	5, 995, 337
1880....	1, 908, 745	3, 835, 191	1, 247, 335	1, 305, 212	7, 749, 233
1881....	2, 306, 505	4, 144, 254	1, 588, 314	1, 646, 518	8, 144, 449
1882....	2, 965, 412	4, 623, 323	1, 736, 692	1, 507, 851	8, 586, 680
1883....	2, 353, 288	4, 595, 510	1, 673, 535	1, 214, 905	8, 529, 300
1884....	2, 518, 692	4, 097, 868	1, 550, 879	1, 022, 188	7, 811, 727
1885....	2, 466, 372	4, 044, 526	1, 711, 920	976, 978	7, 415, 469
1886....	3, 568, 022	5, 683, 329	2, 562, 503	1, 600, 537	7, 009, 754
1887....	4, 730, 577	6, 417, 148	3, 339, 071	2, 139, 640	7, 559, 518
1888....	5, 063, 693	6, 489, 738	2, 899, 440	1, 403, 700	7, 998, 969
1889....	7, 292, 754	7, 603, 642	3, 385, 732	1, 522, 204	8, 322, 824
1890....	9, 012, 379	9, 202, 703	4, 277, 071	1, 885, 307	7, 904, 214
1891....	7, 062, 233	8, 279, 870	3, 904, 240	1, 307, 176	7, 406, 064
1892....	9, 069, 556	9, 157, 000	4, 927, 581	1, 551, 844	6, 709, 255
1893....	6, 060, 492	7, 124, 502	4, 019, 995	1, 136, 458	6, 976, 990
1894....	7, 748, 932	6, 657, 388	4, 412, 032	1, 021, 772	7, 427, 342
1895....	10, 438, 268	9, 446, 308	6, 114, 834	1, 306, 135	7, 703, 459
1896....	9, 916, 035	8, 623, 127	5, 281, 689	1, 122, 010	*a*8, 563, 209

a British Iron Trade Association.

GREAT BRITAIN.

PRODUCTION OF IRON ORE.

The following table of the production of iron ore in the United Kingdom of Great Britain and Ireland from 1855 to 1895 has been compiled directly from Mr. Richard Meade's "Coal and Iron Industries of the United Kingdom" (London, 1882) and from the annual reports of Her Majesty's inspectors of mines, otherwise known as "Mineral Statistics."

Production of iron ore in the United Kingdom, 1855 to 1895.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1855.....	9, 553, 741	1869.....	11, 508, 525	1883.....	17, 383, 046
1856.....	10, 483, 309	1870.....	14, 370, 655	1884.....	16, 137, 887
1857.....	9, 573, 281	1871.....	16, 334, 888	1885.....	15, 417, 982
1858.....	8, 040, 959	1872.....	15, 584, 357	1886.....	14, 110, 013
1859.....	7, 880, 316	1873.....	15, 577, 499	1887.....	13, 098, 041
1860.....	8, 024, 205	1874.....	14, 844, 936	1888.....	14, 590, 713
1861.....	7, 215, 518	1875.....	15, 821, 060	1889.....	14, 546, 105
1862.....	7, 562, 240	1876.....	16, 841, 584	1890.....	13, 780, 767
1863.....	9, 088, 960	1877.....	16, 692, 802	1891.....	12, 777, 689
1864.....	10, 064, 890	1878.....	15, 726, 370	1892.....	11, 312, 675
1865.....	9, 910, 045	1879.....	14, 379, 735	1893.....	11, 203, 476
1866.....	9, 965, 012	1880.....	18, 026, 050	1894.....	12, 367, 308
1867.....	10, 021, 058	1881.....	17, 446, 065	1895.....	12, 615, 414
1868.....	10, 169, 231	1882.....	18, 031, 957		

The maximum production of iron ore in Great Britain was reached in 1882. There has since been a great decline in the production of iron ore in Great Britain, due in part to the increased use of steel, which has called for iron ores of a purer quality than are found in many of the iron-ore districts of the United Kingdom, and in part to the facility and cheapness with which steel-making ores can be obtained from Spain and other countries. Of the iron ore mined in 1895 Ireland produced 65,724 tons; England, 11,715,595 tons; Wales, 9,422 tons; and Scotland, 824,673 tons.

IMPORTS OF IRON ORE.

As the production of iron ore in Great Britain has declined the importation of foreign iron ore has increased. The following table, compiled from the annual reports of Her Majesty's inspectors of mines, gives the imports of iron ore into the United Kingdom from 1873 to 1895, to which has been added for comparison the annual domestic

production of iron ore during the same period. The purple ore referred to in the table is the residuum from imported cupreous iron pyrites:

Imports of iron ore into Great Britain.

Year.	Iron ore imported.	Purple ore imported.	Total ore imported.	Production of domestic ore.	Approximate consumption.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1873....	967, 536	275, 000	1, 242, 536	15, 577, 499	16, 820, 035
1874....	754, 141	255, 000	1, 009, 141	14, 844, 936	15, 854, 077
1875....	458, 693	280, 000	738, 693	15, 821, 060	16, 559, 753
1876....	672, 235	300, 000	972, 235	16, 841, 584	17, 813, 819
1877....	1, 142, 308	415, 000	1, 557, 308	16, 692, 802	18, 250, 110
1878....	1, 173, 411	400, 000	1, 573, 411	15, 726, 370	17, 299, 781
1879....	1, 085, 045	332, 300	1, 417, 345	14, 379, 735	15, 797, 080
1880....	2, 632, 601	427, 730	3, 060, 331	18, 026, 050	21, 086, 381
1881....	2, 450, 698	352, 500	2, 803, 198	17, 446, 065	20, 249, 263
1882....	3, 284, 946	408, 000	3, 692, 946	18, 031, 957	21, 724, 903
1883....	3, 191, 073	390, 000	3, 581, 073	17, 383, 046	20, 964, 119
1884....	2, 730, 829	422, 304	3, 153, 133	16, 137, 887	19, 291, 020
1885....	2, 822, 598	490, 890	3, 313, 488	15, 417, 982	18, 731, 470
1886....	2, 878, 469	417, 741	3, 296, 210	14, 110, 013	17, 406, 223
1887....	3, 765, 788	447, 580	4, 213, 368	13, 098, 041	17, 311, 409
1888....	3, 562, 071	464, 207	4, 026, 278	14, 590, 713	18, 616, 991
1889....	4, 031, 265	483, 257	4, 514, 522	14, 546, 105	19, 060, 627
1890....	4, 471, 790	492, 669	4, 964, 459	13, 780, 767	18, 745, 226
1891....	3, 180, 543	462, 168	3, 642, 711	12, 777, 689	16, 420, 400
1892....	3, 780, 503	453, 308	4, 233, 811	11, 312, 675	15, 546, 486
1893....	4, 065, 864	459, 613	4, 525, 477	11, 203, 476	15, 728, 953
1894....	4, 413, 652	462, 037	4, 875, 689	12, 367, 308	17, 242, 997
1895....	4, 450, 311	436, 847	4, 887, 158	12, 615, 414	17, 502, 572

EXPORTS OF IRON ORE.

The quantity of iron ore exported from Great Britain annually is very small. In 1895 it amounted to only 1,611 long tons, against 1,889 tons in 1894.

PRODUCTION OF COAL.

Great Britain has not been dependent upon any other country for any part of her supply of mineral fuel; she is, indeed, an exporter of coal in large quantities. The following table gives the official statistics of the total annual production of coal in England, Scotland, Wales, and Ireland from 1854 to 1896.

Production of coal in Great Britain, 1854 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1854....	64, 661, 401	1869....	107, 427, 557	1884....	160, 757, 779
1855....	64, 453, 070	1870....	110, 431, 192	1885....	159, 351, 418
1856....	66, 645, 450	1871....	117, 352, 028	1886....	157, 518, 482
1857....	65, 394, 707	1872....	123, 497, 316	1887....	162, 119, 812
1858....	65, 008, 649	1873....	128, 680, 131	1888....	169, 935, 219
1859....	71, 979, 765	1874....	126, 590, 108	1889....	176, 916, 724
1860....	80, 042, 698	1875....	133, 306, 485	1890....	181, 614, 288
1861....	83, 635, 214	1876....	134, 125, 166	1891....	185, 479, 126
1862....	81, 638, 338	1877....	134, 179, 968	1892....	181, 786, 871
1863....	86, 292, 215	1878....	132, 612, 063	1893....	164, 325, 795
1864....	92, 787, 873	1879....	133, 720, 393	1894....	188, 277, 525
1865....	98, 150, 587	1880....	146, 969, 409	1895....	189, 661, 362
1866....	101, 630, 544	1881....	154, 184, 300	1896....	195, 561, 260
1867....	104, 500, 480	1882....	156, 499, 977		
1868....	103, 141, 157	1883....	163, 737, 327		

During the whole period covered by the above table, with the exception of one year, Ireland produced annually over 100,000 tons but less than 200,000 tons of coal. Details of the production of coal in the United Kingdom in 1895 are as follows: England, 132,769,436 tons; Scotland, 28,792,693 tons; Wales, 27,973,647 tons; Ireland, 125,586 tons: total, 189,661,362 tons.

EXPORTS OF COAL, COKE, AND PATENT FUEL.

The exports of coal from Great Britain from 1873 to 1896 are given in the following table, in long tons. Included in the figures given is the coal exported for the use of steamers engaged in the foreign trade. Coke and patent fuel are also included, and both have been reduced to their equivalents in coal, it being assumed that 60 tons of coke equal 100 tons of coal and that 100 tons of patent fuel equal 90 tons of coal, pitch constituting about 10 per cent of the latter article:

Exports of coal, coke, and patent fuel from Great Britain.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1873.....	16, 076, 628	1881.....	25, 049, 928	1889.....	37, 138, 021
1874.....	17, 194, 092	1882.....	26, 766, 222	1890.....	38, 660, 272
1875.....	18, 002, 417	1883.....	29, 439, 891	1891.....	40, 120, 861
1876.....	20, 053, 209	1884.....	30, 230, 747	1892.....	39, 380, 756
1877.....	19, 283, 478	1885.....	30, 766, 674	1893.....	37, 488, 070
1878.....	19, 673, 282	1886.....	30, 362, 575	1894.....	42, 687, 430
1879.....	21, 038, 030	1887.....	31, 717, 026	1895.....	42, 907, 302
1880.....	23, 902, 646	1888.....	34, 570, 110	1896.....	44, 199, 382

IMPORTS OF COAL.

Great Britain is a very small importer of coal. In 1895 the total imports, including culm and cinder, amounted to only 16,265 long tons, against 10,313 tons in 1894.

PRODUCTION OF PIG IRON.

The following table gives the official statistics of the production of pig iron in the United Kingdom from 1740 to 1896. As there is no iron industry in Ireland the figures contained in the table relate solely to the production of pig iron by England, Scotland, and Wales:

Production of pig iron in Great Britain.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1740	17,350	1855	3,218,154	1877	6,608,664
1788	68,300	1856	3,586,377	1878	6,381,051
1796	125,079	1857	3,659,447	1879	5,995,337
1806	243,851	1858	3,456,064	1880	7,749,233
1818	325,000	1859	3,712,904	1881	8,144,449
1820	400,000	1860	3,826,752	1882	8,586,680
1823	455,166	1861	3,712,390	1883	8,529,300
1825	581,367	1862	3,943,469	1884	7,811,727
1827	690,000	1863	4,510,040	1885	7,415,469
1828	703,184	1864	4,767,951	1886	7,009,754
1830	677,417	1865	4,825,254	1887	7,559,518
1833	700,000	1866	4,523,897	1888	7,998,969
1836	1,000,000	1867	4,761,023	1889	8,322,824
1839	1,248,781	1868	4,970,206	1890	7,904,214
1840	1,396,400	1869	5,445,757	1891	7,406,064
1842	1,099,138	1870	5,963,515	1892	6,709,255
1843	1,215,350	1871	6,627,179	1893	6,976,990
1844	1,999,608	1872	6,741,929	1894	7,427,342
1845	1,512,500	1873	6,566,451	1895	7,703,459
1847	1,999,508	1874	5,991,408	1896	*8,563,209
1852	2,701,000	1875	6,365,462		
1854	3,069,838	1876	6,555,997		

* British Iron Trade Association.

The production of pig iron in the United Kingdom in 1895 was divided as follows: England and Wales, 6,654,685 tons; Scotland, 1,048,774 tons: total, 7,703,459 tons. Great Britain's maximum production of pig iron was reached in 1882.

PRODUCTION OF BESSEMER STEEL.

The invention in the decade between 1850 and 1860 of the Bessemer process for making steel wrought a complete revolution in the world's iron and steel industries. During the decade between 1860 and 1870 the Siemens-Martin, or open-hearth, process of making steel was perfected in England and France. Authentic statistics of the production of steel in Great Britain by these processes do not go back to the early years of their use in that country. The following statistics of the production of Bessemer and open-hearth steel in Great Britain have been collected by Mr. J. S. Jeans, secretary of the British Iron Trade Association.

The production of Bessemer steel ingots in Great Britain from 1868 to 1896 has been as follows, in long tons of 2,240 pounds:

Great Britain's production of Bessemer steel, 1868 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1868.....	110,000	1878.....	807,527	1888.....	2,032,794
1869.....	160,000	1879.....	834,511	1889.....	2,140,791
1870.....	215,000	1880.....	1,044,382	1890.....	2,014,843
1871.....	329,000	1881.....	1,441,719	1891.....	1,642,005
1872.....	410,000	1882.....	1,673,649	1892.....	1,500,810
1873.....	496,000	1883.....	1,553,380	1893.....	1,493,454
1874.....	540,000	1884.....	1,299,676	1894.....	1,535,384
1875.....	620,000	1885.....	1,304,127	1895.....	1,535,225
1876.....	700,000	1886.....	1,570,520	1896.....	1,815,842
1877.....	750,000	1887.....	2,089,403		

PRODUCTION OF OPEN-HEARTH STEEL.

The production of open-hearth steel ingots in Great Britain from 1873 to 1896 has been as follows, in long tons:

Production of open-hearth steel ingots in Great Britain, 1873 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1873.....	77,500	1881.....	338,000	1889.....	1,429,169
1874.....	90,500	1882.....	436,000	1890.....	1,564,200
1875.....	88,000	1883.....	455,500	1891.....	1,514,538
1876.....	128,000	1884.....	475,250	1892.....	1,418,830
1877.....	137,000	1885.....	583,918	1893.....	1,456,309
1878.....	175,500	1886.....	694,150	1894.....	1,575,318
1879.....	175,000	1887.....	981,104	1895.....	1,754,737
1880.....	251,000	1888.....	1,292,742	1896.....	2,317,555

TOTAL PRODUCTION OF STEEL.

The following table gives the total production of steel in Great Britain from 1873 to 1896. We have added the estimated production of crucible and other steel to that of Bessemer and open-hearth steel:

Total production of steel in Great Britain, 1873 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1873.....	653, 500	1881.....	1, 859, 719	1889.....	3, 669, 960
1874.....	710, 500	1882.....	2, 189, 649	1890.....	3, 679, 043
1875.....	788, 000	1883.....	2, 088, 880	1891.....	3, 256, 543
1876.....	908, 000	1884.....	1, 854, 926	1892.....	3, 019, 640
1877.....	967, 000	1885.....	1, 968, 045	1893.....	3, 049, 763
1878.....	1, 063, 027	1886.....	2, 344, 670	1894.....	3, 210, 702
1879.....	1, 089, 511	1887.....	3, 150, 507	1895.....	3, 389, 962
1880.....	1, 375, 382	1888.....	3, 405, 536	1896.....	4, 233, 397

PRODUCTION OF BESSEMER STEEL RAILS.

Mr. Jeans gives the production of Bessemer steel rails in Great Britain from 1876 to 1896 as follows, in long tons:

British production of Bessemer steel rails.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1876.....	400, 000	1883.....	1, 097, 174	1890.....	1, 019, 606
1877.....	508, 400	1884.....	784, 968	1891.....	662, 676
1878.....	622, 390	1885.....	706, 583	1892.....	535, 836
1879.....	520, 231	1886.....	730, 343	1893.....	579, 386
1880.....	732, 910	1887.....	1, 021, 847	1894.....	598, 530
1881.....	1, 023, 740	1888.....	979, 083	1895.....	604, 338
1882.....	1, 235, 785	1889.....	943, 048	1896.....	817, 476

EXPORTS OF PIG IRON.

Great Britain is a large exporter of pig iron as well as of iron and steel in finished forms. Her exports of pig iron from 1870 to 1896 are given in the following table, in long tons:

Exports of pig iron from Great Britain, 1870 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1870.....	753, 339	1879.....	1, 223, 436	1888.....	1, 036, 319
1871.....	1, 057, 458	1880.....	1, 632, 343	1889.....	1, 190, 371
1872.....	1, 331, 143	1881.....	1, 482, 354	1890.....	1, 145, 268
1873.....	1, 142, 065	1882.....	1, 758, 072	1891.....	840, 055
1874.....	776, 116	1883.....	1, 564, 048	1892.....	767, 053
1875.....	947, 827	1884.....	1, 269, 576	1893.....	840, 294
1876.....	910, 005	1885.....	960, 931	1894.....	830, 985
1877.....	882, 059	1886.....	1, 044, 552	1895.....	866, 568
1878	923, 080	1887.....	1, 126, 447	1896.....	1, 059, 796

EXPORTS OF ALL KINDS OF IRON AND STEEL, INCLUDING PIG IRON.

In addition to being a large exporter of pig iron Great Britain also exports large quantities of iron and steel rolled into finished forms, as will be seen by the following table, which gives her total exports of all kinds of iron and steel (pig iron included) from 1870 to 1896, in long tons:

British exports of all kinds of iron and steel, including pig iron.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1870.....	2, 825, 575	1879.....	2, 883, 484	1888.....	3, 966, 563
1871.....	3, 169, 219	1880.....	3, 792, 993	1889.....	4, 186, 182
1872.....	3, 382, 762	1881.....	3, 820, 315	1890.....	4, 001, 430
1873.....	2, 957, 813	1882.....	4, 353, 552	1891.....	3, 240, 146
1874.....	2, 487, 522	1883.....	4, 043, 308	1892.....	2, 739, 279
1875.....	2, 457, 306	1884.....	3, 496, 991	1893.....	2, 856, 574
1876.....	2, 224, 470	1885.....	3, 130, 682	1894.....	2, 649, 998
1877.....	2, 346, 370	1886.....	3, 388, 494	1895.....	2, 835, 541
1878.....	2, 296, 860	1887.....	4, 143, 028	1896.....	3, 552, 286

IMPORTS OF ALL KINDS OF IRON AND STEEL.

The imports of all kinds of iron and steel into Great Britain, including pig iron, from 1880 to 1896, are given in the following table:

Imports of all kinds of iron and steel into Great Britain.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1880.....	281, 329	1886.....	296, 096	1892.....	301, 357
1881.....	294, 005	1887.....	326, 642	1893.....	297, 773
1882.....	318, 574	1888.....	352, 532	1894.....	292, 908
1883.....	321, 551	1889.....	353, 604	1895.....	311, 486
1884.....	307, 661	1890.....	323, 840	1896.....	330, 770
1885.....	307, 939	1891.....	314, 931		

GERMANY.

Statistics of the iron and steel and mining industries of Germany always include the production of the Grand Duchy of Luxemburg, which forms a part of the German Zollverein. Germany ranks next to the United States and Great Britain in the production of coal, pig iron, and steel, and is abreast of both countries in the production of iron ore. We are indebted to Dr. H. Rentzsch, the statistician of the Association of German Iron and Steel Manufacturers, for the official statistics of the production of iron ore, pig iron, and steel in Germany, including Luxemburg, in recent years, and to Dr. Hermann Wedding, of Berlin, for statistics of the production of coal and lignite. All German statistics are in metric tons of 2,204 pounds.

PRODUCTION OF IRON ORE.

In his admirable and unequaled volume on "Coal and Iron in All Countries," prepared for the Paris Universal Exposition of 1878, Johann Pechar gives the production of iron ore in Germany and Luxemburg at various periods prior to 1869, as follows: 1848, 693,725 metric tons; 1853, 903,236 tons; 1857, 1,962,054 tons; 1862, 2,216,021 tons; 1866, 2,996,021 tons; 1867, 3,264,464 tons; 1868, 3,634,369 tons. The production of iron ore in Germany and Luxemburg from 1869 to 1896 is given by Dr. Rentzsch as follows:

Production of iron ore in Germany and Luxemburg.

Year.	Germany.	Luxemburg.	Total.
	Metric tons.	*Metric tons.*	*Metric tons.*
1869	3, 129, 425	924, 382	4, 053, 807
1870	2, 927, 527	911, 695	3, 839, 222
1871	3, 382, 546	985, 479	4, 368, 025
1872	4, 724, 735	1, 170, 939	5, 895, 674
1873	4, 845, 833	1, 331, 743	6, 177, 576
1874	3, 694, 802	1, 442, 666	5, 137, 468
1875	3, 677, 948	1, 052, 405	4, 730, 353
1876	3, 515, 982	1, 196, 000	4, 711, 982
1877	3, 715, 756	1, 262, 825	4, 978, 581
1878	4, 050, 842	1, 411, 217	5, 462, 059
1879	4, 245,046	1, 614, 393	5, 859, 439
1880	5, 065, 176	2, 173, 464	7, 238, 640
1881	5, 438, 919	2, 161, 882	7, 600, 801
1882	5, 786, 449	2, 476, 805	8, 263, 254
1883	6, 180, 641	2, 575, 976	8, 756, 617
1884	6, 554, 342	2, 451, 454	9, 005, 796
1885	6, 509, 379	2, 648, 490	9, 157, 869
1886	6, 051, 579	2, 434, 179	8, 485, 758
1887	6, 701, 395	2, 649, 711	9, 351, 106
1888	7, 402, 382	3, 261, 925	10, 664, 307
1889	7, 831, 569	3, 170, 618	11, 002, 187
1890	8, 046, 719	3, 359, 413	11, 406, 132
1891	7, 555, 461	3, 102, 060	10, 657, 521
1892	8, 168, 841	3, 370, 292	11, 539, 133
1893	8, 105, 595	3, 351, 938	11, 457, 533
1894	8, 433, 784	3, 958, 281	12, 392, 065
1895	8, 436, 523	3, 913, 077	12, 349, 600
1896	9, 403, 574	4, 758, 741	14, 162, 315

The imports of iron ore into Germany and Luxemburg in 1896 amounted to 2,586,705 tons, and the exports to 2,642,384 tons.

PRODUCTION OF COAL AND LIGNITE.

The following table, for which we are chiefly indebted to Dr. Wedding, gives the aggregate production of coal and lignite in Germany and Luxemburg from 1848 to 1896, in metric tons:

Production of coal and lignite in Germany.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1848....	5, 800, 985	1871....	37, 856, 110	1885....	73, 675, 515
1853....	10, 714, 556	1872....	42, 324, 467	1886....	73, 682, 584
1857....	14, 867, 121	1873....	46, 145, 194	1887....	76, 232, 618
1860....	16, 730, 492	1874....	46, 658, 145	1888....	81, 960, 083
1861....	18, 755, 361	1875....	47, 804, 054	1889....	84, 788, 609
1862....	20, 660, 677	1876....	49, 550, 461	1890....	89, 051, 527
1863....	22, 366, 203	1877....	48, 229, 882	1891....	94, 252, 278
1864....	25, 612, 899	1878....	50, 519, 899	1892....	92, 544, 030
1865....	28, 552, 762	1879....	53, 470, 716	1893....	95, 426, 153
1866....	28, 162, 805	1880....	59, 118, 035	1894....	98, 805, 702
1867....	30, 802, 889	1881....	61, 540, 485	1895....	103, 957, 639
1868....	32, 879, 123	1882....	65, 378, 211	1896....	112, 437, 741
1869....	34, 343, 913	1883....	70, 442, 648		
1870....	34, 003, 004	1884....	72, 113, 820		

Of the total production of coal and lignite in 1896 there were 26,797,880 tons of brown coal, or lignite, and of the total production in 1895 there were 24,788,363 tons of brown coal. Germany is both an importer and exporter of coal. In 1896 the coal and coke exported amounted to 13,815,152 metric tons, against 12,654,165 tons in 1895.

PRODUCTION OF PIG IRON.

The production of pig iron in Germany and Luxemburg in 1844 is said by Dr. Wedding to have amounted to only 171,000 metric tons, and Herr Pechar says that in 1848 it amounted to 205,342 tons. It was not until 1866 that the production reached 1,000,000 tons, in which year it is said by Dr. Wedding to have amounted to 1,046,954 tons. Since 1869 it has been as follows, in metric tons, according to Dr. Rentzsch:

Production of pig iron in Germany and Luxemburg.

Year.	Germany.	Luxemburg.	Total.
	Metric tons.	*Metric tons.*	*Metric tons.*
1869	1,288,990	120,439	1,409,429
1870	1,261,683	129,441	1,391,124
1871	1,420,830	142,852	1,563,682
1872	1,807,845	180,549	1,988,394
1873	1,983,163	257,411	2,240,574
1874	1,660,208	246,054	1,906,262
1875	1,759,052	270,337	2,029,389
1876	1,614,687	231,658	1,846,345
1877	1,717,359	215,366	1,932,725
1878	1,899,264	248,377	2,147,641
1879	1,965,351	261,236	2,226,587
1880	2,468,372	260,666	2,729,038
1881	2,620,394	293,615	2,914,009
1882	3,004,218	376,587	3,380,805
1883	3,135,031	334,688	3,469,719
1884	3,234,614	365,998	3,600,612
1885	3,267,823	419,611	3,687,434
1886	3,128,016	400,641	3,528,657
1887	3,531,914	492,039	4,023,953
1888	3,813,345	523,776	4,337,121
1889	3,962,824	561,734	4,524,558
1890	4,099,537	558,913	4,658,450
1891	4,096,223	544,994	4,641,217
1892	4,350,945	586,516	4,937,461
1893	4,427,714	558,289	4,986,003
1894	4,700,221	679,817	5,380,038
1895	4,769,687	694,814	5,464,501
1896	.....	.....	6,374,816

IMPORTS OF PIG IRON.

The following table gives the imports of pig iron and "old iron" into Germany from 1871 to 1896, in metric tons:

Imports of pig iron into Germany.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1871	440, 634	1880	238, 572	1889	356, 654
1872	662, 981	1881	250, 576	1890	405, 627
1873	744, 121	1882	291, 689	1891	250, 670
1874	550, 467	1883	283, 992	1892	215, 725
1875	625, 645	1884	272, 269	1893	227, 176
1876	583, 858	1885	223, 466	1894	211, 848
1877	541, 864	1886	169, 694	1895	199, 556
1878	484, 663	1887	164, 015	1896	337, 181
1879	397, 098	1888	225, 035		

EXPORTS OF PIG IRON.

The following table gives the exports of pig iron and "old iron" from Germany from 1871 to 1896, in metric tons:

Exports of pig iron from Germany.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1871	111, 838	1880	318, 879	1889	210, 566
1872	150, 857	1881	353, 248	1890	181, 850
1873	154, 368	1882	279, 210	1891	212, 708
1874	222, 501	1883	351, 517	1892	177, 768
1875	339, 192	1884	297, 116	1893	171, 629
1876	306, 825	1885	276, 764	1894	232, 370
1877	365, 625	1886	345, 387	1895	220, 103
1878	416, 384	1887	312, 977	1896	192, 915
1879	433, 116	1888	195, 013		

PRODUCTION OF STEEL.

The following table gives the production of finished steel of all kinds in Germany from 1866 to 1896, in metric tons:

Production of all kinds of steel in Germany.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1866.....	83, 737	1877.....	391, 110	1888.....	1, 862, 676
1867.....	88, 589	1878.....	489, 151	1889.....	2, 095, 479
1868.....	92, 696	1879.....	500, 900	1890.....	2, 232, 099
1869.....	109, 753	1880.....	660, 591	1891.....	2, 562, 549
1870.....	125, 814	1881.....	897, 425	1892.....	2, 756, 217
1871.....	143, 305	1882.....	1, 074, 806	1893.....	3, 163, 442
1872.....	285, 582	1883.....	1, 060, 592	1894.....	3, 641, 624
1873.....	310, 425	1884.....	1, 138, 499	1895.....	3, 962, 775
1874.....	361, 947	1885.....	1, 202, 090	1896.....	4, 796, 226
1875.....	347, 337	1886.....	1, 376, 356		
1876.....	377, 910	1887.....	1, 738, 404		

PRODUCTION OF STEEL RAILS.

Dr. Rentzsch gives the production of Bessemer and open-hearth steel rails in Germany from 1871 to 1895 as follows, in metric tons:

Production of steel rails in Germany.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1871.....	128, 406	1880.....	407, 731	1889.....	427, 899
1872.....	179, 092	1881.....	504, 132	1890.....	559, 746
1873.....	186, 643	1882.....	505, 133	1891.....	596, 209
1874.....	237, 894	1883.....	473, 560	1892.....	535, 494
1875.....	241, 505	1884.....	400, 248	1893.....	483, 228
1876.....	253, 746	1885.....	422, 349	1894.....	568, 819
1877.....	294, 831	1886.....	391, 635	1895.....	493, 855
1878.....	374, 762	1887.....	456, 219		
1879.....	335, 828	1888.....	435, 189		

TOTAL EXPORTS OF ALL KINDS OF IRON AND STEEL.

The total exports of all kinds of iron and steel from Germany in 1896, including pig iron, amounted to 1,511,296 metric tons, against 1,523,105 tons in 1895 and 1,436,440 tons in 1894.

FRANCE.

The statistical tables for this country which we shall present have been compiled in part from statistics furnished by H. Pinget, of Paris, secretary of the comité des forges de France, and in part from official government statistics.

PRODUCTION OF IRON ORE.

The production of iron ore in France from 1860 to 1895 (not including Algeria) has been as follows, in metric tons:

Production of iron ore in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1860	3,604,637	1875	2,505,870	1886	2,285,648
1865	3,658,464	1876	2,393,340	1887	2,579,465
1866	3,790,168	1877	2,426,278	1888	2,841,757
1867	3,279,395	1878	2,469,953	1889	3,070,389
1868	3,005,094	1879	2,271,173	1890	3,471,718
1869	3,461,672	1880	2,874,263	1891	3,579,286
1870	2,899,593	1881	3,032,070	1892	3,706,748
1871	2,099,706	1882	3,467,251	1893	3,517,438
1872	3,081,026	1883	3,297,853	1894	3,772,101
1873	3,051,124	1884	2,976,948	1895	3,679,767
1874	2,516,548	1885	2,318,104		

IMPORTS OF IRON ORE.

France annually imports considerable quantities of iron ore from Germany and Luxemburg, Spain, Belgium, Greece, and other countries. The following table gives the total iron ore imports from 1861 to 1896, in metric tons:

Imports of iron ore into France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1861	310,000	1873	721,000	1885	1,420,000
1862	374,000	1874	801,000	1886	1,159,000
1863	436,000	1875	833,000	1887	1,155,000
1864	458,000	1876	849,000	1888	1,310,000
1865	477,000	1877	977,000	1889	1,442,000
1866	450,000	1878	932,000	1890	1,610,000
1867	492,000	1879	942,000	1891	1,438,000
1868	554,000	1880	1,169,000	1892	1,684,000
1869	592,000	1881	1,287,000	1893	1,630,000
1870	489,000	1882	1,426,000	1894	1,638,000
1871	378,000	1883	1,601,000	1895	1,651,000
1872	669,000	1884	1,413,000	1896	1,862,000

EXPORTS OF IRON ORE.

The exports of iron ore from France seldom exceed 300,000 metric tons annually. The following table gives the iron ore exported from 1861 to 1896:

French exports of iron ore.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1861.....	64,000	1873.....	353,000	1885.....	90,000
1862.....	64,000	1874.....	213,000	1886.....	104,000
1863.....	66,000	1875.....	180,000	1887.....	281,000
1864.....	91,000	1876.....	105,000	1888.....	294,000
1865.....	153,000	1877.....	79,000	1889.....	262,000
1866.....	137,000	1878.....	80,000	1890.....	285,000
1867.....	150,000	1879.....	67,000	1891.....	299,000
1868.....	195,000	1880.....	115,000	1892.....	305,000
1869.....	239,000	1881.....	88,000	1893.....	302,000
1870.....	145,000	1882.....	121,000	1894.....	248,000
1871.....	136,000	1883.....	105,000	1895.....	237,000
1872.....	337,000	1884.....	120,000	1896.....	233,000

PRODUCTION OF IRON ORE IN ALGERIA.

The production of iron ore in Algeria, which is now regarded as a part of the French Republic, was as follows from 1873 to 1895, in metric tons. All the iron ore mined in Algeria is exported, chiefly to England, the Netherlands, and the United States. The figures given below are not included in the production of iron ore in France, already given:

Production of iron ore in Algeria.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1873.....	445,000	1881.....	657,000	1889.....	352,000
1874.....	535,000	1882.....	567,000	1890.....	475,000
1875.....	557,000	1883.....	557,000	1891.....	405,000
1876.....	512,000	1884.....	493,000	1892.....	453,000
1877.....	454,000	1885.....	419,000	1893.....	394,000
1878.....	376,000	1886.....	433,000	1894.....	344,000
1879.....	418,000	1887.....	438,000	1895.....	318,000
1880.....	614,000	1888.....	384,000		

PRODUCTION OF COAL AND LIGNITE.

The production of coal and lignite in France from 1787 to 1896 has been as follows, in metric tons, about one ton in fifty of the total production being lignite:

Production of coal and lignite in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1787.....	215, 000	1871.....	13, 258, 920	1885.....	19, 510, 530
1802.....	844, 180	1872.....	15, 802, 515	1886.....	19, 909, 894
1812.....	835, 523	1873.....	17, 479, 341	1887.....	21, 287, 589
1820.....	1, 093, 658	1874.....	16, 907, 913	1888.....	22, 602, 894
1830.....	1, 862, 665	1875.....	16, 956, 840	1889.....	24, 303, 509
1840.....	3, 003, 382	1876.....	17, 101, 448	1890.....	26, 083, 118
1850.....	4, 433, 567	1877.....	16, 804, 529	1891.....	26, 024, 893
1860.....	8, 303, 681	1878.....	16, 960, 916	1892.....	26, 178, 701
1865.....	11, 600, 404	1879.....	17, 110, 979	1893.....	25, 650, 981
1866.....	12, 260, 085	1880.....	19, 361, 564	1894.....	27, 416, 905
1867.....	12, 738, 686	1881.....	19, 765, 983	1895.....	28, 019, 893
1868.....	13, 253, 876	1882.....	20, 603, 704	1896.....	29, 310, 832
1869.....	13, 464, 205	1883.....	21, 333, 884		
1870.....	13, 330, 308	1884.....	20, 023, 514		

IMPORTS OF COAL.

In late years France has annually imported from Great Britain, Germany, Belgium, and other countries about two-fifths as much coal and coke as she has produced. The following table gives the imports of coal into France from 1876 to 1895, in metric tons. The coke imported has been changed to its equivalent in coal, the French authorities considering that it requires one and one-half tons of coal to produce one ton of coke:

Imports of coal into France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	8, 221, 000	1883.....	11, 707, 000	1890.....	11, 603, 000
1877.....	7, 882, 000	1884.....	11, 678, 000	1891.....	11, 690, 000
1878.....	8, 201, 000	1885.....	10, 917, 000	1892.....	11, 557, 000
1879.....	8, 880, 000	1886.....	10, 381, 000	1893.....	11, 401, 000
1880.....	9, 940, 000	1887.....	10, 565, 000	1894.....	11, 644, 000
1881.....	10, 222, 000	1888.....	10, 551, 000	1895.....	11, 510, 000
1882.....	10, 868, 000	1889.....	9, 981, 000		

EXPORTS OF COAL.

The exports of coal from France are chiefly made to Belgium and Switzerland, the former country taking 454,000 metric tons, and the latter country 246,000 tons in 1895. The total exports of coal in 1895 aggregated 963,000 tons, of which 840,000 tons were bituminous and anthracite coal, 80,000 tons were coke (equal to 120,000 tons of coal), and 3,000 tons were lignite. The following table gives the total exports of coal from France from 1876 to 1895, in metric tons. The coke exported has been changed to its equivalent weight in coal, and is included in the figures given:

Exports of coal from France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	727, 000	1883.....	510, 000	1890.....	941, 000
1877.....	614, 000	1884.....	500, 000	1891.....	906, 000
1878.....	594, 000	1885.....	506, 000	1892.....	895, 000
1879.....	540, 000	1886.....	610, 000	1893.....	898, 000
1880.....	600, 000	1887.....	595, 000	1894.....	801, 000
1881.....	600, 000	1888.....	629, 000	1895.....	963, 000
1882.....	457, 000	1889.....	943, 000		

PRODUCTION OF PIG IRON.

The production of pig iron in France from 1819 to 1896 has been as follows, in metric tons:

Production of pig iron in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1819.....	112, 500	1869.....	1, 380, 965	1884.....	1, 871, 537
1830.....	266, 361	1870.....	1, 178, 114	1885.....	1, 630, 648
1840.....	347, 773	1871.....	859, 641	1886.....	1, 516, 574
1850.....	405, 653	1872.....	1, 217, 838	1887.....	1, 567, 622
1855.....	849, 296	1873.....	1, 381, 626	1888.....	1, 683, 349
1859.....	856, 152	1874.....	1, 415, 897	1889.....	1, 733, 964
1860.....	898, 353	1875.....	1, 448, 272	1890.....	1, 962, 196
1861.....	966, 894	1876.....	1, 435, 212	1891.....	1, 897, 387
1862.....	1, 090, 837	1877.....	1, 506, 827	1892.....	2, 057, 258
1863.....	1, 156, 875	1878.....	1, 521, 274	1893.....	2, 003, 096
1864.....	1, 212, 750	1879.....	1, 400, 286	1894.....	2, 069, 714
1865.....	1, 203, 710	1880.....	1, 725, 293	1895.....	2, 003, 868
1866.....	1, 260, 348	1881.....	1, 886, 350	1896.....	2, 333, 702
1867.....	1, 229, 044	1882.....	2, 039, 067		
1868.....	1, 235, 308	1883.....	2, 069, 430		

IMPORTS OF PIG IRON.

The following table gives the imports of pig iron into France from 1876 to 1896, in metric tons. The figures given for 1896 are provisional:

Imports of pig iron into France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	80, 746	1883.....	238, 150	1890.....	20, 620
1877.....	101, 410	1884.....	136, 234	1891.....	56, 756
1878.....	89, 716	1885.....	91, 010	1892.....	87, 316
1879.....	79, 367	1886.....	55, 773	1893.....	85, 948
1880.....	72, 066	1887.....	25, 068	1894.....	59, 072
1881.....	191, 091	1888.....	26, 911	1895.....	37, 230
1882.....	223, 131	1889.....	13, 025	1896.....	22, 193

EXPORTS OF PIG IRON.

The following table gives the exports of pig iron from France from 1876 to 1896, in metric tons. The figures given for 1896 are provisional:

Exports of pig iron from France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	10, 170	1883.....	4, 972	1890.....	171, 162
1877.....	11, 076	1884.....	4, 043	1891.....	98, 058
1878.....	14, 392	1885.....	5, 823	1892.....	120, 754
1879.....	14, 554	1886.....	8, 683	1893.....	104, 547
1880.....	14, 326	1887.....	75, 417	1894.....	117, 990
1881.....	10, 497	1888.....	24, 540	1895.....	161, 307
1882.....	8, 267	1889.....	120, 007	1896.....	195, 308

PRODUCTION OF BESSEMER AND OPEN-HEARTH STEEL.

The total production of Bessemer and open-hearth steel in France, in finished forms, including steel rails, from 1876 to 1895 is given in the following table, in metric tons:

Production of Bessemer and open-hearth steel in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	211, 000	1883.....	499, 000	1890.....	547, 000
1877.....	240, 000	1884.....	481, 000	1891.....	605, 000
1878.....	283, 000	1885.....	528, 000	1892.....	651, 000
1879.....	307, 000	1886.....	428, 000	1893.....	639, 000
1880.....	360, 000	1887.....	469, 000	1894.....	646, 000
1881.....	394, 000	1888.....	483, 000	1895.....	691, 000
1882.....	433, 000	1889.....	496, 000		

PRODUCTION OF MISCELLANEOUS KINDS OF STEEL.

The production of puddled, cement, crucible, and miscellaneous steel (omitting Bessemer and open-hearth steel) in France, in finished forms, from 1876 to 1895, was as follows, in metric tons. These figures are included in the total production of steel given in the next table.

Production of miscellaneous steel in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	31,000	1883.....	23,000	1890.....	35,000
1877.....	29,000	1884.....	22,000	1891.....	34,000
1878.....	30,000	1885.....	26,000	1892.....	32,000
1879.....	26,000	1886.....	26,000	1893.....	25,000
1880.....	29,000	1887.....	24,000	1894.....	28,000
1881.....	28,000	1888.....	34,000	1895.....	24,000
1882.....	25,000	1889.....	33,000		

TOTAL PRODUCTION OF STEEL.

M. Pinget informs us that complete statistics of the production of Bessemer, open-hearth, and other steel in the form of ingots are not of record, and that only the statistics of finished steel, including castings, are obtainable. The following table gives the production of all kinds of finished steel in France from 1860 to 1896. Steel rails are included.

Total production of steel in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1860.....	29,848	1873.....	150,529	1886.....	454,000
1861.....	37,777	1874.....	208,787	1887.....	493,294
1862.....	47,096	1875.....	256,393	1888.....	517,294
1863.....	37,583	1876.....	241,842	1889.....	529,302
1864.....	41,559	1877.....	269,181	1890.....	581,998
1865.....	40,574	1878.....	312,921	1891.....	638,530
1866.....	37,764	1879.....	333,265	1892.....	682,527
1867.....	46,477	1880.....	388,894	1893.....	664,032
1868.....	80,564	1881.....	422,416	1894.....	674,190
1869.....	110,224	1882.....	458,238	1895.....	714,523
1870.....	94,387	1883.....	521,820	1896.....	883,508
1871.....	86,126	1884.....	502,908		
1872.....	141,705	1885.....	553,839		

PRODUCTION OF STEEL RAILS.

The production of steel rails in France from 1876 to 1895 is given in the following table. France reached its maximum production of steel rails in 1883, in which year 391,000 metric tons were made. In 1895, as compared with 1883, the decreased production was over 61 per cent:

Production of steel rails in France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	181, 000	1883.....	391, 000	1890.....	176, 000
1877.....	184, 000	1884.....	368, 000	1891.....	212, 000
1878.....	231, 000	1885.....	356, 000	1892.....	230, 000
1879.....	254, 000	1886.....	255, 000	1893.....	207, 000
1880.....	280, 000	1887.....	203, 000	1894.....	183, 000
1881.....	303, 000	1888.....	173, 000	1895.....	152, 000
1882.....	336, 000	1889.....	166, 000		

IMPORTS OF STEEL.

The following table gives the imports of steel into France from 1876 to 1896, in metric tons. The figures given for 1896 are provisional:

Imports of steel into France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	4, 717	1883.....	35, 257	1890.....	5, 765
1877.....	4, 538	1884.....	12, 279	1891.....	5, 301
1878.....	4, 751	1885.....	8, 825	1892.....	5, 404
1879.....	5, 985	1886.....	7, 140	1893.....	5, 969
1880.....	7, 023	1887.....	7, 252	1894.....	6, 623
1881.....	17, 940	1888.....	5, 243	1895.....	5, 079
1882.....	40, 277	1889.....	4, 629	1896.....	6, 131

EXPORTS OF STEEL.

The following table gives the exports of steel from France from 1876 to 1896, in metric tons. The figures given for 1896 are provisional:

Exports of steel from France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	2, 222	1883.....	1, 293	1890.....	39, 164
1877.....	1, 762	1884.....	1, 015	1891.....	18, 075
1878.....	1, 457	1885.....	11, 028	1892.....	8, 994
1879.....	1, 083	1886.....	18, 758	1893.....	10, 668
1880.....	1, 415	1887.....	34, 000	1894.....	15, 509
1881.....	829	1888.....	14, 549	1895.....	20, 719
1882.....	917	1889.....	36, 316	1896.....	44, 680

IMPORTS OF ALL KINDS OF IRON AND STEEL.

The following table gives the imports of all kinds of iron and steel into France (including pig iron, rails, etc.) from 1876 to 1896, in metric tons. The figures for 1896 are provisional:

Imports of all kinds of iron and steel into France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	112, 228	1883.....	318, 313	1890.....	41, 540
1877.....	140, 044	1884.....	188, 775	1891.....	77, 026
1878.....	134, 334	1885.....	134, 130	1892.....	111, 335
1879.....	125, 468	1886.....	88, 203	1893.....	113, 254
1880.....	118, 026	1887.....	54, 284	1894.....	88, 220
1881.....	263, 025	1888.....	54, 842	1895.....	63, 978
1882.....	321, 020	1889.....	32, 940	1896.....	52, 665

EXPORTS OF ALL KINDS OF IRON AND STEEL.

The following table gives the exports of all kinds of iron and steel from France (including pig iron, rails, etc.) from 1876 to 1896, in metric tons. The figures for 1896 are provisional:

Exports of all kinds of iron and steel from France.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1876.....	26, 786	1883.....	10, 366	1890.....	278, 259
1877.....	19, 399	1884.....	8, 887	1891.....	150, 144
1878.....	20, 603	1885.....	29, 815	1892.....	159, 799
1879.....	19, 261	1886.....	50, 987	1893.....	146, 944
1880.....	22, 532	1887.....	155, 114	1894.....	166, 957
1881.....	14, 610	1888.....	72, 915	1895.....	210, 886
1882.....	12, 110	1889.....	225, 342	1896.....	288, 075

BELGIUM.

The statistics of the mining and metallurgical industries of Belgium which we shall present are official government statistics, obtained in part directly from the Belgian minister of the interior and of public instruction and in part from the publications of the Association des Maitres de Forges.

PRODUCTION OF IRON ORE.

The production of iron ore in Belgium from 1840 to 1895 has been as follows, in metric tons:

Production of iron ore in Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1840.....	191, 812	1872.....	749, 781	1884.....	176, 005
1845.....	394, 544	1873.....	503, 565	1885.....	187, 118
1850.....	299, 272	1874.....	527, 050	1886.....	152, 508
1855.....	852, 134	1875.....	365, 044	1887.....	172, 436
1860.....	809, 176	1876.....	269, 206	1888.....	185, 542
1865.....	1, 018, 231	1877.....	234, 127	1889.....	181, 526
1866.....	886, 641	1878.....	207, 157	1890.....	172, 291
1867.....	602, 829	1879.....	195, 212	1891.....	202, 204
1868.....	519, 740	1880.....	253, 499	1892.....	209, 943
1869.....	628, 046	1881.....	223, 412	1893.....	238, 783
1870.....	654, 332	1882.....	208, 867	1894.....	311, 222
1871.....	697, 272	1883.....	215, 670	1895.....	312, 637

IMPORTS OF IRON ORE.

The imports of iron ore into Belgium from 1887 to 1895 are given in the following table, in metric tons. Although Belgium is rich in coal she is poor in iron ore, and is therefore compelled to obtain from other countries the greater part of the iron ore she consumes:

Imports of iron ore into Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	1, 451, 806	1890.....	1, 644, 422	1893.....	1, 684, 679
1888.....	1, 746, 984	1891.....	1, 534, 276	1894.....	1, 942, 883
1889.....	1, 805, 210	1892.....	1, 679, 443	1895.....	1, 857, 623

EXPORTS OF IRON ORE.

As will be seen by the following table, which gives the exports of iron ore annually from Belgium from 1887 to 1895, Belgium occasionally exports more iron ore than she produces:

Exports of iron ore from Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	176, 530	1890.....	171, 654	1893.....	171, 120
1888.....	148, 310	1891.....	192, 127	1894.....	258, 529
1889.....	155, 108	1892.....	225, 650	1895.....	328, 427

PRODUCTION OF COAL.

The production of coal in Belgium from 1830 to 1896 has been as follows, in metric tons:

Production of coal in Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1830.....	2, 568, 054	1872.....	15, 658, 948	1885.....	17, 437, 603
1840.....	3, 929, 962	1873.....	15, 778, 401	1886.....	17, 285, 543
1845.....	4, 919, 257	1874.....	14, 669, 029	1887.....	18, 378, 624
1850.....	5, 820, 588	1875.....	15, 011, 331	1888.....	19, 218, 481
1855.....	8, 409, 330	1876.....	14, 329, 578	1889.....	19, 869, 980
1860.....	9, 610, 895	1877.....	13, 669, 077	1890.....	20, 365, 960
1865.....	11, 840, 703	1878.....	14, 899, 175	1891.....	19, 675, 644
1866.....	12, 774, 662	1879.....	15, 447, 292	1892.....	19, 583, 173
1867.....	12, 755, 822	1880.....	16, 886, 698	1893.....	19, 410, 519
1868.....	12, 298, 589	1881.....	16, 873, 951	1894.....	20, 534, 501
1869.....	12, 943, 994	1882.....	17, 590, 989	1895.....	20, 450, 604
1870.....	13, 697, 118	1883.....	18, 177, 754	1896.....	21, 213, 000
1871.....	13, 733, 176	1884.....	18, 051, 499		

Belgium imports over a million tons of coal and coke annually and exports a much larger quantity of both coal and coke. The exports of coal and coke from Belgium in 1896 amounted to 5,505,355 metric tons, in 1895 to 5,486,389 tons, and in 1894 to 5,416,254 tons.

PRODUCTION OF PIG IRON.

The production of pig iron in Belgium from 1845 to 1896 has been as follows, in metric tons:

Production of pig iron in Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1845.....	134,563	1871.....	609,230	1885.....	712,876
1850.....	144,452	1872.....	655,565	1886.....	701,677
1855.....	294,270	1873.....	607,373	1887.....	755,781
1860.....	319,943	1874.....	532,790	1888.....	826,850
1861.....	311,838	1875.....	541,805	1889.....	832,226
1862.....	356,550	1876.....	490,508	1890.....	787,836
1863.....	392,078	1877.....	470,488	1891.....	684,126
1864.....	449,875	1878.....	518,646	1892.....	753,268
1865.....	470,767	1879.....	389,330	1893.....	745,264
1866.....	482,404	1880.....	608,084	1894.....	818,597
1867.....	423,069	1881.....	624,736	1895.....	829,234
1868.....	435,754	1882.....	726,946	1896.....	932,780
1869.....	534,319	1883.....	783,433		
1870.....	563,468	1884.....	750,812		

IMPORTS OF PIG IRON.

Belgium annually imports large quantities of pig iron from Germany and Luxemburg, France, England, Spain, and Sweden and Norway. The following table gives the imports of pig iron into Belgium from 1887 to 1895, in metric tons:

Imports of pig iron into Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	141,462	1890.....	245,956	1893.....	158,660
1888.....	211,055	1891.....	183,542	1894.....	227,428
1889.....	238,361	1892.....	149,563	1895.....	225,665

EXPORTS OF PIG IRON.

Belgium also exports small quantities of pig iron annually, the total exports for the last thirteen years, however, never exceeding 20,000 metric tons, as will be seen by the following table:

Exports of pig iron from Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1884.....	10,665	1889.....	14,773	1894.....	12,022
1885.....	10,718	1890.....	11,463	1895.....	9,864
1886.....	19,816	1891.....	17,002	1896.....	10,750
1887.....	11,701	1892.....	18,227		
1888.....	9,722	1893.....	18,519		

PRODUCTION OF STEEL.

Belgian statistics of steel in ingots are incomplete, as are those of Germany and France, and we consequently give the production of finished steel only, which will be found in the following table, from 1865 to 1896, in metric tons. Steel rails are included:

Production of finished steel in Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1865.....	545	1876.....	64,543	1887.....	191,445
1866.....	930	1877.....	90,646	1888.....	185,417
1867.....	1,420	1878.....	102,259	1889.....	214,561
1868.....	1,857	1879.....	88,952	1890.....	201,817
1869.....	2,826	1880.....	102,772	1891.....	206,305
1870.....	4,062	1881.....	119,237	1892.....	208,281
1871.....	6,622	1882.....	151,291	1893.....	224,922
1872.....	12,389	1883.....	156,301	1894.....	341,318
1873.....	18,533	1884.....	153,999	1895.....	367,947
1874.....	30,932	1885.....	125,461	1896.....	498,765
1875.....	45,536	1886.....	137,771		

PRODUCTION OF STEEL RAILS.

The production of steel rails alone in Belgium from 1881 to 1895 has been as follows, in metric tons:

Production of steel rails in Belgium.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1881.....	87,047	1886.....	71,769	1891.....	131,601
1882.....	109,809	1887.....	108,184	1892.....	125,648
1883.....	118,138	1888.....	101,194	1893.....	104,496
1884.....	112,930	1889.....	139,356	1894.....	113,661
1885.....	76,744	1890.....	122,370	1895.....	122,357

TOTAL IMPORTS OF ALL KINDS OF IRON AND STEEL.

The total imports of all kinds of iron and steel into Belgium in 1895, including pig iron, amounted to 310,704 metric tons, against 310,384 tons in 1894, 244,415 tons in 1893, and 217,137 tons in 1892.

TOTAL EXPORTS OF ALL KINDS OF IRON AND STEEL.

The total exports of all kinds of iron and steel from Belgium in 1896, including pig iron, amounted to 580,973 metric tons, against 488,744 tons in 1895, 441,247 tons in 1894, 406,967 tons in 1893, 414,906 tons in 1892, and 421,947 tons in 1891.

AUSTRIA AND HUNGARY.

The statistics for the Austro-Hungarian Empire have been received chiefly through the courtesy of Herr Pechar, of Prague, Bohemia; Herr J. Pizzala and Herr V. Wolff, both of Vienna; and the Hungarian royal statistical office, at Budapest.

PRODUCTION OF IRON ORE.

The production of iron ore in Austria and Hungary from 1871 to 1895 has been as follows, in metric tons. Iron ore is found in all parts of the Austro-Hungarian Empire, and owing to this fact and to the extreme richness of the ores that are mined but little ore is imported, the total imports in 1895 amounting to only 117,600 metric tons, against 88,212 tons in 1894. The exports of iron ore from the Empire are also very small, amounting to only 119,050 tons in 1895, as compared with 110,559 tons in 1894.

Production of iron ore in Austria and Hungary.

Year.	Austria.	Hungary.	Total.
	Metric tons.	*Metric tons.*	*Metric tons.*
1871	771, 398	360, 853	1, 132, 251
1872	927, 628	433, 015	1, 360, 643
1873	1, 040, 461	547, 597	1, 588, 058
1874	906, 485	423, 313	1, 329, 798
1875	704, 984	398, 243	1, 103, 227
1876	554, 966	347, 456	902, 422
1877	538, 701	345, 559	884, 260
1878	666, 159	330, 734	996, 893
1879	628, 246	320, 632	948, 878
1880	696, 832	445, 744	1, 142, 576
1881	618, 964	465, 479	1, 084, 443
1882	902, 510	546, 112	1, 448, 622
1883	882, 313	598, 424	1, 480, 737
1884	973, 829	650, 871	1, 624, 700
1885	931, 471	651, 289	1, 582, 760
1886	796, 116	635, 464	1, 431, 580
1887	846, 566	566, 061	1, 412, 627
1888	1, 009, 320	634, 457	1, 643, 777
1889	1, 115, 153	665, 619	1, 780, 772
1890	1, 361, 548	792, 241	2, 153, 789
1891	1, 231, 248	875, 563	2, 106, 811
1892	993, 290	920, 541	1, 913, 831
1893	1, 109, 112	977, 248	2, 086, 360
1894	1, 214, 736	900, 486	2, 115, 222
1895	1, 384, 911	955, 262	2, 340, 173

PRODUCTION OF COAL AND LIGNITE.

In both Austria and Hungary the larger part of the coal that is mined is brown coal, or lignite. The following table gives, in metric tons, the quantity of each kind of fuel that has been annually produced in each of the two countries from 1880 to 1895.

Coal produced in Austria and Hungary.

Year.	Austria.		Hungary.		Total.
	Brown coal.	Black coal.	Brown coal.	Black coal.	
	Metric tons.	*Metric tons.*	*Metric tons.*	*Metric tons.*	*Metric tons.*
1880	8, 420, 647	5, 889, 631	1, 013, 393	805, 047	16, 128, 718
1881	8, 961, 498	6, 343, 316	1, 112, 633	848, 519	17, 265, 966
1882	8, 996, 290	6, 559, 002	1, 259, 896	799, 319	17, 614, 507
1883	9, 853, 865	7, 194, 096	1, 473, 779	892, 501	19, 414, 241
1884	10, 008, 653	7, 190, 866	1, 584, 623	940, 434	19, 724, 576
1885	10, 514, 153	7, 378, 666	1, 586, 766	955, 879	20, 435, 464
1886	10, 931, 352	7, 421, 278	1, 567, 614	859, 197	20, 779, 441
1887	11, 573, 173	7, 796, 151	1, 723, 440	786, 408	21, 879, 172
1888	12, 860, 255	8, 274, 461	1, 874, 201	850, 691	23, 859, 608
1889	13, 845, 863	8, 592, 876	1, 952, 226	937, 452	25, 328, 417
1890	15, 329, 057	8, 931, 065	2, 252, 226	994, 812	27, 507, 160
1891	16, 183, 076	9, 192, 885	2, 427, 927	1, 019, 352	28, 823, 240
1892	16, 190, 273	9, 241, 126	2, 554, 365	1, 052, 214	29, 037, 978
1893	16, 815, 955	9, 732, 651	2, 917, 899	982, 798	30, 449, 303
1894	17, 332, 538	9, 572, 952	3, 175, 056	1, 037, 322	31, 117, 868
1895	18, 389, 147	9, 722, 679	3, 474, 905	1, 068, 046	32, 654, 777

TOTAL PRODUCTION OF COAL AND LIGNITE.

The following table gives the total production of coal and lignite in the whole of the Austro-Hungarian Empire from 1819 to 1895, in metric tons:

Coal production of Austria and Hungary, 1819 to 1895.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1819	94, 607	1871	10, 048, 038	1884	19, 724, 576
1825	154, 944	1872	10, 556, 067	1885	20, 435, 464
1830	211, 298	1873	11, 904, 073	1886	20, 779, 441
1835	250, 782	1874	12, 279, 757	1887	21, 879, 172
1840	469, 212	1875	12, 852, 046	1888	23, 859, 608
1845	721, 707	1876	13, 418, 997	1889	25, 328, 417
1850	944, 323	1877	13, 601, 457	1890	27, 507, 160
1855	2, 101, 050	1878	13, 915, 009	1891	28, 823, 240
1860	3, 496, 495	1879	14, 891, 024	1892	29, 037, 978
1865	5, 069, 303	1880	16, 128, 718	1893	30, 449, 303
1868	7, 021, 756	1881	17, 265, 966	1894	31, 117, 868
1869	7, 663, 043	1882	17, 614, 507	1895	32, 654, 777
1870	8, 355, 944	1883	19, 414, 241		

IMPORTS AND EXPORTS OF COAL AND COKE.

Austria-Hungary both imports and exports considerable quantities of coal and coke, the imports in 1895 amounting to 5,053,202 metric tons, against 4,502,226 tons in 1894. The exports in 1895 amounted to 7,869,179 tons, as compared with 7,637,722 tons in 1894.

PRODUCTION OF PIG IRON.

The production of pig iron in Austria and Hungary from 1871 to 1895 has been as follows, in metric tons:

Production of pig iron in Austria and Hungary since 1871.

Year.	Austria.	Hungary.	Total.
	Metric tons.	*Metric tons.*	*Metric tons.*
1871	260, 451	132, 901	393, 352
1872	312, 800	146, 857	459, 657
1873	371, 039	163, 469	534, 508
1874	332, 157	161, 898	494, 055
1875	303, 459	159, 704	463, 163
1876	273, 046	127, 380	400, 426
1877	259, 036	128, 594	387, 630
1878	293, 197	141, 053	434, 250
1879	285, 840	118, 322	404, 162
1880	320, 302	143, 932	464, 234
1881	379, 640	164, 000	543, 640
1882	435, 478	176, 261	611, 739
1883	522, 400	176, 456	698, 856
1884	539, 621	194, 725	734, 346
1885	499, 097	215, 687	714, 784
1886	485, 313	234, 667	719, 980
1887	511, 777	192, 753	704, 530
1888	586, 121	204, 106	790, 227
1889	617, 012	238, 810	855, 822
1890	666, 273	299, 107	965, 380
1891	617, 145	304, 701	921, 846
1892	630, 790	309, 856	940, 646
1893	663, 345	318, 902	982, 247
1894	742, 372	329, 985	1, 072, 357
1895	778, 510	349, 163	1, 127, 673

IMPORTS AND EXPORTS OF PIG IRON.

Both Austria and Hungary import and export pig iron, the imports, however, far exceeding the exports. The pig iron imported into the Empire in 1895 amounted to 175,400 metric tons, against 138,849 tons in 1894, 75,621 tons in 1893, 66,096 tons in 1892, and 59,710 tons in 1891. The pig iron exported in 1895 amounted to 9,185 metric tons, against

11,582 tons in 1894, 12,460 tons in 1893, 11,569 tons in 1892, and 10,335 tons in 1891.

PRODUCTION OF STEEL.

The Bessemer process received early recognition in Austria, the erection of the first Bessemer works in that country having been commenced in 1862 at Turrach, in Upper Styria. Open-hearth steel was first made in the Empire in 1870. The following table gives the production of all kinds of crude steel in the Austro-Hungarian Empire from 1887 to 1895:

Production of all kinds of steel in Austria-Hungary since 1887.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	299, 191	1890.....	499, 600	1893.....	650, 740
1888.....	392, 813	1891.....	540, 030	1894.....	705, 650
1889.....	416, 512	1892.....	590, 080	1895.....	780, 630

SWEDEN.

Dr. Richard Åkerman, general director of the Board of Trade, Stockholm, has furnished the following statistics of the production of iron ore, coal, pig iron, and crude steel (Bessemer, open-hearth, and crucible ingots, and blister steel) in Sweden. Metric tons are used.

PRODUCTION OF IRON ORE.

The production of iron ore in Sweden from 1860 to 1895 was as follows, in metric tons:

Production of iron ore in Sweden since 1860.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1860.....	417, 079	1878.....	677, 448	1888.....	959, 540
1865.....	516, 772	1879.....	645, 365	1889.....	985, 904
1870.....	630, 348	1880.....	775, 344	1890.....	941, 241
1871.....	662, 539	1881.....	826, 137	1891.....	987, 405
1872.....	732, 430	1882.....	892, 863	1892.....	1, 293, 583
1873.....	832, 490	1883.....	885, 124	1893.....	1, 483, 762
1874.....	926, 416	1884.....	909, 553	1894.....	1, 927, 212
1875.....	822, 437	1885.....	873, 362	1895.....	1, 904, 662
1876.....	796, 605	1886.....	872, 480		
1877.....	738, 803	1887.....	903, 186		

There has been a great increase in the production of iron ore in Sweden since 1892, which is attributable to the opening up of a new and very important iron-ore field in the province of Norrbotten, in the northeastern part of the Kingdom, which is known as the Gellivara district. The production of this new district in 1891 amounted to only 180 metric tons; in 1892, to 178,817 tons; in 1893, to 306,594 tons; in 1894, to 658,161 tons; and in 1895, to 624,709 tons. The Gellivara ore is chiefly of Bessemer quality and is very rich in iron. The ore of this district is shipped principally to Westphalia and Silesia, in Germany, but a considerable quantity goes also to Great Britain. Shipments are made from the port of Lulea, on the Gulf of Bothnia, which is connected with the mines by a railroad over 100 miles long.

EXPORTS OF IRON ORE.

The total exports of iron ore from Sweden, including exports from the Gellivara district, amounted in 1896 to 1,150,695 metric tons, against 800,452 tons in 1895, 831,395 tons in 1894, 484,055 tons in 1893, and 320,071 tons in 1892.

PRODUCTION OF COAL.

The following table gives the production of coal in Sweden from 1860 to 1895, in metric tons. The coal deposits of Sweden which have been developed are all situated in the extreme southern part of the Kingdom:

Production of coal in Sweden since 1860.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1860.....	26,476	1883.....	152,949	1890.....	187,512
1865.....	33,881	1884.....	164,851	1891.....	198,033
1870.....	36,727	1885.....	174,077	1892.....	199,380
1875.....	64,217	1886.....	170,329	1893.....	199,933
1880.....	100,875	1887.....	169,017	1894.....	195,950
1881.....	117,953	1888.....	169,006	1895.....	223,652
1882.....	143,280	1889.....	186,719		

PRODUCTION OF PIG IRON.

The production of pig iron in Sweden, in metric tons, from 1860 to 1896 was as follows. All Swedish pig iron is produced with charcoal.

Pig iron produced in Sweden since 1860.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1860.....	185, 019	1878.....	340, 858	1888.....	457, 052
1865.....	226, 620	1879.....	342, 547	1889.....	420, 665
1870.....	300, 338	1880.....	405, 713	1890.....	456, 103
1871.....	298, 761	1881.....	430, 042	1891.....	490, 913
1872.....	339, 409	1882.....	398, 945	1892.....	485, 664
1873.....	345, 720	1883.....	422, 627	1893.....	453, 421
1874.....	327, 852	1884.....	430, 534	1894.....	462, 809
1875.....	350, 539	1885.....	464, 737	1895.....	462, 930
1876.....	352, 467	1886.....	442, 457	1896.....	488, 400
1877.....	344, 536	1887.....	456, 625		

IMPORTS OF PIG IRON AND OF IRON AND STEEL RAILS.

Sweden imports pig iron annually in considerable quantities, chiefly for the manufacture of castings. She is also a large importer of iron and steel rails. The imports of pig iron into Sweden in 1896 amounted to 33,104 metric tons, compared with 30,960 tons in 1895, 27,679 tons in 1894, 20,782 tons in 1893, and 32,575 tons in 1892. The iron and steel rails imported in 1896 aggregated 38,794 metric tons, compared with 15,253 tons in 1895, 21,665 tons in 1894, 42,071 tons in 1893, and 42,478 tons in 1892.

EXPORTS OF PIG IRON AND OF FINISHED IRON AND STEEL.

Sweden annually exports a large part of the pig iron she produces, its excellent quality enabling her to find ready sale for it in all parts of the world. In 1896 the exports of pig iron amounted to 70,747 metric tons, as compared with 86,368 tons in 1895, 67,026 tons in 1894, 59,836 tons in 1893, and 57,502 tons in 1892. The exports of all kinds of iron and steel bars from Sweden in 1896, not including wire rods, amounted to 180,515 metric tons, against 177,086 tons in 1895, 150,270 tons in 1894, 162,717 tons in 1893, and 179,388 tons in 1892. The exports of wire rods alone in 1896 amounted to 5,748 metric tons, compared with 3,734 tons in 1895, 1,782 tons in 1894, 1,713 tons in 1893, and 4,605 tons in 1892.

PRODUCTION OF BESSEMER STEEL INGOTS AND CASTINGS.

The production of Bessemer steel ingots and castings in Sweden from 1880 to 1896 is given in the following table, in metric tons:

Bessemer steel ingots produced in Sweden since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	30, 013	1886.....	54, 121	1892.....	82, 422
1881.....	39, 328	1887.....	68, 199	1893.....	84, 398
1882.....	47, 358	1888.....	68, 620	1894.....	83, 322
1883.....	50, 878	1889.....	80, 324	1895.....	97, 320
1884.....	53, 123	1890.....	94, 247	1896.....	115, 300
1885.....	52, 021	1891.....	92, 985		

PRODUCTION OF OPEN-HEARTH STEEL INGOTS AND CASTINGS.

The production of open-hearth steel ingots and castings in Sweden from 1880 to 1896 is given in the following table, in metric tons:

Production of open-hearth steel ingots and castings in Sweden since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	7, 718	1886.....	22, 361	1892.....	76, 556
1881.....	11, 158	1887.....	41, 898	1893.....	81, 889
1882.....	13, 405	1888.....	44, 712	1894.....	84, 003
1883.....	16, 800	1889.....	55, 487	1895.....	99, 259
1884.....	19, 354	1890.....	72, 984	1896.....	135, 300
1885.....	26, 743	1891.....	78, 197		

PRODUCTION OF CRUCIBLE AND BLISTER STEEL.

The production of crucible steel ingots and castings and of blister steel in Sweden from 1880 to 1895 is given in the following table, in metric tons:

Crucible and blister steel produced in Sweden, 1880 to 1895.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	1, 550	1886.....	1, 749	1892.....	1, 493
1881.....	1, 741	1887.....	1, 468	1893.....	1, 222
1882.....	1, 430	1888.....	1, 205	1894.....	1, 415
1883.....	1, 827	1889.....	2, 010	1895.....	1, 251
1884.....	1, 764	1890.....	2, 055		
1885.....	1, 786	1891.....	1, 592		

TOTAL PRODUCTION OF STEEL.

The following table gives the total production of crude steel (Bessemer, open-hearth, and crucible ingots and castings, and blister steel) in Sweden, in metric tons, from 1865 to 1895:

Total production of steel in Sweden since 1865.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1865.....	7,409	1878.....	25,918	1887.....	111,565
1870.....	12,180	1879.....	28,582	1888.....	114,537
1871.....	8,542	1880.....	39,281	1889.....	137,821
1872.....	15,859	1881.....	52,227	1890.....	169,286
1873.....	16,986	1882.....	62,193	1891.....	172,774
1874.....	22,948	1883.....	69,505	1892.....	160,471
1875.....	21,387	1884.....	74,241	1893.....	167,509
1876.....	24,069	1885.....	80,550	1894.....	168,740
1877.....	22,253	1886.....	78,231	1895.....	197,830

SPAIN.

The information given in the following tables has been furnished by Don Roman Oriol, of Madrid, and Mr. William Gill, the resident manager of the Orconera Iron Ore Company, Limited, of Bilbao.

PRODUCTION OF IRON ORE.

The following table gives the total production of iron ore in Spain from 1880 to 1896, in metric tons:

Production of iron ore in Spain, 1880 to 1896.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	3,565,338	1886.....	4,166,946	1892.....	5,041,317
1881.....	3,502,681	1887.....	6,796,266	1893.....	5,419,070
1882.....	4,726,293	1888.....	5,609,876	1894.....	5,352,353
1883.....	4,526,279	1889.....	5,710,640	1895.....	5,514,339
1884.....	3,907,266	1890.....	6,065,113	1896.....	6,808,000
1885.....	3,933,298	1891.....	5,122,784		

IRON ORE IN THE BILBAO DISTRICT.

The province of Biscay, in which is situated the important port of Bilbao, annually produces about five-sixths of the total iron-ore production of Spain. Of the total production of the country more than five-sixths are exported. In 1896 the exports amounted to 6,253,473 metric tons, as compared with 5,248,192 tons in 1895. The following table, which has been compiled by Mr. William Gill, gives the approximate production of iron ore in the Bilbao district from 1882 to 1896; also the exports of iron ore from the Bilbao River for the same years:

Production and exports of iron ore from Bilbao, Spain.

Year.	Approximate production in the Bilbao district.	Exports from Bilboa River.	Year.	Approximate production in the Bilbao district.	Exports from Bilboa River.
	Metric tons.	*Metric tons.*		*Metric tons.*	*Metric tons.*
1882....	3, 855, 000	3, 692, 632	1890....	4, 740, 000	4, 272, 918
1883....	3, 627, 782	3, 378, 234	1891....	3, 840, 000	3, 316, 464
1884....	3, 216, 321	3, 155, 432	1892....	4, 210, 500	3, 855, 000
1885....	3, 311, 419	3, 295, 982	1893....	4, 360, 000	3, 953, 000
1886....	3, 300, 667	3, 160, 047	1894....	4, 566, 000	4, 152, 000
1887....	4, 400, 000	4, 170, 422	1895....	4, 572, 000	4, 214, 000
1888....	3, 960, 000	3, 591, 637	1896....	5, 160, 000	4, 713, 000
1889....	4, 180, 000	3, 885, 612			

PRODUCTION OF COAL AND LIGNITE.

The production of coal and lignite in Spain from 1880 to 1896 is given in the following table, in metric tons. Since 1880 the lignite produced in Spain in any single year has never exceeded 50,000 tons:

Production of coal and lignite in Spain since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	847, 128	1886.....	1, 001, 432	1892.....	1, 426, 036
1881.....	1, 209, 882	1887.....	1, 038, 305	1893.....	1, 520, 109
1882.....	1, 196, 255	1888.....	1, 036, 566	1894.....	1, 707, 734
1883.....	1, 070, 750	1889.....	1, 153, 757	1895.....	1, 783, 783
1884.....	979, 350	1890.....	1, 238, 396	1896.....	1, 878, 399
1885.....	945, 904	1891.....	1, 299, 697		

IMPORTS AND EXPORTS OF COAL.

Spain both imports and exports coal, the imports, however, far exceeding the exports, and coming chiefly from Great Britain. In 1896 the total imports of coal and coke into Spain amounted to 1,681,378 metric tons, of which 1,447,345 tons were coal and 234,033 tons were coke. The total exports of coal from Spain in 1896 amounted to 144,734 tons, against 150,554 tons in 1895.

PRODUCTION OF PIG IRON.

The production of pig iron in Spain from 1880 to 1896 is given in the following table, in metric tons:

Production of pig iron in Spain since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	85, 939	1886.....	156, 204	1892.....	211, 436
1881.....	114, 394	1887.....	188, 634	1893.....	234, 563
1882.....	120, 064	1888.....	212, 116	1894.....	223, 798
1883.....	139, 920	1889.....	197, 874	1895.....	206, 452
1884.....	124, 363	1890.....	179, 782	1896.....	246, 326
1885.....	159, 225	1891.....	278, 460		

EXPORTS OF PIG IRON.

Spain annually exports a part of the pig iron she produces. Her exports in 1896 amounted to 23,805 metric tons, against 22,669 tons in 1895.

PRODUCTION OF BESSEMER STEEL.

Spain first commenced the manufacture of Bessemer steel in 1885, and in 1892 she first produced Robert-Bessemer steel. The following table gives the total production of Bessemer and of Robert-Bessemer steel in Spain from the beginning of their manufacture:

Total production of Bessemer steel in Spain.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1885.....	126	1889.....	42, 792	1893.....	50, 690
1886.....	24, 817	1890.....	47, 467	1894.....	65, 643
1887.....	30, 906	1891.....	44, 413	1895.....	51, 502
1888.....	33, 628	1892.....	27, 305	1896.....	62, 511

PRODUCTION OF OPEN-HEARTH STEEL.

Open-hearth steel was first produced in Spain in 1888, the production in that year amounting to 1,553 metric tons. The following table gives the production in each year from 1888 to 1896:

Total production of open-hearth steel in Spain.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1888.....	1, 553	1891.....	25, 845	1894.....	25, 291
1889.....	8, 855	1892.....	24, 559	1895.....	21, 752
1890.....	26, 184	1893.....	27, 118	1896.....	42, 066

TOTAL PRODUCTION OF STEEL.

The following table gives the production of all kinds of steel in Spain from 1880 to 1896, in metric tons. From 1880 to 1884, inclusive, the figures are for puddled steel only, some of the years being estimated. Very little, if any, puddled steel has been made in Spain since the close of 1885. The maximum production of all kinds of steel in Spain was reached in 1896:

Production of all kinds of steel in Spain, 1880 to 1896.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	350	1886.....	24, 817	1892.....	51, 864
1881.....	385	1887.....	30, 906	1893.....	77, 808
1882.....	554	1888.....	35, 181	1894.....	90, 934
1883.....	400	1889.....	51, 647	1895.....	73, 254
1884.....	373	1890.....	73, 651	1896.....	104, 577
1885.....	487	1891.....	70, 258		

ITALY.

The tables given below were compiled in part from statistics furnished by N. Pellati, of Rome, Italy, inspector-general of mines, and in part from the annual reports of the minister of agriculture, industry, and commerce. Metric tons are used throughout.

PRODUCTION OF IRON ORE.

The total production of iron ore in Italy, including the Island of Elba, from 1880 to 1895, is given in the following table, in metric tons:

Production of iron ore in Italy since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	289, 058	1886.....	209, 082	1892.....	214, 487
1881.....	421, 065	1887.....	230, 575	1893.....	191, 305
1882.....	242, 083	1888.....	177, 157	1894.....	187, 728
1883.....	203, 582	1889.....	173, 489	1895.....	183, 371
1884.....	225, 368	1890.....	220, 702		
1885.....	200, 955	1891.....	216, 486		

PRODUCTION OF IRON ORE IN THE ISLAND OF ELBA.

The production of iron ore in Italy outside of the Island of Elba is very small, as will be seen by the following table, which gives the iron ore production of Elba alone from 1880 to 1895, in metric tons. In 1881 the Italian Government restricted the quantity of Elban ore to

be mined each year to 200,000 tons, and in 1885 it further limited the annual production to 180,000 tons:

Production of iron ore in Elba.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	274, 322	1886.....	186, 337	1892.....	186, 681
1881.....	403, 215	1887.....	208, 090	1893.....	177, 395
1882.....	207, 432	1888.....	154, 830	1894.....	174, 229
1883.....	164, 277	1889.....	153, 497	1895.....	172, 838
1884.....	180, 243	1890.....	189, 752		
1885.....	175, 060	1891.....	176, 779		

IMPORTS OF IRON ORE.

Italy is a very small importer of iron ore, the imports in 1895 amounting to only 1,742 metric tons, as compared with 1,003 tons in 1894.

EXPORTS OF IRON ORE.

Italy annually exports a large part of the iron ore mined within her borders, sending it chiefly to Great Britain, France, and the United States. The following table gives the total exports of iron ore from Italy (including all exports from the Island of Elba) from 1887 to 1895, in metric tons:

Exports of iron ore from Italy since 1887.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	171, 553	1890.....	186, 676	1893.....	156, 273
1888.....	130, 743	1891.....	202, 309	1894.....	159, 205
1889.....	183, 281	1892.....	124, 755	1895.....	164, 367

PRODUCTION OF COAL.

The following table gives the production of coal in Italy, in metric tons, from 1880 to 1895. The figures include the quantity of anthracite, lignite, fossiliferous, and bituminous coal mined in each year:

Production of coal in Italy since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	139, 369	1886.....	243, 325	1892.....	295, 713
1881.....	134, 582	1887.....	327, 665	1893.....	317, 249
1882.....	164, 737	1888.....	366, 794	1894.....	271, 295
1883.....	214, 421	1889.....	390, 330	1895.....	305, 321
1884.....	223, 322	1890.....	376, 326		
1885.....	190, 413	1891.....	289, 286		

IMPORTS OF COAL AND COKE.

Italy is a large importer of coal and coke. In 1895 her imports came chiefly from Great Britain, Austria and Hungary, France, and Germany. The following table gives the imports of coal and coke into Italy from 1880 to 1895, in metric tons:

Imports of coal and coke into Italy since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	1,737,746	1886.....	2,927,092	1892.....	3,877,571
1881.....	2,073,315	1887.....	3,583,143	1893.....	3,724,401
1882.....	2,180,020	1888.....	3,872,905	1894.....	4,696,258
1883.....	2,351,092	1889.....	3,999,117	1895.....	4,304,787
1884.....	2,605,051	1890.....	4,354,847		
1885.....	2,957,436	1891.....	3,916,685		

EXPORTS OF COAL.

Small quantities of coal are annually exported from Italy, the exports in 1895 amounting to 16,497 metric tons. In 1894 the exports amounted to 13,692 tons.

PRODUCTION OF PIG IRON.

The following table gives the production of pig iron in Italy, in metric tons, from 1880 to 1895. It will be noticed that there has been a marked decrease in the production of pig iron in Italy in late years as compared with the production in 1880 and the immediately following years.

Production of pig iron in Italy since 1880.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1880.....	21,000	1886.....	12,291	1892.....	12,729
1881.....	27,800	1887.....	12,265	1893.....	8,038
1882.....	24,778	1888.....	12,538	1894.....	10,329
1883.....	24,306	1889.....	13,473	1895.....	9,213
1884.....	18,405	1890.....	14,346		
1885.....	15,991	1891.....	11,930		

IMPORTS OF PIG IRON

Italy is a heavy importer of pig iron, obtaining a large part of her supply from Great Britain, Spain, and Austria and Hungary. She is also said to have lately imported considerable quantities of pig iron

from the United States. The following table gives the imports of pig iron into Italy from 1887 to 1895, in metric tons:

Imports of pig iron into Italy since 1887.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1887.....	231,547	1890.....	129,641	1893.....	114,343
1888.....	89,563	1891.....	108,989	1894.....	119,207
1889.....	168,677	1892.....	100,935	1895.....	131,870

EXPORTS OF PIG IRON.

Italy is a small exporter of pig iron, the exports in 1895 amounting to only 966 metric tons, France being the chief importer. Small quantities of Italian pig iron are also occasionally imported by China.

PRODUCTION OF STEEL.

The production of finished steel in Italy from 1881 to 1895 is given in the following table, in metric tons:

Production of finished steel in Italy since 1881.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1881.....	3,630	1886.....	23,760	1891.....	75,925
1882.....	3,450	1887.....	73,262	1892.....	56,543
1883.....	2,965	1888.....	117,785	1893.....	71,380
1884.....	4,645	1889.....	157,899	1894.....	54,614
1885.....	3,382	1890.....	107,676	1895.....	50,314

RUSSIA.

Russian statistics of production are given in poods, each of which the Treasury Department of the United States Government regards as the equivalent of 36.112 pounds. The reductions to metric tons in the following tables have been made on this basis.

The tables herewith presented have been compiled in part from data furnished by Mr. George Kamensky, of the Imperial mint at St. Petersburg; in part from an official publication printed in English at St. Petersburg in 1893 by the Russian Government for use in connection with the Russian mining and metallurgical exhibits at the World's Columbian Exposition at Chicago in that year, and prepared by Mr. A. Keppen, mining engineer; in part from statistical publications issued by the Comité Central de Statistique, at St. Petersburg; in part from

statistics published in the "Bulletin Russe de Statistique Financière et de Législation" for January–February, 1897; and in part from statistical tables published by the minister of finance and commerce. The production of Finland is included in the statistics presented.

PRODUCTION OF IRON ORE.

The production of iron ore in Russia from 1871 to 1894 was as follows, in metric tons:

Production of iron ore in Russia, 1871 to 1894.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1871	832, 543	1879	999, 149	1887	1, 355, 912
1872	891, 935	1880	1, 023, 705	1888	1, 433, 930
1873	901, 651	1881	1, 017, 264	1889	1, 640, 242
1874	934, 074	1882	1, 077, 085	1890	1, 796, 130
1875	1, 063, 867	1883	997, 266	1891	1, 998, 508
1876	1, 011, 284	1884	1, 015, 038	1892	2, 044, 178
1877	846, 208	1885	1, 093, 740	1893	2, 195, 380
1878	911, 112	1886	1, 061, 242	1894	2, 487, 225

PRODUCTION OF COAL.

The production of all kinds of coal in Russia, nearly all of which is of good quality, was as follows from 1870 to 1895. Lignite is included in the figures given for 1894 and 1895, and possibly in the figures given from 1870 to 1883, inclusive. For the other years it is probably omitted:

Production of coal in Russia, 1870 to 1895.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1870	696, 673	1883	3, 916, 105	1890	6, 014, 911
1875	1, 709, 718	1884	3, 929, 982	1891	6, 233, 138
1878	2, 483, 575	1885	4, 268, 341	1892	6, 946, 120
1879	2, 874, 790	1886	4, 576, 547	1893	7, 613, 862
1880	3, 238, 470	1887	4, 533, 718	1894	8, 762, 492
1881	3, 439, 787	1888	5, 185, 902	1895	9, 071, 408
1882	3, 672, 782	1889	6, 213, 869		

PRODUCTION OF PIG IRON.

The production of pig iron in Russia from 1825 to 1895 was as follows, in metric tons:

Production of pig iron in Russia.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1825.....	139, 642	1873.....	384, 221	1885.....	527, 536
1830.....	182, 952	1874.....	380, 219	1886.....	532, 104
1835.....	172, 009	1875.....	427, 182	1887.....	612, 447
1840.....	185, 605	1876.....	441, 433	1888.....	683, 315
1845.....	187, 260	1877.....	398, 238	1889.....	740, 067
1850.....	227, 555	1878.....	417, 239	1890.....	926, 471
1855.....	268, 637	1879.....	432, 636	1891.....	1, 004, 861
1860.....	335, 255	1880.....	448, 411	1892.....	1, 071, 800
1865.....	299, 432	1881.....	469, 476	1893.....	1, 148, 923
1870.....	359, 531	1882.....	462, 530	1894.....	1, 332, 489
1871.....	359, 253	1883.....	481, 679	1895.....	1, 454, 325
1872.....	399, 253	1884.....	509, 519		

PRODUCTION OF STEEL.

The production of crude steel of all kinds in Russia from 1879 to 1895 was as follows, in metric tons:

Production of crude steel in Russia since 1879.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1879.....	210, 008	1885.....	192, 899	1891.....	433, 486
1880.....	307, 305	1886.....	241, 795	1892.....	514, 984
1881.....	293, 408	1887.....	225, 484	1893.....	630, 796
1882.....	247, 741	1888.....	222, 293	1894.....	703, 058
1883.....	221, 948	1889.....	258, 739	1895.....	769, 900
1884.....	207, 025	1890.....	378, 431		

PRODUCTION OF STEEL RAILS.

The production of steel rails in Russia from 1881 to 1894 was as follows, in metric tons:

Production of steel rails in Russia, 1881 to 1894.

Year.	Metric tons.	Year.	Metric tons.	Year.	Metric tons.
1881.....	206, 642	1886.....	114, 034	1891.....	166, 503
1882.....	153, 309	1887.....	86, 998	1892.....	185, 585
1883.....	128, 700	1888.....	63, 048	1893.....	227, 047
1884.....	98, 286	1889.....	88, 385	1894.....	242, 510
1885.....	95, 550	1890.....	166, 156		

IMPORTS AND EXPORTS.

Russia imports considerable quantities of coal and exports small quantities. She also imports much larger quantities of iron and steel than she exports.

DOMINION OF CANADA.

The statistical tables given below have been compiled in part from information received from the department of agriculture at Ottawa, in part from publications of the geological survey of Canada, in part from the Statistical Year Book, and in part from information obtained directly from the manufacturers by the American Iron and Steel Association.

PRODUCTION OF IRON ORE.

The production of iron ore in the Dominion of Canada from 1885 to 1896 is given in the following table, the figures for 1896 being provisional. Of the total production of 91,783 long tons in 1895 Nova Scotia mined 74,814 long tons, the Province of Quebec 15,878 tons, and British Columbia 1,091 tons:

Production of iron ore in Canada since 1885.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1885.....	41, 187	1889.....	75, 162	1893.....	111, 341
1886.....	62, 239	1890.....	68, 313	1894.....	98, 206
1887.....	68, 152	1891.....	61, 588	1895.....	91, 783
1888.....	70, 167	1892.....	92, 186	1896.....	78, 755

EXPORTS OF IRON ORE.

Canada formerly exported considerable quantities of iron ore, but in late years her exports have been very small, amounting in 1895 to only 1,403 gross tons.

PRODUCTION OF COAL.

The production of coal in the Dominion of Canada from 1886 to 1896 (the figures for the latter year being provisional) is given in the following table, in long tons. Of the 3,137,050 long tons mined in 1895 Nova Scotia produced 2,023,152 tons, British Columbia 939,654 tons, the Northwest Territories 165,762 tons, and the province of New Brunswick 8,482 tons:

Production of coal in Canada, 1886 to 1896.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1886.....	1, 867, 836	1890.....	2, 783, 625	1894.....	3, 453, 341
1887.....	2, 159, 370	1891.....	3, 234, 889	1895.....	3, 137, 050
1888.....	2, 373, 334	1892.....	2, 939, 774	1896.....	3, 342, 173
1889.....	2, 428, 105	1893.....	3, 426, 397		

IMPORTS AND EXPORTS OF COAL.

Canada both imports and exports coal. The imports of coal into the Dominion in the fiscal year ended with June 30, 1895, amounted to 2,705,882 long tons, and the exports from the Dominion in the calendar year ending with December 31, 1895, amounted to 989,349 tons.

PRODUCTION OF PIG IRON.

The production of pig iron in Canada is given in the following table, in long tons, from 1890 to 1896:

Production of pig iron in Canada since 1890.

Year.	Long tons.	Year.	Long tons.
1890.....	19, 439	1894.....	44, 791
1891.....	21, 331	1895.....	37, 829
1892.....	37, 896	1896.....	60, 030
1893.....	49, 953		

IMPORTS AND EXPORTS OF PIG IRON.

During the last twelve fiscal years, with the exception of the fiscal year ending with June 30, 1894, the imports of pig iron into Canada always exceeded the production of pig iron in the Dominion. In the fiscal year 1894, however, Canada produced considerably more pig iron than she imported. In the fiscal year 1895 the imports of pig iron slightly exceeded the production in the same fiscal year, the imports being 31,304 long tons and the production 28,296 tons. In the fiscal year 1894

the imports amounted to 40,884 tons and in 1893 to 56,716 tons. In the fiscal year 1895 pig iron to the value of $6,202 was exported from Canada, but the quantity exported is not given in any of the Canadian export tables to which we have had access.

PRODUCTION OF STEEL.

The production of steel in Canada in 1896, all made by the basic and acid open-hearth processes, amounted to 16,000 long tons. In 1895 the open-hearth steel made amounted to 17,000 tons and in 1894 to 25,685 tons.

TOTAL VALUE OF IMPORTS AND EXPORTS OF IRON AND STEEL.

The total value of iron and steel and manufactures thereof imported into Canada in the fiscal year ended June 30, 1895, was $9,249,749, against $11,310,771 in 1894. The exports from Canada of iron and steel goods made in the Dominion amounted to $308,711 in the fiscal year 1895 and to $295,924 in the fiscal year 1894.

PRODUCTION OF IRON ORE IN ALL OTHER COUNTRIES.

We estimate the production of iron ore in 1895 in India, Mexico, Greece, China, and the remaining countries of the world (including Cuba and Algeria, iron-ore statistics for which countries will be found on preceding pages of this report) at 1,386,000 tons. Of this total Cuba and Algeria contributed about one-half and the remaining countries of the world the other half.

PRODUCTION OF COAL AND LIGNITE IN ALL OTHER COUNTRIES.

The production of coal and lignite in all countries of the world, except those for which statistics have been given in the preceding pages, amounted to about 17,500,000 tons in 1895. Of this total India contributed 4,441,890 tons; New South Wales, 3,798,584 tons; Japan, possibly 3,600,000 tons; and the Transvaal, 1,170,696 tons.

PRODUCTION OF PIG IRON IN ALL OTHER COUNTRIES.

We estimate the production of pig iron in 1895 in all the countries of the world for which pig-iron statistics have not already been given at 125,000 tons; India, China, Japan, and Mexico contributing largely to make up the total given.

PRODUCTION OF STEEL IN ALL OTHER COUNTRIES.

The production of all kinds of steel in all the countries of the world for which steel statistics have not already been given we estimate at 10,000 tons in 1895. To this total China contributed at least 3,000 tons of Bessemer and open-hearth steel.

THE WORLD'S PRODUCTION OF IRON ORE, COAL, PIG IRON, AND STEEL.

The following tables give the production of iron ore, coal, pig iron, and steel in all countries in 1895, the latest year for which complete statistics are available. Tons of 2,240 pounds are used in giving the production of the United States, Great Britain, Canada, and "other countries," and metric tons of 2,204 pounds are used for all the Continental countries of Europe.

The world's production of iron ore and coal.

Country.	Iron ore.		Coal and lignite.	
	Year.	Tons.	Year.	Tons.
United States	1895	15, 957, 614	1895	172, 426, 366
Great Britain	1895	12, 615, 414	1895	189, 661, 362
Germany and Luxemburg	1895	12, 349, 600	1895	103, 957, 639
France	1895	3, 679, 767	1895	28, 019, 893
Belgium	1895	312, 637	1895	20, 450, 604
Austria and Hungary	1895	2, 340, 173	1895	32, 654, 777
Russia	1895	2, 700, 000	1895	9, 071, 408
Sweden	1895	1, 904, 6 2	1895	223, 652
Spain	1895	5, 514, 339	1895	1, 783, 783
Italy	1895	183, 371	1895	305, 321
Canada	1895	91, 783	1895	3, 137, 050
Cuba and other countries	1895	1, 386, 044	1895	17, 500, 000
Total	1895	59, 035, 404	1895	579, 191, 855
Percentage of the United States	1895	27. 03	1895	29. 77

The world's production of pig iron and steel.

Country.	Pig iron.		Steel.	
	Year.	Tons.	Year.	Tons.
United States	1895	9,446,308	1895	6,114,834
Great Britain	1895	7,703,459	1895	3,389,962
Germany and Luxemburg	1895	5,464,501	1895	3,962,775
France	1895	2,003,868	1895	714,523
Belgium	1895	829,234	1895	367,947
Austria and Hungary	1895	1,127,673	1895	780,630
Russia	1895	1,454,325	1895	769,900
Sweden	1895	462,930	1895	197,830
Spain	1895	206,452	1895	73,254
Italy	1895	9,213	1895	50,314
Canada	1895	37,829	1895	17,000
Other countries	1895	125,000	1895	10,000
Total	1895	28,870,792	1895	16,448,969
Percentage of the United States	1895	32.71	1895	37.17

The percentage of iron ore produced by the United States in 1895 is seen by these tables to have been 27.03; of coal, 29.77; of pig iron, 32.71; and of steel, 37.17.

THE RAILROADS OF THE WORLD.

The Archiv für Eisenbahnwesen for May–June contains the table of railroad statistics for the world, which that carefully edited journal publishes every year. The statistics now collected are to the end of 1895. The New York Railroad Gazette has converted the figures of absolute length in miles. The Archiv's figures are, of course, in metric units, and the conversion is tedious and errors are liable to have crept in, but reasonable pains have been taken to avoid them:

The railroads of the world.

Country.	Length of railroads.	Country.	Length of railroads.
EUROPE.	*Miles.*	EUROPE—continued.	*Miles.*
Germany (excluding Luxemburg)	28,841	Russia (including Finland)	23,455
Austria-Hungary (including Bosnia)	18,671	Italy	9,286
Great Britain and Ireland	20,909	Belgium	3,446
France	24,980	The Netherlands (including Luxemburg)	1,927
		Switzerland	2,172

The railroads of the world—Continued.

Country.	Length of railroads.
EUROPE—continued.	*Miles.*
Spain	7,548
Portugal	1,454
Denmark	1,409
Norway	1,115
Sweden	6,061
Servia	336
Roumania	1,617
Greece	570
European Turkey, Bulgaria, and Roumelia	1,419
Malta, Jersey, Man	68
Total	155,284
AFRICA.	
Egypt	1,259
Algiers and Tunis	2,051
Cape Colony	2,444
Natal	401
South African Republic	616
Orange Free State	621
Mauritius, Reunion, Senegal, Angola, Mozambique, Kongo	777
Total	8,169
AUSTRALASIA	13,888
NORTH AMERICA.	
United States	181,717
British North America and Newfoundland	16,231
Mexico	7,127
Central America	621
Total	205,696
SOUTH AMERICA.	
United States of Colombia	281
Cuba	1,076
Venezuela	634
Santo Domingo	72
Brazil	7,496
SOUTH AMERICA—cont'd.	*Miles.*
Argentina	8,893
Paraguay	157
Uruguay	1,119
Chile	1,967
Peru	1,036
Bolivia	621
Ecuador	186
British Guiana	22
Jamaica, Barbados, Trinidad, Martinique, and Puerto Rico	466
Total	24,026
ASIA.	
British India	19,403
Ceylon	297
Asia Minor	1,100
Russia (Transcaspian district)	890
Siberia	1,088
Persia	34
Dutch India	1,289
Japan	2,237
Portuguese India	51
Malay States	87
China	124
Siam	89
Cochin China, Pondicherry, Malacca, and Tonquin	201
Total	26,890
RECAPITULATION.	
Europe	155,284
Africa	8,169
Australasia	13,888
North America	205,696
South America	24,026
Asia	26,890
Total	433,953

ADDENDA.

It was the writer's intention to introduce the foregoing statistical tables with some explanatory and analytical comments, but when the tables were ready to be printed, other engagements prevented the preparation of the introduction referred to, and in lieu thereof the note at the foot of page 51 was inserted. The opportunity to submit detailed comments may be offered hereafter. One of the matters intended to be referred to in the proposed introductory chapter was the presentation of a list of the authorities consulted in the compilation of the tables. This omission is here supplied, as follows:

All the statistics of the production, consumption, and prices of iron and steel in the United States have been compiled from the records of the American Iron and Steel Association. The tables which compare the production of iron and steel by the United States with that of other countries have also been compiled from the same records, as have also the tables which give the world's production of iron and steel and iron ore and coal. The statistics of the imports and exports of iron and steel, including tin plates, and of iron ore by the United States have been compiled by the Bureau of Statistics of the Treasury Department, except that the table of imports of iron ore from Cuba has been compiled from the records of the American Iron and Steel Association. The statistics of the production of tin plates by the United States have been supplied by Col. Ira Ayer, special agent of the Treasury Department. The prices of foreign tin plates are given upon the authority of the Iron Age, of New York, and from the books of a reputable firm which has bought foreign tin plates at New York for a long period of years. The prices of tin utensils are furnished by a wholesale manufacturing company. The prices of Russia sheet iron and of American-Russia sheet iron are given upon the authority of the W. Dewees Wood Company, of Pittsburg. The prices of wire nails are given upon the authority of the Western editor of the Iron Age and of the American Wire Nail Company, of Anderson, Indiana. Railroad statistics for the United States have been supplied by H. V. & H. W. Poor, and the statistics of iron and steel vessels built in the United States have been compiled by the Bureau of Navigation of the Treasury Department.

The detailed statistics of the production of iron and steel and of iron ore and coal by foreign countries for a long series of years have been obtained from the official statistical publications of these countries and from direct correspondence with official and other statisticians. The

authorities for the foreign statistical tables are given in connection with the tables.

In the preparation of all the tables, and especially in correcting and verifying the proofs, I have had the assistance of Mr. William G. Gray, of the office of the American Iron and Steel Association.

The iron and steel statistics which are herewith presented, both for the United States and for foreign countries, are the most comprehensive and trustworthy that have ever been compiled.

GOLD AND SILVER.

PRODUCTION.

The statistics of the gold and silver product are collected by the Director of the Mint and are accepted as official in these reports. For the year 1896 they show the greatest product of gold ever recorded for the United States—2,568,132 ounces, with a coining value of $53,088,000, an increase of $6,478,000 over the product of 1895. Of silver the product was 58,834,800 ounces, with a coining value of $76,069,236, or a commercial value of $39,655,000. This product has been exceeded in amount only in 1892 and 1893. The details of the production are given in the following tables, with comparisons with previous year:

Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1896, as estimated by the Director of the Mint.

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alabama	275	$5,700	.....	.....	$5,700
Alaska	99,444	2,055,700	145,300	$187,863	2,243,563
Arizona	125,978	2,604,200	1,913,000	2,473,373	5,077,573
California	737,036	15,235,900	600,600	776,533	16,012,433
Colorado	721,320	14,911,000	22,573,000	29,185,293	44,096,293
Georgia	7,305	151,000	600	776	151,776
Idaho	104,263	2,155,300	5,149,900	6,658,457	8,813,757
Iowa	48	1,000	.....	.....	1,000
Maryland	15	300	.....	.....	300
Michigan	1,800	37,200	59,000	76,283	113,483
Minnesota	39	800	.....	.....	800
Montana	209,207	4,324,700	16,737,500	21,640,404	25,965,104
Nevada	119,404	2,468,300	1,048,700	1,355,895	3,824,195
New Mexico	23,017	475,800	687,800	889,277	1,365,077
North Carolina	2,143	44,300	500	646	44,946
Oregon	60,517	1,251,000	61,100	78,998	1,329,998
South Carolina	3,062	63,300	300	388	63,688
South Dakota	240,414	4,969,800	229,500	296,727	5,266,527
Tennessee	15	300	.....	.....	300

Approximate distribution, by producing States and Territories, etc.—Continued.

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coinage value.	
Texas	387	$8,000	525,400	$679,305	$687,305
Utah	91,908	1,899,900	8,827,600	11,413,463	13,313,363
Vermont	48	1,000	.....	.....	1,000
Virginia	169	3,500	.....	.....	3,500
Washington	19,626	405,700	274,900	355,426	761,126
Wyoming	692	14,300	100	129	14,429
Total	2,568,132	53,088,000	58,834,800	76,069,236	129,157,236

Product of gold and silver for the calendar year 1895, by States and Territories.

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alaska	78,140	$1,615,300	67,200	$86,880	$1,702,180
Arizona	95,072	1,965,300	986,900	1,275,990	3,241,290
California	722,171	14,928,600	653,700	845,180	15,773,780
Colorado	643,634	13,305,100	23,398,500	30,252,600	43,557,700
Georgia	6,192	128,000	400	520	128,520
Idaho	86,088	1,779,600	3,110,600	4,021,780	5,801,380
Michigan	2,075	42,900	37,300	48,220	91,120
Montana	198,405	4,101,400	17,569,100	22,715,600	26,817,000
Nevada	75,088	1,552,200	956,200	1,236,290	2,788,490
New Mexico	23,810	492,200	694,800	898,320	1,390,520
North Carolina	2,622	54,200	400	520	54,720
Oregon	42,972	888,300	51,000	65,930	954,230
South Carolina	6,212	128,400	400	520	128,920
South Dakota	187,187	3,869,500	159,300	205,960	4,075,460
Texas	.....	.....	450,000	581,810	581,810
Utah	66,419	1,373,000	7,468,100	9,655,720	11,028,720
Washington	16,980	351,000	122,700	158,640	509,640
Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming	1,693	35,000	400	520	35,520
Total	2,234,760	46,610,000	55,727,000	72,051,000	118,661,000

The following tables show the increase or decrease in the silver product in each State for recent years:

Production of silver in the United States in 1891 and 1892, and the increase or decrease in each year, by States and Territories.

State or Territory.	1891.	1892.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	8,000	8,400	400	.....
Arizona	1,480,000	1,161,900	.....	318,100
California	750,000	392,200	.....	357,800
Colorado	21,160,000	26,632,300	5,472,300	.....
Georgia	400	400	.....	.....
Idaho	4,035,000	3,461,200	.....	573,800
Michigan	73,000	65,600	.....	7,400
Montana	16,350,000	19,038,800	2,688,800	.....
Nevada	3,520,000	2,454,500	.....	1,065,500
New Mexico	1,325,000	1,176,700	.....	148,300
North Carolina	5,000	9,800	4,800	.....
Oregon	230,000	54,200	.....	175,800
South Carolina	500	400	.....	100
South Dakota	100,000	58,100	.....	41,900
Texas	375,000	328,100	.....	46,900
Utah	8,750,000	8,490,800	.....	259,200
Washington	165,000	165,700	700	.....
Alabama, Maryland, Tennessee, Vermont, Virginia, Wyoming	3,100	900	.....	2,200
Total	58,330,000	63,500,000	8,167,000	2,997,000
Net increase	.....	.....	5,170,000	.....

Production of silver in the United States in 1892 and 1893, and the increase or decrease in each year, by States and Territories.

State or Territory.	1892.	1893.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	8,400	9,600	1,200	.....
Arizona	1,161,900	2,935,700	1,773,800	.....
California	392,200	470,100	77,900	.....
Colorado	26,632,300	25,838,600	.....	793,700
Georgia	400	500	100	.....
Idaho	3,461,200	3,910,700	449,500	.....
Michigan	65,600	43,500	.....	22,100
Montana	19,038,800	16,906,400	.....	2,132,400
Nevada	2,454,500	1,561,300	.....	893,200
New Mexico	1,176,700	458,400	.....	718,300
North Carolina	9,800	13,400	3,600	.....
Oregon	54,200	11,800	.....	42,400
South Carolina	400	500	100	.....
South Dakota	58,100	140,400	82,300	.....
Texas	328,100	349,400	21,300	.....
Utah	8,490,800	7,196,300	.....	1,294,500
Washington	165,700	152,700	.....	13,000
Alabama Maryland Tennessee Vermont Virginia Wyoming	900	700	.....	200
Total	63,500,000	60,000,000	2,409,800	5,909,800
Net decrease	.....	.....	.....	3,500,000

Production of silver in the United States in 1893 and 1894, and the increase or decrease in each year, by States and Territories.

State or Territory.	1893.	1894.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	9,600	22,261	12,661	.....
Arizona	2,935,700	1,147,204	.....	1,788,496
California	470,100	717,368	247,268	.....
Colorado	25,838,600	23,281,399	.....	2,557,201
Georgia	500	325	.....	175
Idaho	3,910,700	3,288,548	.....	622,152
Michigan	43,500	35,122	.....	8,378
Montana	16,906,400	12,820,081	.....	4,086,319
Nevada	1,561,300	1,035,151	.....	526,149
New Mexico	458,400	632,183	173,783	.....
North Carolina	13,400	352	.....	13,048
Oregon	11,800	26,171	14,371	.....
South Carolina	500	305	.....	195
South Dakota	140,400	58,973	.....	81,427
Texas	349,400	429,314	79,914	.....
Utah	7,196,300	5,891,901	.....	1,304,399
Washington	152,700	113,160	.....	39,540
Alabama, Maryland, Tennessee, Virginia, Vermont, Wyoming	700	182	.....	518
Total	60,000,000	49,500,000	527,997	11,027,997
Net decrease	.....	.....	.....	10,500,000

Production of silver in the United States in 1894 and 1895, and the increase or decrease in each year, by States and Territories.

State or Territory.	1894.	1895.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	22,261	67,200	44,939	.....
Arizona	1,147,204	986,900	.....	160,304
California	717,368	653,700	.....	63,668
Colorado	23,281,399	23,398,500	117,101	.....
Georgia	325	400	75	.....
Idaho	3,288,548	3,110,600	.....	177,948
Michigan	35,122	37,300	2,178	.....
Montana	12,820,081	17,569,100	4,749,019	.....
Nevada	1,035,151	956,200	.....	78,951
New Mexico	632,183	694,800	62,617	.....
North Carolina	352	400	48	.....
Oregon	26,171	51,000	24,829	.....
South Carolina	305	400	95	.....
South Dakota	58,973	159,300	100,327	.....
Texas	429,314	450,000	20,686	.....
Utah	5,891,901	7,468,100	1,576,199	.....
Washington	113,160	122,700	9,540	.....
Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming	182	400	218	.....
Total	49,500,000	55,727,000	6,707,871	480,871
Net increase	.....	.....	6,227,000	.....

Production of silver in the United States in 1895 and 1896, and the increase or decrease in each year, by States and Territories.

State or Territory.	1895.	1896.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	67,200	145,300	78,100	.....
Arizona	986,900	1,913,000	926,100	.....
California	653,700	600,600	.....	53,100
Colorado	23,398,500	22,573,000	.....	825,500
Georgia	400	600	200	.....
Idaho	3,110,600	5,149,900	2,039,300	.....
Michigan	37,300	59,000	21,700	.....
Montana	17,569,100	16,737,500	.....	831,600
Nevada	956,200	1,048,700	92,500	.....
New Mexico	694,800	687,800	.....	7,000
North Carolina	400	500	100	.....
Oregon	51,000	61,100	10,100	.....
South Carolina	400	300	.....	100
South Dakota	159,300	229,500	70,200	.....
Texas	450,000	525,400	75,400	.....
Utah	7,468,100	8,827,600	1,359,500	.....
Washington	122,700	274,900	152,200	.....
Alabama Connecticut Minnesota Nebraska Tennessee Virginia Wyoming	400	100	.....	300
Total	55,727,000	58,834,800	4,825,400	1,717,600
Net increase	.....	.....	3,107,800	.....

Ranks of the States and Territories in the production of gold and silver in 1895.

Rank.	Gold.	Rank.	Silver.	Rank.	Total.
1	California.	1	Colorado.	1	Colorado.
2	Colorado.	2	Montana.	2	Montana.
3	Montana.	3	Utah.	3	California.
4	South Dakota.	4	Idaho.	4	Utah.
5	Arizona.	5	Arizona.	5	Idaho.
6	Idaho.	6	Nevada.	6	South Dakota.
7	Alaska.	7	New Mexico.	7	Arizona.
8	Nevada.	8	California.	8	Nevada.
9	Utah.	9	Texas.	9	Alaska.
10	Oregon.	10	South Dakota.	10	New Mexico.
11	New Mexico.	11	Washington.	11	Oregon.
12	Washington.	12	Alaska.	12	Texas.
13	South Carolina.	13	Oregon.	13	Washington.
14	Georgia.	14	Michigan.	14	South Carolina.
15	North Carolina.		Georgia.	15	Georgia.
16	Michigan.	15	North Carolina.	16	Michigan.
			South Carolina.	17	North Carolina.

Ranks of the States and Territories in the production of gold and silver in 1896.

Rank.	Gold.	Rank.	Silver.	Rank.	Total.
1	California.	1	Colorado.	1	Colorado.
2	Colorado.	2	Montana.	2	Montana.
3	South Dakota.	3	Utah.	3	California.
4	Montana.	4	Idaho.	4	Utah.
5	Arizona.	5	Arizona.	5	Idaho.
6	Nevada.	6	Nevada.	6	South Dakota.
7	Idaho.	7	New Mexico.	7	Arizona.
8	Alaska.	8	California.	8	Nevada.
9	Utah.	9	Texas.	9	Alaska.
10	Oregon.	10	Washington.	10	New Mexico.
11	New Mexico.	11	South Dakota.	11	Oregon.
12	Washington.	12	Alaska.	12	Washington.
13	Georgia.	13	Oregon.	13	Texas.
14	South Carolina.	14	Michigan.	14	Georgia.
15	North Carolina.		Georgia.	15	Michigan.
16	Michigan.	15	North Carolina.	16	South Carolina.
			South Carolina.		

Production of gold in the United States in 1895 and 1896, and the increase or decrease in each year, by States and Territories.

State or Territory.	1895.	1896.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	78,140	99,444	21,304	.....
Arizona	95,072	125,978	30,906	.....
California	722,171	737,036	14,865	.....
Colorado	643,634	721,320	77,686	.....
Georgia	6,192	7,305	1,113	.....
Idaho	86,088	104,263	18,175	.....
Michigan	2,075	1,800	.....	275
Montana	198,405	209,207	10,802	.....
Nevada	75,088	119,404	44,316	.....
New Mexico	23,810	23,017	.....	793
North Carolina	2,622	2,143	.....	479
Oregon	42,972	60,517	17,545	.....
South Carolina	6,212	3,062	.....	3,150
South Dakota	187,187	240,414	53,227	.....
Texas	.....	387	387	.....
Utah	66,419	91,908	25,489	.....
Washington	16,980	19,626	2,646	.....
Alabama, Iowa, Maryland, Minnesota, Tennessee, Vermont, Virginia, Wyoming, Connecticut, Nebraska	1,693	1,301	.....	392
Total	2,254,760	2,568,132	318,461	5,089
Net increase	.....	.....	313,372	.....

Product of gold and silver in the United States from 1792.

[The estimate for 1792–1873 is by Dr. R. W. Raymond, United States Mining Commissioner, and since by the Director of the Mint.]

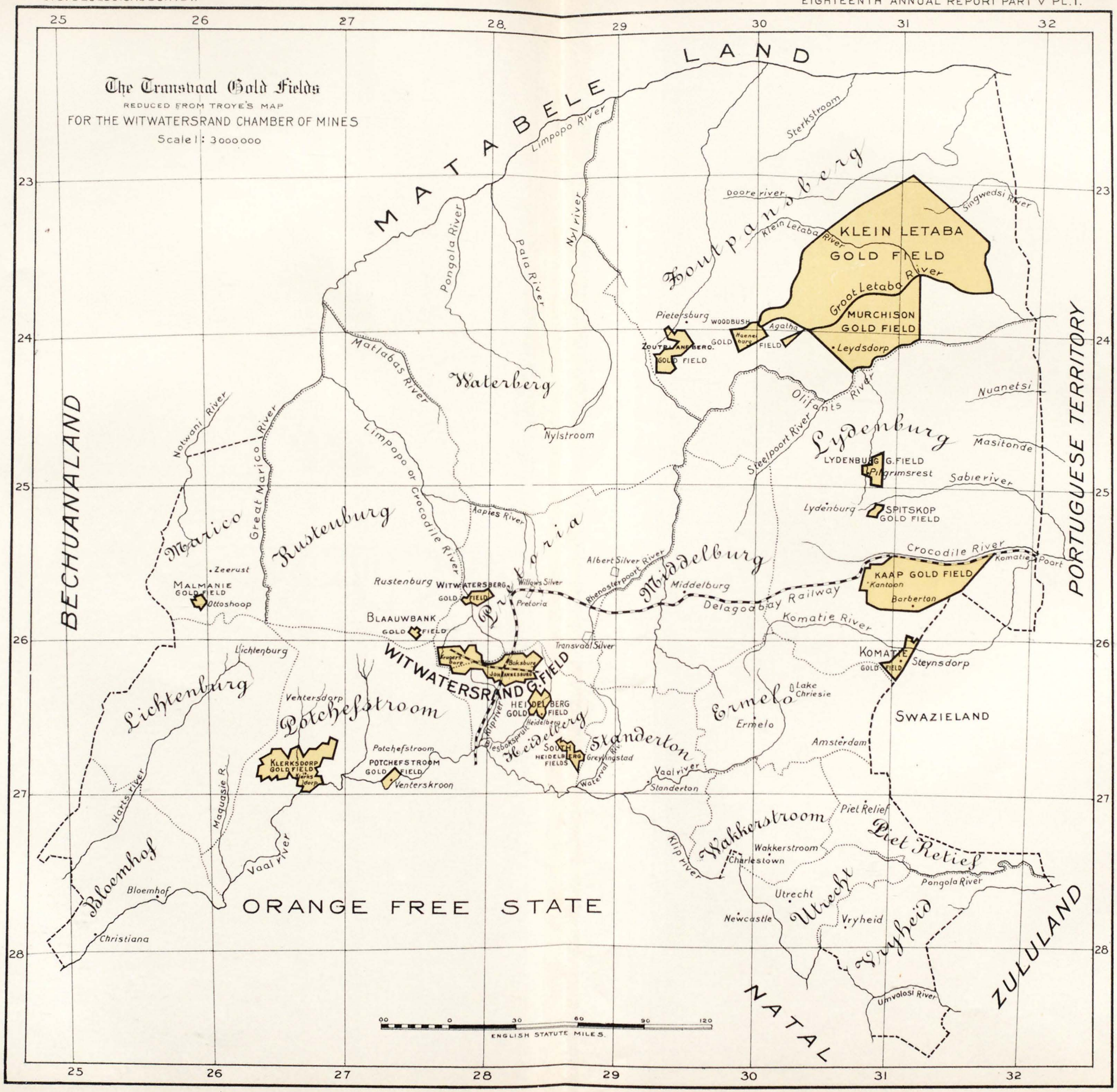
Year.	Total.	Gold.	Silver.
April 2, 1792–July 31, 1834	$14,000,000	$14,000,000	(*a*)
July 31, 1834–Dec. 31, 1844	7,750,000	7,500,000	$250,000
1845	1,058,327	1,008,327	50,000
1846	1,189,357	1,139,357	50,000
1847	939,085	889,085	50,000
1848	10,050,000	10,000,000	50,000
1849	40,050,000	40,000,000	50,000
1850	50,050,000	50,000,000	50,000
1851	55,050,000	55,000,000	50,000
1852	60,050,000	60,000,000	50,000
1853	65,050,000	65,000,000	50,000
1854	60,050,000	60,000,000	50,000
1855	55,050,000	55,000,000	50,000
1856	55,050,000	55,000,000	50,000
1857	55,050,000	55,000,000	50,000
1858	50,500,000	50,000,000	500,000
1859	50,100,000	50,000,000	100,000
1860	46,150,000	46,000,000	150,000
1861	45,000,000	43,000,000	2,000,000
1862	43,700,000	39,200,000	4,500,000
1863	48,500,000	40,000,000	8,500,000
1864	57,100,000	46,100,000	11,000,000
1865	64,475,000	53,225,000	11,250,000
1866	63,500,000	53,500,000	10,000,000
1867	65,225,000	51,725,000	13,500,000
1868	60,000,000	48,000,000	12,000,000
1869	61,500,000	49,500,000	12,000,000
1870	66,000,000	50,000,000	16,000,000
1871	66,500,000	43,500,000	23,000,000
1872	64,750,000	36,000,000	28,750,000
1873	71,750,000	36,000,000	35,750,000
1874	70,800,000	33,500,000	37,300,000
1875	65,100,000	33,400,000	31,700,000
1876	78,700,000	39,900,000	38,800,000
1877	86,700,000	46,900,000	39,800,000
1878	96,400,000	51,200,000	45,200,000
1879	79,700,000	38,900,000	40,800,000
1880	75,200,000	36,000,000	39,200,000
1881	77,700,000	34,700,000	43,000,000
1882	79,300,000	32,500,000	46,800,000
1883	76,200,000	30,000,000	46,200,000

Product of gold and silver in the United States from 1792—Continued.

[The estimate for 1792–1873 is by Dr. R. W. Raymond, United States Mining Commissioner, and since by the Director of the Mint.]

Year.	Total.	Gold.	Silver.
1884	$79, 600, 000	$30, 800, 000	$48, 800, 000
1885	83, 400, 000	31, 800, 000	51, 600, 000
1886	86, 000, 000	35, 000, 000	51, 000, 000
1887	86, 350, 000	33, 000, 000	53, 350, 000
1888	92, 370, 000	33, 175, 000	59, 195, 000
1889 mint	97, 446, 000	32, 800, 000	64, 646, 000
1889 census	99, 282, 866	32, 886, 180	66, 396, 686
1890	103, 330, 714	32, 845, 000	70, 485, 714
1891	108, 591, 565	33, 175, 000	75, 416, 565
1892	115, 101, 000	33, 000, 000	82, 101, 000
1893	113, 531, 000	35, 955, 000	77, 576, 000
1894	103, 500, 000	39, 500, 000	64, 000, 000
1895	118, 661, 000	46, 610, 000	72, 051, 000
1896	129, 157, 236	53, 088, 000	76, 069, 236

a Insignificant.


The Transvaal Gold Fields
REDUCED FROM TROYE'S MAP
FOR THE WITWATERSRAND CHAMBER OF MINES
Scale 1 : 3000000
MATABELE LAND
BECHUANALAND
PORTUGUESE TERRITORY
ORANGE FREE STATE
SWAZIELAND
NATAL
ZULULAND
KLEIN LETABA GOLD FIELD
MURCHISON GOLD FIELD
WITWATERSRAND G. FIELD
KAAP GOLD FIELD
KOMATIE GOLD FIELD
SPITSKOP GOLD FIELD
LYDENBURG G. FIELD
HEIDELBERG GOLD FIELD
SOUTH HEIDELBERG FIELDS
POTCHEFSTROOM GOLD FIELD
KLERKSDORP GOLD FIELDS
MALMANIE GOLD FIELD
BLAAUWBANK GOLD FIELD
ZOUTPANSBERG GOLD FIELD
WOODBUSH GOLD FIELD
Pietersburg
Leydsdorp
Lydenburg
Pilgrimsrest
Pretoria
Middelburg
Rustenburg
Zeerust
Ottoshoop
Lichtenburg
Ventersdorp
Potchefstroom
Venterskroon
Klerksdorp
Heidelberg
Standerton
Ermelo
Amsterdam
Wakkerstroom
Piet Relief
Utrecht
Vryheid
Newcastle
Bloemhof
Christiana
Barberton
Komatie Poort
Steynsdorp
Lake Chriesie
Greylingstad
Charlestown
Waterberg
Zoutpansberg
Marico
Rustenburg
Lichtenburg
Bloemhof
Pretoria
Middelburg
Ermelo
Standerton
Wakkerstroom
Piet Relief
Utrecht
Vryheid
Limpopo River
Sterkstroom
Doore river
Singwedsi River
Klein Letaba River
Groot Letaba River
Olifants River
Steelpoort River
Nuanetsi
Masitonde
Sabie river
Crocodile River
Komatie River
Delagoa bay Railway
Pongola River
Umvolosi River
Vaal river
Klip river
Waterval River
Nylstroom
Nylriver
Pongola River
Pala River
Matlabas River
Limpopo or Crocodile River
Great Marico River
Notwani River
Hartsriver
Maquasie R.
Aapies River
Albert Silver River
Rhenosterpoort River
Willows Silver
Transvaal Silver
Rhenosterspruit
Blesboksprutt
Klipriver
Boksburg
Johannesburg
Gregory's Berg
ENGLISH STATUTE MILES.
00 0 30 60 90 120
25 26 27 28 29 30 31 32
23 24 25 26 27 28

THE WITWATERSRAND BANKET, WITH NOTES ON OTHER GOLD-BEARING PUDDING STONES.[1]

By George F. Becker.

INTRODUCTORY.

The area which yields most of the gold product of the African continent is a strip of country about 30 miles long and less than a mile wide, with the town of Johannesburg near the middle. It stretches along a low divide known as the Witwatersrand, or white water range, from which the district takes its name. The ore is a gold-bearing pudding stone, or, in Dutch, "banket," i. e., almond taffy. The stupendous bullion output of this district is exerting a strong influence on the monetary systems of the world, and the smoke of the melting furnaces has even obscured portions of the political horizon.

In the following table of the product of the Witwatersrand, the figures from 1887, when production began, to 1894 are taken from Messrs. Hatch and Chalmers's work. They include only the product of the deep mines and exclude a small amount of gold which in the earlier years was extracted from modern surface placers. The data include the product of the Heidelberg district, which may be seen on the accompanying map (Pl. I), but exclude that of Pochefstroom and Klerksdorp. Of late years there has been no alluvial washing, and the product is given as stated by the Witwatersrand Chamber of Mines for 1895 and 1896.[2] The conversion from pounds to dollars is made at the rate of $4.8665=£1. It is unfortunately the habit at Johannesburg to make returns in terms of ounces of crude bullion instead of fine gold. In 1896 the average value of the bullion was $16.78 per ounce.

[1]This paper is prepared at the request of Director Walcott, and by permission of R. H. Benson, esq., of London, at whose instance I visited the Transvaal in 1896.

[2]The 1896 output, as estimated by the Chamber of Mines, is given in the South African Financial Record for March 6, 1897.

Gold product of the Witwatersrand banket.

Year.	Ounces.	Pounds sterling.	Dollars.
1887	23, 149	81, 022	394, 294
1888	207, 660	726, 821	3, 537, 074
1889	369, 557	1, 300, 509	6, 328, 927
1890	494, 817	1, 735, 491	8, 445, 767
1891	729, 238	2, 556, 328	12, 440, 370
1892	1, 208, 928	4, 290, 733	20, 880, 852
1893	1, 476, 502	5, 180, 090	25, 208, 908
1894	2, 023, 198	6, 959, 622	33, 869, 000
1895	2, 277, 640	7, 840, 779	38, 157, 151
1896	2, 280, 892	7, 864, 341	38, 271, 815
Unrecorded:			
1887–88–89	42, 000	146, 945	715, 108

The last item is an estimate by the Chamber of Mines of bullion which escaped record in the early years, before the statistical machinery of the district had been started up.

The output for the first third of 1897 is as follows:

Gold product of the Witwatersrand for the first third of 1897.

Months.	Ounces.	Penny-weight.
January	209, 832	0
February	211, 000	13
March	232, 066	19
April	235, 698	19

The March yield was the greatest for any one month since exploitation began, but that of April exceeds it, and the output for the four months indicates a product for 1897 of nearly $45,000,000.[1]

I regret to say that it is not convenient to accompany this paper by a map showing the various mines of the Witwatersrand. The highly productive territory is so long, and many of the mining properties are of such moderate size, that an adequate map is a very large affair. Readers who care for details will find abundant maps in the larger treatises quoted in this discussion.

Exploitation on the Witwatersrand has hitherto been confined almost entirely to what are known as the outcrop properties and to depths of less than 1,000 feet. These upper workings have been elab-

[1]While this paper is going through the press, the London Economist of June 12 brings the news that the May output is 248,305 ounces, an increase of more than $200,000 on the April yield.

orately described, the most recent and thorough descriptions being by Messrs. Carl Schmeisser,[1] Hatch and Chalmers,[2] C. S. Goldmann,[3] and L. De Launay.[4] Within a year some of the deeper shafts on the "Deep Level" properties have reached the ore-bearing strata. The deepest shafts are, I believe, those of the Robinson Deep, close to Johannesburg. On this property No. 2 shaft cut the South Reef (or the highest of the important conglomerate beds) in July, 1896, at 1,806 feet. At the point encountered this reef assayed 3 ounces over a width of 12 inches. In March, 1897, No. 1 shaft cut the South Reef at 2,385 feet and found it assaying 5 ounces over a width of 6 inches.[5] A bore hole called the Bezuidenville has cut the reefs at 3,251 feet from the surface and 5,800 feet from the outcrop, finding them auriferous.[6] This bore hole is close to town and directly south of the Meyer and Charlton. The Rand Victoria bore hole lies some 5 miles to the eastward of the Bezuidenville and at 4,100 feet from the croppings. It cut the first reef at a depth of 2,343 feet, where it assayed 1 ounce 4 pennyweight.[7]

There is little doubt that exploitation on the Witwatersrand can be pushed to a depth of 5,000 feet. There is no indication that heavy ground or unmanageable quantities of water will be met with, and while the data as to temperature increment are thus far very unsatisfactory, they indicate a rise of only 1° F. for from 82 to 100 feet of depth. A careful scrutiny of the conditions leads me to believe that there are no serious natural obstacles to mining in this region at 4,000 feet, nor, under proper management, would there be any excessive unavoidable expense.[8] Whether the deposits will remain remunerative at such depths is a separate question.

The future of the Rand is a more important matter than its past. Whether or no the gold-bearing series will contiuue to carry profitable quantities of the precious metal, and whether they will turn out to be productive when followed on the surface to greater distances from Johannesburg, are questions the answers to which must be deductions from the true theory of the genesis of the deposits. The discussion of gold deposition on the Witwatersrand is a very responsible task, for an error in the conclusion might easily lead to lamentable disasters. It should therefore be undertaken in a thoroughly dispassionate spirit. I shall begin by marshaling the facts, so far as I have been able to ascertain them, and then review the theories which have been advanced to account for them. Some of the analogies to be drawn require more

[1] Vorkommen u. Gewinnung der nutz. Min. in der Südafr. Rep., 1895.

[2] The Gold Mines of the Rand, 1895.

[3] South African Mines, 1895–96, 3 vols. This is an elaborate compilation chiefly devoted to the financial status of mining companies in the Transvaal and other portions of South Africa. The third volume consists of very useful maps.

[4] Les mines d'or du Transvaal, 1896.

[5] Robinson Deep, directors' report, May 1, 1897.

[6] Consolidated Gold Fields of South Africa, directors' report, November 1, 1896.

[7] Hatch and Chalmers, page 100.

[8] See extracts of an opinion by me on the "Practicability of deep mining on the Rand," in the annual report of the directors of the Consolidated Gold Fields of South Africa, November, 1896.

details as to other deposits than it is convenient to give in discussing the Witwatersrand pudding stone, and these will be given by themselves in a separate division of the paper.

GOLD DEPOSITION ON THE WITWATERSRAND.

THE GOLD-BEARING REGION.

Before entering on the details of the occurrence of gold in the great deposits about Johannesburg it may be well to glance at their general relations to the auriferous regions of southern Africa and to sketch, in barest outlines, their geological position; for these general relations will contribute somewhat to a comprehension of the conditions under which the deposits were generated. It must be understood, however, that the stratigraphy of the region has not been thoroughly worked out, and that, though a number of geologists and mining engineers have studied some questions, the information has for the most part been gathered for the benefit of companies to whose interest it is to withhold information. Partly as a consequence of these conditions great differences of opinion exist among those who have given public expression to their views.

A large area in South Africa is known to be auriferous; indeed, there is a strong probability, as has often been pointed out, that the Ophir of the ancients was in Mashonaland.[1] The area to the northward of the Transvaal which is dotted over with proclaimed gold fields may be estimated at 75,000 square miles. The gold fields of the Transvaal are shown on the map printed by the Witwatersrand Chamber of Mines, which is copied for this report, and they cover about 55,000 square miles. It is quite possible, of course, that there are other undiscovered fields within or without this region. A glance at the map will show the important fact that Johannesburg, Heidelberg, Pochefstroom, and Klerksdorp lie at the southern edge of the auriferous area. These are also the only districts in which the gold is found in conglomerates, all

[1] Ophir was to the southward of the Red Sea, and it can hardly be doubted that it lay either in India or in Africa. No locality in India corresponds to Ophir, and the civilization of India has been such that rich gold fields would not have fallen into oblivion. There is also no doubt that the ancients possessed an intimate knowledge of the geography of eastern Africa. It is difficult to believe that this knowledge was acquired for its own sake or as an incident to the pursuit of slaves and ivory. There are great numbers of ancient superficial mine workings in Mashonaland and Matabeleland, among which strange smelting implements, vases, images, and phallic symbols have been found, but nothing which is certainly an inscription. At Zimbabwe, also, there are very remarkable antique stone buildings. Some nonsense has been written about the Zimbabwe ruins and the relics found in the ancient gold mines. There is as yet no definite proof of their origin, but I think it may be considered as established that they are not due to the unguided efforts of the Kaffirs. The only probable invaders would have been Egyptians or Semitic races from the Arabian coast. It is of course probable that the mines were worked, perhaps intermittently, over a very long period; but in the East customs do not change rapidly. The ⋚-shaped ingot mold found at Zimbabwe by Mr. Theodore Bent, may be only a few hundred years old, and yet nearly related to the ⋚-shaped tin ingots which there is reason to believe the Phœnicians left in England. This region affords a capital opportunity for research by some sufficiently learned archæologist.

of the more northerly fields being characterized by veins not dissimilar to those of other gold-bearing regions, such as California and Australia. They are usually associated with schists and granitoid rocks.

In a report[1] made to the British South Africa Company, dated November, 1894, Mr. John Hays Hammond describes the auriferous region of Matabeleland and Mashonaland as forming a high plateau along the main divide or watershed of the river systems of the country, being the source of the tributaries of the Limpopo and Sabi rivers on the south and those of the Zambesi on the north. This watershed trends in a northeasterly direction. The great bulk of the country Mr. Hammond reports as granite, the remainder being metamorphic schist, probably dynamometamorphosed igneous material. The schists constitute the gold belt of the country, and occur as broad bands and patches in the granite. It is chiefly in the region of intense metamorphism that the quartz veins occur, the walls usually being highly foliated chloritic schist. The auriferous belts extend for the most part in an easterly and westerly direction, with a width of from 5 to 20 miles. Mr. Hammond states that millions of pounds sterling worth of gold has undoubtedly been derived from the numerous ancient workings, all of which seem to be shallow. The ancients were probably unable to deal with much water or with sulphidized ores.[2]

The gold fields of the northern portion of the Transvaal resemble those of Mashonaland and Matabeleland. The quartz veins are characteristically associated with schists and granite and very often, according to Mr. Schmeisser, lie conformably between strata.[3] One may perhaps suspect that schistose surfaces rather than planes of bedding have controlled the position of the veins. The schists for the most part strike east or northeast and dip steeply, as a rule, to the south. The gold fields lie at or near watersheds in the northern portion of the Transvaal, as well as in the British South Africa (or Chartered) Company's territory.

The schistose rocks of the northern Transvaal and the Chartered Company's territory are known as the Swasi schists. Their age is unknown, but it is supposed that they are Silurian. They are not dissimilar in appearance to portions of the Algonkian in the United States, and may in fact include several formations.

Along the southern edge of the auriferous Swasi area and unconformably upon it lies the Lower Cape series. This is the formation containing the great auriferous conglomerates. It consists of numerous beds of silicified conglomerate alternating with quartzites and containing subordinate quantities of slate. Its age also is unknown, no definite fossils having been obtained from it. There is no doubt

[1] Reprinted in extenso in Mr. C. S. Goldmann's South African Mines, vol. 2, 1895–96, p. 64.

[2] The Matabele outbreak prevented my visiting these fields.

[3] Op. cit., p. 27.

that it is Paleozoic, and a somewhat uncertain correlation with the rocks near Cape Town would assign it to the Devonian or the Lower Carboniferous. Mr. G. A. F. Molengraaff[1] considers this series as divisible into a lower portion, which he calls the Old Schist formation, and the auriferous group, for which he retains the name Lower Cape. I saw no distinct evidence of such a division, though there is doubtless some faulting, and on Mr. Molengraaff's maps no such discordance displays itself. If it exists it would seem to be slight. His Old Schist occurs at the crest of the Witwatersrand and includes the Hospital Hill slates; it is not wholly devoid of auriferous beds.

The Upper Cape series lies unconformably upon the Lower Cape. This discordance, which I have had occasion to examine, is marked and very important to the technology of the district. The Upper Cape contains, close to its base, one auriferous conglomerate, the Black Reef,[2] which at certain points has been successfully mined. An extensive sheet of dolomite overlies the Black Reef, and the dolomite is again overlain, in seeming conformity, by the Gatsrand series.

Overlying the Upper Cape are the coal-bearing beds of the Karoo. They are Triassic, or possibly in part Permian, and lie unconformably on the older rocks. They are nearly horizontal, almost undisturbed, and conceal the older rock over large tracts of country.

CHARACTER OF THE MAIN REEF SERIES.

The gold-bearing pudding stones, which make Johannesburg famous, are known as the Main Reef series, and occur in the Lower Cape formation. The gold is not confined to this formation, since the Black Reef is a member of the Upper Cape. Neither is the Main Reef series the only gold-bearing portion of the Lower Cape. All the conglomerates of this series, which is miles in thickness, seem to carry some gold, and, locally at least, some others besides the Main Reef series have proved fairly rich; but none which are yet definitely known not to belong to the Main Reef have become economically important. They have received various names, which are sometimes inconsistently applied through erroneous hypotheses of continuity. Immediately about Johannesburg the more prominent groups of conglomerates of the Lower Cape formation, in ascending order, are known as the Main Reef, Bird Reef, Kimberly Reef, and the Elsburg series. The intervals between these groups of conglomerates, measured across the croppings, are approximately 3,000, 5,000, and 10,000 feet, so that the Elsburg series is over 3 miles from the Main Reef. The distance measured perpendicularly to the stratification is, of course, much smaller and averages somewhat less than one-half of the horizontal distance. In any one section the various pudding stone beds can be distinguished

[1] Neues Jahrbuch für Mineral., Beil.-Bd. 9, 1894, p. 174.

[2] "Reef" is a term which is very loosely used in South Africa. At Kimberly it means slate horse. At Johannesburg it means conglomerate beds, usually, of course, auriferous ones.

by the size and color of pebbles, the appearance of the matrix, and the like. Some miners think they can recognize the Main Reef series at any distance from Johannesburg by the appearance, but little faith is to be placed in such identification, inasmuch as on any continuous stratum of the pudding stone, followed along the strike, the lithological character varies. This I have had many opportunities of observing.

The Main Reef series comprises several beds of conglomerate at no great distance from one another. The number of these auriferous strata is not constant, and they receive different names in different parts of the district. The beds most often heard of are the South Reef, the Main Reef Leader, and the Main Reef. The last named is the widest, usually several feet, and sometimes as much as 12. As a rule, gold is not uniformly distributed through it, and it is not very rich. In most mines only a part of this bed is extracted, and in some it is left standing. The Main Reef Leader is a thin bed lying above the Main Reef at a distance of a few feet or a few inches. It is almost invariably rich. It averages about 15 inches in thickness. The South Reef is commonly separated from the Main Reef Leader by 30 to 100 feet of quartzite. This reef is also thin and commonly very rich. In some parts of the district there are half a dozen valuable reefs, and even more. Whether any one bed could actually be followed by a drift continuously for 20 or 30 miles is very doubtful. It appears to me rather that the beds of conglomerate form a group of very flat lenticular masses, any one dying out in strike, but usually being replaced in the floor or roof by an equivalent bed. In a number of cases one of the reefs is "split" by sandstone or quartzite, and they are known to die out locally. It has repeatedly happened in cross-cutting that profitable banket has been unexpectedly encountered, and that such strata were only locally developed. But, although the persistency of the reef is apparently exaggerated on the Rand, there is no doubt that the beds are much more persistent than such beds generally are, and that single strata can be followed continuously for several miles. So long as gold-bearing pudding stones occur, it is of small consequence whether they are the same as, or only equivalent to, the banket in the type localities. All the reefs of the Main Reef series carry gold, and portions at least of each seem to be workable.

As has been indicated above, auriferous banket occurs in other districts besides that of the Witwatersrand. It is one of the great problems of economical geology in the Transvaal to trace the Lower Cape, with its bankets, to the eastward and the westward. This task is a difficult one, for various reasons. The Lower Cape was much disturbed and faulted before the Upper Cape was deposited; the larger part of the surface is occupied by Upper Cape and Karoo beds, concealing the Lower Cape; the Karoo is substantially undisturbed; finally, the country is a peneplain, and is rarely dissected to such an extent as to expose the rocks. Much more than nine-tenths of the country is so

level that one can drive about regardless of roads, as on the Laramie plains, and this area is covered with grass.

The Heidelberg district is so closely associated with the Witwatersrand proper that the two are regarded industrially as one. To the southwestward the Klerksdorp and the Pochefstroom districts carry auriferous banket, and observers seem agreed that the Lower Cape is represented in these localities. A wide belt of Upper Cape and a granitic intrusion separate the Witwatersrand from Pochefstroom. In 1895 these western districts produced over 90,000 ounces of gold, worth a million and a half of dollars. To the westward of the Heidelberg district the country is a coal-bearing one, and the underlying bankets have been discovered only at certain points; but in Swaziland and Zululand auriferous banket certainly occurs, and gentlemen very familiar with the Johannesburg deposits assure me that all the essential peculiarities of the Lower Cape are there reproduced. At a point called Denny-Dalton, in Zululand, accessible from the railway station of Dundee in Natal, some work has been done on these deposits. The trouble with the Zululand banket is said to be that it runs only 4 or 5 pennyweights, so that under present conditions there is no profit in it. It need not be said that richer patches are very likely to occur in a $4 reef.

MARINE ORIGIN OF BANKET.

The strata of the Lower Cape seem to be evidently marine, and they have usually been so considered, but Mr. Henry Lewis[1] suggests that they are lacustrine, and Mr. Schmitz-Dumont is reported to have pronounced the banket fluvial. Geologists are, of course, entirely familiar with the characteristics of lake and river beds as distinguished from marine deposits, but it seems desirable that this information should be more widely spread among laymen interested in the Witwatersrand, and this is my excuse for dwelling somewhat on the subject.

Marine gravels are distinguishable from river gravels even in very limited exposures. The average character of the pebbles is quite different in the two cases, because of the difference in the agencies by which they are shaped. In rapid streams rock fragments are turned over and over, and are reduced to their final shape by great numbers of small bruises which are almost uniformly distributed over the surface. The result is to produce a symmetrical ellipsoidal pebble. Along a sea beach, on the other hand, the waves, when not too violent, drag the pebbles to and fro without turning them over, this process often continuing for a long time with no interruption. The pebbles are thus ground down more on one side than on the other. Hence, as may be seen on almost any beach, there is in marine gravels a considerable proportion of muffin-shaped pebbles, much flatter on one side than on the opposite one.

[1] Treatise on Ore Deposits, by J. A. Phillips and Henry Lewis, 1896, p. 64.

The pebbles in river deposits also differ from those in marine deposits in their arrangement. In streams the thinner pebbles are tilted downstream and overlap one another like roofing slates, as shown in fig. 1. This can be verified in any rapid brook, or even in the runlets of a recent shower. It is also easy to see that this must be the result, for if one were to drop a disk into a rapid stream it would oppose its broad side to the current as it sank, in accordance with well-known mechanical principles, and then, reaching the bottom, it would strike upon its edge, so that the running water would tilt it over downstream.

In ancient gravels which have been disturbed since their deposition, the former direction of the current can be inferred from the overlap, or the "shingling," or imbrication of the pebbles. Confusing irregularities occur only when some strong eddy has locally produced a backward flow. Beach gravels also are imbricated, but only for a few feet in one direction; then the direction changes. The process may be watched on modern beaches, where each wave generates a local current, the effects

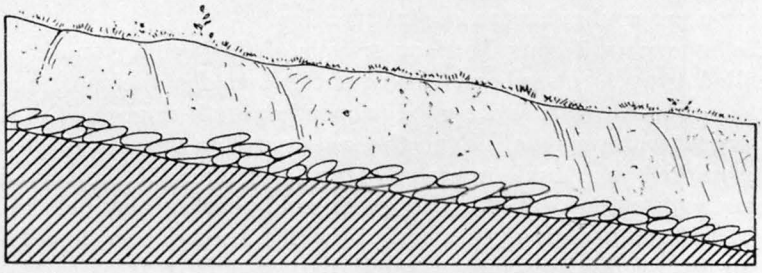


FIG. 1.—Imbrication of pebbles in a stream bed.

of which are partially or wholly obliterated by the next. This capricious imbrication is characteristic of beaches.

In the banket of the Rand the pebbles are to a very large extent unsymmetrical, showing one flattest side. This is best seen near the croppings; for example, in the upper levels of the Simmer and Jack, where many of the pebbes have been loosened by the oxidation of the encrusting pyrite. The primitive asymmetry is easily distinguished from subsequent dynamic molding. The arrangement of the pebbles on the Rand is, furthermore, not one of regular shingling, but of capricious imbrication, and this is exhibited in almost any drive or stope.

Streams which have only pebbles in their beds must be rapid, and rapid streams cut into the rock over which they flow. Hence river gravels occur in channels and the gravel lies unconformably on the incised rock. The stratification of stream gravels is always very irregular and is distinguished as "stream bedding" or "cross bedding." Marine beds are almost always found in series, the members of which are regularly stratified and are conformable with one another. As a

rule, an offshore area receiving sediments sinks under the weight, making room for successive nearly horizontal beds. Thus, in marine gravels there are no confining channels, and in most cases the conglomerates are conformable with sandstone or shale strata. There are local developments of stream or current bedding even in marine beds, but these are subordinate to the regular stratification in beach deposits, while regular, persistent stratification is absent in river gravels.

On the Rand the Main Reef series is underlain by a series many thousand feet in thickness, and the reef appears to me thoroughly conformable with this immense mass of rocks. The stratification is so perfect that a single pebbly stratum only a few inches in thickness can be traced for many thousand feet, and perhaps for miles, along the strike. No such phenomenon was ever seen in rivers. Neither is there any trace of a river channel. The backs opposite the Robinson Deep must measure over a mile, and there is no trace of a channel wall; indeed, were there a channel it must contain the whole Lower Cape series, which can not be less than 4 miles in thickness, measured in a direction perpendicular to the stratification.

The famous auriferous Tertiary gravels of California would scarcely be called gravels elsewhere. The pebbles are for the most part as large as cobblestones, and a good proportion of them reach the size of the largest watermelons. Even the recent stream gravels, such as are being worked in Alaska, are very coarse and much of the material is no smaller than cocoanuts. The great gold-bearing channels in California are not usually over a mile in width, though occasionally they extend to 2 miles, but only a small part of such masses carries any large quantity of gold per ton. They are worked in part by hydraulicking, the cheapest of processes, and in part by drifting. A drift mine can not be run considerably under $1 per cubic yard, or, say 2 shillings per ton. Now, in these great river channels the only portion which will pay for drifting is almost invariably the center of the channel on the bed rock. As a rule, the width of the channel which will pay for drifting is not over 200 feet, although in exceptional cases it extends to 400 feet. Much of the gold in these channels is coarse and nuggets are frequent. Could anything be more unlike the conditions on the Rand, where there is no real bed rock above the Swasi schists, no single surface along which the gold has accumulated, no conglomerate in the Main Reef series with pebbles larger than a goose egg, where there are no nuggets, and where the remunerative ore is known, by actual exploration, to be fairly uniform for a width of some 6,000 feet? It may, indeed, be said that richer gravels than those of California might exist. If they did, most of the gold would still be found near the center of the channel and at bed rock, partly in the shape of nuggets, and they would merely resemble the richer portions of the Tertiary river beds of the Sierra Nevada.

The hypothesis of a lacustrine origin for the Lower Cape formation seems to me as untenable as the fluvial suggestion. Lakes are characteristically quiet sheets of water, from which sediments scarcely escape; in fact, they may be called Nature's "slime ponds." Lake beds are usually composed in great part of excessively fine silt, quite comparable to mill slimes. Such beds are not, however, composed exclusively of fine sediments; violent showers, landslides, glaciers, volcanoes, and dynamic disturbances introduce coarse material into lakes, which, when worked over, produce fresh-water conglomerates. But these are always, so far as I know, associated with the peculiar fine sediments which are the direct evidence of the absence of strong, persistent currents in the body of water where sedimentation went on. Nothing of this kind is observable on the Rand; on the contrary, a vast proportion of the rocks was originally either conglomerates or sands as coarse and clean as are now formed off shores along which rapid currents flow, carrying away the finer detritus. Unless, too, the banket of Zululand is wholly independent of that of Klerksdorp and Heidelberg, the mere extent of the deposits would preclude any lake to which the name of inland sea would not be more appropriate.

BANKET DEPOSITED IN EAST-WEST CURRENTS.

The vast thickness of the Lower Cape, together with the physical character of the beds, indicates that the material was deposited off a subsiding shore which underwent depression more rapidly at some times than at others. It must always have been subject to currents of considerable strength, and these were probably strongest when the depression was most rapid. The direction of the shore was, roughly speaking, east and west, possibly with offlying islands, and the direction of the currents must have been from east to west. This is easily proved. It is well known that the present rather vigorous currents of the African coast flow down the east coast, across the Cape, and up the west coast. They flow as nearly in a westerly direction as circumstances permit, and were a broad channel to be formed across Africa in the latitude of Johannesburg the currents would flow through it from the east with greatly increased vigor. The currents must always have had this tendency, for they are due to the direction of the prevailing winds, which again depends upon the direction of the rotation of the earth. A practical result of these conditions is that, other things being equal, the coarsest conglomerates of wide extension must have formed along straight stretches of east-west coast, while in the shelter of bights or promontories finer material would settle. Local accumulations of coarse material might, however, occur where the irregularity of the coast line was such as to give rise to violent eddies.

The above considerations are, of course, independent of the theories of gold deposition, and would apply if there were not a pennyweight of gold in the country. On the Rand, however, there certainly is a

relation between the coarseness of the pebbles and the amount of gold, so that on any theory of deposition the distribution of conglomerate is important.

UPHEAVAL AND INJECTION.

The disturbances to which the Lower Cape has been subjected are important and interesting, but by no means fully worked out. It is sometimes assumed that the beds were laid down horizontally. For a small area such an assumption is justifiable enough, but it is quite insufficient, even as a rough approximation, when one is dealing with beds a score of miles, or many score of miles, in length. One has only to recall the beaches of any coast line with which one is familiar to perceive that bights, points, shallows, and deeper basins are almost certain to occur within a dozen miles; while islands as well as coastal sinuosities are of frequent occurrence, particularly in a subsiding area. When such a region is disturbed, bent, and faulted, the final configuration is the resultant of the original irregularities and the induced movements. Along the Witwatersrand proper the coast would seem to have been remarkably straight, and the chief disturbance has been a rather sharp flexure of the northern edge of the series upward. In Deep Levels the dip of the strata is usually between 20° and 30°, while at the croppings 60° is more characteristic, and some of the properties show outcrops which dip nearly vertically, but this is only a local exaggeration of the general tendency. The low range of hills called the Witwatersrand is formed of the upturned edges of the Lower Cape beds. The line of greatest flexure of the beds is, in most cases at any rate, still beneath the surface. The flexure of the beds was accompanied by innumerable fractures attended by small faults. The faults have not as yet been systematically studied, but some of them are normal, some are overthrust; some follow the strike, others the dip. I think there is no doubt that the systematic relations of the principal faults could be elucidated, but much information not recorded on the mine maps would be requisite for a discussion. The indications of the association of normal and abnormal faults is that the pressures acted at a considerable angle to the horizon. The dislocations were accompanied by the injection of the country with large numbers of dikes, which appear to be diabase and related rocks.[1] Between the Lower Cape and the Upper Cape is a sheet of amygdaloidal diabase, which probably escaped through some of these dikes, and both disturbances and intrusions seem to have occurred for the most part before the Upper Cape was deposited, though minor disturbances certainly occurred at a later period.

It is desirable from an economic point of view to observe the evident deduction that the present croppings of the reefs are not at all likely

[1]Dr. Koch examined a set of the dike rocks for Mr. Schemeisser, and Professor Lacroix studied Professor De Launay's specimens. The dikes are diabases, norites, and augite porphyrites, sometimes quartzose and sometimes olivinitic.

to represent the beds at a uniform distance from the original shore line. It is almost unthinkable that a mass of beds should have been turned up and eroded off so regularly that the croppings of the residual mass should coincide with the contours of the undisturbed strata. When the disturbance is accompanied by faults the difficulty of such an hypothesis is increased. Hence the auriferous character of the present croppings for 30 or more miles indicates that the gold-bearing pudding stones represent a broad band or sheet of metal-bearing rock, not a narrow strip along an ancient shore.

Associated with the dikes, and manifestly connected with them genetically, are numerous quartz seams. These cut the country as irregularly as the dikes. As a rule they show neither gold nor sulphurets, but sometimes masses of pyrrhotite and a little pyrite are found in them, and in a few cases pockets of gold have been encountered, particularly, it is said, at their intersection with the reefs. It is possible that this last conclusion is an erroneous one, for the white veins nowhere contain gold so distributed as to form workable ore in considerable quantities, and it is only where they cross drifts or stopes that they are broken down. There is no way of ascertaining just how much gold has come from the pockets in the white quartz, but opinions among the managers seem agreed that it does not exceed a few thousand pounds in value. With this exception all of the gold of the Witwatersrand occurs in the banket reefs, of which by no means all carry gold in remunerative quantities.

COMPOSITION OF BANKET.

The banket is a highly siliceous mass, consisting of quartz pebbles embedded in a matrix composed of sand, pyrite, and other minerals, all cemented by secondary silica. The large quartz pebbles have all the characteristics of vein quartz, but show under the microscope undulous extinctions and other evidences of the dynamic action to which they have been subjected. They are frequently cracked, and then sometimes show veinlets along the fractures. The quartz pebbles often carry pyrite and other sulphurets, as zinc blende and galena. This was recognized by Dr. A. Koch,[1] who states that pyrite occurs as inclusions in the quartz pebbles of almost all the conglomerates. So, too, Mr. A. Pelikan[2] states that in the suite of specimens which he has examined pyrite is found as inclusions in the quartz pebbles. Mr. De Launay denies this occurrence. Gold and pyrite, he says, exist exclusively in the cement, never in the pebbles. In the Crown Reef mine I

[1] In Mr. Schmeisser's treatise, page 48.

[2] Verhandl. k. k. geol. Reichsanstalt, 1894, p. 421. Dr. Koch examined banket from the Simmer and Jack, Robinson, Village Main Reef, Meyer and Charlton, and Langlaagte Estate. Mr. Pelikan's specimens came from the Robinson, Crown Reef, and Meyer and Charlton. I have slides from the Ferreira, Village Main Reef, Crown Reef, Simmer and Jack, Robinson, City and Suburban, and the Crown Deep. I have also examined a series from the Ferreira owned by the general manager, Mr. Harry Johns.

found more than a dozen instances of the inclusion of sulphurets in the course of a brief search, and I observed a great number of such cases in other mines on subsequent occasions. These were cases in which the sulphurets were disseminated through the quartz of the pebbles, not arranged on surfaces which might be interpreted as recemented cracks. Under the microscope I find many cases of the inclusion of disseminated pyrite in pebbles of what is plainly vein quartz. Some of the sulphuret-bearing pebbles are auriferous. One such which I collected in the Crown Reef was large enough to bear trimming, so that the outer surface could be entirely removed. The residual kernel was assayed by Mr. A. F. Crosse and found to contain gold in appreciable quantities. Prof. Le Neve Foster[1] states that assays by Mr. Richard Smith show some of the pebbles to be auriferous. The question whether free gold exists in the pebbles has been much discussed, and has been treated as if it were a matter of the first importance in determining the nature of the gold deposits. This is quite a mistake, as I shall explain somewhat later. I was assured that free gold has repeatedly been observed in the pebbles with the naked eye, but I did not succeed in getting a sight of any such specimen. Mr. Pelikan, however, has found moss gold embedded in the quartz of his specimens, and has photographed the occurrence of gold embedded in quartz under the microscope. These photographs are published in Mr. Goldmann's work,[2] with different tints for pyrite and gold. I possess a slide of Ferreira ore which shows free gold solidly embedded in a quartz pebble.

The matrix of the banket contains most of the gold and pyrite. Some of the pyrite in the matrix is said to be in well-defined, sharp crystals, but much more of it is in the form of rolled pebbles. In some of the ores of the district it is evident to the naked eye that pyrite pebbles exist, but in most cases a thin section is needed to display them. Dr. Koch says that the grains of pyrite are generally shaped by attrition, or at least display rounding of the edges and corners. This is confirmed by Mr. Pelikan. Mr. De Launay also calls especial attention to the fact that the pyrite often occurs in grains which are rolled, or at least broken, blunted, or rounded. He finds such pyrite pebbles extremely prevalent both in the Main Reef series and elsewhere. He considers the pyrite pebbles as auriferous, and mentions having observed under the microscope gold embedded in pyrite, without stating whether in these particular instances the pyrite was rounded or not.[3] In some of the specimens which I have examined the pyrite is substantially all in the form of well-rounded pebbles, isolated from one another by sand and secondary minerals. No one who has seen such specimens would admit for a moment either

[1] Text-Book of Mining, 1894, p. 42.
[2] Op. cit., vol. 3, pl. 6.
[3] Op. cit., pp. 306, 347.

that the pyrite was not rolled or that it was fractured by movement in the rocks during upheaval. The pebbles have been worn round, and the detritus has been removed. In several cases they are externally converted into a brownish-black mineral, which is probably hematite, and the conversion must have taken place before the upheaval of the banket, for the specimens are blue and fresh. The pyrite pebbles measure on the average one-tenth of a millimeter in diameter. In some specimens the pyrites are densely crowded into layers and the pebbly character is less apparent. Some recrystallization may have gone on in these cases, but I did not succeed in finding the well-defined crystal outlines usual in embedded sulphurets. The pyrite pebbles in many cases contain numerous scattered particles of gold, which may be seen by very strong incident light. I have observed this both in my own slides and in Mr. Johns's suite.

The free gold in the matrix, like the pyrite, seems to be in two different conditions. Dr. Koch found the metal in minute crystals, or in irregular, sharp-cornered, hackly aggregates. Mr. Pelikan observed it in irregular lumps, grains, and scales, which, in his opinion, correspond beyond a question to alluvial occurrences. According to Mr. De Launay, the gold almost always occurs as extremely minute scales, often so thin as to be translucent, very rare exceptions being aggregates of gold on the white quartz veins, small masses of free gold crystallized by secondary solution in the banket, and coatings on joint planes. Mr. Crosse also has found evidence of the existence of gold in a crystalline condition. In my slides the gold in the matrix corresponds most closely to Mr. De Launay's description. It appears in irregular flakes and scales, which often conform to the accompanying sand grains, as if pressure had molded the metal. The grains are not smooth, but neither have they either the crystalline appearance or the hackly surface of gold in vein quartz. The scales are often excessively thin, and pass over into mere yellowish-brown stains in which, by the help of direct sunlight, shining yellow points can be observed. The smaller scales of gold found on beaches are not ordinarily smooth, but they are smoother than those of the banket. I believe that pressure and the roughness of the surrounding detritus have determined their outlines to a large extent in the pudding stone.

Besides the more important minerals of the banket, Dr. Koch found in the matrix magnetite (also noted by Mr. Curtis), zircon, rutile, tourmaline, muscovite, chlorite, and a colorless highly refracting mineral not determined. Mr. Pelikan found biotite and a greenish mineral, perhaps identical with Dr. Koch's, which he suspects of being pyroxenic. Dr. Hatch notes marcasite, copper pyrite, blende, galena, ilmenite, and magnetite; he also records that Mr. Crosse has detected corundum by chemical means. I have repeatedly found pyrrhotite in the mines (for example, in the Crown Deep), but only in association with the white quartz veins referred to above. There is either

magnetite or hematite among the pebbles of my slides, and zircons were observed. The main mass of the matrix consists, besides gold and pyrite, of sand grains, chlorite and sericite, and secondary quartz. It is interesting and important to compare this matrix with slides of the quartzite adjoining the banket, because many grains which might be interpreted as secondary in the matrix are there seen to be mere sand. In both quartzite and matrix it is apparent that the sand grains have been largely attacked by sericite and that a portion of the irregularity of outline is due to this cause. The matrix also contains prisms, often grouped in fan-shaped aggregates, of a colorless secondary mineral, possibly an amphibole. The same or a similar mineral was noted by Koch and by Pelikan. Its determination is not essential for the purposes of this paper.

DISTRIBUTION OF GOLD IN BANKET.

It is well recognized on the Rand that, other things being equal, the coarser pebble carries the greatest quantity of gold. Usually the rich ore is heavily sulphureted, but this is not invariable. As a rule, the thinner portions of reefs are richer than thicker portions. It is usually the under portion of a coarse streak which is richest, but such a coarse streak is sometimes met with in the lower portion of a reef and sometimes in the upper portion. There is in this respect no general rule. It is said that the sandstone near the banket in rare instances carries gold. It is known, however, that in some alleged instances of this kind the gold was really confined to the parting between the sandstone and the banket. The banket is patchy. There are rich patches and poor ones, rich patches in poor ones, and poor patches in rich ones. Sometimes these patches have an elongated form, and then are often called "chutes." Opinions differ among managers as to whether there are on the Rand any real continuous chutes or channels, such as are almost invariably found in gold-bearing quartz veins. I could learn of no case which was an indubitable chute as distinguished from an elongated patch. As a rule, the bodies are certainly patches, and, if there are true chutes as well, two distinct types of deposit are present. The general uniformity of appearance and conditions militate against this view.

It has already been mentioned that the Lower Cape is intersected by numerous dikes, mostly of diabase or closely allied rocks, these dikes being connected in the most evident and intimate manner with the formation of the white quartz seams which carry pyrrhotite and rarely pockets of gold. I made a special effort to ascertain whether the dikes are in any way connected with the tenor of the banket, and consulted many of the most experienced managers on the subject. There is, I believe, no connection whatever.[1] The ore at and near a dike is some-

[1]Messrs. Hatch and Chalmers find no reliable evidence that dikes have acted beneficially on the tenor of the reefs. Op. cit., p. 72.

times rich and sometimes poor; a single dike will intersect one stope, or one reef, at a point where the assays are high, and will cut another working or another stratum of pudding stone in a poor patch. The conditions are such as they would be if, after ore deposition were complete, the country had been disrupted and injected with dikes having no connection with the deposition of gold in the banket. Mr. De Launay came to precisely the same conclusion, and emphasizes it by an "assay plan" with the dikes drawn into it, and this diagram fully justifies his position.[1] On the other hand, Mr. P. R. Krause[2] insists that the dikes and the distribution of gold are intimately related. He is unable to cite any valid evidence in favor of his view, confessing that the only direct "demonstration" of the connection between mineralization and the eruptive rocks is the occurrence of chlorite and talc in the matrix of the conglomerates. I presume that for talc one should read sericite. As a matter of fact, micas, including sericite, are distributed through the Lower Cape, as they are in most sandstones; and chlorite, the most ordinary decomposition product of mica, is very common in ancient sandstones or quartzites. Talc is not more significant in this respect than chlorite.

THEORIES OF DEPOSITION.

In the foregoing pages an attempt has been made to gather all the more striking facts which it is necessary to consider in testing the theories propounded to account for the deposition of gold on the Rand. One of them must be right.

The theory that the banket reefs are of alluvial origin, representing metamorphosed placers, was probably the earliest to be suggested, and was held as long ago as 1887, when gold production first began. Who first advocated this solution I am unable to state. It has been supported in 1891 by Mr. De Launay, who has since adopted another view, and by Mr. Pelikan in 1894.

In 1888 Mr. W. H. Penning[3] was led, mainly by the character of the gold (which he describes as occurring in sharp grains, not waterworn), to state: "I am convinced that it was deposited—at the same time the gravels were being accumulated—from water holding gold in solution." This is the opinion expressed by Mr. De Launay in his latest work, 1896.

In discussing Mr. Penning's paper, Mr. W. Topley suggested that the water which, percolating through the already formed conglomerates, deposited the gold may have been at a high temperature. In 1890 my friend, Mr. J. S. Curtis, published a paper[4] on the banket, in which he states that Mr. Gardner F. Williams, now manager of the Kimberly

[1] Op. cit., p. 324.
[2] Zeitschr. für prak. Geol., Jan., 1897.
[3] Jour. Soc. Arts, London, vol. 36, 1888, p. 437.
[4] Eng. and Min. Jour., vol. 49, 1890, p. 200.

diamond mines, considered the gold in the conglomerate as not alluvial but quartz gold, deposited after the upheaval of the strata. Mr. Curtis accepted this view, considered the deposits as closely resembling lodes, and referred the impregnation of the conglomerates to the action of the dikes. This opinion is based on the angular character of the gold and on the presence of pyrite both in the banket and in the dikes. Had the iron sulphide of the banket been alluvial, Mr. Curtis says, "there would have been pebbles of pyrites." Of course the large proportion of rounded pebbles of pyrite in the banket was then unknown. Mr. Curtis explained the fact that gold is not found in the sandstone by the relative porosity and openness of the conglomerate. The view of the deposits first distinctly expressed by Mr. Curtis is that to which Dr. Koch leans, and which is adopted by Messrs. Hatch and Chalmers, and by almost all the engineers on the Witwatersrand.

IMPREGNATION THEORY.

None of the theories are free from objections, real or specious. The impregnation theory implies that there must be deep fissures through which the auriferous solutions obtained access to the once-barren banket beds, and that the solutions permeated the coarse beds to the practical exclusion of the finer sandstone strata. A system of fissures such as would be needed to convey metalliferous solutions certainly exists in the dikes and faults so abundant on the Rand. There are also less-pronounced partings or joints, often nearly parallel to the conglomerate beds. These last are very important in stoping the ore, and they are well known to all managers. All of these dislocations were produced during the upheaval of the beds from a nearly horizontal position into that which they now occupy. The gold in the banket is not distributed in any apparent relation to the dislocations. Not only do the dikes cut the reefs in poor and rich patches indiscriminately, as was pointed out above, but such of the dislocations as are in sandstone or in quartzite are, as a rule, absolutely barren. The fissures are also almost altogether wanting in some localities where the ore is nevertheless of good grade. This is the case in portions of the Geldenhuis Deep and of the Simmer and Jack. In these mines there is often an inconvenient absence of any partings to which stoping can be carried, and this "freezing" is not attended by any falling off in the assays. On the other hand, the white quartz veins are manifestly related to the dikes, often starting from them or accompanying them, and themselves not dislocated by the fissure system to any greater extent than is easily accounted for by slight renewals of movement postdating the main upheaval. The white veins, however, cut and fault the banket, but without enriching or impoverishing it. The only natural conclusion is that the dikes and white veins postdate not merely the formation of the conglomerate, but the deposition of gold in the banket. The deep fissures which afforded channels for the ore-bearing

solutions might be narrow, as a rule; but it is hardly possible that all of them should be so, and it is most improbable that the ore which they contained should not be rich, as rich as the banket would be if all the pebbles were removed from it. Now, no such "rake veins," as they would be called, have been met with on the Rand.

If the solutions rose through "rake veins," they would permeate all accessible permeable strata and partings. Now, it seems to be generally assumed that a conglomerate without matrix would be much more permeable to fluids than a sandstone. This is true if only rapid currents, such as might be impeded by fluid friction, are to be considered. There is no probability, however, that ores are deposited from rapid currents. For slow currents fluid friction is a vanishing quantity, and then the permeability of a given rock may be considered as measured by the interstitial space. Now, the interstitial space in a conglomerate composed of pebbles of various sizes is really less per cubic foot than that of a fine but even-grained sandstone. If the material is of absolutely uniform grain, the interstitial space is wholly independent of the size of the component particles, and can not fall below 26 per cent. It is a fact well known to mill men that a cubic foot of sized tailings weighs less than a cubic foot of unsized tailings. Sandstones used for building in some cases contain over 20 per cent of voids, and highly indurated sandstones contain 4 or 5 per cent.

It follows, then, that the sandstones as well as the conglomerates should have been impregnated when soaked in an auriferous solution, and to approximately an equal extent, while as a fact the sandstone does not contain one one-thousandth part of the gold. The impregnation theory would, furthermore, seem to involve the presence and the prevalence of chutes in the banket. There is no doubt that most of the gold occurs in patches which are distinctly different from chutes, and many engineers are confident that real chutes are absent. Much of the pyrite is in the form of minute waterworn pebbles, and much of the gold is inclosed in the pyrite, indicating a common origin for the two minerals. This fact is regarded by De Launay as fatal to the impregnation theory, and, indeed, it seems impossible to reconcile this mode of occurrence with the hypothesis.

The strength of the impregnation theory lies in the fact that some of the gold and of the pyrite appears to be crystallized, as if deposited in place. A portion of the observed phenomena seem certainly secondary. Below water level, or "in the blue," visible gold is very rare on the Rand. In the oxidized upper levels it was much more frequent, and free gold was often found in the cavities from which pyrite had disappeared by oxidation. This is, of course, a very common phenomenon at the croppings of auriferous deposits, and can be accounted for only by the recrystallization of gold attending the oxidation of pyrite. The modus operandi is also pretty clear. Iron sulphate is a weak solvent for gold, and iron sulphate is one of the products of decomposition of

pyrite. Recrystallization is a process which goes on in the presence of weak solvents. Recrystallization of rock components is a very common thing, and the ordinary phenomenon called metamorphism is substantially recrystallization. The quartzite walls of the Main Reef are in part recrystallized sandstones, and recrystallization of silica has certainly taken place in the banket. Some recrystallization of gold and pyrite in the blue may very probably have occurred as an incident to general metamorphism or to the formation of the white veins. Hence the impregnation theory is not the only one which will account for the state of one portion of the gold and pyrite, and the fact that it could explain this state is insufficient to outweigh the many objections to the theory.

On the whole, then, it appears to me that this theory is untenable. It is popular with engineers accustomed to quartz veins, partly because it involves a close analogy between the Rand deposits and the more familiar type of gold deposit.

PRECIPITATION THEORY.

The theory maintained by Mr. De Launay in his latest work is that the sea in which the banket was deposited was a saturated solution of gold and pyrite. These minerals were precipitated as the banket accumulated, a part of the pyrite being at the same time waterworn. This theory is an elaboration of Mr. Penning's. It avoids some of the objections to the impregnation hypothesis. The absence of rake veins and well-marked chutes is consistent with the scheme of Messrs. Penning and De Launay, and it would account fairly well for the patchiness of the reefs. Mr. Penning was driven to it by the angularity of the gold; Mr. De Launay, by the supposed importance of the rarity of gold in the pebbles.

The precipitation theory, however, is by no means free from objections, chief of which is that it gives no account of the most important feature of the deposits, namely, the association of gold in largest quantity with the coarsest banket. One would expect to find the sands at least as much mingled with the auriferous precipitate as the banket. Precipitates are usually thrown down in a fine state of division. How is it, then, that the currents which swept away all mud and fine sand did not also carry off the crystals of gold and pyrite before they had time to reach considerable dimensions? To meet this evident objection Mr. De Launay makes the following statement:

> Pour tenir compte de ce fait charactéristique que l'or est presque exclusivement dans les conglomérats et non dans les grès intermédiaires, on admettrait l'influence d'une préparation mécanique ayant concentré l'or et la pyrite, en leur qualité d'éléments lourds, avec les galets les plus gros, comme cela s'est passé pour tous les dépôts d'alluvions aurifères.

Thus this geologist supposes a relatively quiet deposition of gold and pyrite from sea water in unsorted material, followed by a natural

concentration. Now, sorting begins the moment that detritus from the land reaches the sea. I perceive no opportunity for the supposed quiet precipitation of gold and pyrite; nor do I understand why precipitation, if it takes place at all, does not continue during the sorting process, so that the sands eliminated from the pebbly material would continue to be enriched by precipitation.

The fundamental hypothesis of a sea highly charged with gold and pyrite seems to me extremely improbable. Had the ocean at any time been so charged, the mineral would, as Mr. De Launay says, be precipitated with extreme ease. How then could the ocean become highly charged? It would seem that the gold and pyrite going into solution, say at the mouth of some submarine solfataric vent, must be thrown down almost immediately and close to the point at which solution took place. An almost uniform distribution of gold along a coast known to be at least 30 miles in length would then be impossible. Again, if the ocean ever was so powerful a solvent for gold, why are there not many and indubitable cases of deposits formed by this method?

The advantages of the precipitation theory over the simple detrital theory are, as I understand Mr. De Launay, that the former hypothesis explains why there is no gold or pyrite in the pebbles and why the gold is not substantially all on the foot wall of the reefs. These advantages are by no means substantial ones, as will presently appear.

MARINE PLACER THEORY.

As has been noted above, pebbles which carry crystallized pyrite and other sulphurets disseminated through the quartz, and not on fissures of any sort, are fairly abundant on the Rand. Gold is also known in the pebbles. Some writers consider it very strange that if the pebbles came from auriferous quartz veins gold-bearing pebbles are not more abundant.[1] As a matter of fact, in the auriferous river gravels of California and Venezuela pebbles showing visible gold are extremely rare. Even in the vast exposures of the hydraulic washings one might spend weeks in the vain search for a specimen. In the sluices, however, small pieces of auriferous quartz may be found with the gold, separated by the concentration process from thousands of tons of barren pebble. On the auriferous beaches of California, Oregon, and Alaska, such pebbles seem to be still rarer than in the river gravels. Thus the rarity of gold-bearing pebbles on the Rand is such as should be expected from analogy if the deposits belong to the class of placers.

The presence of crystallized gold and pyrite is by no means unaccountable on the same theory. Even in the Tertiary gravels of California recrystallization of sulphurets is now in progress, and it is probable that recrystallization of gold also has taken place to some extent. On the Rand it is certain that solutions capable of dissolving

[1] Mr. Curtis did not adduce the rarity of gold-bearing pebbles in favor of the impregnation theory, no doubt because of his familiarity with California gravels.

gold to some extent have been present below water level at some time since the original deposition. These accompanied the formation of the white quartz veins which cut the banket beds and which occasionally carry a little gold. The same solutions must have been capable of dissolving pyrite. The solvent fluids were probably hot waters containing sulphides of the alkalies and carbonates. Such waters dissolve gold and sulphurets, and they almost invariably accompany eruptive activity such as is manifested in the dikes of the Rand. Now, recrystallization being due to the action of fluids which exercise a feeble solvent power, it would be extremely remarkable (taking the existence of the white veins into consideration) if the gold and pyrite of the banket showed no evidences of recrystallization. It is quite as easy to account for recrystallization of the gold and the pyrite as for the conversion of the sandstone into quartzite.

The objection to the theory under consideration that the gold is not uniformly found on the foot wall of the reef is entirely without weight. In auriferous *river* gravels, indeed, most of the gold is found either on bed rock or on layers of pipeclay; but the banket is not a river deposit. As has been explained already, river gravels are distinguishable both by the form of the pebbles and by their imbrication or "shingling" from marine gravels, to which class those of the Rand belong. The deposits are therefore comparable with the auriferous beach deposits of the Pacific Coast or of New Zealand, and not with the river gravels of the Sierra Nevada. In the beach gravels the gold is found at the bottom of the layer of material set in motion by the last wave or current by which the mass has been agitated. Hence the beach deposits consist of stratified masses of gravel and sand in which the gold is for the most part confined to those layers which are composed of heavy particles.

On the Pacific Coast the gold is commonly associated with black sands, consisting largely of magnetic iron oxide or titanic iron ore. On the Rand, magnetite, though not absent, is relatively rare. It does not follow that the deposits of the two regions are not similar. The magnetite on the Pacific beaches does not originate to any extent in the gold-quartz veins, but in country rock. If the country rock happened to be poor in magnetite the sands would not be black. Such seems to have been the case in the Jurassic gold-bearing marine conglomerate of Placer County, California. Again, the magnetite may have been in part converted into pyrite by the sulphur-bearing solutions accompanying the intrusion of the dikes.

The beach sands of the Pacific Coast of North America and those of New Zealand form along the shores of extensive gold-bearing regions. It is natural that they should so form; it would be difficult to comprehend their entire absence, and it is hard enough to understand why they are not more abundant. What has become of the immense quantity of gold swept away by erosion from the western slope of the Sierra

Nevada and the auriferous territory of northern California? It has certainly been carried to the sea, and, as a heavy metal, some of it has been left along the coast in the beach sands. The aggregate quantity of gold in the sand is very great, but I see no probability that it represents more than a small fraction of the gold which has been scattered by Nature's hydraulic process. The only answer is that the metal has been so triturated, so "floured," that it has been swept away into the abyss of the Pacific and perhaps partly dissolved in the waters of the ocean. Just as very fine gold can not be saved in a sluice, so still more finely comminuted gold must remain suspended almost indefinitely in ocean currents.

Now, at the time of the formation of the conglomerate the Witwatersrand lay along the shore of an extensive auriferous area, presenting belt after belt of quartz veins striking in a direction nearly parallel to the coast. The drainage probably cut across this area, bringing down auriferous detritus. The streams certainly brought down vein quartz from a gold-bearing country. This supply was more abundant at some times than at others, the variation probably representing fluctuations in the gradual upheaval of the land area. It is clear that vigorous currents swept the shore, for otherwise such accumulations of conglomerate could not have been formed. Here, then, there were all the conditions for the formation of beach placers. It might have been predicted à priori that, if littoral deposits could be found within a moderate distance to the southward of the area of Mashonaland, Matabeleland, and the northern Transvaal, they would be nearly certain to show some alluvial gold.

It has been argued that if the deposits of the Witwatersrand are ancient beaches they are substantially unique. It is certainly true that they are the richest of such deposits ever known, but geologically and qualitatively they by no means stand alone. Europe, America, Australia, and New Zealand all possess auriferous, marine gravels of pre-Tertiary age. Ancient river gravels would be preserved only under exceptional circumstances, and it is doubtful whether a single case of pre Tertiary gold-bearing river gravels is yet known. It is interesting to compare other old gold placers with the deposits of the Witwatersrand, and for that reason notes on some of them are added to this paper. They certainly reenforce the argument for the alluvial origin of the gold in the banket, and it may be noted that nearly all of these deposits lie in the regions known to contain gold-quartz veins older than the marine strata.

Let it be assumed for the sake of argument that the banket really represents a marine placer of early Paleozoic age, formed off the shore of an extensive gold-bearing region, and since injected with dikes. One would then expect to find the gold in the coarser streaks of the resulting conglomerate and on the lower side of such streaks. The reef would extend for many miles, and perhaps for many hundreds of miles. The tenor would depend in part on the strength of the currents

sweeping along the coast, and in part on the quality of the material fed into the sea at different points, or at the same point during different seasons. Hence, conglomerate of a given coarseness would be richer at some points than at others, and there might be almost barren portions or beds, but the distribution would be in patches, not in chutes. The gold would almost all be finely divided, for nuggets would commonly remain in the rivers. Pyrite would almost certainly appear in the sands, but experience shows that gold-bearing pebbles would be rare. When the conglomerate was upheaved, injected with dikes, and metamorphosed, it would be found that the dikes sometimes cut poor patches and sometimes rich ones, their disposition having nothing to do with the original distribution of the gold. The sandstones would be converted into quartzites, and recrystallization of gold and pyrite would occur to some extent. In short, it seems to me that deposits exactly analagous to those of the Rand must form in this way, while in some details the composition of the banket would doubtless depend on the lithological character of the back country.

Thus, it seems to me that there are no valid objections to the theory of marine placer origin and no noteworthy features left unexplained by this theory, while so much can not be said of either the impregnation or the precipitation theory. The beach deposits of the Pacific form an excellent instance of such marine placers, although they are not so rich as those of the Rand. On the other hand, no case is known of an extensive gold deposit which is certainly an impregnation in sand or gravel, nor is there an established case of marine precipitation.

There seem to be no other possible theories besides those discussed, but Mr. Hamilton Smith is quoted as stating that in his opinion the gold is partly detrital and partly in place in the banket. Speaking with exactness, I agree with him, for, as has been mentioned, the white quartz veins are not absolutely barren. To my mind, however, it seems conclusively proved that only a minute fraction of 1 per cent of the gold has this origin, for I see no reasonable evidence that any portion of the gold excepting that to be found in the white quartz seams is untransported.

Consequences of placer theory.—On the theory which I have adopted the auriferous banket should be found to stretch along a line of ancient coast bounding an area in which gold-bearing quartz veins were rich and numerous. How large this area may have been, and therefore how long its ancient coast was, is as yet impossible to say; but the indications are that the area was extensive and the coast long. Doubtless some portions of the coast will furnish only banket too poor to work, but until the Lower Cape formation has been traced across the continent of Africa other spots as rich as the Rand may be hoped for.

In the search it will probably be found that coarse pebble is a necessary, though an insufficient, indication of rich ore. In other words, to produce rich ore close natural concentration and therefore rapid currents were needful, but these could not avail to produce rich reef

along stretches where there was a deficiency of gold. As was pointed out above, the oceanic currents about South Africa must always have flowed in a westerly direction; for these currents are ultimately referable to the direction in which the earth rotates. These currents must have been strongest where least impeded, and can not have been of full strength in bays or bights.

Were the Main Reef series continuously exposed across South Africa, marking the southward termination of the continent in the early Paleozoic, such general considerations might be neglected. As a matter of fact, this series is only very partially exposed, and must be sought on some theory or other under later formations. In such a search it is certainly important to note that coarse banket at any point means a shore along which the currents were unobstructed and which was unsheltered by promontories projecting still farther south. This hint may be considered useful in discovering the banket, however this has been charged with gold. On the other hand, if the marine placer theory is true, the westerly side of promontories will show small pebble and little gold, and this will be true, also, of bays and bights in proportion as they are offered protection from the coastal currents.

The confidence with which the deep levels of the Rand can be explored must depend largely on the true theory of the origin of the gold. On the favorite impregnation theory the deposits must be subject to the sudden, seemingly eccentric changes of quartz veins. At any time the gold tenor might be found to drop suddenly to zero, because unforeseeable obstructions had prevented the circulation of the auriferous solutions over a certain area. On the other hand, on the marine placer theory a sudden failure of gold is not to be anticipated, and a discussion of the conditions along the outcrop, furnishes strong reason to believe that the yield will keep up to a great depth.

OTHER PRE-TERTIARY GOLD-BEARING PUDDING STONES.

Examination of the auriferous conglomerates or banket of the Transvaal has led me to believe that this rock is an early Paleozoic beach deposit, closely analogous in origin to those now forming both on the Pacific coast of North America from Lower California to Alaska and on the New Zealand shore.[1] The Witwatersrand banket is sometimes discussed as if it were the only gold-bearing pudding stone yet discovered, excepting, of course, the well-known Tertiary and Post-Tertiary river gravels. As a matter of fact, a considerable number of pre-Tertiary auriferous conglomerates are known. They occur in North America, Australia, New Zealand, and even in France; some of them are also (locally at least) very rich, but none of them is known to be both extensive and rich, like the Main Reef series of the Transvaal.

[1]The beach sands of New Zealand afford employment to a large number of gold miners. J. Hector, Handbook of New Zealand, third edition, 1883, p. 50. They would seem to be more remunerative than the American beaches.

It is a matter of interest to compare such occurrences, so far as they have been described, and for that reason the following notes are set down. They are doubtless incomplete, for I have not made a systematic search for instances through geological literature, yet they seem sufficient in number to show that the Witwatersrand banket is anomalous only in its vast aggregate value.

IN FRANCE.

Gold is found in a Lower Carboniferous conglomerate (millstone grit) in southern France, in the Department of Gard, near Bessèges. According to M. Théodore Picard this conglomerate furnishes the gold dust carried down by the Gardon, the Cèze, and the Gagnières.[1] According to Mr. J. A. Phillips, this conglomerate has been worked and has yielded small quantities of the precious metal.[2] There can be no doubt, it seems to me, that this conglomerate, one of the most persistent and widely spread horizons in Europe, is a marine shore deposit.

IN NOVA SCOTIA.

An auriferous conglomerate which has been worked to some extent occurs in Nova Scotia, Colchester County, at Corbetts Mills, 4 miles north of Gays River. It is pronounced Carboniferous in age, and lies unconformably upon the older metamorphic rocks, these last being Algonkian or Cambrian, and intersected by small, rich gold-quartz veins. According to Mr. C. F. Hartt, this banket is rich for a foot or more from the bottom; the gold occurs in scales up to a quarter of an inch in diameter, and sometimes 20 or 30 scales are visible in a mass of less than a cubic inch.[3] Sir William Dawson says:

> The conglomerate is formed of the débris of these older rocks, and gold occurs in it exactly as in modern auriferous gravels, being found in the lower part of the conglomerate, and also in hollows and crevices of the underlying slate.[4]

Mr. H. S. Poole writes:

> In the "runs" or hollows of the slate the bed rock is removed to a depth of 3 or 4 feet for the gold contained in the backs or crevices of the slate. The gold is not very fine and pieces of over a pennyweight are only occasionally found. Usually the surface of the grains is rough, not as though it were fresh from a lead, but rather as if each grain or piece of gold had been first smoothed by attrition and afterwards had fine particles attached to it.[5]

In response to an inquiry, Dr. Geo. M. Dawson informs me that the conglomerate at Corbetts Mills is "evidently a fossil placer and not an impregnation. Small scales of gold embedded in it, when examined with the magnifying glass, have the rounded form usual in placer deposits, but in addition are usually evenly roughened, evidently by

---

[1] Bull. Soc. Sci. Nat., Nimes, 17th year, 1889, p. 29.

[2] Ore deposits, 1884, p. 232.

[3] Canadian Naturalist, 2d series, vol. 1, 1864, p. 459.

[4] Acadian Geology, 2d edition, 1868, p. 277, and Supplement, 1878, p. 96. Sir William Dawson writes the name "Corbitt's Mills."

[5] Quart. Jour. Geol. Soc. London, vol. 36, 1880, p. 313.

the subsequent pressure upon them of surrounding sand grains." The description of Mr. Poole would lead one to suppose a secondary crystallization of gold on the surface of nuggets, but if this is the opinion which Mr. Poole intended to convey, Dr. Dawson dissents from it, as is mentioned above. The alluvial gold scales of the Rand, too, are probably distorted and roughened by the pressure of sand grains. Mr. E. R. Faribault has been good enough to send me, through Dr. Dawson, the following note on this interesting occurrence:

The auriferous conglomerate at Corbetts Mills, Gays River, Colchester County, Nova Scotia, is a coarse conglomerate at the very base of the Lower Carboniferous, resting directly on the Upper Ferruginous slate group of the gold-bearing rocks of Nova Scotia. It is wholly made up of the detritus of the gold-bearing slate. Most of the smaller pebbles are well waterworn and have the form of seashore pebbles, and vary from the size of a hazelnut to that of an egg; but quite a few pieces of slate and quartz are not in the least waterworn, and these are generally much larger in size. The matrix is composed of a gritty mixture of quartz, slate, and hematite, cementing the whole very firmly. The pebbles are not, however, uniformly arranged where they are mining. This bed of conglomerate has been traced and found more or less auriferous for some 4 miles along the face of a ridge of gold-bearing slate, rising to about 150 feet above the level of the Carboniferous basin. A belt of quartz veins, many of them proved to be auriferous and some of them of great extent, follows the top of this ridge along a steep anticlinal fold, and its débris brought down the hill by numerous small streams have certainly largely contributed to make up the auriferous conglomerate at the beginning of the Lower Carboniferous period.

The conglomerate has been worked by levels leaving the line of outcrop at right angles and following the gentle slope of the underlying slate rocks. The miners have noticed that the gold was coarser and most plentiful about the line of the present outcrop of the conglomerate, getting finer and scarcer the farther they recede from it. Most of the gold has been found at the very bottom of the bed of conglomerate in the matrix or in very thin flakes on the surface of the pebbles; and crevices in the slate, running at right angles to the stratification and cleavage, were found very rich, in some cases to depths of 10 to 14 feet. A shaft sunk about 800 feet distant from the line of outcrop gave the following section of Lower Carboniferous:

	Feet.
Surface drift	20
Quartzose feldspathic conglomerate	35
Coarse sandstone	2
Coarse irregular conglomerate (auriferous)	8

My conclusion is that the auriferous conglomerate of Gays River is a littoral deposit of marine origin.

IN THE UNITED STATES.

The marine Triassic conglomerates which lie to the eastward of the auriferous area of the southern Appalachians contain a little gold. This was barely mentioned by Mr. Jules Marcou in 1862.[1] In 1894, without knowing of Marcou's statement, I came to the conclusion that these conglomerates must be gold bearing and determined to test the matter. I found that mining on a very small scale had been done 3 miles northwest of Moncure, Chatham County, North Carolina. The pit may measure 100 cubic yards and is said to have yielded a little

[1] Proc. Boston Soc. Nat. Hist., vol. 9, 1862, p. 47.

gold. I took samples from the cement and found gold in them with the pan. The conglomerate contains pebbles as large as a man's head, consisting of quartz, granite, schists, and porphyrite.[1]

Gold was discovered in the Black Hills of Dakota in 1876 and caused some excitement among miners. The gold occurs in a marine conglomerate at the base of the Potsdam (Upper Cambrian). According to Mr. Henry Newton, the pebbles are quartz, quartzite, and some of the harder schists of the unconformably underlying, metamorphic rocks. The gold dust is very fine and its "concentration was begun by the shore action of the Potsdam sea."[2] Mr. W. R. Devereux says: "The horizontal character of the sediments and the fact that their accompanying life forms belonged to salt-water types, leads us at once to the conclusion that they were ocean sediments and not river beds, and that they were formed in very shallow water where there was strong wave action." The same authority remarks that there are pebbles of hematite and that the cement is oxide of iron; the ore needs stamping; the gold is found in smooth, rounded, flattened grains, ordinarily coated with iron oxide; the deposit is richest at bed rock and is said to have milled as high as $50 per ton; one nugget of 3 pennyweight has been found.[3] It seems to me highly probable that the hematite pebbles and the ferruginous matrix represent decomposed pyrite. It will be observed that the largest nugget reported is trifling in size compared with those common in river gravels. Mr. Waldemar Lindgren tells me that this conglomerate extends down into Wyoming, and is said by trustworthy local informants to be auriferous on both sides of the Black Hills of Wyoming. This conglomerate would appear to be the nearest analogue to the Witwatersrand gold field.

There is also an auriferous conglomerate at the Bald Mountain district, in the Big Horn Range, in the extreme northern part of Wyoming. Bald Mountain lies in about latitude 44° 50′, longitude 107° 50′. This pudding stone seems to have been worked since 1893. It is considered Silurian by Prof. W. C. Knight.[4] Mr. G. H. Eldridge[5] has visited the locality and colored it on his maps as Cambrian, but had no time to make a satisfactory examination of the occurrence. Other accounts represent it as agreeing in general character with Mr. Eldridge's basal Cambrian conglomerate.[6] I have understood that there is an auriferous conglomerate in New Mexico, but have not succeeded in obtaining any information about it.

In California three pre-Tertiary auriferous conglomerates are known.

---

[1] Reconnoissance of the gold fields of the southern Appalachians: Sixteenth Ann. Rept. U. S. Geol. Survey, Part III, 1895, p. 315.

[2] Geology and resources of the Black Hills of Dakota: Mon. U. S. Geog. and Geol. Surv. Rocky Mountain Region, 1880, pp. 54, 61, 84.

[3] Trans. Am. Inst. Min. Eng., 1880, p. 465.

[4] Bull. Univ. of Wyoming No. 14, 1893, p. 130.

[5] Bull. U. S. Geol. Survey No. 119, 1894, p. 66.

[6] In Mon. U. S. Geol. Survey Vol. XXXII (unpublished), Geology of the Yellowstone National Park, by Mr. Arnold Hague and others, Part II, Chapter V, an auriferous fresh-water conglomerate is described which is provisionally referred to the Eocene.

Mr. Lindgren has described one which forms a member of the Jurassic Mariposa marine beds. It occurs in Placer County, on the ridge between the North and Middle forks of the American River, at an elevation of 2,100 feet, and is many yards in thickness. The pebbles are phthanite and limestone with quartz in variable quantities. There is no black sand, but much pyrite in the rock, which is a shore deposit. Mr. Lindgren made numerous tests of this conglomerate as exposed in a small shaft, and invariably found one or more colors to the pan.[1] The locality is especially interesting because the main era of gold-vein formation in the Sierra is later than this conglomerate, while its existence proves that there was also an earlier era of deposition.

Close to Folsom there is a stratum of conglomerate at the base of the Chico (Cretaceous), which carries some gold and has been worked on a small scale. There is every reason to believe this a marine shore deposit, near, of course, to the mouth of some stream which brought down the auriferous material.

Mr. R. L. Dunn[2] has described an auriferous conglomerate in Siskiyou County, California, which is at least 10 miles in length, and, like that at Folsom, lies at the base of the Chico, of which it is a member, resting unconformably on the metamorphic rocks. It has an average thickness of 100 feet, and most of the pay is near the lower surface. The gold is both coarse and fine and is accompanied by hematite and pyrite. Mr. Dunn regards this conglomerate as river gravel, but Mr. J. S. Diller tells me that those portions which he has examined within the area mapped by Mr. Dunn have the physical and stratigraphical characteristics of marine deposits, and, furthermore, they contain marine fossils, which renders further argument needless. Nevertheless, at some point or points there may be submerged river gravels, such as Mr. Dunn supposes, though the evidence which he adduces is not convincing. Mr. Dunn states that a conglomerate in the same geological position as far south as Redding is also auriferous, and that at Ashland, in southern Oregon, a conglomerate has milled $5 per ton in free gold.

In British Columbia no pre-Tertiary auriferous conglomerates are yet known to exist, though Dr. George M. Dawson suspects their presence and has made tests, thus far with negative results.[3]

The most westerly auriferous conglomerate discovered in America occurs along the headwaters of Forty Mile Creek, which is a tributary of the Yukon, in Alaska. The creek joins the river about latitude 64½°. The conglomerate in question was first recognized as auriferous last July by Mr. Josiah Edward Spurr, of the United States Geological Survey, and no account of it has yet been published. It forms the basal number of a heavy series of rocks believed to be of Cretaceous age. The basal conglomerate is in the neighborhood of 100 feet in thickness; it

[1] Am. Jour. Sci., 3d series, vol. 48, 1894, p. 275.
[2] Twelfth Rept. California State Mining Bureau, 1894, p. 459.
[3] Geol. Nat. Hist. Surv. Canada, new series, vol. 7, 1894, p. 314B.

is of marine origin and rests unconformably on metamorphic rocks. It has never yet been worked for gold, and the evidence of its auriferous character rests upon the sudden enrichment of the streams which cut through it.

IN AUSTRALIA.

The earliest discovery of auriferous conglomerate in Queensland was, I believe, at the Peak Downs district. In 1870 Mr. Richard Daintree wrote: [1]

> The miners use the Carboniferous sandstone, the Glossopteris bed at bottom, and take the cement several inches from its junction with the Glossopteris bed for their wash dirt.

The cement is conformable with this bed. The gold is waterworn.[2] Similar occurrences are known in New South Wales. The Rev. W. B. Clarke, in 1875, discovered gold in the Carboniferous conglomerate of Tallawang, Phillip County, New South Wales, and at other localities. Mr. C. S. Wilkinson states that these conglomerates are associated with sandstone and shale containing Glossopteris.

Mr. Harrie Wood writes:

> The conglomerate [of Tallawang] yields from 1 to 15 pennyweight of gold per ton, while nuggets weighing 5 ounces have been obtained from it. The gold is generally in the form of flat scaly pieces, and waterworn. At Cooyal, and other parts of the Mudgee district, waterworn gold occurs in the coal measures. Gold has been discovered in the marine conglomerates and shale beds, which are believed to be of Cretaceous age, and which rest upon the flanks of the Silurian, Devonian, and granite formations in the Mount Brown or Albert gold fields.[3]

Mr. Wilkinson has also recorded the existence of a gold-bearing conglomerate at Gulgong, Phillip County.

Mr. Clarke found gold in the coal measures in the southern part of the colony near Shelleys Flat, Shoalhaven, prior to 1860, and as far back as 1855 a quartz pebble from the Carboniferous showing gold was detected by Sir Thomas Mitchell.[4] The Australian Carboniferous contains an abundance of marine fossil Mollusca.

I have not been able to learn that pre-Tertiary banket has been discovered in Victoria, but it may be noted here that much of the Tertiary "gold drift" is regarded by the Australian geologists as of marine origin.

In South Australia there is an auriferous conglomerate at Algebuckina, on the Neales River, which, in the opinion of the Government geologist, Mr. H. Y. L. Brown, may be Mesozoic.[5]

In Tasmania gold is found near Hobart, in the coal measures according to Liversidge. An auriferous conglomerate, the age of which is not stated, has been worked at Beaconsfield,[6] and another such pudding stone is mentioned as occurring at Mount Lyell.

---

[1] W. B. Clarke, Remarks on the Sedimentary Formation of New South Wales, 4th edition, 1878, p. 9.
[2] R. Daintree, Quart. Jour. Geol. Soc. London, vol. 34, 1878, p. 435.
[3] Mineral Products of New South Wales, 1887, p. 30.
[4] The Minerals of New South Wales, by Archibald Liversidge, 2d edition, 1876.
[5] Catalogue of South Australian Minerals, 1893, p. 16.
[6] A. G. Lock, Gold, 1882, p. 630.

IN NEW ZEALAND.

In New Zealand auriferous conglomerates are found near the limit of the Cretaceous and Tertiary, and seemingly on the Mesozoic side of the line. Many such localities are enumerated by Mr. Alexander McKay.[1] The most famous is the Blue Spur. This, according to Mr. S. H. Cox, is a Cretaceous river bed or basin. The ore is stamped and a vast amount of work has been done on the deposit. That it has yielded largely seems evident, but I find no statement as to product. The wide distribution of these conglomerates, and the fact that they lie at the base of the coal-bearing series of New Zealand, suggest a doubt as to their fluvial origin.

In India the presence of gold as a detrital product in strata is suspected, but the evidence seems to be of an indirect nature.[2]

CONCLUSIONS.

In glancing through these notes on pre-Tertiary auriferous conglomerates, the reader will doubtless remark the fact that only one of them seems to present considerable similitude to river deposits. The remainder seem to be unquestionably marine. The exception is that at Blue Spur in New Zealand. Even in this case the description is not sufficiently explicit to justify anything like an unqualified acceptance of its reference to stream action. On the other hand, more than half of the gold gathered by man in historic and pre-historic times has undoubtedly been derived from Tertiary and post-Tertiary river beds. The contrast in origin between the later and earlier detrital deposits is striking, but very easily explained.

Accumulations of river gravel are superficial continental features of very small stability. Unless they are accidentally protected by lavas which have flowed down the river beds, the gravels are triturated and removed even by ordinary erosive action. Thus in California the discontinuity of the Tertiary gravels shows that vast quantities of this material have been swept away. Were an auriferous area to remain long enough above the sea, it would be cut down to "base-level," and the river channels as well as the gravels would be obliterated.[3] If an area marked by the presence of gravels, such as the Sierra Nevada of California, were to sink beneath the ocean at the rate of a few feet a year, most of its surface features would be destroyed or obscured. The advancing waves, creeping slowly up the slope, would cut away the prominent bluffs or hills, leaving a relatively smooth surface. When submersion was complete this slope would be found covered with coarse detrital material, rounded by wave action and sorted by both waves and currents; in short, a basal gravel would be produced, needing only induration to convert it into a basal conglomerate. Now, in this mass

[1] New Zealand, Papers and Reports relating to Minerals and Mining, 1895, Paper C. 13, pp. 25-26.
[2] V. Ball, Geol. of India, Part III, Economic Geology, 1881, p. 176.
[3] The High Veldt of South Africa is a magnificent instance of base-leveling.

there would evidently be incorporated all or most of the river gravels which had enjoyed an independent existence while the range stood above water level. The river gravels, with any gold which they might contain, would merely furnish their quota to the marine littoral conglomerate. Such a conglomerate would contain gold not only derived from the pre-existent river gravels, but also from the detrital material spread broadcast over the old land surface, and some or much, too, from the destruction of solid vein-bearing rocks by the advancing waves.

In the pre-Tertiary rocks only those gravels remain which were protected by superjacent beds and allowed to indurate. River gravels, as such, could escape dispersion only when during subsidence they were immediately covered in by fresh deposits, without undergoing any noteworthy wave action, and such conditions would assuredly be very exceptional. Hence the extreme rarity of pre-Tertiary river gravels. The considerations set forth in the preceding paragraph also makes it clear how, currents cooperating, great continuous sheets of gold-bearing basal conglomerate may form, and in the notes above it will be observed that many of the known auriferous conglomerates are basal.

In series which show a basal conglomerate there are very frequently other conglomerates intercalated between sandstones or shales. The mechanical theory of such intercalated beds of pudding stone is much more complex than that of the basal conglomerate. It is not needful to enter upon it here. Evidence enough has been given in the preceding pages to show that in ancient formations alluvial gold is most likely to be found in marine shore deposits entirely analogous to the auriferous beaches of the present time.

COPPER.

By CHARLES KIRCHHOFF.

GENERAL TRADE CONDITIONS.

Never before in the history of the copper trade has there been so great an addition to the product of any country as that witnessed during 1896 in the United States, the increase over the preceding year having been nearly 80,000,000 pounds. It is worth noting that this increase is not due to the appearance of one or a group of new producers, but has been the result of expansion and of full work of long-established mines. During 1896, as in previous years, the American copper industry has reaped the advantages which flow from the possession of a commanding position in the world's markets. During the long period of industrial and commercial stagnation which has followed the panic of 1893 the copper mines of the United States have run steadily. The majority of them have earned a good return on the capital invested. Many have expanded steadily, and practically all of them have kept their plant and equipment up to the highest efficiency. During the times when a large percentage of the mining population throughout the country was unemployed, or suffered from long spells of idleness, the labor in the different copper-mining districts had work, year in and year out. There may be instances where local conditions at individual mines forced a curtailment of work or a readjustment of wages on a lower level, but their importance is so insignificant that they do not affect the general statement that since 1892 labor in the copper mines and reduction works of the United States has had full employment at full wages. Indeed, an advance of 10 per cent in wages was granted by many producers in some districts, an advance which was retained during the whole of 1896.

Had the copper-mining industry not possessed an outlet in foreign markets it must have suffered, in common with other mining interests, from the sharp restrictions in the demand and the savage competition which have characterized the last three years in every other branch of the metal industries, and notably in iron and steel. While the quantities of American copper retained for home consumption fell from 244,000,000 pounds in 1895 to 178,700,000 pounds in 1896, the exports expanded from 136,500,000 pounds in 1895 to 281,000,000 in 1896. In the face of a heavy shrinkage in the domestic requirements an unpre-

cedented development in production was possible. In no branch of industry have the blessings of access to the world's markets been so emphatically proven. The events in copper mining during the past three years foreshadow the future position of other American industries.

So far as the world's copper markets are concerned one important circumstance must not be left out of sight. Our consumption has been abnormally low. A moderate revival in business must lead to an important expansion. Should such an increase coincide with a period of continued heavy demand in Europe, then productive capacity all over the world may be strained to the utmost. Even a return to the requirements in this country of 1895, with its brief spell of summer activity, would drive every plant to its utmost, so that a slackening in Europe might prove welcome.

Some increase in the output for 1897 is probable in Montana, Arizona, and in the Lake Superior region. The only new producer of any consequence which will figure in the returns of the current year is the Mountain Copper Company of Keswick, Shasta County, California, which is turning out copper at the rate of 800,000 to 1,000,000 pounds per month.

From the Butte district in Montana come reports of much significance, as affecting the capacity of that district to produce at low cost, and that is that the precious metal contents of the ores at greater depths show a tendency toward diminution.

Appended to the protest of the American Copper Producers' Association filed with the Ways and Means Committee is a statement showing the production of the principal mines during the year. The figures are reproduced below:

Production of the leading copper mines in 1896.

Name of company.	Pounds.
Montana:	
Anaconda Copper Mining Company	124,549,878
Boston and Montana and Butte and Boston Copper Mining Company	60,600,000
Montana Ore Purchasing Company	15,898,100
Parrot Silver and Copper Mining Company	7,891,345
Total	208,939,323
Lake Superior:	
Calumet and Hecla Mining Company	90,456,933
Quincy Mining Company	16,617,933
Tamarack Mining Company	16,495,000
Osceola Mining Company	6,995,000
Atlantic Mining Company	4,895,985
Franklin Mining Company	2,737,874

Production of the leading copper mines in 1896—Continued.

Name of company.	Pounds.
Lake Superior—Continued.	
Tamarack Mining Company, Junior	2,330,000
Wolverine Copper Mining Company	2,220,933
Kearsarge Mining Company	1,639,000
Central Mining Company	408,495
Total	144,797,153
Arizona:	
Copper Queen Consolidated Mining Company	23,260,696
United Verde Copper Company	22,328,413
Arizona Copper Company	12,472,000
Old Dominion Copper Mining Company	5,620,000
Detroit Copper Mining Company	6,985,150
Total	70,666,259
Total production in 1896	424,402,735

PRODUCTION.

The following table shows the production of copper in the United States from its first rise to the dignity of an industry. For the earlier years the best available sources have been drawn upon for the estimates given. Since 1882 the figures are those collected by this office:

Production of copper in the United States from 1845 to 1896.

[Long tons.]

Year.	Total production.	Lake Superior.	Calumet and Hecla.	Percentage of Lake Superior of total product.
1845	100	12		12
1846	150	26		17.3
1847	300	213		71
1848	500	461		92.2
1849	700	672		96
1850	650	572		88
1851	900	779		86.6
1852	1,100	792		72
1853	2,000	1,297		64.9
1854	2,250	1,819		80.8
1855	3,000	2,593		86.4
1856	4,000	3,666		91.7

Production of copper in the United States from 1845 to 1896—Continued.

[Long tons.]

Year.	Total production.	Lake Superior.	Calumet and Hecla.	Percentage of Lake Superior of total product.
1857	4,800	4,255	.....	88.6
1858	5,500	4,088	.....	74.3
1859	6,300	3,985	.....	63.3
1860	7,200	5,388	.....	74.8
1861	7,500	6,713	.....	89.5
1862	9,000	6,065	.....	67.4
1863	8,500	5,797	.....	68.2
1864	8,000	5,576	.....	69.7
1865	8,500	6,410	.....	75.4
1866	8,900	6,138	.....	69
1867	10,000	7,824	603	78.2
1868	11,600	9,346	2,276	80.6
1869	12,500	11,886	5,497	95.1
1870	12,600	10,992	6,277	87.2
1871	13,000	11,942	7,242	91.9
1872	12,500	10,961	7,215	87.7
1873	15,500	13,433	8,414	86.7
1874	17,500	15,327	8,984	87.6
1875	18,000	16,089	9,586	89.4
1876	19,000	17,085	9,683	89.9
1877	21,000	17,422	10,075	83
1878	21,500	17,719	11,272	82.4
1879	23,000	19,129	11,728	83.2
1880	27,000	22,204	14,140	82.2
1881	32,000	24,363	14,000	76.1
1882	40,467	25,439	14,309	62.9
1883	51,574	26,653	14,788	51.6
1884	64,708	30,961	18,069	47.8
1885	74,052	32,209	21,093	43.5
1886	70,430	36,124	22,553	51.3
1887	81,017	33,941	20,543	41.9
1888	101,054	38,604	22,453	38.2
1889	101,239	39,364	21,727	38.7
1890	115,966	45,273	26,727	38.9
1891	126,839	50,992	.....	40.2
1892	154,018	54,999	.....	35.7
1893	147,033	50,270	.....	34.2
1894	158,120	51,031	.....	32.3
1895	169,917	57,737	34,455	34
1896	205,384	64,073	40,338	31.2

In detail, the production of copper, territorially distributed, has been as follows since 1883:

Total copper production in the United States, 1883 to 1887.

Source.	1883.	1884.	1885.
	Pounds.	*Pounds.*	*Pounds.*
Lake Superior	59,702,404	69,353,202	72,147,889
Arizona	23,874,963	26,734,345	22,706,366
Montana	24,664,346	43,093,054	67,797,864
New Mexico	823,511	59,450	79,839
California	1,600,862	876,166	469,028
Utah	341,885	265,526	126,199
Colorado	1,152,652	2,013,125	1,146,460
Wyoming	962,468	.....	.....
Nevada	288,077	100,000	8,871
Idaho	.....	46,667	40,381
Missouri	260,306	230,000	.....
Maine and New Hampshire	212,124	249,018	211,602
Vermont	400,000	655,405	
Southern States	395,175	317,711	40,199
Middle States	64,400	2,114	190,641
Lead desilverizers, etc	782,880	950,870	910,144
Total domestic copper	115,526,053	144,946,653	165,875,483
From imported pyrites and ores	1,625,742	2,858,754	5,086,841
Total (including copper from imported pyrites)	117,151,795	147,805,407	170,962,324

Source.	1886.	1887.
	Pounds.	*Pounds.*
Lake Superior	80,918,460	76,028,697
Arizona	15,657,035	17,720,462
Montana	57,611,621	78,699,677
New Mexico	558,385	283,664
California	430,210	1,600,000
Utah	500,000	2,500,000
Colorado	409,306	2,012,027
Wyoming	.....	.....
Nevada	50,000	.....
Idaho	.....	.....
Missouri	.....	.....
Maine and New Hampshire	315,719	200,000
Vermont		
Southern States	29,811	.....
Middle States	.....	.....
Lead desilverizers, etc	1,282,496	2,432,804
Total domestic copper	157,763,043	181,477,331
From imported pyrites and ores	4,500,000	3,750,000
Total (including copper from imported pyrites)	162,263,043	185,227,331

Since 1888 the production has been as follows, in detail:

Total copper production in the United States, 1888 to 1896.

Source.	1888.	1889.	1890.
	Pounds.	*Pounds.*	*Pounds.*
Lake Superior	86, 472, 034	88, 175, 675	101, 410, 277
Arizona	31, 797, 300	31, 586, 185	34, 796, 689
Montana	97, 897, 968	98, 222, 444	112, 980, 896
New Mexico	1, 631, 271	3, 686, 137	850, 034
California	1, 570, 021	151, 505	23, 347
Utah	2, 131, 047	65, 467	1, 006, 636
Colorado, including copper smelters (*a*)	1, 621, 100	1, 170, 053	3, 585, 691
Wyoming	232, 819	100, 000	.....
Nevada	50, 000	26, 420	.....
Idaho	50, 000	156, 490	87, 243
Washington	.....	.....	.....
Maine and New Hampshire	271, 631	72, 000	378, 840
Vermont			
Southern States	18, 201	18, 144	
Middle States	.....	.....	
Lead desilverizers, etc. (*b*)	2, 618, 074	3, 345, 442	4, 643, 439
Total domestic copper	226, 361, 466	226, 775, 962	259, 763, 092
From imported pyrites and ores	4, 909, 156	5, 190, 252	6, 017, 041
Total (including copper from imported pyrites)	231, 270, 622	231, 966, 214	265, 780, 133

Source.	1891.	1892.	1893.
	Pounds.	*Pounds.*	*Pounds.*
Lake Superior	114, 222, 709	123, 198, 460	112, 605, 078
Arizona	39, 873, 279	38, 436, 099	43, 902, 824
Montana	112, 063, 320	163, 206, 128	155, 209, 133
New Mexico	1, 233, 197	1, 188, 796	280, 742
California	3, 397, 405	2, 980, 944	239, 682
Utah	1, 562, 098	2, 209, 428	1, 135, 330
Colorado, including copper smelters (*a*)	6, 336, 878	7, 593, 674	7, 695, 826
Wyoming	.....	.....	.....
Nevada	.....	.....	20, 000
Idaho	146, 825	226, 000	36, 367

a Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

b For 1894 the quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.

Total copper production in the United States, 1888 to 1896—Continued.

Source.	1891.	1892.	1893.
	Pounds.	*Pounds.*	*Pounds.*
Washington	.....	.....	39, 785
Maine and New Hampshire Vermont Southern States Middle States	296, 463	467, 448	732, 793
Lead desilverizers, etc. (*b*)	4, 989, 590	5, 491, 702	7, 456, 838
Total domestic copper	284, 121, 764	344, 998, 679	329, 354, 398
From imported pyrites and ores and regulus	11, 690, 312	7, 973, 065	10, 431, 574
Total (including copper from imported pyrites)	295, 812, 076	352, 971, 744	339, 785, 972

Source.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds.*
Lake Superior	114, 308, 870	129, 330, 749	143, 524, 069
Arizona	44, 514, 894	47, 953, 553	72, 934, 927
Montana	183, 072, 756	190, 172, 150	221, 918, 179
New Mexico	31, 884	143, 719	2, 701, 664
California	120, 000	218, 332	690, 237
Utah	1, 147, 570	2, 184, 708	3, 502, 012
Colorado, including copper smelters (*a*)	6, 481, 413	6, 079, 243	6, 022, 176
Wyoming	.....	.....	.....
Nevada	.....	.....	.....
Idaho	.....	1, 425, 914	.....
Washington	.....	.....	.....
Maine and New Hampshire Vermont Southern States Middle States	2, 374, 514	3, 105, 036	4, 704, 993
Lead desilverizers, etc. (*b*)	2, 136, 473	.....	4, 063, 173
Total domestic copper	354, 188, 374	380, 613, 404	460, 061, 430
From imported pyrites and ores and regulus	10, 678, 434	*c*5, 300, 000	*c*5, 900, 000
Total (including copper from imported pyrites)	364, 866, 808	385, 913, 404	465, 961, 430

a Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

b For 1894 and 1896 the quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.

c Estimated.

The available supply for the domestic markets may be computed as follows:

Supply of copper for the United States in 1891, 1892, 1893, 1894, 1895, and 1896.

Source.	1891.	1892.	1893.
	Pounds.	*Pounds.*	*Pounds.*
Production of domestic copper	284, 121, 764	344, 998, 679	329, 354, 398
Imports:			
Fine copper in ore, entered for consumption	8, 931, 554	7, 669, 978	7, 256, 015
Fine copper in regulus, entered for consumption	2, 403, 919	303, 087	3, 175, 559
Bars and ingots	2, 556	22, 097	554, 348
Old copper	134, 407	71, 485	59, 375
Total	295, 594, 200	353, 065, 326	340, 399, 695
Exports:			
Ingots and bars	69, 279, 024	30, 515, 736	138, 984, 128
Estimated fine copper contents of matte	50, 000, 000	66, 000, 000	50, 000, 000
Total	119, 279, 024	96, 515, 736	188, 984, 128
Available supply	176, 315, 176	256, 549, 590	151, 415, 567

Source.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds.*
Production of domestic copper	354, 188, 374	380, 613, 404	460, 061, 430
Imports:			
Fine copper in ore, entered for consumption	4, 804, 614	*a* 5, 300, 000	*a* 5, 900, 000
Fine copper in regulus, entered for consumption	5, 873, 820		
Bars and ingots	606, 415	7, 979, 322	9, 074, 379
Old copper	160, 592	1, 336, 901	2, 422, 554
Total	365, 633, 815	395, 229, 627	477, 458, 363
Exports:			
Ingots and bars	162, 393, 000	121, 328, 390	258, 473, 285
Estimated fine copper contents of matte	5, 750, 000	15, 200, 000	22, 881, 936
Total	168, 143, 000	136, 528, 390	281, 355, 221
Available supply	197, 490, 815	258, 701, 237	196, 103, 142

a Estimated.

This statement leaves out of account the stocks concerning which no reliable data are obtainable. For the years 1895 and 1896 the imports of ore and regulus are gross weight, and not fine copper contents. The latter must be estimated.

Since July, 1892, Mr. John Stanton, of New York, has collected monthly, from sworn returns, the following figures showing the production of the leading mines of Lake Superior, Montana, and Arizona. The estimate of outside sources is drawn, particularly recently, from official returns of the principal smaller mines.

American product of copper.

[Long tons.]

Year.	Reporting mines.	Outside sources.	Total.
Second six months of 1892	59, 239	6, 287	65, 526
1893	129, 760	12, 730	142, 490
1894	142, 543	17, 080	159, 623
1895	155, 497	15, 700	171, 197
1896	189, 494	14, 400	203, 894

The monthly reports, in detail, for the years 1892, 1893, and 1894 are published in Mineral Resources for 1895. For the years 1895 and 1896, and for the earlier months of 1897, the monthly production was as follows:

American product of copper, monthly, 1895 and 1896.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
1895.			
January	10, 094	1, 600	11, 694
February	11, 120	1, 600	12, 720
March	12, 553	1, 600	14, 153
April	11, 944	1, 600	13, 544
May	13, 260	1, 600	14, 860
June	11, 641	1, 100	12, 741
July	12, 524	1, 100	13, 624
August	14, 290	1, 100	15, 390
September	14, 251	1, 100	15, 351
October	15, 045	1, 100	16, 145
November	15, 330	1, 100	16, 430
December	13, 445	1, 100	14, 545
Total	155, 497	15, 700	171, 197

American product of copper, monthly, 1895 and 1896—Continued.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
1896.			
January	14,872	1,200	16,072
February	16,316	1,200	17,516
March	16,722	1,200	17,922
April	15,912	1,200	17,112
May	15,533	1,200	16,733
June	14,825	1,200	16,025
July	15,395	1,200	16,595
August	15,600	1,200	16,800
September	15,777	1,200	16,977
October	16,958	1,200	18,158
November	15,165	1,200	16,365
December	16,419	1,200	17,619
Total	189,494	14,400	203,894
1897.			
January	16,937	700	17,637
February	16,119	700	16,819
March	17,583	700	18,283
April	16,554	900	17,454
May	17,805	1,000	18,805
June	18,653	1,000	19,653

A considerable number of foreign mines, including those of the Peninsula, the Cape, Australia, Germany, and Mexico, report monthly to a secretary in London since July, 1892. During the last six months of 1892, and in 1893, 1894, 1895, and 1896, the product of this group, which retains friendly relations with the American Producers' Association, has been as follows:

Foreign reporting mines.

Year.	Long tons.
Second half 1892	39,655
1893	81,785
1894	88,531
1895	86,178
1896	86,196

In detail the monthly production in 1895 and 1896 has been as follows:

Foreign reporting mines.

Year and month.	Long tons.	Year and month.	Long tons.
1895.		1896.	
January	6,737	April	6,865
February	6,739	May	7,495
March	7,424	June	7,055
April	7,219	July	7,847
May	7,400	August	7,022
June	6,965	September	7,182
July	6,988	October	7,297
August	7,129	November	7,108
September	6,947	December	7,685
October	7,753	Total	86,396
November	7,728	1897.	
December	7,149	January	6,595
Total	86,178	February	7,241
1896.		March	8,358
January	6,910	April	7,318
February	6,834	May	7,116
March	7,096	June	7,635

The fluctuations in the product have not been large, and aside from the output of the Boleo mines in Mexico there has been no notable increase. It is understood that the Boleo, now, too, has attained the maximum aimed at.

According to the compilations by Mr. John Stanton the exports of fine copper from the United States were as follows:

United States exports.

Year and month.	Long tons.	Year and month.	Long tons.
1893.		1894.	
January	3,171	January	7,717
February	1,815	February	5,590
March	2,334	March	7,137
April	3,450	April	6,209
May	4,482	May	6,140
June	5,109	June	6,976
July	7,181	July	7,622
August	9,127	August	6,408
September	16,131	September	7,093
October	11,478	October	5,057
November	7,821	November	4,785
December	8,293	December	6,793
Total	80,392	Total	77,527

United States exports—Continued.

Year and month.	Long tons.	Year and month.	Long tons.
1895.		1896.	
January	7,144	April	10,684
February	3,450	May	10,481
March	3,914	June	9,797
April	5,677	July	10,885
May	5,430	August	9,119
June	8,600	September	10,898
July	6,035	October	11,371
August	4,493	November	12,034
September	4,106	December	12,980
October	3,773	Total	125,605
November	4,874		
December	7,226	1897.	
Total	64,722	January	9,651
		February	8,856
1896.		March	11,232
January	8,168	April	10,279
February	8,296	May	12,175
March	10,892	June	12,677

THE LAKE SUPERIOR MINES.

The following is, in detail, the output of the Lake Superior mines, as reported by the companies, from 1884 to 1891:

Production of Lake Superior copper mines, 1884 to 1891.

Mine.	1884.	1885.	1886.	1887.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Calumet and Hecla	40,473,585	47,247,990	50,518,222	46,016,123
Quincy	5,650,436	5,848,530	5,888,511	5,603,691
Osceola	4,247,630	1,945,208	3,560,786	3,574,972
Franklin	3,748,652	4,007,105	4,264,297	3,915,838
Allouez	1,928,174	2,170,476	1,725,463	885,010
Atlantic	3,163,585	3,582,633	3,503,670	3,641,865
Pewabic	227,834	.....	.....	.....
Central	1,446,747	2,157,408	2,512,886	2,199,133
Grand Portage	255,860	.....	.....	.....
Conglomerate	1,198,691	.....	.....	.....
Mass	481,396	363,500	247,179	.....
Copper Falls	891,168	1,150,538	1,378,679	719,150
Phœnix	631,004	344,355	1,101,804	11,000
Hancock	562,636	203,037	150,000	.....
Huron	1,927,660	2,271,163	1,992,695	1,881,760
Ridge	74,030	63,390	158,272	84,902

Production of Lake Superior copper mines, 1884 to 1891—Continued.

Mine.	1884.	1885.	1886.	1887.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
St. Clair	139,407	.....	.....	.....
Cliff	28,225	.....	22,342	.....
Wolverine	751,763	328,610	3,125	2,300
Nonesuch	23,867	28,484	.....	.....
Isle Royale	16,074	.....	.....	.....
National	87,368	162,252	184,706	25,187
Minnesota	1,144	12,608	.....	.....
Belt	130,851	27,433	7,300	.....
Sheldon and Columbia	9,828	.....	.....	.....
Adventure	4,333	4,000	1,000	.....
Peninsula	1,225,981	.....	.....	.....
Tamarack	.....	181,669	3,646,517	7,396,529
Ogima	1,106	12,000	.....	.....
Kearsarge	.....	.....	.....	21,237
Evergreen Bluff	954	1,500	1,000	.....
Ash Bed	1,517	.....	.....	.....
Sundry companies—tributers	21,696	34,000	50,000	50,000
Total	69,353,202	72,147,889	80,918,460	76,028,697

Mine.	1888.	1889.	1890.	1891.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Calumet and Hecla	50,295,720	48,668,296	59,868,106	.....
Quincy	6,367,809	6,405,686	8.064,253	10,542,519
Osceola	4,134,320	4,534,127	5,294,792	6,543,358
Franklin	3,655,751	4,346,062	5,638,112	4,319,840
Allouez	314,198	1,762,816	1,407,828	1,241,423
Atlantic	6,974,877	3,698,837	3,619,972	3,653,671
Central	1,817,023	1,270,592	1,413,391	1,237,500
Mass	.....	58,349	62,187	.....
Copper Falls	1,199,950	1,440,000	1,330,000	1,427,000
Huron	2,370,857	2,219,473	1,736,777	1,257,059
Ridge	50,924	28,000	21,569	.....
National	.....	454,134	123,879	.....
Adventure	.....	692	15,485	.....
Peninsula	.....	736,507	1,108,660	1,599,670
Tamarack	11,411,325	10,605,451	10,106,741	16,161,312
Kearsarge	829,185	1,918,849	1,598,525	1,727,390
Evergreen Bluff	.....	21,580	.....	.....
Sundry companies—tributers	50,000	6,224	.....	.....
Total	86,472,034	88,175,675	101,410,277	

The permission to publish the report of the Calumet and Hecla Company since 1891 has not been given. According to the return by the company in Michigan, the product was 79,769,293 pounds in 1894, 79,137,399 pounds in 1895, and 90,356,733 pounds in 1896.

The following table records only the output of the other leading producers in that district:

Production of Lake Superior copper mines in 1892, 1893, 1894, 1895, and 1896.

Mines.	1892.	1893.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Tamarack	16,426,633	15,085,113	15,375,281	14,840,000	16,095,000
Quincy	11,103,926	14,398,477	15,484,014	16,304,721	16,863,477
Osceola	7,098,656	6,715,870	6,918,502	6,270,373	6,251,304
Franklin	3,769,605	3,504,244	3,556,487	3,086,933	2,746,076
Atlantic	3,703,875	4,221,933	4,437,609	4,832,497	4,895,985
Kearsarge	1,467,758	1,627,030	1,998,710	1,946,163	1,377,226
Tamarack Junior	796,769	1,610,259	2,349,329	2,605,000	2,135,000
Peninsula	973,217	.....	.....	.....	.....
Copper Falls	1,350,000	750,000	.....	.....	.....
Huron	461,499	562,776	.....	.....	.....
Allouez	546,530	.....	.....	.....	.....
Central	1,625,982	1,180,040	584,590	379,020	469,243
Centennial	106,801	.....	.....	.....	.....
Wolverine	500,074	1,025,062	1,665,255	1,815,391	2,220,933

The annual report of the Calumet and Hecla Mining Company for the fiscal year ending April 30 shows that the product for the fiscal year 1896–97 was 92,475,595 pounds, as compared with 85,552,756 pounds in 1895–96 and 62,466,414 pounds in 1894–95, the dividends in the last fiscal year having been $3,000,000. The statement of assets and liabilities on April 30 shows $84,535 cash at the mine office, $15,000 cash at the New York office, $6,599,427 copper and cash at Boston, and $322,442 bills receivable. The copper is valued at only 8 cents per pound. The liabilities, which include $562,000 for machinery contracts, leave a balance of assets of $5,889,211. Mr. Agassiz's report says:

The number of men engaged in pushing operations is again at its maximum, so that our mine reserves are increasing at a satisfactory rate. We have continued our explorations on the Calumet and on the Osceola amygdaloids, but so far nothing of importance has been developed. We can hardly expect satisfactory results until we have carried on for some time regular mining operations from the three shafts we are starting on the outcrop of the Osceola amygdaloid. At the south end of the mine there has been a very material improvement in the character of the conglomerate lode. At the Red Jacket shaft we have erected a large iron shaft house, with a capacity nearly equal to that of four of our ordinary shaft houses. This we are now equipping with breakers and other machinery. The new additions necessary to complete the hoisting plant at this shaft are now under way, and we are at work on

the shaft itself. We hope to have all our new machinery at the Superior, at No. 5 Calumet shaft, and at the Red Jacket shaft in operation before the close of navigation. We now have small hoisting engines at each of our shafts, to enable us to handle to advantage our timber and other material intended for under ground. We have also added a number of underground hauling engines for tramming. At the mills the boilers formerly at the waterworks boiler house have been transferred to the mill boiler house, so that our boilers are now under one roof. The greater part of our buildings at Torch Lake have been covered with iron, and we hope to have them all properly protected before the coming fall. The expenditures on account of the aid fund for the fiscal year amounted to $49,508.94. Since January the company has paid the men's contributions to the fund. The value of the aid fund at cost is $123,240.91.

The Tamarack produced in 1896 23,628,899 pounds of mineral, having hoisted 575,960 tons of rock and stamped 490,625 tons at a cost of 29.95 cents per ton. The total cost per ton of rock stamped was $2.28 and per ton of rock mined $1.94. In recent years the yield of rock has not been favorable. For the past two years, according to the report of Mr. W. E. Parnall, the percentage of mineral in the rock has not exceeded 2.42 per cent, whereas from 1890 to 1893 the least in any year was 3.18 per cent, and in 1890 it was 3.87 per cent. A decided improvement is now reported. The gross receipts for 1896 were $1,746,188.36. The running expenses at the mine were $1,116,787, and the smelting, transportation, and marketing expenses were $260,704.61, leaving a mining profit of $368,696.75, out of which dividends of $360,000 were paid. The construction account and the cost of sinking the new shaft were $256,720.63, which reduces the balance of assets from $1,031,328.55 on December 31, 1895, to $783,304.67 on December 31, 1896. A new mill with two 20-inch Ball heads was built, capable of treating 600 tons of rock per day. The old mill with five stamps crushed 290 tons per day per head as the average.

In 1896 the Quincy produced 16,863,477 pounds of fine copper, which realized $1,842,117.19, to which must be added $22,080.42 realized from the sale of silver, $12,959.38 from interest on loans, and $1,475.79 on real estate account. The running expenses at the mine were $893,696.52 and the smelting, transportation, and other expenses were $214,872.62, a total of $1,108,569.14, leaving an income of $770,063.64. During the year dividends aggregating $1,000,000 were paid, making a total paid of $8,670,000. During the year there were mined 637,113 tons of rock, of which 577,024 tons were hoisted and 555,543 tons stamped, being 385 tons 403 pounds of rock per head for twenty-four hours of actual running time. The product of the stamp mill was 15,251,410 pounds of mineral, and 5,119,315 pounds of mineral was obtained from the rock houses. Recently a considerably larger quantity of silver is obtained by treating certain grades of the copper electrolytically.

The following table shows the operations of the Quincy mine for a series of years. It illustrates well the steady increase in production, the fluctuations in the yield, the heavy decline in the price of copper, the crowding down of cost through improvements, in spite of increas-

ing depth, and the remarkable uniformity of wages paid. It should be stated that the average price realized is calculated from the gross income and the product, the reports failing to show the quantity of copper on hand at the beginning of each fiscal year, and the values at which it was put in:

Operations of the Quincy mine.

Year.	Product.	Yield fine copper per fathom broken.	Price obtained.	Cost per pound.	Number of miners on contract.	Average monthly contract wages.
	Pounds.	*Pounds.*	*Cents.*	*Cents.*		
1864	2,498,574	562	44.8	26.7	242	$65.50
1865	2,720,980	501	.....	.....	212	57.53
1866	2,114,220	451	31.3	29.	227	53.16
1867	1,921,620	526	22.7	18.9	167	50.83
1868	1,417,941	447	25.2	23.1	157	50.44
1869	2,417,365	446	21.9	16.7	210	51.10
1870	2,496,774	528	21.5	15.3	181	46.09
1871 (*a*)	2,409,501	441	22.8	15.2	104	47.08
1872	2,269,104	391	32.5	22.9	233	60.62
1873	2,621,087	491	26.5	18.6	223	62.42
1874	3,050,154	577	21.9	15.1	234	43.38
1875	2,798,281	485	22.7	15.8	217	46.74
1876	3,073,171	507	20.	15.7	227	47.13
1877	2,837,014	467	18.6	15.1	247	43.79
1878	2,991,050	395	14.9	14.	234	41.50
1879	2,639,958	403	16.3	13.7	212	38.76
1880	3,609,250	563	18.5	11.8	192	49.10
1881	5,702,606	767	18.7	10.	212	48.54
1882	5,682,663	800	17.1	9.5	152	48.83
1883	6,012,239	850	13.7	8.9	165	46.02
1884	5,680,087	722	12.2	8.6	157	43.35
1885	5,848,497	710	11.4	7.5	132	44.00
1886	5,888,517	638	11.1	6.8	140	45.80
1887	5,603,691	781	11.7	8.6	142	48.40
1888	6,367,809	690	15.9	10.1	158	49.60
1889	6,405,686	690	12.	9.4	145	49.15
1890	8,064,253	769	15.7	8.2	146	52.60
1891	10,542,519	685	12.8	9.1	182	53.40
1892	11,103,926	572	11.27	8.8	238	53.75
1893	14,398,477	574	10 4	7.1	259	49.60
1894	15,484,014	584	9.5	5.7	285	50.70
1895	16,304,721	517	10.1	5.9	336	50.00
1896	16,863,477	477	10.9	6.5	379	52.00

a Introduction of steam drills.

The Osceola produced in 1896 7,365,739 pounds of mineral, which yielded 6,251,304 pounds of refined copper, the yield being 404 pounds per cubic fathom broken. The percentage of fine copper in the stamp rock was 1.26 per cent against 1.34 per cent in 1895. The total cost per ton of rock hoisted was $1.86, while the total cost per pound of copper was 9.64 cents in 1896 against 8.75 cents in 1895, 8.70 cents in 1894, 9.48 cents in 1893, and 9.12 cents in 1892. During the year 1896, 278,517 tons of rock were hoisted, 30,455 tons of which were discarded and 248,062 tons stamped, the cost of the latter operation being 24.788 cents per ton. The total income was $687,017.85, while the total costs were $602,908.74, leaving a net income of $84,109.11. Dividends of $100,000 were paid, reducing the balance of assets to $257,171.76 on December 31, 1896. There were charged to running expenses $63,000, which included $11,000 for balance of repairs on shaft No. 3, injured by fire, $32,000 for sinking No. 6 shaft 1,058 feet, and $20,000 for new equipment.

The Franklin product was smaller in 1896, because January was lost through the burning of the engine house in 1895. The mine produced 3,367,218 pounds of mineral, which yielded 2,746,076 pounds of refined copper. There were hoisted 135,156 tons of rock, 122,079 tons thereof being stamped, yielding 1.379 per cent of mineral. The amount of mass and barrel-work for the year was 961,930 pounds. The income was $307,447.99, while the expenditures were $246,893.29 for mine costs, and $39,896.41 for smelting, freight, etc., thus showing a mining profit of $20,658.29. The costs include $64,835.24 expended for explorations on the Franklin, Junior, which have shown encouraging results on the Pewabic lode, on which the shaft was down 640 feet late in January. About 600 tons of rock taken from the fourth level yielded 1.4 per cent of fine copper.

The Kearsarge product was small in 1896 on account of inadequate stamping facilities. Of the total 34,587 tons stamped, 22,863 tons were crushed during the first five months. The total product of mineral was 1,570,305 pounds, and of refined copper, 1,377,228 pounds, the yield per cubic fathom of ground broken being 449 pounds, while the percentage of fine copper in the stamp rock was 1.99 per cent. The total cost per ton of rock hoisted was $1.97, while the cost per pound of copper for the year was 9.76 cents. With the completion of the new Tamarack stamp mill the normal product will be attained. The total income for the year was $162,297.38, while the costs were $134,368.02, a balance of $27,929.36.

In the low cost of handling material the management of the Atlantic Mining Company continues its records.

Cost of copper at the Atlantic mine per ton of rock treated.

Items of cost.	1888.	1889.	1890.	1891.	1892.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Mining, selecting, breaking, and all surface expenses, including taxes	83.73	87.87	104.14	95.29	83.98
Transportation to mill	3.47	3.88	3.46	3.86	3.33
Stamping and separating	26.89	27.78	27.78	25.82	25.09
Freight, smelting, marketing, and New York expenses	21.42	20.22	20.37	18.47	17.67
Total working expenses	135.51	139.75	155.75	143.44	130.07
Total expenditures, including construction	142.82	153.27	166.70	154.51	133.51
Net profit	54.36	6.23	27.71	0.16	.....
Yield of copper, per cent	0.667	0.663	0.650	0.615	0.615

Items of cost.	1893.	1894.	1895.	1896.
	Cents.	*Cents.*	*Cents.*	*Cents.*
Mining, selecting, breaking, and all surface expenses, including taxes	79.49	75.18	75.25	76.43
Transportation to mill	3.28	3.03	4.08	4.96
Stamping and separating	24.95	23.30	22.20	24.87
Freight, smelting, marketing, and New York expenses	18.22	17.71	18.81	17.47
Total working expenses	125.94	119.22	120.34	123.73
Total expenditures, including construction	160.24	165.07	156.05	135.99
Yield of copper, per cent	0.669	0.703	0.730	0.660

An advance in wages of 10 per cent is mainly responsible for the increased cost in 1896.

The yield of rock was less in 1896 than in 1895, being only 13.19 pounds per ton as compared with 14.6 pounds in the previous year. There were stamped 371,128 tons of rock, producing 6,449,600 pounds of mineral yielding 4,894,228 pounds of refined copper, which sold for $530,667.14, to which must be added $493.71 for interest. The working expenses at the mine aggregated $394,378.80, and the smelting, freight, and other expenses $64,830.34, showing a gross profit of $71,951.71, to which must be added amount credited real estate for stumpage, $3,185. Construction accounts at mine, mill, and railroad absorbed $45,507.81, and $1,218.49 was paid for timber lands. This made a net addition to

surplus of $28,410.41, which attained $179,285.38. From this surplus a dividend of $40,000 was paid, the previous dividends having aggregated $700,000.

A recent find of rock exceptionally high in copper is that on Six Mile Hill, near Houghton, now being developed.

MONTANA.

The growth in importance of Montana as a copper producer is shown in the following table:

Montana's proportion of the copper product.

Year.	United States.	Montana.		Lake Superior.
	Pounds.	*Pounds.*	*Per cent.*	*Per cent.*
1882	90, 646, 232	9, 058, 284	10. 0	62. 9
1883	115, 526, 053	24, 664, 346	21. 4	51. 6
1884	144, 946, 653	43, 093, 054	29. 7	47. 8
1885	165, 875, 483	67, 797, 864	40. 9	43. 5
1886	157, 763, 043	57, 611, 621	36. 7	51. 6
1887	181, 477, 331	78, 699, 677	43. 4	41. 9
1888	226, 361, 466	97, 897, 968	43. 3	38. 2
1889	226, 775, 962	98, 222, 444	43. 3	38. 9
1890	259, 763, 092	112, 980, 896	43. 5	39. 0
1891	284, 121, 764	112, 063, 320	39. 4	40. 2
1892	344, 998, 679	163, 206, 128	47. 3	35. 7
1893	329, 354, 398	155, 209, 133	47. 1	34. 2
1894	354, 188, 374	183, 072, 756	51. 6	32. 3
1895	380, 613, 404	190, 172, 150	50. 0	34. 0
1896	460, 061, 430	221, 918, 179	48. 2	31. 2

The last annual report of the Anaconda Copper Mining Company is that for the fiscal year ending June 30, 1897. During that time there was shipped from the mines at Butte to the reduction works at Anaconda, 1,408,369 short tons dry weight of ore, of which 676,577 tons came from the Anaconda group of mines and 731,792 tons from the Syndicate group and other mines. The total cost of mining, including all expenditures, was $5,725,999.93, from which are deducted $278,252.54, one-half of the profits of the subsidiary departments. For new machinery, replacements, and other work the sum of $387,531.63 was expended on these mines. The cost of mining per ton of ore shipped, deducting freight to the smelter, figures out $3.74 for the Anaconda group and $3.66 for the Mountain Iron group. The expenditures at the reduction works at Anaconda were $5,812,517.60. This does not deduct $278,252.54, one-half of the profits of the subsidiary departments.

The gross cost includes $3,894,298.19 at the lower works and $1,918,-219.41 at the refinery. In the former is included $1,030,146.22 for concentrating and $2,633,034.62 for smelting. In the latter there is included $1,091,141.28 for converting, $131,006.26 for casting, and $562,849.56 for refining. The shipments from Anaconda amounted to 132,364,198 pounds of copper, 5,935,837 ounces of silver, and 20,380 ounces of gold. It is worth noting that the sales during the fiscal year, however, amounted to 120,864,097 pounds of copper, 6,057,067 ounces of silver, and 18,511 ounces of gold. The balance sheet shows net expenses for mining and reduction of $10,982,012.45, railway and ocean freights of $681,692.57, refining charges at the seaboard of $1,058,824.93, interest on advances of $116,115.83, and general expenses of $77,679.31. The income consisted of $13,003,955.10 for sales of copper, $3,881,551.75 for sales of silver, and $382,259.70 for sales of gold. Royalties, rent, and dividends yielded $151,595.32. The stock of copper, silver, and gold increased from $4,888,020.26 on July 1, 1896, to $5,521,031.48, leaving a balance of profit of $5,136,048. Dividends aggregating $3,000,000 were paid during the year.

Since shipments began the Anaconda and Syndicate mines have produced 8,154,954 short tons of ore, yielding 488,753 short tons of copper, 35,584,067 ounces of silver, and 118,634 ounces of gold.

The receipts of the Boston and Montana Company for the calendar year 1896, from sales of copper, silver, and gold, were $6,414,307.20. The costs were $2,887,968.27 at Butte and at the reduction works at Great Falls, and the expenses of handling copper, freight, copper charges, commissions, and expense account were $646,314.82, an aggregate of $3,534,283.09, leaving a profit of $2,880,024.11. Deducting $55,673.92 for interest and $150,000 for sinking fund, a balance of $2,674,350.19 remained, out of which dividends aggregating $1,500,000 were paid. During the year about $300,000 was expended for machinery and improvements at the mines and reduction works. This included a hoisting engine at the West Colusa shaft sufficient to reach a depth of 2,000 feet and an air compressor at the Leonard shaft. At the reduction plant a new power house has been built, which is to furnish current enough to the electrolytic refinery to carry the capacity up to 3,500,000 pounds per month. A new blast-furnace plant is under construction. In the early part of the year the smelter of the Butte and Boston Company was leased to treat principally the low-grade ores, which it was thought would hardly pay to transport to Great Falls for treatment. The matte produced is sent to Great Falls. Owing to operating the Butte smelter, the works at Great Falls were not run to full capacity during the latter part of the year.

The Parrot Silver and Copper Company is building large new works on the Jefferson, 5 miles south of Whitehall, on the line of the Northern Pacific Railway, at a distance of about 32 miles east of Butte. It is expected that this plant will be ready to operate toward the close of the current year.

The Butte Reduction Works is being enlarged also. The concentrating plant has been increased in capacity from 150 to 400 tons daily. To the smelting works there has been added a Wethey calcining furnace of a daily capacity of 50 to 55 tons of ore, and a reverberatory matting furnace, the hearth of which is 35 feet long. This has increased the capacity from about 300,000 to 700,000 pounds per month now. Other improvements are in contemplation which will bring the capacity up to at least 1,000,000 pounds of fine copper per month.

ARIZONA.

The greatest increase, relatively, has taken place in Arizona. The Detroit Copper Company installed a converter in midsummer. The Copper Queen has three converters, but had only blowing power for two of them. This is now being added to, so that in case of need all the converters may be simultaneously operated. The hoisting capacity is also being increased. The Arizona Copper Company is also installing a converter. The mines of the Globe district are working slowly, awaiting the completion of railroad connections. The United Verde Company has considerably expanded its productive capacity.

CALIFORNIA.

The only new producer of any magnitude which has actively prepared to enter the ranks during 1896 is the Mountain Copper Company, Limited, an English corporation, with the large share capital of £1,250,000, which has also purchased the New Jersey Metal Refining Works at Elizabeth, New Jersey. It is estimated that in the middle of the current year the product had reached 800,000 to 1,000,000 pounds per month. The property consists of mines at Iron Mountain, Shasta County, a railroad 11 miles long connecting with the Southern Pacific at Keswick, and a smelting plant with two furnaces capable of handling 300 to 400 tons of ore, to which additional plant is being added to carry the capacity up to 500 tons per day. From the reports quoted in the prospectus, it appears that about three-fourths of the ore body, which is estimated to contain over 1,000,000 tons of ore, carries 7.5 per cent of copper. The assays indicate also an average content of 3 ounces of silver and 85 cents in gold.

IMPORTS.

The imports of fine copper contained in ores, and of regulus and black copper, and of ingot copper, old copper, plates not rolled, rolled plates, sheathing metal, and manufactures not otherwise specified, and of brass, are given in the following tables:

Fine copper contained in ores, and regulus and black copper imported and entered for consumption in the United States, 1867 to 1896, inclusive.

Year ending—	Fine copper contained in ores.		Regulus and black copper. (a)		Total value.
	Quantity.	Value.	Quantity.	Value.	
	Pounds.		*Pounds.*		
June 30, 1867	.....	$936,271	.....	.....	$936,271
1868	3,496,994	197,203	.....	.....	197,203
1869	21,960,604	448,487	.....	.....	448,487
1870	1,936,875	134,736	.....	.....	134,736
1871	411,315	42,453	499	$60	42,513
1872	584,878	69,017	4,247	1,083	70,100
1873	702,086	80,132	1,444,239	279,631	359,763
1874	606,266	70,633	28,880	5,397	76,030
1875	1,337,104	161,903	12,518	2,076	163,979
1876	538,972	68,922	8,584	1,613	70,535
1877	76,637	9,756	1,874	260	10,016
1878	87,039	11,785	.....	.....	11,785
1879	51,959	6,199	.....	.....	6,199
1880	1,165,283	173,712	2,201,394	337,163	510,875
1881	1,077,217	124,477	402,640	51,633	176,110
1882	1,473,109	147,416	224,052	30,013	177,429
1883	1,115,386	113,349	.....	.....	113,349
1884	2,204,070	219,957	2,036	204	220,161
1885	3,665,739	343,793	285,322	20,807	364,600
Dec. 31, 1886	4,503,400	341,558	1,960	98	341,656
1887	3,886,192	194,785	27,650	1,366	196,151
1888	4,859,812	381,477	4,971	324	381,801
1889	3,772,838	274,649	60,525	4,244	278,893
1890	3,448,237	241,732	221,838	15,688	257,420
1891	8,931,554	774,057	2,403,919	214,877	988,934
1892	7,669,978	453,474	303,087	17,390	470,864
1893	7,256,015	435,448	3,175,559	202,197	637,645
1894	4,804,614	260,402	5,873,820	144,832	405,234
1895	b 8,921,920	213,689	b 3,104,640	125,853	339,542
1896	b 2,620,800	126,580	b 3,427,200	210,725	337,305

a Not enumerated until 1871. b Ores.

Copper imported and entered for consumption in the United States, 1867 to 1896, inclusive.

Year ending—	Bars, ingots, and pigs.		Old, fit only for remanufacture.		Old, taken from bottoms of American ships abroad. (a)	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds		*Pounds.*		*Pounds.*	
June 30, 1867	1,635,953	$287,831	569,732	$81,930	.....	.....
1868	61,394	6,935	318,705	42,652	.....	.....
1869	13,212	2,143	290,780	34,820	.....	.....
1870	5,157	418	255,386	31,931	.....	.....
1871	3,316	491	369,634	45,672	.....	.....
1872	2,638,589	578,965	1,144,142	178,536	.....	.....
1873	9,697,608	1,984,122	1,413,010	255,711	32,307	$4,913
1874	713,935	134,326	733,326	137,087	9,500	930
1875	58,475	10,741	396,320	55,564	11,636	1,124
1876	5,281	788	239,987	35,545	10,304	1,981
1877	230	30	219,443	28,608	41,482	5,136
1878	1	1	198,749	25,585	.....	6,004
1879	2,515	352	112,642	11,997	11,000	1,107
1880	1,242,103	206,121	695,255	91,234	.....	.....
1881	219,802	36,168	541,074	63,383	14,680	1,504
1882	6,200	836	508,901	59,629	16,075	1,629
1883	.....	.....	330,495	36,166	9,415	666
1884	b542	107	149,701	12,099	.....	554
1885	914	172	81,312	6,658	.....	1,160
Dec. 31, 1886	276	37	37,149	2,407	.....	584
1887	212	22	39,957	2,374	.....	129
1888	1,787	299	37,620	2,535	.....	.....
1889	3,160	522	19,912	1,176	.....	.....
1890	5,189	859	284,789	26,473	.....	.....
1891	2,556	389	134,407	9,685	.....	.....
1892	22,097	2,588	71,485	6,114	.....	.....
1893	554,348	58,480	59,375	6,945	.....	6,326
1894	606,415	42,688	160,592	15,726	.....	1,143
1895	7,979,322	726,347	1,336,901	109,340	.....	.....
1896	9,074,379	750,976	2,422,554	196,419	.....	.....

a Not enumerated until 1873. b Includes "plates not rolled" since 1884.

Copper imported and entered for consumption in the United States, etc.—Continued.

Year ending—	Plates not rolled.		Plates rolled, sheets, pipes, etc.	
	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*	
June 30, 1867	.....	.....	.....	$1,101
1868	.....	.....	.....	1
1869	.....	.....	.....	39
1870	.....	.....	.....	2,039
1871	430	$129	.....	7,487
1872	148,192	33,770	.....	18,895
1873	550,431	97,888	.....	4,514
1874	.....	.....	.....	27
1875	8	4	.....	617
1876	5,467	600	.....	326
1877	.....	.....	.....	203
1878	.....	.....	.....	1,201
1879	27,074	4,496	.....	786
1880	120	11	.....	4,134
1881	20	3	.....	82
1882	.....	.....	5,855	1,551
1883	.....	.....	2,842	379
1884	.....	.....	6,529	2,330
1885	.....	.....	470	120
Dec. 31, 1886	.....	.....	3,770	339
1887	.....	.....	37,925	5,493
1888	.....	.....	5,208	737
1889	.....	.....	13,848	2,082
1890	.....	.....	4,209	917
1891	.....	.....	122,219	23,291
1892	.....	.....	1,788	600
1893	.....	.....	7,056	1,065
1894	.....	.....	12,681	1,821
1895	.....	.....	27,156	2,586
1896	.....	.....	34,481	4,834

Copper imported and entered for consumption in the United States, etc.—Continued.

Year ending—	Sheathing metal, in part copper. (a)		Manufactures not otherwise specified.	Total value.
	Quantity.	Value.	Value.	
	Pounds.			
June 30, 1867	220,889	$37,717	$15,986	$424,565
1868	101,488	18,852	21,492	89,932
1869	43,660	6,592	43,212	86,806
1870	.....	.....	485,220	519,608
1871	.....	.....	668,894	722,673
1872	.....	.....	1,007,744	1,817,910
1873	.....	.....	869,281	3,216,429
1874	282,406	50,174	125,708	448,252
1875	136,055	23,650	35,572	127,272
1876	18,014	2,903	29,806	71,949
1877	110	22	41,762	75,761
1878	647	55	35,473	68,319
1879	300	20	39,277	58,035
1880	6,044	693	130,329	432,522
1881	39,520	4,669	284,509	390,318
1882	.....	.....	77,727	141,372
1883	6,791	1,047	40,343	78,601
1884	19,637	926	55,274	71,290
1885	86,619	9,894	61,023	79,027
Dec. 31, 1886	21,573	1,917	31,871	37,155
1887	18,189	1,867	37,289	47,174
1888	23,622	2,696	14,567	20,834
1889	23,520	2,572	13,430	19,782
1890	37,458	4,467	24,752	57,468
1891	228,486	29,112	12,926	75,403
1892	417,134	51,380	49,764	110,446
1893	1,670	167	16,166	89,149
1894	8,422	1,470	3,851	66,699
1895	5,698	389	13,166	851,828
1896	343,803	37,134	20,953	1,010,316

a Does not include copper sheathing in 1867, 1868, and 1869.

The imports of copper in ore and in the form of pigs, bars, and old, monthly, are presented in the following table:

Imports of copper in ore and as pigs and bars, monthly, in 1893, 1894, 1895, and 1896.

Month.	Ore and regulus.		Fine, in ore.	
	1896.	1895.	1894.	1893.
	Tons.	*Tons.*	*Pounds.*	*Pounds.*
January	132	867	690, 633	611, 548
February	93	122	330, 673	462, 659
March	200	259	628, 267	530, 864
April	223	819	395, 236	733, 067
May	324	487	441, 541	191, 861
June	296	371	225, 538	654, 119
July	147	5, 145	549, 200	620, 746
August	319	119	583, 662	646, 294
September	245	166	*a* 38 15, 342	1, 157, 942
October	295	339	10, 677 *a* 75	736, 691
November	169	157	*a* 877	876, 420
December	288	783	*a* 1, 877	501, 176
Total	.....	.....	.....	7, 723, 387
Dutiable	.....	.....	3, 870, 769	.....
Free	2, 731	9, 634	*a* 2, 867	.....

Month.	Pigs, bars, ingots, and old.			
	1896.	1895.	1894.	1893.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
January	1, 021, 038	773, 531	673, 200	965, 539
February	657, 949	298, 491	129, 765	198, 009
March	747, 644	520, 491	95, 225	262, 206
April	1, 667, 210	614, 688	42, 326	1, 581, 453
May	866, 183	245, 257	132, 902	301, 336
June	903, 788	199, 737	302, 269	32, 628
July	610, 884	253, 817	170, 575	114, 610
August	856, 766	1, 334, 874	743, 062	193, 470
September	1, 003, 385	2, 190, 881	174, 354	1, 112, 794
October	903, 547	1, 465, 750	521, 606	85, 241
November	757, 794	653, 281	275, 530	234, 710
December	1, 401, 085	831, 002	185, 910	454, 694
Total	.....	.....	.....	5, 536, 690
Dutiable	.....	.....	2, 289, 324	.....
Free	11, 397, 273	9, 381, 800	1, 157, 400	.....

a Tons.

The source of the imports of fine copper in ore into the United States during 1893 and 1894 is shown in the following table. For 1895 and 1896 the tonnage of material is given.

Imports of fine copper in ore in 1893, 1894, 1895, and 1896.

Countries from which imported.	1893.		1894.	
	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*	
Spain	166,870	$11,680	.....	.....
Dominion of Canada:				
Nova Scotia, New Brunswick, etc	1,344	48	.....	.....
Quebec, Ontario	4,795,704	307,000	4,599,505	$342,790
British Columbia	7,790	778	78,380	7,838
Newfoundland and Labrador	1,788,261	91,099	2,028,261	113,931
Mexico	639,606	41,201	303,782	18,356
Venezuela	257,112	12,570	236,750	11,099
All other countries	66,700	3,612	*a* 4,479	408
Total	7,723,387	467,988	7,251,157	494,422

Countries from which imported.	1895 (ore and regulus).		1896 (ore and regulus).	
	Quantity.	Value.	Quantity.	Value.
	Tons.		*Tons.*	
Spain	.....	.....	.....	.....
Dominion of Canada:				
Nova Scotia, New Brunswick, etc	.....	.....	.....	.....
Quebec, Ontario	1,168	$72,099	529	$22,638
British Columbia	1,135	117,888	1,031	43,302
Newfoundland and Labrador	5,467	15,510	.....	.....
Mexico	1,853	198,171	.....	.....
Venezuela	.....	.....	.....	.....
All other countries	11	771	.....	.....
Total	9,634	404,439	1,560	65,940

a All from Peru.

For the year 1893 the above table includes 467,372 pounds which were either reexported or entered in bonded warehouses and not withdrawn during 1893, so that the actual amount of imported fine copper contained in ores consumed in the United States in 1893 was 7,256,015 pounds.

EXPORTS.

The exports of copper in the form of ore (including matte), ingots, and manufactured copper for a series of years have been as follows:

Copper and copper ore of domestic production exported from the United States, 1864 to 1896.

[Cwts. are long hundredweights of 112 pounds.]

Year ending—	Ore and matte.		Pigs, bars, sheets, and old.	
	Quantity.	Value.	Quantity.	Value.
	Cwts.		*Pounds.*	
June 30, 1864	109, 581	$181, 298	102, 831	$43, 229
1865	225, 197	553, 124	1, 572, 382	709, 106
1866	215, 080	792, 450	123, 444	33, 553
1867	87, 731	317, 791	*a* 4, 637, 867	303, 048
1868	92, 612	442, 921	1, 350, 896	327, 287
1869	121, 418	237, 424	1, 134, 360	233, 932
1870	*a* 19, 198	537, 505	2, 214, 658	385, 815
1871	*a* 54, 445	727, 213	581, 650	133, 020
1872	35, 564	101, 752	267, 868	64, 844
1873	45, 252	170, 365	38, 958	10, 423
1874	13, 326	110, 450	503, 160	123, 457
1875	*a* 51, 305	729, 578	5, 123, 470	1, 042, 536
1876	15, 304	84, 471	14, 304, 160	3, 098, 395
1877	21, 432	109, 451	13, 461, 553	2, 718, 213
1878	32, 947	169, 020	11, 297, 876	2, 102. 455
1879	23, 070	102, 152	17, 200, 739	2, 751, 153
1880	21, 623	55, 763	4, 206, 258	667, 242
1881	9, 958	51, 499	4, 865, 407	786, 860
1882	25, 936	89, 515	3, 340, 531	565, 295
1883	112, 923	943, 771	8, 221, 363	1, 293, 947
1884	386, 140	2, 930, 895	17, 044, 760	2, 527, 829
1885	432, 300	4, 739. 601	44, 731, 858	5, 339, 887
Dec. 31, 1886	417, 520	2, 241, 164	19, 553, 421	1, 968, 772
1887	501, 280	2, 774, 464	12, 471, 393	1, 247, 928
1888	794, 960	6, 779, 294	31, 706, 527	4, 906, 805
1889	818, 500	8, 226, 206	16, 813, 410	1, 896, 752
1890	431, 411	4, 413, 067	10, 971, 899	1, 365, 379
1891	672, 120	6, 565, 620	69, 279, 024	8, 844, 304
1892	*b* 943, 040	6, 479, 758	30, 515, 736	3, 438, 048
1893	835, 040	4, 257, 128	138, 984, 128	14, 213, 378
1894	87, 040	440, 129	162, 393, 000	15, 324, 925
1895	276, 480	1, 631, 251	121, 328, 390	12, 222, 769
1896	414, 265	2, 393, 914	259, 223, 924	27, 822, 280

a Evidently errors in quantities. *b* Corrected figures.

Copper and copper ore of domestic production exported, etc.—Continued.

[Cwts. are long hundredweights of 112 pounds.]

Year ending—	Value of manufactured product.	Total value.
June 30, 1864	$208, 043	$432, 570
1865	282, 640	1, 544, 870
1866	110, 208	936, 211
1867	171, 062	791, 901
1868	152, 201	922, 409
1869	121, 342	592, 698
1870	118, 926	1, 042, 246
1871	55, 198	915, 431
1872	121, 139	287, 735
1873	78, 288	259, 076
1874	233, 301	467, 208
1875	43, 152	1, 815, 266
1876	343, 544	3, 526, 410
1877	195, 730	3, 023, 394
1878	217, 446	2, 488, 921
1879	79, 900	2, 933, 205
1880	126, 213	849, 218
1881	38, 036	876, 395
1882	93, 646	748, 456
1883	110, 286	2, 348, 004
1884	137, 135	5, 595, 859
1885	107, 536	10, 187, 024
Dec. 31, 1886	76, 386	4, 386, 322
1887	92, 064	4, 114, 456
1888	211, 141	11, 897, 240
1889	86, 764	10, 209, 722
1890	139, 949	5, 918, 395
1891	293, 619	15, 703, 543
1892	245, 064	10, 162, 870
1893	464, 991	18, 935, 497
1894	378, 040	16, 143, 094
1895	1, 084, 289	14, 938, 309
1896	819, 017	31, 035, 211

The destination of the copper exports during the years 1893, 1894, 1895, and 1896 is shown in the following table from the reports of the Bureau of Statistics:

Destination of exports of copper bars and ingots.

Country.	1893.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds*	*Pounds.*
Germany	17, 677, 887	20, 359, 114	14, 962, 257	29, 609, 837
United Kingdom	42, 649, 832	67, 621, 830	24, 064, 694	78, 479, 716
France	27, 960, 646	20, 419, 969	25, 266, 032	45, 502, 864
Other countries in Europe	49, 914, 487	53, 447, 119	56, 236, 915	103, 984, 801
Other countries	781, 276	544, 968	798, 492	1, 646, 890
Total	138, 984, 128	162, 393, 000	121, 328, 390	259, 224, 108

The Bureau of Statistics has prepared in further detail the following statement showing the destination of exports, monthly, during the year 1896:

Exports of copper bars and ingots in 1896, by months.

Month.	United Kingdom.	Austria.	Belgium.	France.	Germany.	Italy.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
January	5,376,699	917,001	655,000	2,100,000	2,966,419	594, 774
February	6,953,375	432,715	585,670	2,105,304	2,370,616	457, 054
March	6,990,134	498,941	481,056	4,859,993	2,718,646	401, 409
April	6,991,096	300,000	300,500	3,451,420	2,926,792	342, 184
May	6,840,854	441,238	269,227	2,500,000	2,764,766	402, 304
June	6,467,322	522,500	201,711	2,064,115	2,373,800	512, 910
July	4,291,129	700,984	1,126,129	4,331,503	1,969,498	189, 474
August	7,366,907	511,907	867,514	2,524,814	2,196,233	35, 218
September	6,230,608	144,981	718,270	2,565,618	1,779,277	56, 926
October	6,823,162	606,620	2,218,842	5,110,777	2,091,821	11, 250
November	6,894,564	761,442	913,470	7,976,747	3,082,933	537, 657
December	7,253,866	694,620	1,310,882	5,912,573	2,369,036	526, 000
Total	78,479,716	6,532,949	9,648,271	45,502,864	29,609,837	4, 067, 160
Total, 1895	24,064,694	3,228,545	8,384,995	25,266,032	14,962,257	901, 485

Month.	Netherlands.	Russia (Baltic).	Mexico.	British North America.	West Indies.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
January	5,930,291	.....	.....	.....	221,412	18, 761, 596
February	4,941,364	.....	.....	1,709	91,962	17, 939, 769
March	4,356,241	221,813	106,273	50,000	184,959	20, 869, 465
April	5,767,203	822,366	.....	.....	182,173	21, 083, 734
May	5,037,499	2,929,232	40,643	48,300	252,539	21, 526, 602
June	5,794,321	2,517,029	7,726	.....	308,660	20, 770, 094
July	6,820,687	2,082,580	10,363	2,700	.....	21, 525, 047
August	6,281,496	676,095	.....	2,500	.....	20, 462, 684
September	7,411,430	1,130,206	.....	25,000	.....	20, 062, 316
October	6,046,564	362,500	.....	25,000	.....	23, 296, 536
November	5,544,071	.....	.....	53,336	.....	25, 764, 220
December	9,063,433	.....	5,335	26,300	.....	27, 162, 045
Total	72,994,600	10,741,821	170,340	234,845	1,241,705	259, 224, 108
Total, 1895	40,451,380	2,968,001	151,664	398,906	1,721	*a*121,328,390

a Including 257,668 pounds to Sweden and Norway, 44,841 pounds to Denmark, and 246,201 pounds to other countries.

THE COPPER MARKETS.

The following table summarizes the highest and lowest prices obtained for Lake copper monthly in the New York markets from 1860 to 1896, both inclusive:

Highest and lowest prices of Lake Superior ingot copper, by months, from 1860 to 1896.

[Cents per pound.]

Year.	January.		February.		March.		April.		May.		June.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1860	24	23½	24	23¾	23¾	23	23½	23	23¼	22½	22¾	21¾
1861	20	19	19½	19	19¾	19¼	19¾	19	19¾	19¼	19	18
1862	28	27	28	25	25	23	23	21½	21½	20¾	23	20¾
1863	35	31	37	35	37	31	31	30	30½	30	30½	30
1864	41¼	39	42	41¼	42½	41½	44	42½	44	43	49	44
1865	50½	46	46	44	44½	34	35	34	34	30	30½	28½
1866	42	38	38	35½	35½	29½	30	28½	31	29	33	31
1867	29¼	27	27¾	27½	27½	24	24½	23½	24¼	24	24½	24
1868	23½	21½	24	22½	24	23¼	24¼	23¼	24¼	24	24	23⅛
1869	26¼	23¾	27	26	26¾	24	24	23¼	24¼	23¾	23¾	22
1870	22	21⅛	21¼	20⅞	20¾	19	19¾	19¼	19½	19	20⅝	19
1871	22⅞	22	22⅜	21⅞	22	21½	21¾	21¼	21¾	21⅜	21½	21¼
1872	28½	27⅛	28⅜	28¼	30½	28⅜	44	30½	42	36	34¾	33
1873	35	32½	35	34	35	34½	34½	33½	33½	32	31½	29⅛
1874	25	24½	25	24⅛	24¾	24	25	24¾	25	24½	24¾	24¼
1875	23½	21½	22¾	21¾	21¾	21½	21¾	21½	23¼	22⅝	23	23
1876	23¼	23	22⅞	22½	22¼	22	22⅝	22	22⅛	21	21	19¼
1877	19½	19	20½	19½	19¼	19	19½	19¼	19¼	19	19⅜	19
1878	17⅝	17¼	17½	17⅛	17⅛	16⅞	17	16⅞	16¾	16¼	16⅜	16¼
1879	16	15½	15½	15½	15¾	15¾	16	15¾	16¼	16	16¼	16⅛
1880	25	21⅜	24½	24	24	22¾	22½	24	21	18	18½	17⅞
1881	19⅜	19⅜	19⅜	19⅛	19⅜	19	19	18¾	18⅞	18¼	18¼	16⅜
1882	20⅜	20¼	20	19	19¼	18⅞	18⅞	17⅞	18¼	18	18¼	18
1883	18⅛	18	17⅞	17¾	17⅝	17⅛	16	15¾	16	15⅞	15⅞	15
1884	15	14⅞	15	14⅞	15	14⅞	15	14½	14¼	14⅛	14¼	14
1885	11½	10⅜	11⅞	10⅘	11⅛	10⅗	11¼	10 1/10	11½	9⅘	11½	11
1886	11⅝	11⅜	11⅝	11⅜	11½	11⅜	11½	11⅜	11⅛	10	10⅛	10
1887	12	11⅛	11⅛	10⅛	10½	10⅜	10⅛	10	10	9 19/20	10¼	10
1888	17 4/10	15 17/20	16 6/10	16	16 7/20	15 19/20	16 9/10	16	16¾	16 3/10	16½	16 9/20
1889	17½	16½	16¾	16½	15¾	15	16	15½	12⅛	12	12 13/40	12
1890	14½	14¼	14¼	14¼	14¼	14	14½	14¼	15¼	14⅝	16¾	15¼
1891	15	14⅝	14⅞	14¼	14¼	13⅝	13¾	13½	13¾	12¾	13	12⅞
1892	11	10¾	10¾	10½	12	10¾	12	11¾	12¼	12	11⅞	11½
1893	12½	12¼	12¼	12	12	11¾	11½	11¼	18⅛	11	11	10¾
1894	10¼	10	10	9⅜	9⅝	9⅜	9½	9⅜	9⅜	9¼	9⅛	9
1895	10	9⅞	9⅞	9½	9½	9¼	9¾	9⅜	10⅝	9¾	10¾	10½
1896	10⅛	9¾	11¼	10	11¼	10⅞	11	10¾	11½	10⅞	11¾	11½

Highest and lowest prices of Lake Superior ingot copper, by months, etc.—Continued.

[Cents per pound.]

Year.	July.		August.		September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1860	21 3/4	21 1/2	21 1/2	21 1/2	22	21 1/4	22	21 1/2	21 1/2	20 1/4	20 1/4	19 3/4
1861	18	17 1/2	19	17 3/4	20 1/4	19	20 1/4	20	22 1/2	20 1/4	27	22 1/2
1862	24 1/2	22 1/2	24 1/2	24	27	24 1/4	32 7/8	27	32 7/8	30 1/2	31 1/2	30 1/2
1863	32	29	31	29	32 1/4	31	34 1/4	32 1/4	38 1/2	34 1/2	38 3/4	38 1/2
1864	55	49	52 1/2	50	52 1/2	47 1/2	48	47	49	47	50	48 1/2
1865	30 1/4	28	32	30 1/2	32 3/4	31 1/2	33	32 1/2	45 1/2	33	45 1/2	39 1/4
1866	33 1/2	31	31	30	31 1/2	30 3/4	31	30 3/4	30 3/4	26 1/2	29	26 1/2
1867	26	24	26 1/4	25 3/4	27 1/4	26 1/4	26 3/4	22 3/4	23	22 3/4	23	21 1/2
1868	24 1/2	23 1/8	24 1/4	24	24	23 3/4	24	23	24	22 1/2	24 1/2	23 3/4
1869	22 1/4	21 7/8	23 1/8	21 7/8	23	22	22 3/4	22	22 1/2	22	22	21 1/2
1870	20 1/2	20 3/8	21 3/8	20 1/8	21 1/2	20 3/4	21 3/4	21 1/2	23 3/8	21 3/4	22 5/8	22 1/4
1871	22 1/4	21 5/8	23	22 3/8	23 7/8	22 7/8	23 7/8	23 1/4	24 1/4	23 1/4	27	24 1/2
1872	34	33	35	32 1/2	35 1/4	33	34 3/4	31 1/4	32 1/4	30 3/4	32 1/2	30 1/2
1873	29	26 5/8	27 1/2	27	27	25 1/2	25 1/2	24	24	21	25	23
1874	24 1/4	20	21	19	21 1/4	21	22 1/4	21 1/4	23 3/4	22 1/4	23 1/4	23 1/4
1875	23	22 5/8	23 3/8	23	23 7/8	23 1/8	23 1/4	23	23 1/4	23	23 3/8	23 3/8
1876	20	19 1/2	19 1/2	18 3/4	21	18 3/4	21 1/4	20 1/2	20 1/2	20	20	19 5/8
1877	19 1/4	19	19	17 7/8	18 1/2	17 7/8	18	17 3/4	17 3/4	17 5/8	17 3/4	17 1/2
1878	16 1/4	16	16	16	16 1/4	16	16	15 1/2	15 7/8	15 1/2	16	15 7/8
1879	16 1/8	16	16 3/8	16	17	16 1/4	21 1/2	18	21 3/4	21	21 1/2	21
1880	18 7/8	18 1/2	19 1/8	19	18 7/8	18 3/4	18 7/8	18 3/4	18 7/8	18 3/4	19 1/8	18 7/8
1881	16 1/2	16	16 5/8	16 3/8	18 1/8	16 3/4	18 3/8	18	19	18 1/8	20 3/8	19 1/4
1882	18 1/4	18 1/8	18 1/4	18 1/8	18 1/4	18	18 1/4	18	18 1/8	18	18	17 7/8
1883	15 1/8	15	15	15	15 1/4	15 1/8	15 1/4	15 1/8	15	14 7/8	15	14 7/8
1884	14 1/8	13 7/8	14	13 7/8	13 1/8	13	13 1/8	12 7/8	13	12 1/2	12 1/8	11
1885	11 1/4	10 7/8	11 1/4	11	11 1/2	10 19/20	11 1/8	10 4/5	11 1/8	10 4/5	11 1/2	11 1/10
1886	10 1/8	10	10 1/4	10	11 1/8	10 1/4	11 3/4	11 1/8	12	11 3/4	12 1/8	11 7/8
1887	10 3/4	10 1/8	10 3/4	10 3/8	11	10 5/8	12 3/20	10 3/10	14 19/20	11 11/20	17 3/4	14 19/20
1888	16 9/10	16 13/20	17	16 3/8	17 7/10	16 9/10	17 3/8	17 7/20	17 3/8	17 1/4	17 9/20	17 1/10
1889	12	12	12	12	12	11	11	11	13 1/4	11 1/4	14 1/2	14
1890	17 1/4	16 1/2	17 1/4	17	17	17	16 7/8	16 3/4	16 3/4	16 3/4	16	15
1891	12 7/8	12 1/2	12 3/8	12	12 1/2	12 1/8	12 3/8	11 3/8	11 1/2	11	11 1/8	10 1/4
1892	11 3/4	11 1/4	11 3/4	11 6/10	11 6/10	11 1/10	11 3/4	11 1/10	12	11 3/4	12 3/8	12 1/4
1893	10 1/2	10 1/4	10 1/8	9 3/8	9 7/8	9 3/4	9 3/4	9 3/4	10 1/4	9 3/4	10 1/2	10 3/8
1894	9 1/8	9	9 1/8	9	9 7/8	9 1/8	9 3/4	9 1/2	9 1/2	9 3/8	10	9 1/2
1895	11 3/4	10 1/2	12 1/4	11 3/4	12 1/4	12	12	11 3/4	11 5/8	11	11	10
1896	11 3/4	11	11 1/8	10 7/8	10 7/8	10 3/8	10 7/8	10 1/2	11 1/2	10 7/8	11 1/2	11 1/4

The following table shows the fluctuations in prices in the English market:

Average values of copper in England.

Year.	Chile bars or G. O. B.			Ore, 25 per cent.		Precipitate.	
	Long tons.			*Per unit.*		*Per unit.*	
	£	s.	d.	s.	d.	s.	d.
1880	62	10	0	12	9	12	11
1881	61	10	0	12	6	13	$8\frac{3}{16}$
1882	66	17	0	13	$6\frac{3}{4}$	13	$10\frac{1}{16}$
1883	63	5	10	12	$4\frac{1}{2}$	12	$10\frac{1}{16}$
1884	54	9	1	10	$5\frac{1}{2}$	11	1
1885	44	0	10	8	4	9	$0\frac{1}{8}$
1886	40	9	3	7	9	8	$3\frac{5}{8}$
1887	43	16	11	8	6	8	$11\frac{3}{4}$
1888	79	19	$4\frac{1}{2}$	14	$3\frac{1}{4}$	16	3
1889	49	10	5	9	$6\frac{1}{8}$	.....	
1890	54	5	5	10	7	.....	
1891	51	9	$8\frac{1}{2}$	9	7	.....	
1892	45	12	$8\frac{3}{4}$	8	7	.....	
1893	43	15	$6\frac{3}{4}$	8	5	.....	
1894	40	7	4	7	$6\frac{1}{2}$	.....	
1895	42	19	7	8	$4\frac{1}{4}$	.....	
1896	46	18	$1\frac{3}{4}$	9	1	.....	

In detail, the fluctuations, monthly, of good merchant copper in the English market were as follows in 1893, 1894, 1895, and 1896:

Fluctuations in good merchant copper in England in 1893, 1894, 1895, and 1896.

[Per long ton.]

Month.	1893.			1894.			1895.			1896.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
January	46	1	8	42	1	$6\frac{1}{2}$	40	13	$9\frac{3}{4}$	41	13	$8\frac{1}{4}$
February	45	13	$2\frac{1}{4}$	41	6	$8\frac{1}{4}$	39	14	$3\frac{3}{4}$	44	16	$11\frac{1}{4}$
March	45	11	$7\frac{3}{4}$	40	19	$5\frac{1}{4}$	39	1	$9\frac{1}{2}$	45	8	$0\frac{3}{4}$
April	44	18	$7\frac{1}{2}$	40	10	$10\frac{3}{4}$	40	3	$6\frac{3}{4}$	45	3	$2\frac{1}{4}$
May	43	15	$1\frac{3}{7}$	39	10	$5\frac{3}{4}$	43	0	0	46	6	6
June	44	4	$3\frac{1}{8}$	38	10	$4\frac{1}{4}$	42	15	$6\frac{1}{4}$	48	18	0
July	42	17	$6\frac{3}{4}$	38	12	$8\frac{3}{4}$	44	0	$2\frac{1}{2}$	49	3	$7\frac{3}{4}$
August	41	10	2	39	12	$4\frac{3}{4}$	46	13	$2\frac{1}{2}$	47	16	$9\frac{3}{4}$
September	42	13	$2\frac{4}{7}$	41	1	0	46	15	$7\frac{1}{2}$	47	18	$7\frac{1}{2}$
October	42	1	$2\frac{1}{4}$	41	2	$10\frac{1}{2}$	46	4	10	47	11	7
November	42	11	$10\frac{1}{2}$	40	3	$2\frac{1}{4}$	43	16	$3\frac{3}{4}$	49	3	11
December	43	8	$2\frac{3}{4}$	40	16	$5\frac{1}{2}$	42	15	11	48	16	$9\frac{3}{4}$

The copper production of the world, 1889 to 1896, inclusive—Continued.

[Long tons.]

Country.	1889.	1890.	1891.	1892.
AFRICA.				
Algiers	160	120	120	.....
Cape of Good Hope:				
Cape Company	a 7,700	5,000	5,100	5,670
Namaqua		1,450	900	450
Total Africa	7,860	6,570	6,120	6,120
ASIA.				
Japan	16,125	17,972	18,500	19,000
Total Asia	16,125	17,972	18,500	19,000
AUSTRALIA.				
New South Wales	4,082	3,455	4,192	4,185
Southern Australia	7,500	6,000	6,100	4,600
Total Australia	11,582	9,455	10,292	8,785

Country.	1893.	1894.	1895.	1896.
EUROPE.				
Great Britain	425	5	580	a 500
Spain and Portugal:				
Rio Tinto	31,954	31,061	32,985	34,501
Tharsis	11,000	11,000	12,000	12,000
Mason and Barry	a 4,400	a 4,200	a 4,100	a 3,900
Sevilla	1,270	1,170	1,050	1,025
Other mines	6,225	4,805	4,300	3,400
Germany:				
Mansfeld	14,150	14,990	14,860	18,265
Other German	2,000	2,210	1,695	1,800
Austria	1,211	1,781	869	1,065
Hungary	210	310	239	205
Sweden	535	350	203	a 200
Norway	1,860	1,885	2,685	a 2,500
Italy	2,333	2,629	2,236	a 3,000
Russia	5,349	5,638	5,326	a 5,000
Total Europe	82,922	82,474	83,128	87,361

a Estimated.

The copper production of the world, 1889 to 1896, inclusive—Continued.

[Long tons.]

Country.	1893.	1894.	1895.	1896.
NORTH AMERICA.				
United States	147,033	158,120	169,917	205,384
Canada	*a* 1,000	1,204	3,923	4,190
Newfoundland	2,040	1,900	1,800	1,800
Mexico:				
Boleo	7,980	10,370	10,450	9,940
Other Mexican	500	1,400	1,170	1,210
Total North America	158,553	172,994	187,260	222,524
SOUTH AMERICA.				
Chile	21,350	21,340	22,075	23,500
Bolivia:				
Corocoro	2,500	2,300	2,250	2,000
Peru	460	440	450	740
Venezuela:				
New Quebrada	2,850	2,500	.....	.....
Argentina	160	230	150	100
Total South America	27,220	26,810	24,925	26,340
AFRICA.				
Algiers	.....	.....	35	.....
Cape of Good Hope:				
Cape Company	5,200	5,000	5,350	5,470
Namaqua	890	1,500	1,730	1,980
Total Africa	6,090	6,500	7,115	7,450
ASIA.				
Japan	18,000	20,050	18,430	21,000
Total Asia	18,000	20,050	18,430	21,000
AUSTRALIA.				
New South Wales	1,558	1,847	3,322	*a* 5,000
South Australia	4,600	4,944	*a* 5,000	*a* 6,000
Total Australia	6,158	6,791	8,322	11,000

a Estimated.

RECAPITULATION.

[Long tons.]

Country.	1889.	1890.	1891.	1892.
Europe	81,613	79,952	80,751	84,648
North America	110,674	124,711	138,065	166,941
South America	31,983	33,960	29,015	29,015
Africa	7,860	6,570	6,120	6,120
Asia	16,125	17,972	18,500	19,000
Australia	11,582	9,455	10,292	8,785
Total	259,837	272,620	282,713	314,509

Country.	1893.	1894.	1895.	1896.
Europe	88,922	82,474	83,128	87,361
North America	158,553	172,994	187,260	222,524
South America	27,220	26,810	24,925	26,340
Africa	6,090	6,500	7,115	7,450
Asia	18,000	20,050	18,430	21,000
Australia	6,158	6,791	8,322	11,000
Total	304,943	315,619	329,180	375,675

Since 1889 the world's production has increased by 115,838 long tons, of which there are to the credit of the United States 104,145 long tons.

THE ENGLISH COPPER TRADE.

Since England is one of the leading copper markets of the world, the following tables, showing the import and export movement, are of great interest:

British imports and exports of copper.

[Long tons.]

Year.	Imports of—		Total imports.	Exports.	Apparent English consumption.
	Bars, cakes, and ingots.	Copper in ores and furnace products.			
1860	13,142	13,715	26,857	26,117	.....
1865	23,137	23,922	47,059	41,398	.....
1870	30,724	27,025	57,749	53,006	.....
1871	33,228	23,671	56,899	56,633	.....
1872	49,000	21,702	70,702	53,195	.....
1873	35,840	26,756	62,596	55,716	.....
1874	39,906	27,894	67,800	59,742	.....
1875	41,931	29,483	71,414	51,870	.....
1876	39,145	36,191	75,336	52,468	.....
1877	39,743	53,582	93,325	54,088	.....
1878	39,360	48,212	87,572	55,001	.....
1879	46,670	50,421	97,091	62,412	30,774
1880	36,509	56,225	92,734	59,482	32,879
1881	32,170	54,057	86,227	61,689	31,607
1882	35,509	58,366	93,875	55,683	42,877
1883	35,653	63,493	99,146	59,350	40,469
1884	39,767	69,623	109,390	64,691	51,263
1885	41,933	81,616	123,549	62,080	54,323
1886	42,969	65,046	108,015	60,511	41,158
1887	29,198	73,891	103,089	69,453	53,096
1888	44,063	90,867	135,470	*a* 72,066	42,562
1889	*b* 38,576	101,407	139,983	75,627	65,759
1890	*c* 49,461	91,788	141,249	89,747	66,170
1891	44,213	94,403	138,616	76,056	59,223
1892	*d* 35,015	99,356	134,371	82,542	*e* 48,367
1893	41,829	88,003	129,832	70,986	66,817
1894	56,158	68,851	125,009	54,689	61,330
1895	42,135	77,806	119,941	65,990	62,692
1896	60,458	75,398	135,856	59,334	89,191

a Including 22,557 tons of Chile bars transferred to France.
b Including 1,166 tons of Chile bars transferred from France to England.
c Including 3,501 tons of Chile bars transferred from France to England.
d Including 3,585 tons of Chile bars transferred from France to England.
e Add 4,001 tons for comparison with former years, the difference arising from the new method of making up stock.

The following figures from the board of trade returns, supplemented by James Lewis & Son, of Liverpool, for the past ten years show in detail the form in which the copper is brought into Great Britain and in what form it is exported:

Imports of copper into Great Britain from 1887 to 1896, inclusive.

[Long tons.]

Character.	1887.	1888.	1889.	1890.	1891.
Pure in pyrites	14,940	15,448	16,097	16,422	15,406
Pure in precipitate	21,819	26,366	25,110	25,563	29,326
Pure in ore	15,148	19,452	22,219	18,000	14,172
Pure in matte	21,984	29,601	37,981	31,803	35,499
Bars, cakes, etc	29,198	44,603	38,576	49,461	44,213
Total	103,089	135,470	139,983	141,249	138,616
Character.	**1892.**	**1893.**	**1894.**	**1895.**	**1896.**
Pure in pyrites	15,110	15,320	15,401	14,561	14,726
Pure in precipitate	28,444	24,988	24,878	26,508	23,160
Pure in ore	13,585	11,701	12,804	15,240	12,499
Pure in matte	42,217	35,994	15,767	21,497	25,013
Bars, cakes, etc	35,015	41,829	56,158	42,135	60,458
Total	134,371	129,832	125,008	119,941	135,856

The following table gives the details relating to the British imports of precipitate and matte:

Imports of precipitate and matte into Great Britain from 1888 to 1896, inclusive

[Long tons.]

Country.	Fine copper.				
	1888.	1889.	1890.	1891.	1892.
Portugal Spain	30,119	28,157	28,018	32,425	32,509
Chile	734	1,919	2,122	595	2,040
United States	20,752	26,581	18,897	19,109	24,668
Other countries	4,362	6,434	8,329	12,696	11,444
Total	55,967	63,091	57,366	64,825	70,661

Imports of precipitate and matte into Great Britain from 1888 to 1896, etc.—Continued.

[Long tons.]

Country.	Fine copper.			
	1893.	1894.	1895.	1896.
Portugal, Spain	29,359	28,645	30,196	28,596
Chile	2,714	626	212	797
United States	20,700	2,133	8,337	10,016
Other countries	8,209	9,242	9,660	8,764
Total	60,982	40,646	48,405	48,173

Messrs. James Lewis & Son, of Liverpool, estimate as follows the imports of copper product into Liverpool, London, and Swansea during the years from 1887 to 1896, which represent the total imports, with the exception of precipitate, into Newcastle and Cardiff, reliable returns of which can not be obtained, but which was estimated to vary from 8,000 to 10,000 tons fine per annum in former years, and in the last few years has been placed as high as 25,000 tons:

Imports of copper produce into Liverpool, Swansea, and London.

[Long tons.]

Country.	1887.	1888.	1889.	1890.	1891.
Chile	20,008	24,479	22,070	22,909	14,378
United States	16,534	25,730	30,729	20,171	26,120
Spain and Portugal	5,178	5,915	5,189	5,202	4,734
Spain and Portugal (precipitate)	13,042	15,568	17,192	18,430	17,439
Spain and Portugal (pyrites)	14,940	15,448	16,097	16,422	15,406
Australia	6,047	6,746	6,285	6,561	6,265
Cape of Good Hope	8,271	8,829	11,507	9,927	7,452
Venezuela	2,261	3,574	4,299	5,245	5,017
Japan	200	4,469	2,523	10,674	7,852
Italy	1,055	1,058	1,043	953	649
Norway	.....	545	234	80	30
Canada	94	156	181	264	189
Newfoundland	359	465	631	1,552	1,617
Mexico	61	158	3,938	3,325	3,616
Peru	13	202	271	254	279
La Plata River	167	135	184	143	211
Other countries	1,074	4,054	1,389	225	236
Total tons fine	89,304	117,531	123,762	122,337	111,490

Imports of copper produce into Liverpool, Swansea, and London—Continued.

[Long tons.]

Country.	1892.	1893.	1894.	1895.	1896.
Chile	17,619	15,875	16,971	18,197	15,923
United States	26,475	35,647	30,495	17,098	39,676
Spain and Portugal	5,372	5,674	4,674	3,288	6,298
Spain and Portugal (precipitate)	14,831	10,296	10,642	12,612	11,474
Spain and Portugal (pyrites)	15,110	15,320	15,401	14,561	14,726
Australia	5,547	6,293	6,481	8,223	10,635
Cape of Good Hope	8,092	5,472	6,112	6,524	5,905
Venezuela	5,028	1,434	2,327	360	107
Japan	4,989	2,370	3,299	4,258	3,492
Italy	725	1,091	763	283	418
Norway	38	.....	30	486	528
Canada	120	50	105	.....	.....
Newfoundland	3,229	2,265	1,279	3,244	2,467
Mexico	869	1,185	1,408	4,623	7,792
Peru	287	462	443	449	741
La Plata River	196	160	229	148	94
Other countries	1,245	1,944	855	930	797
Total tons fine	109,772	105,638	101,514	95,284	121,073

The apparent decline in the shipments to this country is due to the fact that the copper is now sent direct to the Continent instead of being forwarded to England and subsequently transshipped.

The quantities of copper in different forms which were imported from the United States to Great Britain and France are given in the following table:

Imports of copper from the United States in England and France.

[Long tons.]

Country.	1887.	1888.	1889.	1890.	1891.
England:					
Ore	26	298	349	5	4
Matte	15,039	20,752	26,581	18,897	19,109
Bars and ingots	1,469	4,680	3,799	1,269	7,007
Total	16,534	25,730	30,729	20,171	26,120
France	3,910	6,496	1,058	1,733	8,329
United States into England and France	20,444	32,226	31,787	21,904	34,449
Chile into England and France	29,019	32,947	22,020	24,641	18,820

Imports of copper from the United States in England and France—Continued.

[Long tons.]

Country.	1892.	1893.	1894.	1895.	1896.
England:					
Ore	18	23	5	.....	.....
Matte	24,668	20,700	2,133	8,337	10,016
Bars and ingots	1,427	14,924	28,357	12,250	29,780
Total	26,113	35,647	30,495	20,587	39,796
France	4,340	12,483	9,248	11,806	21,998
United States into England and France	30,453	48,130	39,743	32,393	61,794
Chile into England and France	19,840	19,717	20,783	22,161	22,593

The exports of copper from Great Britain, estimating the fine contents of alloys, were as follows:

Exports of copper from Great Britain from 1888 to 1896, inclusive.

[Long tons.]

Character.	1888.	1889.	1890.	1891.	1892.
English, wrought and unwrought, and sheets	32,058	48,189	58,571	51,765	58,518
Yellow metal, at 60 per cent	4,513	9,195	10,514	8,547	8,853
Brass, at 70 per cent	2,650	3,773	3,721	3,992	3,783
Total	39,221	61,157	72,806	64,304	71,154
Fine foreign	*a* 32,845	14,470	16,941	11,752	11,388
Total	72,066	75,627	89,747	76,056	82,542

Character.	1893.	1894.	1895.	1896.
English, wrought and unwrought, and sheets	45,349	34,874	45,299	38,734
Yellow metal, at 60 per cent	8,745	9,514	8,978	6,773
Brass, at 70 per cent	4,049	3,808	3,747	4,172
Total	58,143	48,196	58,024	49,679
Fine foreign	12,843	6,493	7,966	9,655
Total	70,986	54,689	65,990	59,334

a Including 22,557 tons Chile bars transferred to France.

THE FRENCH COPPER TRADE.

The direct imports of copper from different countries into France were as follows for a series of years, according to James Lewis & Son:

Direct imports into France from 1887 to 1896, inclusive.

[Long tons.]

Year.	Chile.	United States.	Mexico.	Other countries.	Total.
1887	9,011	3,910	.....	1,048	13,969
1888	8,468	6,496	2,700	6,905	24,569
1889	2,470	1,058	738	1,715	5,981
1890	2,803	1,733	.....	975	5,511
1891	4,442	8,329	.....	2,118	14,889
1892	2,221	4,340	2,515	2,208	11,284
1893	3,842	12,483	7,620	2,908	26,853
1894	3,812	9,248	6,299	1,588	20,947
1895	3,964	11,806	4,520	2,505	22,795
1896	7,030	21,998	3,627	3,700	36,355

According to the French official statistics, the imports of bars, ingots, etc., were as follows:

Imports of copper into France.

[Metric tons.]

Source.	1895.	1896.
England	8,250	5,596
Chile	3,494	4,573
United States	11,157	21,279
Other countries	11,717	12,197
Total	34,618	43,645

According to the returns of our Bureau of Statistics, the exports of copper to France were only 20,653 metric tons. It is probable that some of the copper sent to Belgium is consigned through to French centers of consumption.

Aron Hirsch & Sohn present the following, as drawn from official sources:

French imports and exports of copper.

[Metric tons.]

	1893.	1894.	1895.	1896.
Imports of bars, ingots, etc	30, 398	28, 654	34, 618	43, 646
Deduct exports	7, 019	5, 322	4, 910	5, 144
	23, 379	23, 332	29, 708	38, 502
Add old copper, excess of imports over exports	2, 892	2, 411	4, 644	5, 524
Balance imports	26, 271	25, 743	34, 352	44, 026

Imports and exports of ores, matte, etc.

[Metric tons.]

	1893.	1894.	1895.	1896.
Imports	20, 543	11, 643	10, 448	9, 216
Exports	10, 214	5, 021	1, 771	1, 260
Total	10, 329	6, 622	8, 677	7, 956

Hirsch & Sohn, holding that the bulk of this material is rich, like Boleo mattes and Corocoro ores, estimate its contents at 70 per cent, and on this basis estimate the copper consumption of France as follows:

Copper consumption of France.

[Metric tons.]

	1893.	1894.	1895.	1896.
Imports, raw material	26, 271	25, 743	34, 352	44, 026
Contents of ore	7, 230	4, 635	6, 074	5, 570
Total	33, 501	30, 378	40, 426	49, 596
Increase (—) or decrease (+) of stocks	+ 355	+ 1, 459	— 103	— 589
Consumption	33, 856	31, 837	40, 323	49, 007

THE GERMAN COPPER TRADE.

The German statistical bureau during the past few years has taken special pains to trace the source of the copper imported into that country, and the returns may be accepted as very close to the actual figures. According to these returns, the imports from the United States amounted to 42,504 metric tons. The report of our own Bureau of Statistics makes the total to Germany and the Netherlands, to which copper for Germany goes in transit, 46,554 metric tons. A partial explanation of this apparent discrepancy may be that December shipments from here were 11,400,000 pounds in 1896, while they were 4,700,000 pounds in December, 1895, so that the German totals do not include a considerably larger quantity afloat and in transit.

German copper consumption has grown very rapidly. The following table, compiled by Aron Hirsch & Sohn, of Halberstadt, shows the principal figures. There is included in the production the copper extracted in German metallurgical works from imported ores and mattes. An allowance is made for this in the table:

Copper consumption of Germany.

[Metric tons.]

	1891.	1892.	1893.	1894.	1895.	1896.
Imports	46,153	44,514	51,806	52,504	59,742	73,123
Exports	9,973	9,817	11,304	10,406	10,893	12,452
Excess of imports	36,180	34,697	40,502	42,098	48,849	60,671
Production	24,688	25,406	24,011	25,857	26,013	*a* 29,700
Total	60,868	60,103	64,513	67,955	74,862	90,371
Copper contents of imported copper ore and iron pyrites	4,000	4,000	4,000	5,000	4,500	5,000
Home consumption	56,868	56,103	60,513	62,955	70,362	85,371

a Estimated.

Turning first to the imports, it may be noted that in 1896 these included 56,114 metric tons of bars and ingots, 3,170 tons of coins and old copper, 709 tons copper contents of brass, old and new, and 5,000 tons contents of imported ores. The source of the imports of bars and ingots during recent years has been—

Source of German imports of ingot copper.

[Metric tons.]

Country.	1894.	1895.	1896.
Free port (Hamburg)	1,689	1,185	2,371
Belgium	356	356	115
France	303	152	81
Norway	128	362	71
Austria-Hungary	50	197	11
Sweden	33	83	198
Switzerland	.....	.....	5
Spain	10	.....	10
England	7,430	7,363	7,478
Netherlands	109	139	73
United States	23,795	31,311	42,504
Japan	2,072	1,932	1,916
Chile	884	825	827
Australia	.....	313	183
Other countries	173	147	271
Total	37,032	44,365	56,114

The production of Germany for a series of years has been as follows. The output of the Mansfeld Company is added, since that corporation is the dominating factor:

Copper production of Germany.

[Metric tons.]

Year.	Total production.	Production of Mansfeld.
1891	24,688	15,365
1892	25,406	15,588
1893	24,011	14,358
1894	25,857	15,217
1895	26,013	15,083
1896	*a* 29,700	18,541

a Estimated.

It will be observed that Mansfeld has considerably increased its production in 1896.

A very notable fact in connection with the German copper trade is the rapid expansion in exports of copper manufactures. Since 1891 the exports have doubled, as is shown by the following table:

Exports of copper manufactures from 1891 to 1896 inclusive.

[Metric tons.]

	1891.	1892.	1893.	1894.	1895.	1896.
Rods and sheets	4,151	4,507	4,889	5,009	4,700	5,429
Wire	2,166	2,565	3,052	4,433	3,975	5,909
Cables	2,030	1,526	1,957	2,193	3,713	7,631
Miscellaneous	558	492	563	501	556	279
Coarse forgings	2,311	1,902	2,050	2,538	2,643	2,648
Cartridges, caps, etc.	2,221	2,374	3,682	3,376	4,450	4,156
Fine copper goods	3,106	3,234	3,859	4,117	4,912	7,837
Totals	16,543	16,600	20,052	22,167	24,949	33,889

THE RUSSIAN COPPER TRADE.

The following table shows the consumption of copper in Russia, to which American producers contribute to some extent:

Copper consumption of Russia.

[Metric tons.]

	1892.	1893.	1894.	1895.
Imports of fine copper	7,803	12,340	10,442	11,033
Imports of manufactures	1,032	1,442	1,049	655
Production	4,901	5,436	5,730	5,413
Consumption	13,736	19,218	17,221	17,101

The production of the Russian mines during 1894 and 1895 was as follows, by districts, in poods:

Copper production in Russia.

[Poods.]

		1894.	1895.
Caucasus		150,000	145,805
Ural:			
Uschkoff	18,000		
Paschkoff	22,000		
Demidoff	45,000		
Bogoslowsky	70,000		
		155,000	149,032
Altai		17,000	12,566
Finland: Pitkaranda		27,500	20,274
Total		349,500	327,677
In metric tons (61 poods)		5,730	5,372

Summarizing the estimates of A. Hirsch & Sohn, we have the following as the copper consumption of the leading European countries:

Copper consumption of leading European countries.

[Metric tons.]

Country.	1893.	1894.	1895.	1896.
Germany	60,513	62,955	70,349	85,371
England	96,615	90,069	91,184	115,557
France	33,856	31,837	40,323	49,007
Austria	14,901	16,457	15,735	16,498
Russia	19,218	17,221	17,101	21,000
	225,103	218,539	234,692	287,433

These figures differ in detail from the statistics compiled by the Metallgesellschaft of Frankfurt-am-Main, whose table includes, besides, Italy, Belgium, Netherlands, and minor countries, and deals also with exports of fine copper to other continents. For 1896 these additional countries are put down for 18,556 metric tons. With these additional channels of consumption, the totals are: For 1893, 231,241 metric tons; for 1894, 223,569 tons; for 1895, 236,027 tons, and for 1896, 287,776 tons. It will be observed that while both series differ considerably as to the total, the increase in the consumption agrees fairly well. That, after all, is the cardinal fact, so far as the copper industry of the United States is concerned. Europe took about 50,000 tons more of copper in 1896 than it did in 1895, which was furnished by the United States.

THE LEADING FOREIGN PRODUCERS.

The statistics of production of the largest foreign producer—the Rio Tinto Company—are shown in the following table for a series of years:

Pyrites and copper statistics of the Rio Tinto Company, Spain.

Year.	Pyrites extracted.				Pyrite consumed (average copper contents).		Copper produced at mines.
	For shipment.	For local treatment.	Total.	Average copper contents.			
	Tons.	*Tons.*	*Tons.*	*Per cent.*	*Tons.*	*Per cent.*	*Tons.*
1876.....	189, 962	159, 196	349, 158	1. 5	158, 597	1. 5	946
1877.....	251, 360	520, 391	771, 751	2. 375	211, 487	2	2, 495
1878.....	218, 818	652, 289	871, 107	2. 78	211, 403	2. 18	4, 184
1879.....	243, 241	663, 359	906, 600	2. 78	236, 849	2. 45	7, 179
1880.....	277, 590	637, 567	915, 157	2. 865	274, 210	2. 481	8, 559
1881.....	249, 098	743, 949	993, 047	2. 75	256, 827	2. 347	9, 466
1882.....	259, 924	688, 307	948, 231	2. 805	272, 826	2. 401	9, 740
1883.....	313, 291	786, 682	1, 099, 973	2. 956	288, 104	2. 387	12, 295
1884.....	312, 028	1, 057, 890	1, 369, 918	3. 234	314, 751	2. 241	12, 668
1885.....	406, 772	944, 694	1, 351, 466	3. 102	354, 501	2. 27	14, 593
1886.....	336, 548	1, 041, 833	1, 378, 381	3. 046	347, 024	2. 306	15, 863
1887.....	362, 796	819, 642	1, 182, 438	3. 047	385, 842	2. 283	17, 813
1888.....	434, 316	969, 317	1, 403, 633	2. 949	393, 149	2. 208	18, 522
1889.....	389, 943	824, 380	1, 214, 323	2. 854	395, 081	2. 595	18, 708
1890.....	396, 349	865, 405	1, 261, 754	2. 883	397, 875	2. 595	19, 183
1891.....	464, 027	972, 060	1, 436, 087	2. 649	432, 532	2. 651 1. 309	21, 227
1892.....	406, 912	995, 151	1, 402, 063	2. 819	435, 758	2. 569 1. 465	20, 017
1893.....	477, 656	854, 346	1, 332, 002	2. 996	469, 339	2. 659 1. 544	20, 887
1894	498, 540	888, 555	1, 387, 095	3. 027	485, 441	2. 594 . 988	20, 606
1895.....	525, 195	847, 181	1, 372, 376	2. 821	518, 560	2. 595 . 986	20, 762
1896.....	591, 752	845, 580	1, 437, 332	2. 931	549, 585	2. 529 1. 068	20, 817

It will be observed that the production was the largest in the history of the company. The amount of pyrites invoiced to customers in England, Germany, and the United States was 549,585 tons in 1896, against 518,560 tons in 1895, 485,441 tons in 1894, and 469,339 tons in 1893. The copper contents of the pyrites shipped was 13,684 tons, while 20,817 tons of copper was made at the mines. There were brought to market 17,777 tons of refined copper, 11,928 tons of copper in pyrites, and 980 tons in sulphate, the manufacture of sulphate of

copper having been resumed at the mines and at the Cwmavon works in Wales. The total production of sulphate was 5,427 tons, of which 3,917 tons were sold. The stock of copper at the end of the year was 5,129 tons.

The gross profit during the year 1896 was £748,014, from which there has been written off for development, overburden, and plant, £55,002, and for redemption of bonds, £53,980, leaving a balance of £639,032. Out of this dividends aggregating £617,500 were paid, or at the rate of 19 per cent per annum. There is outstanding £3,250,000 of share capital and £3,546,020 of 4 per cent bonds. The company has a reserve fund of £100,000.

The report of the Tharsis Company shows that the total quantity of mineral raised in 1896 was 557,577 tons as compared with 612,483 tons. The shipments of pyrites in 1896 were 239,725 tons, against 226,829 tons in 1895, but owing to protracted drought and to a strike the quantity of precipitate shipped declined from 9,443 tons in 1895 to 7,538 tons in 1896. The gross profits amounted to £277,469 in 1896, against £301,711 in 1895, while the net profits were £218,769, against £219,491 in 1895. The dividend declared was 17½ per cent.

The account of the Cape Copper Company shows a credit balance of £197,353, including £66,101 brought forward. This has been dealt with as follows: £2,358 has been paid in income tax, and £77,625 in dividends; £10,000 has been transferred to the reserve fund, £10,000 to the smelting and sulphate works sinking fund, and £10,000 to the railroad and jetty sinking fund, leaving a balance of £87,370.

The Mount Lyell Mining and Railway Company of Tasmania has been developed during the year. The plant includes two blast furnaces and two converters, for which the machinery was built in the United States.

To this equipment two ore furnaces and one matting furnace are being added, which will carry the daily capacity up to 500 tons, the two furnaces which ran during the half year ending March 31 having averaged 108 tons each. The two treated 34,069 tons of ore, producing a matte carrying about 30 per cent of copper. This is smelted again to make a converter matte of the latter. The output during the half year named was 2,657 tons, which yielded 1,463 long tons of copper, 90,332 ounces of silver, and 6,528 ounces of gold, valued at £71,667 for the copper and £36,839 for the precious metals. The net profit was £45,742 for the mines and works and £5,919 for the railroad. The average assay of the ore treated was 4.8 per cent of copper, 2.69 ounces of silver, and 0.204 ounce of gold. The capacity of the enlarged plant would therefore be from 12,000,000 to 13,000,000 pounds of copper per annum.

LEAD.

By CHARLES KIRCHHOFF.

INTRODUCTION.

In spite of the fact that the year 1896 was one of general industrial depression, reflected in the case of lead by a sharp contraction of the consumption, the output of the metal from American sources showed so marked an increase that the record of 1891 was passed. In that year the quantity of lead produced from ores mined in the United States was 178,554 short tons. In 1896 it reached 188,000 short tons. Even that quantity did not cover the requirements of the country, in a year of depression, by 20,000 short tons. In years of normal consumption our requirements lie between 240,000 and 250,000 short tons.

PRODUCTION.

The following tables present the figures of the total gross production of lead in the United States from 1825. Up to the year 1882 the figures have been compiled from the best data available. Since 1882 the statistics are those collected by this office, with the exception of the year 1889, when they were gathered by the Census Office:

Production of refined lead in the United States from 1825 to 1872, inclusive.

Year.	Total production.	Year.	Total production.	Year.	Total production.
	Short tons.		*Short tons.*		*Short tons.*
1825	1,500	1844	26,000	1859	16,400
1830	8,000	1845	30,000	1860	15,600
1831	7,500	1846	28,000	1861	14,100
1832	10,000	1847	28,000	1862	14,200
1833	11,000	1848	25,000	1863	14,800
1834	12,000	1849	23,500	1864	15,300
1835	13,000	1850	22,000	1865	14,700
1836	15,000	1851	18,500	1866	16,100
1837	13,500	1852	15,700	1867	15,200
1838	15,000	1853	16,800	1868	16,400
1839	17,500	1854	16,500	1869	17,500
1840	17,000	1855	15,800	1870	17,830
1841	20,500	1856	16,000	1871	20,000
1842	24,000	1857	15,800	1872	25,880
1843	25,000	1858	15,300		

From 1873 to 1885, inclusive, the production was separated into two groups, that of desilverized lead obtained from smelting argentiferous ores drawn from the Rocky Mountain region and that of "soft" lead produced from nonargentiferous ores of the Mississippi Valley. The latter also includes small quantities obtained from Virginia and Tennessee. In 1886 the treatment of foreign ores in American smelting works began to assume importance, and it became necessary to make allowance for the quantities involved in order to arrive at the actual lead product of the United States. Later the refining in bond of foreign base bullion became an important industry. Varying quantities of the metal so produced are retained for home consumption, so that it became necessary to make special inquiries dealing with this feature. The growing complications make it impossible to arrive at an exact statement of the lead obtained from domestic sources, so that only a close estimate is possible. The table below covers the period in question.

In 1894, after a careful consideration of the methods possible, the system was adopted of appealing to the smelters for a statement showing the source territorially of the lead contents of the ore worked by them. This was regarded as the most satisfactory and direct means, not alone for reaching a sound basis for an estimate of the actual lead product of the United States, but also, at the same time, afforded an opportunity for reaching precise data relative to the contribution and the total of the different States and Territories. The result of the investigations thus made is embodied in the following table:

Production of refined lead in the United States from 1873 to 1896, both inclusive.

Year.	Total production. (a)	Desilverized lead. (a)	Soft lead. (b)	From foreign ores and base bullion.	Net American product.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1873	42,540	20,159	22,381	.....	42,540
1874	52,080	.....	.....	.....	52,080
1875	59,640	34,909	24,731	.....	59,640
1876	64,070	37,649	26,421	.....	64,070
1877	81,900	50,748	31,152	.....	81,900
1878	91,060	64,290	26,770	.....	91,060
1879	92,780	64,650	28,130	.....	92,780
1880	97,825	70,135	27,690	.....	97,825
1881	117,085	86,315	30,770	.....	117,085
1882	132,890	103,875	29,015	.....	132,890
1883	143,957	122,157	21,800	.....	143,957
1884	139,897	119,965	19,932	.....	139,897
1885	129,412	107,437	21,975	.....	129,412

a Including foreign base bullion refined in bond.
b Including a small quantity of lead produced in the Southern States.

Production of refined lead in the United States from 1873 to 1896, both inclusive—Cont'd.

Year.	Total production.	Desilverized lead.	Soft lead.	From foreign ores and base bullion.	Net American product.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1886	135,629	114,829	20,800	*a* 5,000	*a* 130,629
1887	160,700	135,552	25,148	*a* 15,000	*a* 145,700
1888	180,555	151,465	29,090	28,636	151,919
1889	182,967	153,709	29,258	26,570	156,397
1890	161,754	130,403	31,351	18,124	143,630
1891	*b* 202,406	171,009	31,397	23,852	178,554
1892	*c* 213,262	181,584	31,678	39,957	173,305
1893	*d* 229,333	196,820	32,513	65,351	163,982
1894	219,090	181,404	37,686	59,739	*e* 162,686
1895	241,882	201,992	39,890	76,173	*e* 170,000
1896	264,994	221,457	43,537	57,612	*e* 188,000

a Estimated.
b Including 4,043 tons of antimonial lead.
c Including 5,039 tons of antimonial lead.
d Including 5,013 tons of antimonial lead.
e Arrived at from direct returns from smelters.

The product of desilverized lead in 1896 includes 7,507 short tons of hard lead.

The following is a comparison of half-yearly periods:

Comparison of half-yearly periods.

	1894.		1895.		1896.	
	First half.	Second half.	First half.	Second half.	First half.	Second half.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Desilverized lead	86,772	94,632	87,957	114,035	109,592	111,865
Soft lead	15,610	22,076	18,013	21,877	21,103	22,434
Total production refined lead	102,382	116,708	105,970	135,912	130,695	134,299
Refined in bond	21,392	17,243	17,458	37,238	26,119	25,656
From material produced in the United States	80,990	99,465	88,512	98,674	104,576	108,643

According to the returns of the refiners, the total quantity of lead produced by refining foreign base bullion in bond was 51,775 short tons. The direct returns report aggregate exports of lead made from

foreign base bullion as 49,679 short tons. In addition thereto refiners report having smelted in bond foreign ores containing 15,545 short tons, of which 7,933 tons are reported exported by them. This total export of 57,612 tons does not quite agree with the export returns of the Bureau of Statistics, which are 44,303 tons exports of foreign lead. The Bureau reports also exports of 8,180 short tons of domestic, and notes a decline in the stock of foreign lead in warehouse from 9,865 short tons on January 1, 1896, to 4,124 tons on January 1, 1897. This would carry the total to 58,224 short tons as compared with 57,612 short tons from direct returns.

The soft lead includes only that product of Missouri, Kansas, Iowa, Wisconsin, and Southern ores which was treated by local smelters. It does not include the ores and concentrates handled by the refining works. This amounted to 8,350 short tons, and carries the total amount of lead to be credited to these States to 51,887 short tons.

Source of lead in American ores smelted.

State or Territory.	1894.	1895.	1896.
	Short tons.	*Short tons.*	*Short tons.*
Colorado	50,613	46,984	44,803
Idaho	33,308	31,638	46,662
Utah	23,190	31,305	35,578
Montana	9,637	9,802	11,070
Nevada	2,254	2,583	1,173
New Mexico	2,973	3,040	3,461
Arizona	1,480	2,053	1,165
California	478	949	691
Washington, Oregon, Alaska, South Dakota, Texas	150	381	1,006
Missouri, Kansas, Wisconsin, Illinois, Virginia	46,300	53,596	51,887
Total lead contents American ores smelted	170,383	182,331	197,496
Contents Mexican ores	*a* 21,000	16,437	15,403
Contents Canadian ores		5,040	10,100
Contents Australian ores	.....	.....	386
From unknown sources	.....	.....	1,732

a Estimated.

An allowance must be made for loss and waste in smelting, duly deducting from the above total, of course, the 43,537 tons of soft lead included in the 51,887 tons drawn from the Mississippi Valley. Estimating this at 6 per cent, a product of 188,000 tons from American sources is reached. This compares with 170,000 tons, which was estimated for 1895.

It is interesting to compare the result arrived at in this manner by another method of reaching the net American product. The total product of metallic lead was 264,994 tons. From this must be deducted 51,775 tons from base bullion refined in bond. There must be further deducted 94 per cent of the lead contents of foreign ores smelted, the total so smelted carrying 27,621 tons of lead. This leaves as drawn from American sources 187,255 tons. The close approximation of the two sets of figures is, of course, to some extent accidental. The estimate does not influence in any way the exactness of the returns as to the total quantity of commercial lead available for the domestic market and exportable.

CONSUMPTION.

Based on the data at hand, the following estimate is presented of the consumption of lead, the stocks of domestic lead being partial direct returns from producers, which do not refer to supplies carried by dealers or manufacturers.

Estimate of the consumption in the United States for the years 1894, 1895, and 1896.

	1894.	1895.	1896.
Supply:			
Product, desilverized lead (including lead refined in bond)	*Short tons.* 181,404	*Short tons.* 201,992	*Short tons.* 221,457
Soft lead	37,686	39,890	43,537
Imports foreign refined lead	8,200	22,947	2,020
Stock, domestic, beginning of year	7,496	8,586	9,557
Stock, foreign in bond, beginning of year	3,302	7,181	.....
Total	238,088	280,596	276,571
Deduct:			
Foreign base bullion and ores refined in bond and exported	29,000	*a* 18,130	*b* 57,612
Lead in manufactures exported under drawback	950	2,000	1,500
Stock, domestic, close of year	8,586	9,557	9,299
Stock, foreign in bond, close of year	7,181	9,865	.....
Total	45,717	39,552	68,411
Consumption	192,371	241,044	208,160

a Including exports of domestic lead. *b* From direct returns.

The striking feature in this exhibit is the very heavy decline in the consumption, so that only a relatively small part of the foreign material treated in this country was retained.

IMPORTS AND EXPORTS.

The following tables, from the records of the Bureau of Statistics, show the imports and exports of lead and its manufactures for a series of years:

Lead imported and entered for consumption in the United States, 1867 to 1896.

Year ending—	Ore and dross.		Pigs and bars.	
	Quantity.	Value.	Quantity.	Value.
June 30—	*Pounds.*		*Pounds.*	
1867	611	$25	65, 322, 923	$2, 812, 668
1868	6, 945	239	63, 254, 677	2, 668, 915
1869	.....	.....	87, 865, 471	3, 653, 481
1870	5, 973	176	85, 895, 724	3, 530, 837
1871	316	10	91, 496, 715	3, 721, 096
1872	32, 231	1, 425	73, 086, 657	2, 929, 623
1873	.....	.....	72, 423, 641	3, 233, 011
1874	.....	.....	46, 205, 154	2, 231, 817
1875	13, 206	320	32, 770, 712	1, 559, 017
1876	.....	.....	14, 329, 366	682, 132
1877	1, 000	20	14, 583, 845	671, 482
1878	.....	.....	6, 717, 052	294, 233
1879	.....	.....	1, 216, 500	42, 983
1880	.....	.....	6, 723, 706	246, 015
1881	5, 981	97	4, 322, 068	159, 129
1882	21, 698	500	6, 079, 304	202, 603
1883	600	17	4, 037, 867	130, 108
1884	419	13	3, 072, 738	85, 395
1885	4, 218	57	5, 862, 474	143, 103
1886	715, 588	9, 699	17, 582, 298	491, 310
December 31—				
1887	153, 731	21, 487	7, 716, 783	219, 770
1888	88, 870	2, 468	2, 582, 236	69, 891
1889	328, 315	7, 468	2, 773, 622	76, 243
1890	11, 065, 865	504, 067	19, 336, 233	593, 671
1891	40, 692, 478	1, 120, 067	3, 392, 562	104, 184
1892	54, 249, 291	1, 278, 114	1, 549, 771	110, 953
1893	58, 487, 319	1, 004, 295	3, 959, 781	129, 290
1894	33, 020, 250	437, 999	39, 168, 529	895, 496
1895	45, 050, 674	687, 222	109, 551, 082	2, 052, 209
1896	37, 829, 583	631, 381	10, 551, 148	191, 479

Lead imported and entered for consumption in the United States, 1867 to 1896—Continued.

Year ending—	Sheets, pipe, and shot.		Shot.		Not otherwise specified.	Total value.
	Quantity.	Value.	Quantity.	Value.		
June 30—	*Pounds.*		*Pounds.*			
1867	185,825	$9,560	.....	.....	$6,222	$2,828,475
1868	142,137	7,229	.....	.....	6,604	2,682,987
1869	307,424	15,531	.....	.....	18,885	3,687,897
1870	141,681	6,879	.....	.....	10,444	3,548,336
1871	86,712	4,209	.....	.....	8,730	3,734,045
1872	15,518	859	.....	.....	20,191	2,952,098
1873	105	12	420	$50	21,503	3,254,576
1874	.....	.....	30,219	1,349	36,484	2,269,650
1875	.....	.....	58	4	25,774	1,585,115
1876	.....	.....	20,007	1,204	27,106	710,442
1877	.....	.....	16,502	1,242	1,041	673,785
1878	.....	.....	15,829	963	113	295,309
1879	.....	.....	3,748	209	930	44,122
1880	.....	.....	1,120	54	371	246,440
1881	.....	.....	900	65	1,443	160,734
1882	.....	.....	1,469	99	2,449	205,651
1883	.....	.....	1,510	79	8,030	138,234
1884	15,040	630	.....	.....	1,992	88,030
1885	971,951	22,217	.....	.....	1,372	166,749
1886	27,357	1,218	.....	.....	964	503,191
December 31—						
1887	27,941	1,286	.....	.....	302	242,845
1888	23,103	1,202	.....	.....	977	74,538
1889	35,859	1,417	.....	.....	1,297	86,425
1890	91,660	5,591	.....	.....	1,136	1,104,465
1891	334,179	12,406	.....	.....	604	1,237,467
1892	90,135	6,207	.....	.....	2,063	1,397,337
1893	59,798	2,955	.....	.....	1,691	1,138,231
1894	44,080	2,050	.....	.....	536	1,336,081
1895	128,008	5,030	.....	.....	1,277	2,745,738
1896	96,010	3,818	.....	.....	644	827,322

Old and scrap lead imported and entered for consumption in the United States, 1867 to 1889, inclusive.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	*Pounds.*		June 30—	*Pounds.*	
1867	1,256,233	$53,202	1880	213,063	$5,262
1868	2,465,575	101,586	1881	123,018	2,729
1869	2,983,272	123,068	1882	220,702	5,949
1870	3,756,785	150,379	1883	1,094,133	31,724
1871	2,289,688	94,467	1884	160,356	4,830
1872	4,257,778	171,324	1885	4,866	106
1873	3,545,098	151,756	December 31—		
1874	395,516	13,897	1886	24,726	882
1875	382,150	13,964	1887	136,625	4,323
1876	265,860	9,534	1888	33,100	904
1877	249,645	8,383	1889	50,816	1,494
1878	106,342	3,756	1890	(*a*)	(*a*)
1879	42,283	1,153			

a Included in pigs and bars after 1889.

Lead, and manufactures of lead, of domestic production, exported from the United States.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
September 30—	*Pounds.*			*Pounds.*		
1790	13,440	$810	.....	.....	.....	$810
1803 (*a*)	900	.....	.....	.....	.....	.....
1804	19,804	.....	.....	.....	.....	.....
1805	8,000	.....	.....	.....	.....	.....
1808	40,583	.....	.....	.....	.....	.....
1809	126,537	.....	.....	.....	.....	.....
1810	172,323	.....	.....	.....	.....	.....
1811	65,497	.....	.....	.....	.....	.....
1812	74,875	.....	.....	.....	.....	.....
1813	276,940	.....	.....	.....	.....	.....
1814	43,600	.....	.....	.....	.....	.....
1815	40,245	.....	.....	.....	.....	.....
1816	35,844	.....	.....	.....	.....	.....
1817	111,034	9,993	.....	.....	.....	9,993
1818	281,168	22,493	.....	.....	.....	22,493
1819	94,362	7,549	.....	.....	.....	7,549
1820	25,699	1,799	.....	.....	.....	1,799

a Barrels.

Lead, and manufactures of lead, of domestic production, exported, etc.—Continued.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
September 30—	*Pounds.*			*Pounds.*		
1821	56,192	$3,512	.....	.....	.....	$3,512
1822	66,316	4,244	.....	.....	.....	4,244
1823	51,549	3,098	.....	.....	.....	3,098
1824	18,604	1,356	.....	.....	.....	1,356
1825	189,930	12,697	.....	.....	.....	12,697
1826	47,337	3,347	$1,820	.....	.....	5,167
1827	50,160	3,761	6,183	.....	.....	9,944
1828	76,882	4,184	5,545	.....	.....	9,729
1829	179,952	8,417	5,185	.....	.....	13,602
1830	128,417	4,831	4,172	.....	.....	9,003
1831	152,578	7,068	6,422	.....	.....	13,490
1832	72,439	4,483	983	.....	.....	5,466
1833	119,407	5,685	2,010	.....	.....	7,695
1834	13,480	805	2,224	.....	.....	3,029
1835	50,418	2,741	433	.....	.....	3,174
1836	34,600	2,218	4,777	.....	.....	6,995
1837	297,488	17,015	3,132	.....	.....	20,147
1838	375,231	21,747	6,461	.....	.....	28,208
1839	81,377	6,003	12,637	.....	.....	18,640
1840	882,620	39,687	15,296	.....	.....	54,983
1841	2,177,164	96,748	20,546	.....	.....	117,294
1842	14,552,357	523,428	16,789	.....	.....	540,217
June 30—						
1843 (*a*)	15,366,918	492,765	7,121	.....	.....	499,886
1844	18,420,407	595,238	10,018	.....	.....	605,256
1845	10,188,024	342,646	14,404	.....	.....	357,050
1846	16,823,766	614,518	10,278	.....	.....	624,796
1847	3,326,028	124,981	13,694	.....	.....	138,675
1848	1,994,704	84,278	7,739	.....	.....	92,017
1849	680,249	30,198	13,196	.....	.....	43,394
1850	261,123	12,797	22,682	.....	.....	35,479
1851	.....	.....	16,426	229,448	$11,774	28,200
1852	.....	.....	18,469	747,930	32,725	51,194
1853	.....	.....	14,064	100,778	5,540	19,604
1854	.....	.....	16,478	404,247	26,874	43,352
1855	.....	.....	5,233	165,533	14,298	19,531
1856	.....	.....	5,628	310,029	27,512	33,140
1857	.....	.....	4,818	870,544	58,624	63,442
1858	.....	.....	27,327	900,607	48,119	75,446

a Nine months.

Lead, and manufactures of lead, of domestic production, exported, etc.—Continued.

Year ending—	Manufactures of—			Pigs, bars, and old.		Total value.
	Lead.		Pewter and lead.			
	Quantity.	Value.	Value.	Quantity.	Value.	
June 30—	*Pounds.*			*Pounds.*		
1859	.....	.....	$28,782	313,988	$28,575	$57,357
1860	.....	.....	56,081	903,468	50,446	106,527
1861	.....	.....	30,534	109,023	6,241	36,775
1862	.....	.....	28,832	79,231	7,334	36,166
1863	.....	.....	30,609	237,239	22,634	53,243
1864	.....	.....	30,411	223,752	18,718	49,129
1865	.....	.....	29,271	852,895	132,666	161,937
1866	.....	.....	44,483	25,278	2,323	46,806
1867	.....	.....	27,559	99,158	5,300	32,859
1868	.....	.....	37,111	438,040	34,218	71,329
1869	.....	.....	17,249	.....	.....	17,249
1870	.....	$28,315	.....	.....	.....	28,315
1871	.....	79,880	.....	.....	.....	79,880
1872	.....	48,132	.....	.....	.....	48,132
1873	.....	13,392	.....	.....	.....	13,392
1874	.....	302,044	.....	.....	.....	302,044
1875	.....	429,309	.....	.....	.....	429,309
1876	.....	102,726	.....	.....	.....	102,726
1877	.....	49,835	.....	.....	.....	49,835
1878	.....	314,904	.....	.....	.....	314,904
1879	.....	280,771	.....	.....	.....	280,771
1880	.....	49,899	.....	.....	.....	49,899
1881	.....	39,710	.....	.....	.....	39,710
1882	.....	178,779	.....	.....	.....	178,779
1883	.....	43,108	.....	.....	.....	43,108
1884	.....	135,156	.....	.....	.....	135,156
1885	.....	123,466	.....	.....	.....	123,466
December 31—						
1886	.....	136,666	.....	.....	.....	136,666
1887	.....	140,065	.....	.....	.....	140,065
1888	.....	194,216	.....	.....	.....	194,216
1889	.....	161,614	.....	.....	.....	161,614
1890	.....	181,030	.....	.....	.....	181,030
1891	.....	173,887	.....	.....	.....	173,887
1892	.....	154,375	.....	.....	.....	154,375
1893	.....	508,090	.....	.....	.....	508,090
1894	.....	456,753	.....	.....	*a* 41,240	497,993
1895	.....	164,083	.....	1,696,879	50,773	214,856
1896	.....	164,877	.....	16,359,452	442,496	607,373

a Not enumerated between 1868 and July 1, 1894.

From records kept by Mr. A. E. Caswell, the imports of lead during the calendar years from 1860 to 1888, both inclusive, were as follows, the official figures in the table presented covering only fiscal years to 1886:

Imports of lead in calendar years from 1860 to 1888.

Year.	In pigs.	In ores.	Total.
	Short tons.	*Short tons.*	*Short tons.*
1860	21,425	.....	21,425
1861	15,720	.....	15,720
1862	32,900	.....	32,900
1863	12,600	.....	12,600
1864	27,900	.....	27,900
1865	13,600	.....	13,600
1866	27,200	.....	27,200
1867	23,330	.....	23,330
1868	23,225	.....	23,225
1869	35,111	.....	35,111
1870	28,600	.....	28,600
1871	28,000	.....	28,000
1872	26,355	.....	26,355
1873	22,114	.....	22,114
1874	17,674	.....	17,674
1875	7,305	.....	7,305
1876	4,685	.....	4,685
1877	745	.....	745
1878	285	.....	285
1879	2,461	.....	2,461
1880	3,228	.....	3,228
1881	3,492	.....	3,492
1882	2,518	.....	2,518
1883	1,085	.....	1,085
1884	2,508	.....	2,508
1885	2,682	.....	2,682
1886	9,760	8,800	18,560
1887	4,312	15,060	19,372
1888	1,642	27,018	28,660

The Bureau of Statistics has published the following data relative to the imports of lead entered for consumption during semiannual periods, from 1891 to 1896, together with the duty collected:

Imports of lead during semiannual periods, with duty collected from 1891 to 1896.

Period.	Lead in ore and dross.	Duty paid.	Lead in bars and pigs.	Duty paid.
	Short tons.		*Short tons.*	
First half 1891	8,778	$263,333	766	$30,661
Second half 1891	11,568	347,054	930	37,190
First half 1892	13,702	411,073	440	17,619
Second half 1892	13,422	402,667	834	33,376
First half 1893	16,484	494,519	1,153	86,830
Second half 1893	12,755	382,791	827	33,061
First half 1894	6,159	184,784	1,040	41,617
Second half 1894	10,351	158,660	18,544	372,486
First half 1895	12,247	191,138	22,847	456,939
Second half 1895	9,779	146,682	29,429	588,571
First half 1896	11,889	178,342	3,233	72,745
Second half 1896	7,701	115,592	1,638	32,766

In addition to this, small quantities of manufactured lead were imported.

During the period of "exempt" lead, the actual quantities of foreign lead which went into United States consumption were larger than those indicated above.

According to the returns of the Treasury Department, the imports of lead in the calendar years 1894, 1895, and 1896 were as follows:

Sources of imports of lead.

Country.	1894.	1895.	1896.
	Pounds.	*Pounds.*	*Pounds.*
United Kingdom	6,357,937	8,161,411	1,365,132
Germany	1,792,305	1,113,148	.....
Other Europe	14,452,179	36,618,228	1,235,981
Total refined pig lead	22,602,421	45,892,787	2,601,113
British North America	4,969,993	15,860,906	25,672,833
Mexico	112,148,130	138,312,146	130,388,173
Total ore and base bullion	117,118,123	154,173,052	156,061,006
Other countries	241,367	931,116	1,656,398
Total imports	139,961,911	200,996,955	160,318,517

The Mexican base bullion which is imported into New York goes to Newark, New Jersey, and also since May, 1895, to Perth Amboy, for refining. The Bureau of Statistics has compiled the following table to show this movement:

Lead entered, withdrawn from, and remaining in warehouse at Newark and Perth Amboy, New Jersey.

Month.	Remaining in warehouse on first day of each month.	Entered warehouse.	Withdrawn for export.
1894.	*Pounds.*	*Pounds.*	*Pounds.*
January	6, 605, 020	4, 592, 990	6, 096, 700
February	5, 029, 350	3, 481, 975	5, 687, 755
March	2, 504, 035	8, 891, 190	5, 760, 625
April	4, 646, 540	6, 090, 055	5, 588, 950
May	4, 278, 335	8, 190, 940	4, 473, 181
June	7, 207, 515	6, 857, 531	5, 311, 544
July	8, 005, 311	8, 121, 595	5, 366, 594
August	9, 923, 826	8, 439, 605	2, 989, 150
September	13, 482, 060	5, 115, 980	3, 777, 121
October	7, 951, 860	7, 180, 115	4, 325, 165
November	6, 244, 370	6, 072, 995	3, 542, 033
December	6, 898, 775	9, 741, 690	3, 360, 288
Total, 1894	.....	*a* 82, 776, 661	56, 279, 106
1895.			
January	10, 569, 875	6, 841, 810	1, 940, 684
February	9, 966, 590	4, 881, 100	224, 012
March	11, 092, 510	8, 231, 965	2, 188, 784
April	11, 037, 170	10, 322, 050	3, 248, 315
May	13, 693, 310	6, 507, 655	4, 647, 528
June	12, 973, 900	7, 616, 649	1, 942, 923
July	15, 513, 730	13, 347, 712	1, 873, 135
August	20, 271, 197	8, 696, 142	585, 117
September	21, 606, 439	5, 631, 965	4, 652, 361
October	17, 850, 727	3, 898, 745	3, 638, 353
November	11, 592, 370	10, 350, 429	6, 352, 884
December	10, 847, 672	11, 845, 622	2, 967, 630
Total, 1895	.....	98, 171, 844	34, 261, 726
1896.			
January	15, 771, 667	7, 951, 581	3, 298, 096
February	12, 158, 590	*b* 5, 837, 395	3, 405, 272
March	10, 321, 569	7, 268, 251	5, 795, 528
April	11, 492, 840	6, 691, 091	9, 186, 902

a 2,249 pounds added to previous entry by liquidation.
b 3,081 pounds added to previous entry by liquidation.

Lead entered, withdrawn from, and remaining in warehouse, etc.—Continued.

Month.	Remaining in warehouse on first day of each month.	Entered warehouse.	Withdrawn for export.
1896.	*Pounds.*	*Pounds.*	*Pounds.*
May	8, 640, 261	5, 703, 846	6, 455, 612
June	7, 726, 840	6, 115, 761	5, 279, 136
July	8, 171, 177	9, 096, 942	7, 391, 414
August	9, 173, 748	7, 252, 757	8, 154, 813
September	7, 977, 586	6, 223, 118	8, 697, 875
October	5, 127, 872	8, 116, 527	6, 034, 017
November	6, 293, 831	*a* 6, 559, 477	6, 677, 975
December	5, 783, 575	6, 374, 719	5, 277, 982
Total, 1896	.....	83, 191, 465	75, 654, 622

Month.	Withdrawn for transportation.	Withdrawn for consumption.	Deductions from previous entries by liquidation.
1894.	*Pounds.*	*Pounds.*	*Pounds.*
January	.....	71, 960	.....
February	.....	319, 535	.....
March	.....	152, 905	835, 155
April	.....	102, 070	767, 240
May	.....	149, 712	638, 867
June	.....	1, 660	746, 531
July	.....	100, 022	736, 464
August	.....	1, 486, 110	407, 060
September	.....	6, 183, 994	685, 465
October	.....	3, 514, 397	1, 048, 943
November	.....	1, 351, 623	524, 934
December	.....	2, 112, 016	598, 286
Total, 1894	.....	15, 546, 004	6, 988, 945
1895.			
January	.....	5, 149, 195	355, 216
February	.....	3, 355, 714	175, 454
March	.....	5, 756, 063	342, 458
April	.....	4, 020, 770	396, 825
May	.....	2, 124, 132	455, 405
June	.....	2, 996, 429	137, 467
July	.....	6, 402, 395	314, 715
August	1, 407, 170	5, 200, 954	167, 659

a 161,613 pounds added to previous entries by liquidation.

Lead entered, withdrawn from, and remaining in warehouse, etc.—Continued.

Month.	Withdrawn for transportation.	Withdrawn for consumption.	Deductions from previous entries by liquidation.
1895.	*Pounds.*	*Pounds.*	*Pounds.*
September	1,550,422	2,809,778	375,116
October	4,116,018	1,974,945	427,786
November	4,084,197	35,010	623,036
December	2,481,826	755,846	716,325
Total, 1895	13,639,633	40,581,231	4,487,462
1896.			
January	5,331,876	497,447	2,437,239
February	3,209,970	875,987	.....
March	.....	152,016	149,436
April	.....	110,720	246,048
May	.....	.....	161,655
June	.....	89,669	302,619
July	.....	225,034	477,923
August	.....	51,770	192,336
September	.....	116,867	258,090
October	.....	262,060	654,491
November	.....	229,363	162,395
December	400,236	100,025	371,950
Total, 1896	8,942,082	2,710,958	5,414,182

DOMESTIC PRODUCERS.

The product of southeastern Missouri has increased during 1896. Returns from 12 producers show a total of 28,182 short tons, all of which, with the exception of 704 tons sent to distant smelters as concentrates, was turned out as pig lead. In the future probably the whole of the mine product will be smelted in the district. In 1897 the mines and plant of the famous Mine la Motte was purchased from Rowland Hazard by a company.

In southwestern Missouri and Kansas desilverizers purchased ores with a metal content of about 7,500 tons lead. Local smelters produced 15,542 tons, so that the output of the district was close to 23,000 tons of lead. The ore product of the district is greater than the quantity represented by the pig-metal product, because a considerable quantity of ore is used for the direct manufacture of pigment.

This separation of the product of the two districts is of value because different causes affect their prosperity. Southeastern Missouri is dependent upon lead pure and simple. Southwestern Missouri

and southeastern Kansas mine lead ore as an incident, though an important one, in the extraction of zinc ore. The producers are therefore affected chiefly by the market for zinc ore, and therefore indirectly by the demand for spelter.

The greater part of the lead production in 1896, say about 137,000 tons, was obtained from ores mined in the Rocky Mountain regions, where it is closely allied with the mining and extraction of ores of the precious metals. The output of the baser metal is, therefore, powerfully influenced by the fluctuations in the price of silver. The unprecedented decline of the latter must have the effect of restricting the quantity of ores containing no lead, the so-called "dry" ores, which is offered to smelters. This, in turn, reduces the demand as a fluxing material for lead-bearing ores. On the other hand, however, the advance in the duty on lead and lead in ores must raise the price to the importing point, and must thus stimulate the production of lead as such. As an example, the case of Leadville may be cited. Four smelters handled, in 1896, 239,493 tons of ore, containing 5,044,200 ounces of silver and 33,899,738 pounds of lead. An advance of 1 cent per pound in the price for lead would apparently counterbalance a decline of 6.7 cents per ounce of silver. In districts in which the lead contents of the shipping product is much higher, as in the Cœur d'Alene, in Idaho, a high price of lead has an even more telling effect.

In the Rocky Mountain region production was adversely affected by the long strike in Leadville. According to the Herald-Democrat's estimate, the total tonnage of the camp was 395,242 tons, of which 40,423 tons was carbonate ore, compared with 70,429 tons in 1895. The quantity of sulphides produced was 106,308 tons in 1896, as compared with 116,975 tons in 1895. From the smelter returns it appears that the ores from the Leadville district produced 18,173 short tons of lead, as compared with 31,236 tons in 1895. In spite of this falling off of about 13,000 tons, the lead product of Colorado declined only about 2,000 tons when compared with the record of 1895.

The Cœur d'Alene district, in Idaho, may be regarded as the most important in the country. During 1895 the output was heavily reduced by labor troubles, and even in 1896 the plants were not all active. An effort has been made to ascertain the tonnage and lead contents of ores and concentrates shipped from the district. The returns, while not complete, possess some interest. Replies were received from the following mines: Morning, You Like It, Gold Hunter, Consolidated Tiger and Poorman, Granite, Last Chance, Helena and Frisco, Bunker Hill and Sullivan, and Sierra Nevada. These shipped, in 1895, 1,980 short tons, and in 1896, 2,862 short tons of ore, containing 1,049 and 1,281 short tons of lead, respectively. They produced, in 1895, 19,255 short tons of concentrates, containing 10,251 tons of lead. In 1896 the product was 58,258 tons of concentrates, with 31,041 tons of lead. Thus these mines produced in the two years 11,300 tons of lead in 1895 and 32,322 tons in 1896. There is not included in the

latter total the product of one mine which made 6,178 tons of concentrates, containing 3,853 tons of lead, because the present management is unable to state what the product was in 1895.

The lead production of Utah showed further expansion. Two-thirds of the lead was smelted by Salt Lake smelters, the total obtained by them from Utah ores being 21,001 short tons. One-third of the product of Utah is handled by distant works, chiefly in Colorado, who worked Utah ores yielding 14,577 short tons of lead.

PRICES.

The following table gives the highest and lowest prices monthly for a series of years, compiled from market quotations:

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1896, inclusive.

[Cents per pound.]

Year.	January.		February.		March.		April.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870	*a* 6.30	6.20	6.25	6.17	6.20	6.10	6.25	6.15
1871	*a* 6.30	6.15	6.25	6.20	6.20	6.15	6.20	6.10
1872	*a* 6	5.90	6	5.87	6	5.87	6.12	5.90
1873	*a* 6.37	6.25	6.50	6.40	6.50	6.25	6.50	6.25
1874	*a* 6	5.90	6.25	6	6.25	6.12	6.25	5.90
1875	*a* 6.20	6	5.90	5.85	5.75	5.62	5 87	5.80
1876	*a* 6	5.87	6.37	6	6.50	6.40	6.40	6.12
1877	*b* 6.15	6.12	6.40	6.20	6.75	6.50	6.50	6.25
1878	4.35	4	3.87	3.65	3.87	3.62	3.75	3.50
1879	4.50	4	4.50	4.50	4.50	3.25	3.25	2.87
1880	6.10	5.50	6	5.87	5.95	5.30	5.75	5.40
1881	5	4.30	5.10	4.80	4.85	4.62	4.85	4.37
1882	5.15	4.95	5.20	5	5.12	4.85	5	4.90
1883	4.70	4.60	4.60	4.50	4.65	4.50	4.62	4.40
1884	4.50	3.75	4.10	3.75	4.15	4.10	4.05	3.62½
1885	3.70	3.55	3.70	3.60	3.70	3.62½	3.70	3.62½
1886	4.70	4.50	4.90	4.60	4.95	4.85	4.90	4.65
1887	4.45	4.15	4.50	4.25	4.45	4.25	4.32½	4.20
1888	4.90	4.50	5.15	4.60	5.25	5	5.05	4.55
1889	3.90	3.75	3.75	3.60	3.75	3.65	3.67½	3.60
1890	3.85	3.80	3.85	3.75	3.95	3.85	4.07½	3.85
1891	4.50	4.05	4.50	4.25	4.37½	4.25	4.32½	4.10
1892	4.30	4.10	4.25	4.05	4.22½	4.10	4.30	4.20
1893	3.90	3.85	3.95	3.90	4.05	3.85	4.12½	4.05
1894	3.25	3.15	3.35	3.20	3.45	3.25	3.45	3.37½
1895	3.12½	3.05	3.12½	3.07½	3.10	3.07½	3.12½	3.05
1896	3.15	3	3.20	3.07½	3.22½	3.07½	3.07½	3.02½

a Gold. *b* Currency.

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1896, inclusive—Continued.

[Cents per pound.]

Year.	May.		June.		July.		August.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870	6.25	6.20	6.25	6.20	6.30	6.20	6.37	6.32
1871	6.18	6.10	6.15	6.12	6.15	6.10	6.12	6
1872	6.62	6.25	6.62	6.40	6.62	6.40	6.50	6.40
1873	6.62	6.35	6.55	6.12	6.12	6	6.25	6
1874	6	5.75	6	5.62	5.80	5.62	5.80	5.65
1875	5.95	5.90	5.90	5.75	6	5.95	5.95	5.87
1876	6.50	6.10	6.50	6.25	6.35	6.20	6.37	6.25
1877	6	5.55	5.70	5.60	5.60	5.37	5.12	4.90
1878	3.50	3.25	3.50	3.12	3.62	3.25	3.50	3.20
1879	3.12	2.87	3.80	3.12	4.10	3.90	4.05	4.00
1880	5.25	4.40	4.75	4.50	4.75	4.25	5	4.30
1881	4.70	4.25	4.50	4.25	4.90	4.50	4.95	4.75
1882	4.85	4.60	4.90	4.55	5.15	4.90	5.10	4.95
1883	4.55	4.40	4.45	4.40	4.40	4.30	4.30	4.20
1884	3.75	3.52½	3.65	3.57½	3.70	3.55	3.70	3.52½
1885	3.75	3.60	3.85	3.62½	4.15	3.87½	4.25	4.12
1886	4.75	4.65	4.90	4.65	4.90	4.75	4.80	4.75
1887	4.70	4.30	4.70	4.50	4.67½	4.40	4.62½	4.55
1888	4.62½	4	4.10	3.65	4.07½	3.85	4.97½	4.15
1889	3.87½	3.60	4.05	3.90	4.05	3.80	3.95	3.75
1890	4.35	4	4.50	4.25	4.50	4.40	4.72½	4.35
1891	4.37½	4.20	4.50	4.35	4.45	4.30	4.53	4.40
1892	4.25	4.20	4.20	4.05	4.25	4	4.15	4
1893	4	3.75	3.90	3.45	3.60	3.30	3.75	3.25
1894	3.40	3.30	3.37½	3.25	3.65	3.37½	3.70	3.30
1895	3.25	3.07½	3.30	3.25	3.50	3.30	3.55	3.50
1896	3.05	3	3.05	3	3	2.90	2.90	2.65

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1896, inclusive—Continued.

[Cents per pound.]

Year.	September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1870	6.37	6.30	6.37	6.25	6.35	6.20	6.35	6.25
1871	6.10	6	6	5.87	6	5.90	6	5.75
1872	6.50	6.30	6.62	6.40	6.60	6.50	6.60	6.42
1873	6.62	6.37	6.75	6.25	6.50	6	6.12	6
1874	6.10	5.65	6.35	6.10	6.50	6.25	6.40	6.12
1875	5.87	5.70	5.65	5.60	5.87	5.65	5.95	5.87
1876	6.25	6	6	5.80	5.80	5.70	5.70	5.65
1877	4.85	4.75	4.85	4.25	4.75	4.50	4.60	4.50
1878	3.45	3.25	3.60	3.37	3.95	3.60	4	3.90
1879	4	3.75	5.50	4	5.62	5	5.60	5.50
1880	4.90	4.80	4.87	4.65	4.85	4.75	4.75	4.25
1881	5.37	4.95	5.25	4.87	5.25	4.90	5.25	5
1882	5.15	4.95	5.15	4.85	4.90	4.50	4.75	4.50
1883	4.32	4.30	4.32	4.12	4.05	3.65	3.75	3.60
1884	3.75	3.55	3.75	3.60	3.55	3.37½	3.75	3.50
1885	4.25	4	4.25	4	4.60	4	4.67½	4.50
1886	4.70	4.45	4.30	4	4.40	4.10	4.35	4.25
1887	4.55	4.25	4.40	4.20	4.75	4.25	5.15	4.90
1888	5.12½	4.90	5.12½	3.62½	3.82½	3.60	3.82½	3.60
1889	4	3.85	3.90	3.75	3.90	3.75	3.90	3.75
1890	5	4.67½	5.25	5	5.25	4.60	4.60	4.05
1891	4.55	4.40	4.55	4.10	4.35	4.10	4.25	4.25
1892	4.15	4	3.95	3.85	3.85	3.70	3.85	3.70
1893	3.95	3.75	3.75	3.25	3.37½	3.30	3.30	3.20
1894	3.30	3.10	3.15	3.05	3.12½	3.10	3.12½	3.02½
1895	3.45	3.32½	3.35	3.30	3.27½	3.15	3.30	3.20
1896	2.80	2.72½	2.92½	2.72½	3.05	2.85	3.05	2.95

THE LEAD MARKET.

The year 1896 was an unsatisfactory one from the standpoint of volume of business and of prices. The price of lead fell to a level never reached before in this country, the metal selling in New York down to 2.65 cents in August. The year opened with lead at 3.15 cents, but the market softened rapidly until 3 cents was reached, a price which induced some heavy buying for delivery during the first quarter. In February a little better feeling developed, since there was less pressure of Mexican product, which Europe was absorbing at more satisfactory prices. Toward the middle of the month the market became more active at 3.15 cents, and closed steady at 3.20 cents. A weakening

tendency developed early in March, the market declining almost continuously under a light business, until early in April the climax was reached through forced sales at 3.02½. After a brief rally to 3.07½, at the end of April, the downward tendency again gained headway in May, and under fairly heavy sales the price receded to 3 cents. It continued weak early in June, until the fear that supplies might be affected by the Leadville strike caused some buying, which led to a recovery to 3.05 cents. But the adverse conditions becoming more pronounced, the market declined throughout July, and fell rapidly in August, under a moderate business, until the record price of 2.65 cents was reached toward the close of the month. There was a reaction in September, which lifted the price up to 2.80 cents, from which it fell off again in September and early October to 2.72½ cents. Then came a sharp rally to 2.92½ cents, due to speculative purchases, and a brief period of quiet and lower prices. Early in November, however, there was a good deal more of activity, which carried the price up to 3.05 cents. December was dull, with values ranging between 2.95 and 3.05 cents.

WORLD'S PRODUCTION.

The following table gives the world's production of lead during the years 1886 to 1894, inclusive, compiled by the Metallgesellschaft, of Frankfort on the Main.

The world's production of lead during the years 1886 to 1896, inclusive.

[Metric tons.]

Country.	1886.	1887.	1888.	1889.	1890.
Germany	91,000	95,000	97,000	100,000	101,000
Spain	*a* 102,000	*a* 119,000	129,200	136,900	140,300
Great Britain	*a* 51,000	*a* 50,000	*a* 50,000	*a* 47,800	49,800
Austria	8,000	7,800	8,000	8,000	8,300
Hungary	2,100	1,800	2,000	2,300	1,200
Italy	19,000	*a* 19,000	17,000	18,000	17,700
Belgium	10,000	10,000	11,000	9,400	9,600
France	4,000	*a* 5,000	6,500	5,400	4,600
Greece	*a* 10,000	12,500	14,500	13,500	14,200
Other European countries	*a* 2,000	*a* 2,000	*a* 2,000	*a* 2,000	*a* 2,000
United States	119,387	132,150	137,790	141,852	130,272
Mexico	16,000	18,100	30,100	27,500	22,300
Australia *b*	*a* 5,000	*a* 10,000	*a* 19,000	*a* 35,000	40,500
Other countries	*a* 1,000	*a* 1,000	*a* 1,000	*a* 1,000	*a* 1,000
Total	440,487	483,350	525,090	548,652	542,772

a Estimated. *b* Exclusive of that part of product not exported to Europe and America.

The world's production of lead during the years 1886 to 1894, inclusive—Continued

[Metric tons.]

Country.	1891.	1892.	1893.	1894.	1895.	1896.
Germany	95,000	98,000	95,000	101,000	111,058	113,792
Spain	145,700	152,300	157,100	152,620	160,786	170,790
Great Britain	49,000	44,900	38,200	42,800	55,300	*a* 60,000
Austria	7,600	7,300	7,200	7,500	8,085	10,120
Hungary	2,100	2,300	2,500	2,113	2,277	*a* 2,000
Italy	18,500	22,000	19,900	19,600	20,353	20,786
Belgium	12,700	10,100	12,000	13,500	15,573	15,390
France	6,700	8,800	8,100	8,758	7,627	*a* 8,000
Greece	13,300	14,400	12,800	14,000	19,800	*a* 14,700
Other European countries	*a* 2,000	*a* 2,500	*a* 3,000	*a* 4,000	*a* 4,000	*a* 4,000
United States	161,948	157,187	147,627	147,600	154,265	170,600
Mexico	30,200	47,500	64,000	57,000	65,000	59,000
Canada	.....	.....	1,000	2,586	10,467	10,977
Australia *b*	56,000	54,000	58,000	50,000	38,000	27,000
Other countries	*a* 1,000	*a* 1,000	*a* 1,000	*a* 1,000	.....	.....
Total	601,748	622,287	627,427	624,077	672,591	687,065

a Estimated. *b* Exclusive of that part of product not exported to Europe and America.

In some respects these tables may need remodeling. Thus Belgium does not really produce any considerable quantity of lead. The entire quantity credited to it is obtained from foreign ores and base bullion, of which some has probably been accounted for in the country where it originated. The English figures, too, are subject to criticism of a similar character.

SPAIN.

During recent years the production of Spain has increased. The following table presents the statistics by provinces, the figures for 1894 and 1895 being official, while those for 1896 are the estimate of Ramon Oriol, of the Revista Minera of Madrid:

Production of lead in Spain.

Province.	1894.	1895.	1896.
	Metric tons.	*Metric tons.*	*Metric tons.*
Murcia	85,465	79,636	85,000
Jaén (Linares)	31,529	38,847	40,500
Córdova	17,795	25,260	26,000
Almeria	13,295	13,707	15,000
Guipúzcoa	4,536	3,336	4,290
Total	152,620	160,786	170,790
Export pig lead and base bullion	160,316	151,129	166,124
Export lead ore	12,164	9,203	6,270

Spain exports a good deal of base bullion which is desilverized in English and continental refineries, so that statisticians run the danger of duplicating the metal.

FRANCE.

Official statistics published in the Annales des Mines show the following:

Lead statistics of France.

Year.	Production from domestic and imported ores.	Exports.	Imports.	Apparent home consumption.
	Metric tons.	*Metric tons.*	*Metric tons.*	*Metric tons.*
1882	8,076	5,301	65,369	68,144
1883	7,770	5,629	69,038	71,179
1884	6,293	4,939	57,536	58,890
1885	4,806	5,890	57,096	56,012
1886	3,874	14,367	61,681	51,188
1887	5,939	10,857	63,338	58,420
1888	6,406	8,850	54,001	51,557
1889	5,305	10,569	61,249	55,985
1890	4,544	9,895	67,754	62,403
1891	6,680	10,957	74,748	70,471
1892	8,776	10,057	73,045	71,764
1893	8,119	9,243	77,679	76,555
1894	8,696	8,133	84,674	85,237
1895	7,627	9,922	66,952	64,657
1896	*a* 8,000	10,209	79,750	77,541

a Estimated.

GREAT BRITAIN.

The lead-mining industry of Great Britain has declined almost uninterruptedly for many years. The official statistics show that the mines produced the following quantities of dressed ores since 1880:

Production of dressed lead ore in Great Britain during the years 1880 to 1895, inclusive.

Year.	Long tons.	Year.	Long tons.	Year.	Long tons.
1880	72,245	1886	53,420	1891	43,859
1881	64,702	1887	51,563	1892	40,024
1882	65,001	1888	51,259	1893	40,808
1883	56,487	1889	48,465	1894	40,599
1884	54,485	1890	45,651	1895	38,412
1885	51,302				

According to the board of trade returns, the exports of English lead in recent years have been as follows:

Exports of English lead during the years 1892, 1893, 1894, and 1895.

	1892.	1893.	1894.	1895.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Ore	5	29	1	21
Pig lead	39,178	29,535	27,801	22,559
Rolled, sheet, pipe, etc	18,984	19,336	19,259	19,259

The principal countries to which this metal was shipped were the following:

Destination of English lead exports in 1893, 1894, and 1895.

Destination.	Pig lead.			Manufactured lead.		
	1893.	1894.	1895.	1893.	1894.	1895.
	Long tons	*Long tons*	*Long tons*	*Long tons*	*Long tons*	*Long tons.*
Russia	9,852	10,434	7,809	3,661	3,730	3,095
Germany	2,479	.....	1,459	309	.....	162
Holland	1,053	.....	.....	15	.....	.....
France	4,645	4,287	1,412	.....	14	10
British East Indies	574	544	575	6,831	6,683	7,070
China	4,804	3,856	2,211	78	23	234
Hongkong	1,706	625	699	383	114	66
Japan	264	351	529	1,939	2,296	2,253
United States	.....	1,901	3,521	.....	30	89

The exports of foreign lead were as follows:

English exports of foreign lead in 1892, 1893, 1894, and 1895.

	1892.	1893.	1894.	1895.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Ore	2,586	2,348	3,916	12,035
Pig lead and sheet	15,613	18,836	13,836	17,695

The following countries received the principal quantities of the pig lead and sheet lead exported:

Country.	1893.	1894.	1895.
	Long tons.	*Long tons.*	*Long tons.*
Russia	3,070	2,809	2,690
Germany	1,626	.....	5,529
Holland	850	1,023	.....
Belgium	8,210	7,875	6,967
France	3,697	.....	.....
Japan	220	.....	.....
United States	.....	1,175	1,344

Of the 12,035 tons of foreign ore exported from England, 4,106 tons went to Russia, 4,336 tons to Belgium, and 3,381 tons to Italy.

England largely imports ores and pig lead and base bullion. During 1894 the imports were 15,600 long tons of ore and 161,861 long tons of pig lead and sheet lead. In 1895 the imports were 31,726 tons and 162,924 long tons respectively. The countries from which the principal quantities are drawn are enumerated in the following table:

Imports of lead ore and pig lead and sheet lead imported into England in 1895.

Country.	Lead ore.	Pig and sheet lead.
	Long tons.	*Long tons.*
Germany	72	6,793
Holland	348	1,414
Belgium	88	3,102
France	1,004	4,373
Spain	2,449	88,003
Italy	296	7,962
Australasia:		
South Australia	4,874	15,341
Victoria	6,996	1,459
Queensland	386	1,161
New South Wales	10,323	19,376
Tasmania	706	.....
New Zealand	208	.....
United States	60	11,146
Mexico	.....	1,638
Chile	1,871	.....

The greater part of the ore imported is therefore from the Broken Hill district in Australia. The lead credited to the United States is of course of Mexican origin, refined in this country in bond.

The official statistics present the following estimates of the amount of lead available for home consumption:

Lead available for consumption in England.

	1894.	1895.
	Long tons.	*Long tons.*
Obtainable from British ores	29, 687	29, 000
Lead imported and obtainable from imported ores	174, 341	188, 305
Exported	64, 030	69, 043
Available for home consumption	139, 998	148, 262

The statistics for 1896 are not yet available.

GERMANY.

According to official statistics, the production of lead in Germany has been as follows:

Production of lead in Germany during the years 1884 to 1896, inclusive.

Year.	Metric tons.	Year.	Metric tons.
1884	94, 809	1891	95, 615
1885	93, 134	1892	97, 742
1886	92, 520	1893	94, 659
1887	94, 921	1894	100, 751
1888	96, 995	1895	111, 058
1889	100, 601	1896	113, 792
1890	101, 781		

Germany has steadily increased her imports of lead during a series of years, while her exports have declined, as compared with the record of 1888, 1889, and 1890. The following table presents the figures since 1888:

German imports and exports of lead during the years 1888 to 1896, inclusive.

Year.	Imports.	Exports.	Year.	Imports.	Exports.
	Metric tons.	*Metric tons.*		*Metric tons.*	*Metric tons*
1888	7, 358	34, 889	1893	23, 856	23, 944
1889	9, 527	32, 793	1894	24, 280	24, 354
1890	12, 766	32, 115	1895	28, 449	27, 855
1891	17, 624	24, 973	1896	33, 016	24, 828
1892	17, 500	25, 657			

The imports of lead ore into Germany during 1896 amounted to 61,742 metric tons, while the exports were 2,541 tons.

CANADA.

During recent years Canada has developed as a producer of lead and promises to attain a rank as an important contributor to the world's supply. The production, according to official statistics, has been as follows:

Production of lead in Canada.

Year.	Pounds.
1890	113,000
1891	588,665
1892	1,768,420
1893	2,135,023
1894	5,662,523
1895	23,075,892
1896	24,199,977

The lead is produced in British Columbia, in the Kootenay country, which is divided into East and West Kootenay. In East Kootenay the North Star was the only producer in 1896. It is located 20 miles west of Fort Steele, the ore being taken to the Columbia River down the Kootenay to Jennings, Montana. The mine has shipped ore averaging 30 ounces of silver and 55 per cent of lead, and has contracted to deliver 7,000 tons to American smelters. The district produced 2,808,411 pounds of lead in 1896. In the Ainsworth division the Pilot Bay smelter was in operation on Kootenay Lake until May, 1896. The division yielded 6,734,000 pounds of lead in 1895, and 2,151,000 pounds in 1896. In the Nelson division of Kootenay West the product was 2,237,921 pounds of lead in 1896. The record of the Trail Creek division is 840,420 pounds of lead in 1895 and 1,580,635 pounds in 1896. The most important district, however, is the Slocan, which is reported to have produced 9,751,464 pounds of lead in 1895 and 19,210,666 pounds in 1896. The latter quantity appears to have been the output of the Slocan mine, which is credited with 18,215 tons of ore containing 2,141,088 ounces of silver and the amount of lead stated. With an increasing number of concentrating plants and smelters and improved facilities for transportation, British Columbia is likely to increase its output quite heavily.

ZINC.

By CHARLES KIRCHHOFF.

PRODUCTION.

The zinc industry in common with the leading manufacturing industries of the country suffered from the financial crisis of 1896. The principal channels of consumption were all contracted. Brass manufacturers were far from busy, those branches of the iron trade in which galvanizing is a feature were depressed, and the building industry which takes a considerable tonnage as sheet zinc did not call for normal requirements. There was, therefore, a sharp decline from the record production of 1895.

For a series of years the production of spelter has been as follows:

Production of spelter in the United States.

Year.	Short tons.	Year.	Short tons.
1873	7,343	1888	55,903
1875	15,833	1889	58,860
1880 *a*	23,239	1890	63,683
1882	33,765	1891	80,873
1883	36,872	1892	87,260
1884	38,544	1893	78,832
1885	40,688	1894	75,328
1886	42,641	1895	89,686
1887	50,340	1896	81,499

a Census year ending May 31.

In the different States the production has been as follows:

Production of spelter in the United States, by States.

Year.	Eastern and Southern States.	Illinois.	Kansas.	Missouri.	Total.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1882	5,698	18,201	7,366	2,500	33,765
1883	5,340	16,792	9,010	5,730	36,872
1884	7,861	17,594	7,859	5,230	38,544
1885	8,082	19,427	8,502	4,677	40,688
1886	6,762	21,077	8,932	5,870	42,641
1887	7,446	22,279	11,955	8,660	50,340
1888	9,561	22,445	10,432	13,465	55,903
1889	10,265	23,860	13,658	11,077	58,860
1890	9,114	26,243	15,199	13,127	63,683
1891	*a* 8,945 *b* 4,217	28,711	22,747	16,253	80,873
1892	9,582 4,913	*c*31,383	24,715	16,667	87,260
1893	8,802 3,882	*c*29,596	22,815	13,737	78,832
1894	7,400 1,376	*c*28,972	25,588	11,992	75,328
1895	9,484 3,697	*c*35,732	25,775	14,998	89,686
1896	8,139 2,427	*c*36,173	20,759	14,001	81,499

a Eastern. *b* Southern. *c* Including Indiana.

Illinois and Indiana gained slightly and Missouri held its own fairly well. The principal sufferer was Kansas, whose production fell off about 5,000 short tons.

For semiannual periods the production of spelter has been as follows:

Production of spelter by semiannual periods.

States.	First half 1892.	Second half 1892.	First half 1893.	Second half 1893.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Eastern Southern	6,901	7,594	7,380	5,304
Illinois and Indiana	15,483	15,900	16,427	16,169
Kansas	14,161	10,554	13,269	9,546
Missouri	8,954	7,713	8,718	5,019
Total	45,499	41,761	45,794	33,038

Production of spelter by semiannual periods—Continued.

States.	First half 1894.	Second half 1894.	First half 1896.	Second half 1896.	First half 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Eastern	5,064	3,712	4,517	3,622	3,866
Southern			1,200	1,227	1,305
Illinois and Indiana	13,392	15,580	16,305	19,868	18,054
Kansas	11,250	14,338	11,351	9,408	15,722
Missouri	6,458	5,534	5,548	8,453	7,956
Total	36,164	39,164	38,921	42,578	46,903

So far as the records go they furnish no indication of a tendency to stimulation of the output during the first or the second half of the year. It will be observed that the product during the first half of 1897 is at the maximum rate yet attained in this country. The capacity is considerably beyond the maximum product, a proportion of the furnaces at a number of the plants having been idle during the first six months of 1897. Nor does it seem likely that the mines may not be able to respond to an enhanced demand, since there have been considerable exports of ore during this period of maximum production of the metal.

STOCKS.

A partial statement of stocks shows the following changes:

States.	Jan. 1, 1893.	Jan. 1, 1894.	Jan. 1, 1895.	Jan. 1, 1896.	Jan. 1, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Eastern	3,316	1,587	1,779	2,333	1,467
Southern		1,437	914	1,108	1,417
Illinois and Indiana	12	826	1,348	1,169	1,730
Kansas	483	590	665	675	2,863
Missouri	349	129	205	517	
Total	4,160	4,569	4,911	5,802	7,477

The consumption of the United States, with the data at hand, figures as follows:

Consumption of spelter in the United States, 1895 and 1896.

	1895.	1896.
	Short tons.	*Short tons.*
Production	89,686	81,499
Imports	432	428
Stocks, beginning of year	4,911	5,802
Total	95,029	87,729
Deduct:		
Exports of foreign	.....	4
Exports of domestic	1,530	10,130
Stocks at end of year	5,802	7,477
Total	7,332	17,611
Home consumption	87,697	70,118

This table demonstrates clearly how consumption fell off during the year 1896.

The principal event in the East has been the final disposal by settlement out of court of the litigation which for the last forty years has been carried on in the courts of New Jersey, relating to the ownership of the unusual deposits of so-called "franklinite" ore, in Sussex County, near Franklin Furnace. Under the title of the New Jersey Zinc Company it has brought under one ownership all of the franklinite ore, so far as the same has been explored, and includes, also, the works and other property of the New Jersey Zinc and Iron Company at Newark, the Passaic Zinc Company at Jersey City, the Lehigh Zinc and Iron Company at South Bethlehem, Pennsylvania, the Florence Zinc Company at Freemansburg, Pennslyvania, the Mineral Point Zinc Company at Mineralpoint, Wisconsin, and the zinc-oxide plant at Waukegan, Illinois. The consolidation thus effected is by far the largest manufacturer of zinc-oxide in the United States. It is also a producer of spelter, but not to any large extent as yet. It is known, however, that processes recently invented admit of the separation of the minerals which compose franklinite ore, and which are, respectively, minerals of zinc, iron, and manganese. It is proposed to utilize the anhydrous silicate of zinc, called willemite, in the manufacture of spelter, and it is known that for that purpose it has unusual value, because of its great purity.

The methods of mining at Sussex have been radically changed since the consolidation was effected. The main deposit is being stripped pre-

paratory to working by open cut at one end, so that a large portion of the ore can be removed very cheaply, and without entailing waste. The other end of the deposit, which lies at a depth of about 1,000 feet, is to be mined by a system of filling or else of caving, so as to waste as little of this valuable ore as possible. A large plant is now in process of construction for the separation of the minerals composing the ore. This plant will be double the capacity of the one erected, which handles some 200 tons of ore per day.

About one year ago the zinc ore or willemite was first exported for the production of metallic zinc abroad. This business also is now well established, and exports have been made at the rate of from 500 to 1,000 tons monthly with a fair degree of regularity.

One of the fruits of the consolidation of interests in the southwest Missouri-Kansas district has been the building of additional smelting plants. The largest of these is that of the Robert Lanyon's Sons Spelter Company, of Iola, Kansas, which has a capacity of over 4,200 short tons per annum and is being enlarged further. One of the new features of the works is that gas firing is used throughout, from steam making to the heating of the retort chambers. Other works are going up at Nevada, Missouri, and at Midway, Kansas. The Nevada Spelter Company has six furnaces running, which are turning out 16,000 pounds of spelter a day. Some of the older works are being enlarged, like that of the Empire Zinc Company, of Joplin, Missouri.

A number of the Western producers have cooperated for some time to establish stable prices, with fair success, since excessive accumulations of metal have been exported via Galveston. But there has been considerable and growing outside competition.

IMPORTS AND EXPORTS.

Zinc imported and entered for consumption in the United States, 1867 to 1896, inclusive.

Year ending—	Blocks or pigs.		Sheets.	
	Quantity.	Value.	Quantity.	Value.
June 30—	*Pounds.*		*Pounds.*	
1867	5,752,611	$256,366	5,142,417	$311,767
1868	9,327,968	417,273	3,557,448	203,883
1869	13,211,575	590,332	8,306,723	478,646
1870	9,221,121	415,497	9,542,687	509,860
1871	11,159,040	508,355	7,646,821	409,243
1872	11,802,247	522,524	10,704,944	593,885
1873	6,839,897	331,399	11,122,143	715,706
1874	3,593,570	203,479	6,016,835	424,504
1875	2,034,252	101,766	7,320,713	444,539

Zinc imported and entered for consumption in the United States, 1867 to 1896, inclusive—Continued.

Year ending—	Blocks or pigs.		Sheets.	
	Quantity.	Value.	Quantity.	Value.
June 30—	*Pounds.*		*Pounds.*	
1876	947,322	$56,082	4,611,360	$298,308
1877	1,266,894	63,250	1,341,333	81,815
1878	1,270,184	57,753	1,255,620	69,381
1879	1,419,791	53,294	1,111,225	53,050
1880	8,092,620	371,920	4,069,310	210,230
1881	2,859,216	125,457	2,727,324	129,158
1882	18,408,391	736,964	4,413,042	207,032
1883	17,067,211	655,503	3,309,239	141,823
1884	5,869,738	208,852	952,253	36,120
1885	3,515,840	113,268	1,839,860	64,781
Dec. 31—				
1886	4,300,830	136,138	1,092,400	40,320
1887	8,387,647	276,122	926,150	32,526
1888	3,825,947	146,156	295,287	12,558
1889	2,052,559	77,845	1,014,873	43,356
1890	1,997,524	101,335	781,366	43,495
1891	808,094	41,199	21,948	1,460
1892	297,969	16,520	27,272	2,216
1893	425,183	22,790	28,913	1,985
1894	387,788	13,788	39,947	2,061
1895	744,301	26,782	42,513	2,773
1896	1,040,719	32,096	27,321	1,358

Year ending—	Old.		Value of manufactures.	Total value.
	Quantity.	Value.		
June 30—	*Pounds.*			
1867	.....	.....	$1,835	$569,968
1868	.....	.....	1,623	622,779
1869	.....	.....	2,083	1,071,061
1870	.....	.....	21,696	947,053
1871	.....	.....	26,366	943,964
1872	.....	.....	58,668	1,175,077
1873	.....	.....	56,813	1,103,918
1874	.....	.....	48,304	676,287
1875	.....	.....	26,330	572,635
1876	.....	.....	18,427	372,817
1877	.....	.....	2,496	147,561

Zinc imported and entered for consumption in the United States, 1867 to 1896, inclusive—Continued.

Year ending—	Old.		Value of manufactures.	Total value.
	Quantity.	Value.		
June 30—	*Pounds.*			
1878			$4,892	$132,026
1879			3,374	109,718
1880			3,571	585,721
1881			7,603	262,218
1882			4,940	948,936
1883			5,606	802,932
1884			4,795	249,767
1885			2,054	180,103
December 31—				
1886			9,162	185,620
1887			11,329	319,977
1888			12,080	170,794
1889			19,580	140,781
1890			9,740	154,570
1891				42,659
1892	115,293	$6,556	20,677	45,969
1893	265	21	16,479	41,275
1894	27,754	530	11,816	28,195
1895	64,398	899	9,953	40,407
1896	14,855	267	9,800	43,521

Imports of zinc oxide from 1885 to 1896, inclusive.

Year ending—	Dry.	In oil.	Year ending—	Dry.	In oil.
	Pounds.	*Pounds.*	December 31—	*Pounds.*	*Pounds.*
June 30, 1885	2,233,128	98,566	1891	2,839,351	128,140
December 31—			1892	2,442,014	111,190
1886	3,526,289	79,788	1893	3,900,749	254,807
1887	4,961,080	123,216	1894	3,371,292	59,291
1888	1,401,342	51,985	1895	4,546,049	129,343
1889	2,686,861	66,240	1896	4,572,781	311,023
1890	2,631,458	102,298			

Exports of zinc and zinc ore of domestic production, 1864 to 1896, inclusive.

Year ending—	Ore or oxide.		Plates, sheets, pigs, or bars.		Value of manufactures.	Total value.
	Quantity.	Value.	Quantity.	Value.		
June 30—	*Cwt.*		*Pounds.*			
1864	14,810	$116,431	95,738	$12,269	.....	$128,700
1865	99,371	114,149	184,183	22,740	.....	136,889
1866	4,485	25,091	140,798	13,290	.....	38,381
1867	3,676	32,041	312,227	30,587	.....	62,628
1868	8,344	74,706	1,022,699	68,214	.....	142,920
1869	.....	65,411	.....	.....	.....	65,411
1870	15,286	81,487	110,157	10,672	.....	92,159
1871	9,621	48,292	76,380	7,823	.....	56,115
1872	3,686	20,880	62,919	5,726	.....	26,606
1873	234	2,304	73,953	4,656	.....	6,960
1874	2,550	20,037	43,566	3,612	.....	23,649
1875	3,683	20,659	38,090	4,245	$1,000	25,904
1876	10,178	66,259	134,542	11,651	4,333	82,243
1877	6,428	34,468	1,419,922	115,122	1,118	150,708
1878	16,050	83,831	2,545,320	216,580	567	300,978
1879	10,660	40,399	2,132,949	170,654	.....	211,053
1880	13,024	42,036	1,368,302	119,264	.....	161,300
1881	11,390	16,405	1,491,786	132,805	168	149,378
1882	10,904	13,736	1,489,552	124,638	.....	138,374
1883	3,045	11,509	852,333	70,981	734	83,224
1884	4,780	16,685	126,043	9,576	4,666	30,927
1885	6,840	22,824	101,685	7,270	4,991	35,085
December 31—						
1886	26,620	49,455	917,229	75,192	13,526	138,173
1887	4,700	17,286	136,670	9,017	16,789	43,092
1888	4,560	18,034	62,234	4,270	19,098	41,402
1889	26,760	73,802	879,785	44,049	35,732	153,583
1890	77,360	195,113	3,295,584	126,291	23,587	344,991
1891	115,820	149,435	4,294,656	278,182	38,921	466,538
1892	18,380	41,186	12,494,335	669,549	166,794	877,529
1893	980	1,271	7,446,934	413,673	224,787	639,731
1894	.....	5	3,607,050	144,074	99,406	243,485
1895	480	1,008	3,060,805	153,175	50,051	204,234
1896	41,500	47,408	20,260,169	1,013,620	51,001	1,112,029

From month to month the exports of zinc ore and of spelter have been as follows, the figures showing how the movement has progressed:

Exports of zinc ore and spelter in 1896 and the first seven months of 1897.

Month.	Ore.		Spelter.	
	1896.	1897.	1896.	1897.
	Short tons.	*Short tons.*	*Pounds.*	*Pounds.*
January	5	850	251,204	13,122
February	.....	1,168	12,052	1,902,113
March	.....	.....	644,829	4,563,191
April	.....	85	388,992	4,615,547
May	.....	250	269,380	3,761,958
June	15	902	870,530	3,150,874
July	.....	629	2,706,208	3,061,757
August	210	.....	536,238	.....
September	375	.....	6,710,390	.....
October	430	.....	4,866,750	.....
November	390	.....	1,905,243	.....
December	650	.....	1,098,344	.....

The greater part of the ore is that mined in New Jersey, while the bulk of the spelter exported is common Western, shipped from the southwest Missouri-Kansas district via Galveston, Texas, and New Orleans, Louisiana, to England.

The exports of spelter from Atlantic and Gulf ports in 1896 were as follows:

Exports of spelter from Atlantic and Gulf ports in 1896.

	Pounds.	Value.
Atlantic ports.		
Baltimore	2,342,372	$120,305
Newport News	433,375	17,335
New York	4,641,645	209,752
Total Atlantic ports	7,417,392	347,392
Gulf ports.		
Brazos de Santiago	145	9
Galveston	8,041,409	453,113
Mobile	635	44
New Orleans	4,784,382	209,277
Saluria	8,240	517
Total Gulf ports	12,834,811	662,960

The exports of ore from the port of New York were 2,055 tons, valued at $46,600.

PRICES.

Opening quiet at 4 cents per pound, the spelter market showed a little more activity toward the middle of January, and the better inquiry extended into February, the market advancing to 4.10 and 4.15 cents. March, however, was very dull, and during April and May the prices gradually crumbled away until late in the latter month a little spurt in buying caused a reaction. June, however, was very dull, and July brought even lower prices, which initiated the export movement of Western spelter. August witnessed a decline to 3.65 cents, and in September, owing to a sharply restricted demand, the price declined to 3.60 cents, the lowest reached during the year. There was a slight improvement in October, followed by a rapid rise to 4.25 cents in November. This checked buying and during the whole of December the market was quiet, the expectations of a marked revival in business being rapidly dispelled.

The following table summarizes the prices of spelter since 1875:

Price of common Western spelter in New York City, 1875 to 1896, inclusive.

[Cents per pound; figures in parentheses are combination prices.]

Year.	January.		February.		March.		April.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875	6.75	6.37	6.67	6.25	6.50	6.20	(7)	6.50
1876	(7.60)	7.40	(7.75)	7.50	(7.75)	7.62	(8)	7.60
1877	6.50	6.25	6.62	6.50	6.50	6.37	6.37	6.25
1878	5.75	5.50	5.62	5.25	5.62	5.25	5.25	5
1879	4.50	4.25	4.62	4.40	4.62	4.37	4.75	4.25
1880	6.50	5.87	6.75	6.37	6.75	6.50	6.50	6.12
1881	5.25	4.87	5.25	5.12	5	4.87	5.12	4.75
1882	6	5.75	5.75	5.62	5.62	5.37	5.50	5.25
1883	4.62	4.50	4.62	4.50	4.75	4.62	4.75	4.60
1884	4.37	4.20	4.40	4.25	4.60	4.40	4.65	4.50
1885	4.50	4.12	4.30	4.25	4.30	4.12	4.30	4.12
1886	4.50	4.30	4.55	4.30	4.60	4.50	4.60	4.50
1887	4.60	4.50	4.60	4.40	4.60	4.40	4.65	4.45
1888	5.37	5.20	5.35	5.25	5.25	4.87	4.87	4.60
1889	5	5	5	4.90	4.87	4.70	4.65	4.65
1890	5.45	5.35	5.35	4.20	5.20	5	5	4.90
1891	6	5.25	5.25	5	5.10	5	5.10	4.90
1892	4.70	4.60	4.60	4.55	4.60	4.50	4.80	4.60
1893	4.35	4.30	4.30	4.25	4.25	4.20	4.50	4.30
1894	3.60	3.50	4	3.60	3.85	3.80	3.75	3.50
1895	3.35	3.20	3.20	3.10	3.20	3.15	3.30	3.25
1896	4.05	4	4.15	4	4.15	4.10	4.20	4.05

Price of common Western spelter in New York City, 1875 to 1896, inclusive—Continued.

[Cents per pound; figures in parentheses are combination prices.]

Year.	May.		June.		July.		August.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875	(7.25)	7.15	(7.25)	7.15	(7.35)	7.25	(7.25)	7.10
1876	(8)	7.75	(8)	7.25	7.25	7.12	7.25	7
1877	6.25	6	6.12	5.87	5.87	5.62	5.90	5.80
1878	5	4.62	4.62	4.25	4.75	4.50	4.87	4.50
1879	4.50	4.25	4.37	4.12	4.75	4.37	5.62	4.80
1880	6	4.62	5.50	5.12	5	4.87	5.25	4.87
1881	5	4.87	5	4.75	5	4.75	5.12	5
1882	5.62	5.25	5.37	5.25	5.37	5.12	5.50	5.12
1883	4.75	4.50	4.62	4.37	4.50	4.30	4.40	4.30
1884	4.60	4.45	4.60	4.45	4.55	4.45	4.62	4.52
1885	4.25	4.10	4.10	4	4.40	4.10	4.60	4.40
1886	4.60	4.40	4.40	4.35	4.40	4.30	4.40	4.30
1887	4.65	4.45	4.65	4.50	4.50	4.50	4.60	4.55
1888	4.65	4.60	4.60	4.50	4.55	4.50	4.87	4.50
1889	4.85	4.62	5	5	5.10	5	5.20	5.15
1890	5.45	5	5.60	5.35	5.60	5.40	5.55	5.40
1891	4.90	4.85	5.10	4.90	5.10	5.05	5.10	5
1892	4.90	4.80	4.90	4.80	4.85	4.70	4.70	4.65
1893	4.40	4.20	4.25	4.15	4.15	3.90	3.90	3.55
1894	3.55	3.45	3.50	3.40	3.50	3.45	3.45	3.40
1895	3.65	3.30	3.75	3.30	3.85	3.70	4.20	4
1896	4.15	4.00	4.15	4.00	4.10	3.90	3.90	3.65

Year.	September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1875	(7.25)	7.10	(7.40)	7.15	(7.40)	7.15	(7.40)	7.15
1876	7.12	6.80	6.75	6.62	6.62	6.37	6.50	6.37
1877	5.87	5.75	5.90	5.70	5.87	5.62	5.75	5.50
1878	4.87	4.75	4.82	4.50	4.75	4.50	4.37	4.25
1879	6	5.62	6.37	6	6.25	5.87	6.25	6
1880	5.12	4.75	5	4.87	4.90	4.65	4.75	4.65
1881	5.25	5	5.37	5.25	5.87	5.50	6	5.87
1882	5.37	5.12	5.37	5.12	5.12	4.87	4.87	4.50
1883	4.50	4.40	4.45	4.35	4.40	4.37	4.37	4.35
1884	4.62	4.50	4.55	4.40	4.40	4.30	4.25	4
1885	4.62	4.50	4.62	4.50	4.60	4.45	4.60	4.45
1886	4.40	4.25	4.30	4.25	4.30	4.25	4.50	4.35
1887	4.65	4.60	4.65	4.50	4.80	4.52	5.87	5

Prices of common Western spelter in New York City, 1875 to 1896, inclusive—Continued.

[Cents per pound; figures in parentheses are combination prices.]

Year.	September.		October.		November.		December.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1888	5.12	4.75	5.12	4.87	5.12	4.87	5.12	4.87
1889	5.15	5.10	5.15	5.10	5.25	5.05	5.35	5.30
1890	5.65	5.50	6	5.65	6.10	5.90	6	5.90
1891	5	4.85	5.15	4.95	4.90	4.75	4.75	4.65
1892	4.65	4.50	4.50	4.35	4.40	4.35	4.40	4.35
1893	3.75	3.65	3.70	3.55	3.85	3.60	3.80	3.70
1894	3.50	3.40	3.50	3.37	3.40	3.35	3.35	3.25
1895	4.35	4.15	4.20	3.90	3.80	3.45	3.50	3.40
1896	3.70	3.60	3.75	3.65	4.25	3.75	4.25	4.15

FOREIGN SPELTER PRODUCTION.

Messrs. Henry R. Merton & Co., of London, make the following report on the spelter production of Europe:

Estimate of the production of zinc in Europe.

[Long tons.]

Country.	1896.	1895.	1894.	1893.	1892.	1891.	1890.
Rhine district and Belgium	179,730	172,135	152,420	149,750	143,305	139,695	137,630
Silesia	95,875	93,620	91,145	90,310	87,760	87,080	87,475
Great Britain	25,880	29,495	32,065	28,375	30,310	29,410	29,145
France and Spain	28,450	22,895	21,245	20,585	18,662	18,360	18,240
Austria	9,255	8,355	8,580	7,560	5,020	6,440	7,135
Poland	6,165	4,960	5,015	4,530	4,270	3,760	3,620
Total	345,355	331,460	310,470	301,110	289,327	284,745	283,245

Country.	1889.	1888.	1887.	1886.	1885.	1884.	1883.
Rhine district and Belgium	134,648	133,245	130,995	129,020	129,754	129,240	123,891
Silesia	85,653	83,375	81,375	81,630	79,623	76,116	70,405
Great Britain	30,806	26,783	19,839	21,230	24,299	29,259	29,161
France and Spain	16,785	16,140	16,028	15,305	14,847	15,341	14,671
Austria	6,330	4,977	5,338	5,000	5,610	6,170	6,267
Poland	3,026	3,785	3,580	4,145	5,019	4,164	3,733
Total	277,248	268,305	257,155	256,330	259,152	260,290	248,128

The output of the works in the different districts was as follows:

Production of zinc by principal foreign producers from 1888 to 1896.

[Long tons.]

District.	1896.	1895.	1894.	1893.	1892.
Rhine district and Belgium:					
Vieille Montagne	67,500	63,545	54,030	54,305	53,770
Stolberg Co	16,715	16,385	15,170	15,135	14,950
Austro-Belge	9,810	9,855	9,595	9,855	9,720
G. Dumont & Frères	10,040	10,080	9,415	8,680	8,675
Rhein-Nassau Co	8,870	9,085	8,165	8,205	8,040
L. de Laminne	7,050	6,440	6,930	6,920	6,845
Escombrera Bleybérg	5,575	5,690	5,750	5,775	6,070
Grillo	6,320	6,195	5,615	5,625	5,550
Märk, Westf., Bergw., Ver	6,220	6,155	5,620	5,620	5,540
Nouvelle Montagne	7,695	6,815	5,290	5,290	5,240
Berzelius	5,010	5,535	5,350	5,345	5,290
Eschger Ghesquiere & Co	3,810	4,205	4,375	4,370	4,100
Société Prayon	*a* 8,000	7,330	4,110	4,250	4,085
Société de Boom	8,380	7,155	7,065	7,110	5,430
Zinkmaatshappy in Limburg	.....	.....	*a* 700	*a* 2,000	.....
Société Campine	4,770	4,200	*a* 2,810	*a* 700	.....
Schulte & Co	3,965	3,465	2,430	565	.....
Total	179,730	172,135	152,420	149,750	143,305
Silesia:					
Schlesische Actien-Gesellschaft	26,430	25,950	25,230	25,255	24,915
G. von Giesche's Erben	20,355	19,860	19,385	18,920	18,295
Herzog von Ujest	25,995	21,140	17,265	17,210	17,085
Graf H. Henckel von Donnersmarck	11,980	11,680	12,005	11,695	11,115
Graefin Schaffgotsch	.....	3,570	6,940	6,885	6,070
Graf G. Henckel von Donnersmarck	4,320	4,400	4,185	4,215	4,070
H. Roth	3,250	3,320	1,805	1,775	1,845
Wünsch	2,065	2,155	1,980	2,075	2,120
Vereinigte Königs & Laurahütte	1,340	1,400	1,270	1,170	1,230
Baron v. Horschitz'sche Erben	.....	.....	935	960	875
Fiscus	140	145	145	150	140
Total	95,875	93,620	91,145	90,310	87,760

a Estimated.

Production of zinc by principal foreign producers from 1888 to 1896—Continued.

[Long tons.]

District.	1896.	1895.	1894.	1893.	1892.
Great Britain:					
Vivian & Sons	5,120	6,970	8,005	7,060	7,791
English Crown Spelter Co., Limited	5,360	5,700	5,515	5,380	5,527
Dillwyn & Co	4,265	4,935	4,870	3,450	3,759
Swansea Vale Spelter Co.	1,665	2,375	2,380	2,105	2,063
Villiers Spelter Co	2,670	2,155	2,300	2,050	1,920
Pascoe, Grenfell & Sons.	1,320	1,680	1,455	1,260	1,080
Nenthead & Tynedale Co	640	1,775	1,870	1,855	1,600
John Lysaght, Limited.	2,790	1,805	2,915	2,760	3,000
Minera Mines	.....	.....	.....	.....	1,350
H. Kenyon & Co	550	500	505	500	500
Leeswood Co	1,500	*a* 1,600	1,750	1,495	1,720
Dynevor Co. and sundries	.....	.....	500	460	.....
Total	25,880	29,495	32,065	28,375	30,310
France and Spain:					
Asturienne	20,710	17,915	18,695	18,695	18,462
St. Amand	2,585	2,520	2,550	1,890	200
Malfidano	5,155	2,460	.....	.....	.....
Total	28,450	22,895	21,245	20,585	18,662
Austria:					
Sagór	1,310	1,080	1,225	1,360	1,475
Cilli	2,310	1,990	2,580	2,510	1,710
Siersza-Niedzieliska	4,650	4,300	4,420	3,690	3,550
Merklin	985	985	355	.....	.....
Total	9,255	8,355	8,580	7,560	6,735
Poland	6,165	4,960	5,015	4,530	4,270

a Estimated.

Production of zinc by principal foreign producers from 1888 to 1896—Continued.

[Long tons.]

District.	1891.	1890.	1889.	1888.
Rhine district and Belgium:				
Vieille Montagne	53,820	52,865	52,016	51,670
Stolberg Co	15,040	14,855	14,634	14,036
Austro-Belge	9,425	9,250	9,245	9,140
G. Dumont & Frères	8,370	8,350	8,863	8,759
Rhein-Nassau Co	8,075	7,960	7,470	7,586
L. de Laminne	6,810	6,760	6,693	6,597
Escombrera Bleyberg	5,770	5,630	5,560	4,930
Grillo	5,390	5,490	5,353	5,299
Märk, Westf., Bergw., Ver	5,600	5,485	5,805	5,537
Nouvelle Montagne	5,550	5,350	5,090	5,032
Berzelius	5,155	5,175	4,910	4,818
Eschger Ghesquiere & Co	3,840	4,065	4,303	4,137
Société Prayon	4,130	4,100	3,956	3,906
Société de Boom	2,720	2,295	*a* 750	1,798
Total	139,695	137,630	134,648	133,245
Silesia:				
Schlesische Actien-Gesellschaft	25,245	24,840	23,675	22,917
G. von Giesche's Erben	18,700	18,550	18,206	17,594
Herzog von Ujest	16,795	16,355	16,202	15,456
Graf H. Henckel von Donnersmarck	11,230	11,670	11,392	11,193
Graefin Schaffgotsch	5,310	6,265	6,405	6,402
Graf G. Henckel von Donnersmarck	3,905	4,090	3,943	4,114
H. Roth	1,730	1,750	1,660	1,555
Wünsch	1,920	1,880	1,907	1,906
Vereinigte Königs & Laurahütte	1,180	1,020	1,130	1,166
Baron v. Horschitz'sche Erben	850	830	963	935
Fiscus	215	225	170	137
Total	87,080	87,475	85,653	83,375
Great Britain:				
Vivian & Sons	7,235	6,605	6,842	6,510
English Crown Spelter Co., Limited	5,180	4,945	4,981	4,980
Dillwyn & Co	3,580	3,930	4,540	3,904

a Estimated.

Production of zinc by principal foreign producers from 1888 to 1896—Continued.

[Long tons.]

District.	1891.	1890.	1889.	1888.
Great Britain—Continued.				
Swansea Vale Spelter Co	1,840	1,615	2,161	2,150
Villiers Spelter Co	2,125	1,890	2,180	1,993
Pascoe Grenfell & Sons	1,060	1,160	1,272	1,330
Nenthead & Tynedale Co	1,440	1,530	1,507	1,516
John Lysaght, Limited	4,185	4,450	5,113	3,750
Staffordshire Knot	.....	350	1,100	150
Minera Mines	2,265	2,170	610	.....
H. Kenyon & Co	500	500	500	500
Total	29,410	29,145	30,806	26,783
France and Spain:				
Asturienne	18,360	18,240	16,785	16,140
Total	18,360	18,240	16,785	16,140
Austria:				
Sagor	1,280	1,430	1,210	1,087
Cilli	1,810	1,880	1,670	1,240
Siersza-Niedzieliska	3,350	3,825	3,450	2,650
Total	6,440	7,135	6,330	4,977
Poland	3,760	3,620	3,026	*a* 3,785

The Metallgesellschaft, of Frankfort on the Main, has compiled the following valuable table, showing the consumption of spelter in the leading countries:

Consumption of zinc, 1891 to 1896, inclusive.

Countries.	1891.	1892.	1893.	1894.	1895.	1896.
	Metric tons.	*Metric tons.*	*Metric tons.*	*Metric tons.*	*Metric tons.*	*Metric tons.*
Germany	89,469	99,672	93,575	99,766	110,895	111,360
England	80,755	73,547	75,042	75,504	83,828	94,682
France	41,418	40,783	44,721	45,421	39,667	51,483
Austria-Hungary	17,240	18,519	22,046	23,582	25,140	25,686
Italy	1,628	1,575	1,682	2,230	2,374	2,563
Belgium	39,600	42,600	42,300	48,100	47,900	48,000
Netherlands	*a* 3,600	*a* 3,600	*a* 3,600	*a* 3,600	*a* 3,600	*a* 3,600
Spain	3,611	3,613	3,500	3,320	4,633	2,439
Russia	8,521	9,438	9,600	10,800	11,670	11,463
United States	71,327	73,465	69,058	64,028	78,424	66,054
Other countries	*a* 8,000	*a* 9,500	*a* 13,000	*a* 8,000	*a* 7,000	*a* 7,000
Total consumption	365,169	376,312	378,124	384,351	415,131	424,330
Total production	362,204	372,900	378,093	380,877	416,621	425,154

a Estimated.

This shows a progressive increase, which has been particularly marked since 1893. The large consumption in some of the European countries, contrasted with our own, is notable, and is probably due principally to the more extended use of sheet zinc for building purposes.

The following statistics relative to the zinc industry of Silesia are compiled from the reports of the Oberschlesische Berg- und Hüttenmännische Verein:

Production of zinc mines of Silesia, 1888 to 1896, inclusive.

Year.	Calamine.	Blende.	Total.
	Metric tons.	*Metric tons.*	*Metric tons.*
1888	319,316	212,264	531,580
1889	325,705	246,955	572,660
1890	368,495	261,921	630,416
1891	391,891	271,277	663,168
1892	358,230	291,617	649,847
1893	348,654	287,375	636,029
1894	.....	.....	574,335
1895	273,151	267,673	540,824
1896	263,338	275,514	538,852

The total number of persons employed in mining was 10,061, to whom wages aggregating 5,588,191 marks were paid. In 1895 2,336 of the total of 10,039 employed were women.

During 1896 there were in operation 23 works, employing 7,673 persons, including 1,671 women, to whom a total of 5,357,095 marks were paid in wages, the average annual pay being 829.53 marks to men, 294.04 marks to boys, and 309.61 marks to women, equal to $190.75, $60.27, and $74.93, respectively, per annum.

The consumption of material was 272,847 tons of calamine, 237,620 tons of blende, 1,761 tons of zinc furnace accretions, and 8,423 tons of zinc dust, there being used also 1,065,063 tons of coal and 26,675 tons of fire clay. The product was 98,323 tons of spelter, 10,666 tons of cadmium, 1,113 tons of lead, valued at 29,782,274 marks.

Five works rolled sheet zinc, employing 741 persons, to whom 555,328 marks was paid in wages. With a consumption of 40,738 metric tons of spelter, the product was 39,488 tons of sheet zinc, 524 tons of lead, and 526 tons of zinc dust, the sheet zinc being valued at 12,631,852 marks.

Owing to an increase in the average price of spelter from 353.26 francs per metric ton in 1895 to 402.75 francs per metric ton in 1896, the Vieille Montagne Company has had a prosperous year. The product of crude zinc was 68,581 metric tons in 1896, as compared with 64,497 tons in 1895, and 54,839 tons in 1894. The product of sheet zinc was 66,893 metric tons in 1896, as compared with 57,000 tons in 1895 and 54,515 tons in 1894, while the output of zinc white was 8,777, 8,988, and 7,669 tons, respectively. In 1896 the gross profit was 6,328,725.89 francs, from which must be deducted for general expenses, interest, discounts, etc., 586,455.84, leaving 5,742,270.05 francs, to which is added a balance carried over of 11,201.04 francs. There was written off, on mining and smelting property, 1,631,332.18 francs. There was added to reserve 732,187.58 francs, and paid in dividends and to administrative bodies 3,382,617.22 francs. The dividends to the stockholders amounted to 2,925,000 francs for 1896, as compared with 2,250,000 francs in 1895.

The Prayon Company, after writing off 250,400.93 francs on the smelting plant, showed a profit of 274,982.09 francs for the year 1896. Out of this 175,000 francs was paid in dividends and 55,850.66 francs went to the administration and 25,000 francs to the reserve fund.

ALUMINUM.

By R. L. PACKARD.

PRODUCTION.

It is estimated that the entire production of aluminum in 1896, both in the United States and in Europe, amounted to 5,516,000 pounds, or 2,758 short tons, of which the United States produced 1,300,000 pounds, or 650 short tons. The following table shows the increase in the production of this metal in the United States from the beginning of its manufacture until 1896, from which it appears that the production of the latter year exceeds one-half of the total of the previous thirteen years:

Production of aluminum in the United States from 1883 to 1896.

Year.	Pounds.	Year.	Pounds.
1883	83	1891	150, 000
1884	150	1892	259, 885
1885	283	1893	333, 629
1886	3, 000	1894	550, 000
1887	18, 000	1895	920, 000
1888	19, 000	1896	1, 300, 000
1889	47, 468	Total	3, 662, 779
1890	61, 281		

USES.

The production referred to above, which is comparatively enormous, supplies the vastly increased demand for this interesting metal for the uses to which it is peculiarly adapted, viz, an infinity of small articles which are required to be very light and comparatively noncorrodible, and for metallurgical use in the manufacture of iron and steel. Its use is also extending for large sheets or plates for roofing and interiors, though this use has hardly yet passed the experimental stage. The market is now full of aluminum cooking utensils, small tableware, and

small articles too numerous to mention. It is used for carriages and bicycles, in ships' fittings, and is being experimented with further as sheathing for small vessels. The corrodibility of the metal has narrowed its use in certain directions. It was proposed a few years ago to make of aluminum canteens and other articles for the German army, and experiments instituted to test the action of tea, coffee, and liquors on the metal gave results which were apparently favorable to such use. The question has been opened again, and it has been maintained that liquids containing small quantities of acetic, citric, and tartaric acids, as well as tea and coffee, dissolve considerable quantities of the metal, and that soap also corrodes it. Nor is it well adapted for surgical instruments, because the antiseptics—carbolic, salicylic, and boracic acids—act readily on it.[1]

The two small vessels—a yacht and a torpedo boat—built of aluminum by the Yarrows for the French navy show after two years' use that the metal has suffered somewhat where it was unprotected by paint, and also that where it has been painted with red lead it was corroded to some extent. The officer who made the examination states that, upon the whole, the vessel had stood service well, but he recommended taking her to pieces and giving the aluminum a thorough cleansing in order to maintain her efficiency, or the deterioration would probably result in the destruction of the vessel. In portions of the deck, where the aluminum was exposed, holes had been formed so that a number of plates had to be changed. Expansion had also taken place. Of two plates riveted together, only one was generally attacked, showing that some galvanic action had taken place, due to a lack of homogeneity in the plates, which were made from different ingots. Mr. Guillemoux, the officer who made the examination, concludes, notwithstanding, that aluminum is a suitable material for seagoing vessels, and that the failures made in the past have been due to lack of knowledge of the nature and proper use of the metal, which for this purpose should be as pure as possible. Care also should be taken to prevent contact with copper, because it was found that one of the vessels examined had been in contact with the copper sheathing of others lying in the same dock, and the corrosion in that case had been increased by the galvanic action thus produced.

It is probable that the corrosion of aluminum by various liquids, and even water, is promoted by the small quantity of sodium which is sometimes present, that metal having been reduced together with the aluminum in the process of manufacture.

Soldering.—The difficulty encountered in soldering aluminum is due in great measure, according to Mr. J. C. McGuire, to the nonadhesion of the solder to the metal, owing to the high conductivity for heat possessed by aluminum, whereby when the melted solder comes in contact with

[1] Karl Bartt, in Monaten Zeitung.

it the heat is conducted away so rapidly that the solder is chilled at the contact and does not flow freely over the aluminum surface. This difficulty, he says, can be overcome to a certain extent if the aluminum is heated by an alcohol lamp or gasoline torch while the soldering is going on. The operation may be assisted by preparing the surface of the aluminum sheet chemically, or by plating it with copper and then soldering these prepared surfaces. But when copper plating is resorted to, the plating itself is apt not to adhere to the surface of the aluminum more than six or eight months, so that the two aluminum surfaces separate, not through the fault of the solder, but of the copper plating.[1]

Plating.—It is said that Prof. Charles Margot, of Geneva, has successfully electroplated aluminum with copper in the following way: He first cleans the aluminum with a solution of an alkaline carbonate and washes it thoroughly, then dips it in a 5 per cent solution of hydrochloric acid, and washes again. The article so prepared is then placed in a weak, slightly acid, solution of sulphate of copper, which gives it a preliminary coating of copper, when it is again washed and placed in the electrolytic bath.

Alloys.—An interesting and valuable addition to the knowledge of the nature of aluminum bronze is given in a paper read before the New York meeting of the American Society of Mechanical Engineers by Mr. Leonard Waldo. Mr. Waldo brings forward certain facts which indicate that there is a chemical combination between aluminum and copper in aluminum bronze. Some of these are reproduced here.

1. Under favorable conditions well-developed crystals showing fixity of chemical composition and perfect regularity of form are found in the ingot metal. (It is to be regretted that Mr. Waldo does not state to what system the crystals belong.)

2. There is evidence of intense chemical action on adding molten aluminum to molten copper. The evolution of heat causes the mass to rise to whiteness with free evolution of gases.

3. The compound resists chemical action to which one of its constituents will sometimes yield.

4. When the various parts of a mass of aluminum bronze are examined by chemical analysis and optically with the microscope, it is found that every part of the solid mass is identical in its chemical composition, and at no point is there any appearance of liquation or any free aluminum.

5. Unlike ordinary copper alloys, aluminum bronze preserves its identity up to the melting point. It does not become red short, but can be forged to a knife edge at a bright-red heat, and at this temperature shows no tendency to "sweat" its aluminum or to otherwise change its chemical relations. The melting points of those compounds corre-

[1] Paper read before the N. A. M. E. Society.

sponding to Cu_4Al and Cu_8Al are nearly identical (1,030° C.=1,886° F.—Le Verrier).

The result of this chemical union is the strongest of copper compounds or alloys. Wire is readily drawn from it with a tensile strength of 180,000 pounds per square inch. Mr. Waldo is of the opinion that it is within the range of possibility that, as the effects of small percentages of silicon and other agents are better known, cold-drawn aluminum bronze may be made which shall approach the highest attainments of special steels, at least in their untempered states. He adds that there are points in which aluminum bronze seems mechanically superior to any steel. It can not at present be tempered, but does not seem to show any change in the nature of its crystallization under stress or shock. Thin, soft ribbon may be indefinitely coiled and uncoiled or run over rollers; a bar may be struck indefinitely upon one end; a rifle firing pin was struck over 120,000 blows without apparently changing its molecular condition. Cartridges of this bronze, made for the new small-caliber low-trajectory rifle, charged with smokeless powder, were fired more than ninety consecutive times for a fire test. Mr. Waldo refers to the noncorrosiveness of the bronze and its low electric potential as fitting it for acid industrial works or water-tube boilers and condensers. He gives tables showing the great serviceability of seamless tubes of aluminum bronze at high temperatures compared with tubes of brass and Swedish open-hearth steel.

IMPORTS.

In the following tables will be found the statistics of the imports of aluminum into the United States from 1870 to 1896:

Aluminum imported and entered for consumption in the United States from 1870 to 1890.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
	Pounds.			*Pounds.*	
June 30, 1870	.....	$98	June 30, 1881	517.10	$6,071
1871	.....	341	1882	566.50	6,459
1873	2	2	1883	426.25	5,079
1874	683	2,125	1884	595	8,416
1875	434	1,355	1885	439	4,736
1876	139	1,412	Dec. 31, 1886	452.10	5,369
1877	131	1,551	1887	1,260	12,119
1878	251	2,978	1888	1,348.53	14,086
1879	284.44	3,423	1889	998	4,840
1880	340.75	4,042	1890	2,051	7,062

Imports of crude and manufactured aluminum from 1891 to 1896.

Calendar year.	Crude.		Leaf.		Manufactures.	Total value.
	Pounds.	Value.	Packs of 100.	Value.		
1891	3,922	$6,266	10,033	$1,135	$1,161	$8,562
1892	43	51	14,540	1,202	1,036	2,289
1893	7,816	4,683	18,700	1,903	1,679	8,265
1894	5,306	2,514	10,780	1,210	386	4,110
1895	25,294	7,814	6,610	646	1,841	10,301
1896	698	591	4,657	523	2,365	3,479

BAUXITE.

This raw material for aluminum, in so far as produced in the United States, came from Georgia and Alabama in the following quantities, from the well-established mines referred to in previous volumes:

Production of bauxite in the United States from 1889 to 1896, by States.

Calendar year.	Georgia.	Alabama.	Total.
	Long tons.	*Long tons.*	*Long tons.*
1889	728	.....	728
1890	1,850	.....	1,850
1891	3,300	600	3,900
1892	2,000	7,200	9,200
1893	2,315	6,764	9,079
1894	2,005	9,016	11,021
1895	3,756	13,313	17,069
1896	7,313	11,051	18,364

QUICKSILVER.

PRODUCTION.

The production of quicksilver in the year 1896 amounted to 30,765 flasks (of 76½ pounds each), valued at $1,075,449. This is a considerable decline from 1895. As usual, California furnished the bulk of the product, and there was a slightly increased amount from Oregon.

The details are shown in the following tables:

Total product of quicksilver in the United States.

[Flasks of 76½ pounds, net.]

Year.	New Almaden.	New Idria.	Redington.	Sulphur Bank.	Great Western.	Napa Consolidated.
1850	7,723	.....	.....	.....	.....	.....
1851	27,779	.....	.....	.....	.....	.....
1852	15,901	.....	.....	.....	.....	.....
1853	22,284	.....	.....	.....	.....	.....
1854	30,004	.....	.....	.....	.....	.....
1855	29,142	.....	.....	.....	.....	.....
1856	27,138	.....	.....	.....	.....	.....
1857	28,204	.....	.....	.....	.....	.....
1858	25,761	.....	.....	.....	.....	.....
1859	1,294	.....	.....	.....	.....	.....
1860	7,061	.....	.....	.....	.....	.....
1861	34,429	.....	.....	.....	.....	.....
1862	39,671	.....	444	.....	.....	.....
1863	32,803	.....	852	.....	.....	.....
1864	42,489	.....	1,914	.....	.....	.....
1865	47,194	(a)	3,545	.....	.....	.....
1866	35,150	6,525	2,254	.....	.....	.....
1867	24,461	11,493	7,862	.....	.....	.....
1868	25,628	12,180	8,686	.....	.....	.....
1869	16,898	10,315	5,018	.....	.....	.....
1870	14,423	9,888	4,546	.....	.....	.....
1871	18,568	8,180	2,128	.....	.....	.....

a Production from 1858 to 1866 was 17,455 flasks; no yearly details obtainable; they are in the product of "various mines."

Total product of quicksilver in the Unitad States—Continued.

[Flasks of 76½ pounds, net.]

Year.	New Almaden.	New Idria.	Redington.	Sulphur Bank.	Great Western.	Napa Consolidated.
1872	18,574	8,171	3,046	.....	.....	.....
1873	11,042	7,735	3,294	.....	340	.....
1874	9,084	6,911	6,678	573	1,122	.....
1875	13,648	8,432	7,513	5,372	3,384	.....
1876	20,549	7,272	9,183	8,367	4,322	573
1877	23,996	6,316	9,399	10,993	5,856	2,229
1878	15,852	5,138	6,686	9,465	4,963	3,049
1879	20,514	4,425	4,516	9,249	6,333	3,605
1880	23,465	3,209	2,139	10,706	6,442	4,416
1881	26,060	2,775	2,194	11,152	6,241	5,552
1882	28,070	1,953	2,171	5,014	5,179	6,842
1883	29,000	1,606	1,894	2,612	3,869	5,890
1884	20,000	1,025	881	890	3,292	4,307
1885	21,400	1,144	385	1,296	3,469	3,506
1886	18,000	1,406	409	1,449	1,949	5,247
1887	20,000	1,890	673	1,490	1,446	5,574
1888	18,000	1,320	126	2,164	625	5,024
1889	13,100	980	812	2,283	556	4,590
1890	12,000	977	505	1,608	1,334	3,429
1891	8,200	792	442	1,375	1,844	4,454
1892	5,563	848	728	1,393	5,867	5,680
1893	6,614	869	1,012	1,200	3,187	6,120
1894	7,235	1,005	1,200	348	5,341	4,930
1895	7,050	1,100	163	2,703	5,023	5,400
1896	6,200	1,335	1,906	1,236	2,303	5,000
Total	957,221	137,215	105,204	92,938	84,287	95,417

Year.	Great Eastern.	Mirabel.	Ætna.	Altoona.	Abbott.	Various mines.	Total yearly production of California mines.
1850	.....	.....	.....	.....	.....	.....	7,723
1851	.....	.....	.....	.....	.....	.....	27,779
1852	.....	.....	.....	.....	.....	4,099	20,000
1853	.....	.....	.....	.....	.....	.....	22,284
1854	.....	.....	.....	.....	.....	.....	30,004
1855	.....	.....	.....	.....	.....	3,858	33,000
1856	.....	.....	.....	.....	.....	2,862	30,000
1857	.....	.....	.....	.....	.....	.....	28,204
1858	.....	.....	.....	.....	.....	5,239	31,000
1859	.....	.....	.....	.....	.....	11,706	13,000

Total product of quicksilver in the United States—Continued.

[Flasks of 76½ pounds, net.]

Year.	Great Eastern.	Mirabel.	Ætna.	Altoona.	Abbott.	Various mines.	Total yearly production of California mines.
1860	.....	.....	.....	.....	.....	2,939	10,000
1861	.....	.....	.....	.....	.....	571	35,000
1862	.....	.....	.....	.....	.....	1,885	42,000
1863	.....	.....	.....	.....	.....	6,876	40,531
1864	.....	.....	.....	.....	.....	3,086	47,489
1865	.....	.....	.....	.....	.....	2,261	53,000
1866	.....	.....	.....	.....	.....	2,621	46,550
1867	.....	.....	.....	.....	.....	3,184	47,000
1868	.....	.....	.....	.....	.....	1,234	47,728
1869	.....	.....	.....	.....	.....	1,580	33,811
1870	.....	.....	.....	.....	.....	1,220	30,077
1871	.....	.....	.....	.....	.....	2,810	31,686
1872	.....	.....	.....	.....	.....	1,830	31,621
1873	.....	.....	.....	.....	.....	5,231	27,642
1874	.....	.....	.....	.....	.....	3,388	27,756
1875	412	.....	.....	.....	.....	11,489	50,250
1876	387	.....	.....	.....	.....	22,063	72,716
1877	505	.....	.....	.....	.....	20,101	79,395
1878	1,366	.....	.....	.....	.....	17,361	63,880
1879	1,455	.....	.....	.....	.....	23,587	73,684
1880	1,279	.....	.....	.....	.....	8,270	59,926
1881	1,065	.....	.....	.....	.....	5,812	60,851
1882	2,124	.....	.....	.....	.....	1,379	52,732
1883	1,669	.....	.....	.....	.....	185	46,725
1884	332	.....	.....	.....	.....	1,186	31,913
1885	446	.....	.....	.....	.....	427	32,073
1886	735	.....	.....	.....	.....	786	29,981
1887	689	1,543	.....	.....	.....	520	*a* 33,825
1888	1,151	3,848	.....	.....	.....	992	33,250
1889	1,345	1,874	.....	.....	.....	924	26,464
1890	1,046	1,290	.....	.....	.....	737	22,926
1891	1,660	1,686	.....	.....	.....	2,451	22,904
1892	1,630	3,208	1,592	.....	672	812	27,993
1893	1,445	5,211	3,795	.....	133	578	30,164
1894	1,368	4,214	3,575	.....	1,200	.....	30,416
1895	1,813	3,900	3,300	3,926	1,223	466	36,067
1896	1,126	1,114	3,800	4,205	1,200	1,340	30,765
Total	25,048	27,888	16,062	8,131	4,428	189,946	1,743,785

a Includes 65 flasks from Oregon.

QUICKSILVER IN NEW SOUTH WALES.

In the annual report of the department of mines of New South Wales, Mr. Joseph E. Carne, geological surveyor, makes the following statement regarding the recent discovery of cinnabar on Yulgilbar Station, Clarence River, New South Wales:

The country at the cinnabar deposit consists of hornblende granite, felsite, and augite-diorite, while in the immediate neighborhood serpentine is largely developed. The special feature of the most important mercury mines of the world, viz, associations of igneous rocks with sedimentary strata, is absent in the present case. So far as yet proved, the mercury ore is confined to the igneous rocks. Two shafts have been sunk, 20 feet and 50 feet, respectively, and prospecting operations have begun.

Associated with the cinnabar is an almost tin-white material, weathering bronze, containing copper, antimony, and sulphur. The copper carbonates, which occur in small quantity in the upper levels, have resulted from the oxidation of this mineral. A complete analysis of the mixed ore has been made, with the following results:

Chemical composition of cinnabar discovered on Yulgilbar Station, New South Wales.

	Per cent.
Metallic mercury	43.68
Metallic copper	6.87
Metallic antimony	4.44
Metallic arsenic	Trace.
Metallic iron	.45
Alumina	Trace.
Lime (CaO)	1.26
Magnesia (MgO)	.21
Gangue (*a*)	30.46
Sulphur	11.46
Carbonic acid	.44
Moisture at 100° C	.25
Total	99.52

a Chiefly silica.

Fine silver at the rate 9 oz. 6 dwt. 4 gr. per ton.
Fine gold a trace (under 2 dwt.).
No tellurium or selenium detached.

MANGANESE ORES.

By John Birkinbine.

INTRODUCTION.

In reviewing the production, value, and uses of ores of manganese and of other ores containing sufficient percentages of this metal to entitle them to be considered manganiferous, the classification heretofore adopted in these reports will be practically followed; but as the collection of data for manganese and iron ores now passes through the same office some changes, which will be apparent to the reader, have been made, owing primarily to an effort to eliminate duplications of statistics. However, to conform to the general arrangement of previous reports, the figures showing the production of manganiferous iron ores are given in this report, in connection with an explanation that these also appear in the statistics of iron ores.

For a description of the commercial ores of manganese and of the usual methods of their occurrence, and for a general résumé of mining localities in the United States and a statement of the principal uses of manganese, the reader is referred to the report of the late Joseph D. Weeks upon the "Production of manganese ores in 1894."[1]

Information concerning the available or workable deposits of manganese ore in foreign countries will be found in the report referred to, and also in that of the succeeding year, 1895. To supplement these data, excerpts have been made from some later publications concerning deposits in the United States of Colombia, Cuba, Canada, Spain, and in some portions of the United States.

The figures showing production in foreign countries are subject to the criticism that some of the material credited as manganese ore should more properly be rated as manganiferous iron ore, when considered from a commercial standpoint; but it has not been practicable to definitely determine the facts in this connection within the limited time that the data have been in hand.

[1]Sixteenth Annual Report of the Director of the United States Geological Survey, Part III, Mineral Resources of the United States, pp 389-394.

PRODUCTION OF MANGANESE ORES.

Ores of manganese were produced in seven States in the year 1896, the total mined being 10,088 long tons, valued at $90,727, or $8.99 per ton. This total, which embraces only the ores extracted from the earth and marketed as manganese ores, represents a slight increase over the previous year's output of 9,547 long tons, a gain of 541 long tons, or 5.67 per cent.

A satisfactory demand for manganese ore at apparently remunerative prices has prevailed throughout the country, but the uncertain character of the deposits as to quantity and quality, and in some instances distance from or inaccessibility to market, has prevented active exploitation of domestic manganese resources, and the greater portion of the supply for the United States was obtained from foreign countries, principally Russia, Chile, Japan, Turkey, and Cuba.

The amounts and values of manganese ores produced in various portions of the United States in 1895 and 1896 are shown below:

Amounts and values of manganese ores produced in the United States in 1895 and 1896.

State.	1895.			1896.		
	Product.	Value.	Value per ton.	Product.	Value.	Value per ton.
	Long tons.			*Long tons.*		
Arkansas	2,991	$20,997	$7.09	3,421	$36,686	$10.72
California	525	5,400	10.29	284	3,415	12.02
Georgia	3,856	27,416	7.11	4,085	27,032	6.62
North Carolina	0	0	0	2	17	8.50
Pennsylvania	460	2,300	5.00	265	1,988	7.50
Virginia	1,715	15,656	9.13	2,018	21,485	10.65
West Virginia	0	0	0	13	104	8.00
Total	9,547	71,769	*a* 7.52	10,088	90,727	*a* 8.99

a Average.

This statement can be supplemented by another indicating the annual production of manganese ores in the United States from 1880 to 1896, the output of the three principal producing States being reported separately, while the product of the other States is consolidated:

Production of manganese ores in the United States from 1880 to 1896.

[Maxima are given in italics.]

Year.	Virginia.	Arkansas.	Georgia.	Other States.	Total.	Total value.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	
1880	3,661	.....	1,800	300	5,761	$86,415
1881	3,295	100	1,200	300	4,895	73,425
1882	2,982	175	1,000	375	4,532	67,980
1883	5,355	400	.....	400	6,155	92,325
1884	8,980	800	.....	400	10,180	122,160
1885	18,745	1,483	2,580	450	23,258	190,281
1886	*20,567*	3,316	6,041	269	30,193	277,636
1887	19,835	5,651	*9,024*	14	*34,524*	*333,844*
1888	17,646	4,312	5,568	1,672	29,198	279,571
1889	14,616	2,528	5,208	1,845	24,197	240,559
1890	12,699	5,339	749	*6,897*	25,684	219,050
1891	16,248	1,650	3,575	1,943	23,416	239,129
1892	6,079	*6,708*	826	.....	13,613	129,586
1893	4,092	2,020	724	882	7,718	66,614
1894	1,797	1,934	1,277	1,300	6,308	53,635
1895	1,715	2,991	3,856	985	9,547	71,769
1896	2,018	3,421	4,085	564	10,088	90,727
Total	160,330	42,828	47,513	18,596	269,267	2,634,706

PRODUCTION OF MANGANIFEROUS IRON ORES.

In the Lake Superior region the iron ores obtained from some of the mines carry manganese (usually from 3 to 8 per cent), and as has been the custom heretofore, mention is made of the amount of such manganiferous iron ores produced in 1896, although these, being more properly classed as iron ores, are included in the iron ore report for 1896.

In Colorado there is a considerable output of manganiferous iron ore and manganiferous silver ore obtained from the silver mines, principally valuable on account of fluxing properties. In 1896, however, 9,072 tons of ore, carrying from 22.25 to 35.05 per cent of manganese, were mined and used by the Colorado Fuel and Iron Company and the Illinois Steel Company for the manufacture of spiegeleisen. This amount is considered strictly as a manganese ore, the balance of Colorado's output, which carries manganese in smaller ratio, being ac-

counted for in the report on the production of iron ores. There was also reported a small amount of manganiferous silver ore mined in Montana, which is included in the total of this class of ore; but it was found impracticable to separate the manganiferous silver ores containing 20 per cent and over of manganese, from those containing under 20 per cent, and these have therefore been grouped together.

The following table shows the reported production of manganiferous iron ores in the United States in 1896:

Production of manganiferous iron ores in the United States in 1896.

Locality.	Product.	Per cent of manganese.	Average value per ton.	Total value.
	Long tons.			
Colorado	9,072	22.25 to 35.05	$4.20	$38,069
Lake Superior region	329,640	3.1 to 7.44	2.09	688,344
Total	338,712	3.1 to 35.05	2.14	726,413

The table which follows shows the total production of manganiferous iron ores in the United States and their reported value for each year from 1889 to 1896:

Total production of manganiferous iron ores in the United States from 1889 to 1896.

[Maxima in italics.]

Year.	Total product.	Total value.	Average value per ton.
	Long tons.		
1889	83,434	$271,680	$3.26
1890	61,863	231,655	*3.74*
1891	132,511	314,099	2.37
1892	153,373	354,664	2.31
1893	117,782	283,228	2.40
1894	205,488	408,597	1.99
1895	125,729	233,998	1.86
1896	*338,712*	*726,413*	2.14

PRODUCTION OF MANGANIFEROUS SILVER ORES.

The total production of manganiferous silver ores in the United States, with the approximate content of manganese and the average value per ton, for each year for which returns have been received, from 1889 to 1896, is given below:

Production of manganiferous silver ores in the United States from 1889 to 1896.

[Maxima in italics.]

Year.	Containing 20 per cent and over.	Containing less than 20 per cent.	Total.	Total value.	Average value per ton.
	Long tons.	*Long tons.*	*Long tons.*		
1889	9,987	55,000	64,987	$227,455	$3.50
1890	7,826	44,014	51,840	181,440	3.50
1891	19,560	59,951	79,511	397,555	5.00
1892	17,047	45,262	62,309	323,794	*5.20*
1893	12,642	*a* 43,320	*a* 55,962	258,695	4.75
1894	12,460	*b* 19,227	*b* 31,687	148,292	4.84
1895	11,789	42,374	54,163	229,651	4.24
1896	.....	.....	*138,079*	*416,020*	3.01

a Including 1,500 tons from Montana for which no value is given.
b Including 1,049 tons from Montana for which no value is given.

PRODUCTION OF MANGANIFEROUS ZINC ORES.

Some of the zinc ores obtained in New Jersey carry considerable percentages of iron and manganese. In treating these ores for the production of zinc oxide they are roasted, the resulting clinker being utilized as an ore for the production of spiegeleisen or manganiferous pig iron.

In the following table will be found a statement of the product of the manganiferous zinc ores in the United States, their aggregate value, and the average value per ton, as reported for each year from 1889 to 1896:

Product of manganiferous zinc ores in the United States from 1889 to 1896.

[Maxima in italics.]

Year.	Quantity.	Value.	Average value per ton.
	Long tons.		
1889	43,648	$54,560	$1.25
1890	*48,560*	*60,700*	1.25
1891	38,228	57,432	*1.50*
1892	31,859	25,937	.81
1893	37,512	30,535	.81
1894	26,981	20,464	.76
1895	43,249	24,451	.57
1896	44,953	20,455	.46

PRODUCTION OF ALL CLASSES OF MANGANESE ORES.

On the basis of the classification and statistics herein indicated, therefore, the total production of manganese and of manganiferous ores in the United States in 1896 may be summarized as follows:

Production of manganese and manganiferous ore in the United States in 1896.

Kinds of ore.	Quantity.	Value.	Average value per ton.
	Long tons.		
Manganese ore	10,088	$90,727	$8.99
Manganiferous iron ore	338,712	726,413	2.14
Manganiferous silver ore	138,079	416,020	3.01
Manganiferous zinc ore	44,953	20,455	.46
Total	531,832	1,253,615	a 2.36

a Average.

IMPORTS.

The following table shows the amount of manganese, including both that classed as manganese ore and that classed as oxide of manganese, imported and entered for consumption into the United States in the years 1889 to 1896, these imports being for calendar years:

Manganese imported and entered for consumption into the United States, 1889–1896.

Year.	Ore.		Oxide of.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
1889	4,135	$72,391	151	$6,000
1890	33,998	509,704	156	7,196
1891	28,624	371,594	201	9,024
1892	58,364	830,006	208	10,805
1893	67,717	860,832	396	19,406
1894	a 44,655	432,561	.....	.....
1895	a 86,111	747,910	.....	.....
1896	a 31,489	250,468	.....	.....

a Not classified as ore and oxide.

Comparison of the annual production of domestic manganese ores with the quantities imported from foreign countries indicate the extent to which this country is dependent upon foreign ores and the relatively small domestic output. This will appear from the following table, indicating the quantities of domestic manganese ores produced and the foreign manganese ores imported and entered for consumption in the United States for each year from 1889 to 1896, both inclusive, together

with the aggregate value of the annual production or importation. In the figures for imported ores those classed as manganese ores and those designated as oxide of manganese are combined, although they were separately reported prior to 1894, but the manganiferous iron ores are not included.

Relative quantities and values of domestic and imported manganese ores from 1889 to 1896.

Year	Domestic production.		Foreign imports.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
1889	24,197	$240,559	4,286	$78,391
1890	25,684	219,050	34,154	516,900
1891	23,416	239,129	28,825	380,618
1892	13,613	129,586	58,572	840,811
1893	7,718	66,614	68,113	880,238
1894	6,308	53,635	44,655	432,561
1895	9,547	71,769	86,111	747,910
1896	10,088	90,727	31,489	250,468
Total for 8 years	120,571	1,111,069	356,205	4,127,897
Average for 8 years	15,071	138,884	44,526	515,987

FERROMANGANESE AND SPIEGELEISEN.

Ores of manganese are used liberally in the manufacture of ferromanganese and spiegeleisen, commercial ferromanganese generally containing 60 per cent or more of manganese, the other constituents varying considerably according to the quality of the ores from which they are produced; but an average analysis of 80 per cent ferromanganese is given by the American Manufacturer as follows:

Average composition of 80 per cent ferromanganese.

	Per cent.
Manganese	80
Carbon	5
Silicon	.50
Iron	14.25
Phosphorus	.20
Sulphur	.05
Total	100

Spiegeleisen, or manganiferous pig iron, differs from ferromanganese in that the iron content predominates over the manganese content. In spiegeleisen the metallic iron usually ranges from 60 to 75 per cent,

metallic manganese from 12 to 20 per cent, carbon between 2 and 4 per cent, while sulphur should not run over 0.05 per cent, and the smaller the percentage of phosphorus the better.

The price of ferromanganese and of spiegeleisen is governed primarily by the percentage of manganese contained therein, provided, of course, the other constituents are in the proper proportion. The carbon content has little influence, although high carbon is usually desirable; the metallic iron and phosphorus contents are, however, important.

The amount of high-grade ferromanganese made in this country in the year 1896 and exported amounted to about 10,000 long tons.

OCCURRENCE OF MANGANESE ORES.

Data concerning the occurrence of manganese in the various States, and also in other countries, will be found in the reports of the late Joseph D. Weeks for the years 1885 to 1895, inclusive. To supplement these, some facts contributed by those familiar with manganese deposits are presented, with proper credit to the several writers cited. In discussing future possible discoveries of these ores it is well to remember that with the doubtful exception of tin ore, the search for ores of manganese may probably be credited with a greater proportion of disappointments, as compared with the number of efforts at exploration or of the tonnage produced, than that for any other of the baser minerals. A blossom or surface discoloration, or lumps of greater or less size containing manganese, have led to many attempts to find bodies of the mineral of merchantable quality, and considerable amounts of this ore, some of it of very satisfactory quality, have been obtained from widely scattered portions of the country. But the uncertainties of the deposits of manganese as to quantity, the damaging influence of small percentages of phosphorus on the value of the ore, and the discount which is demanded on account of excess of silica have prevented the exploitation of any deposits except either such as furnish rich and pure ores, or those which are convenient to a market. The writer can designate localities where the indications of obtaining ore in quantity carrying a comparatively high percentage of manganese are most favorable, and yet the deposits are unproductive, or wrought but moderately, because the phosphorus content places the material beyond the limit of profit at the present price. If the component of manganese was the only desideratum there are a number of known deposits which would be utilized, but the Bessemer-steel industry, being the largest user of manganese ores, limits the price paid per unit of manganese in the ores by a discount because of phosphorus in excess of a designated amount,[1] and ores of lower percentages of phosphorus are similarly discounted on account of the excess of silica.

[1] Seventeenth Ann. Rept. U. S. Geol. Survey, Part III, Mineral Resources, p. 192.

PRODUCTION OF MANGANESE ORES, BY STATES AND COUNTRIES.

ALABAMA.

For the description of the Alabama manganese deposits, which have been wrought to a limited extent, if at all, we are indebted to Mr. Henry McCalley of the Alabama geological survey. The black oxide or peroxide of manganese (pyrolusite) and the brown oxide or hydrated sesquioxide (manganite) are the only ores of manganese which are found in Alabama in sufficient quantity to be of commercial value, and it is sometimes difficult to decide to which of these oxides an ore belongs. These ores are found in many places in the State in small quantities, but seldom appear in workable quantity. The manganese ores are intimately associated with the limonites, occurring in irregular pockets, or as masses, bowlders, lumps, nodules, and gravels in a residual loam; also as stratified seams; but they are confined to the same localities and geological horizons as the limonites. In fact the manganese ores are nearly always accompanied by limonite, and the same stratum that in one place is a limonite, in another is a manganese oxide. It is often still more intimately associated; an ore may prove to be a ferruginous manganese, or a manganiferous limonite, according to whether the manganese or iron is in excess. It also occurs in veins and streaks through sandstones, quartzites, and chert bowlders, and as a cementing material in a breccia of these rocks, just as do the limonites.

The principal known manganese deposits are in Cleburne County, at the top of the Weisner (Chilhowee) group (lower Cambrian), in Etowah and Blount counties near the bottom and top of the Fort Payne chert (lower Carboniferous), and in Cherokee County, in the Siliceous (Knox) dolomite and chert group (lower Silurian). One or two of the Cleburne County deposits have been worked, and one, which appears to have been exhausted, doubtless furnished all of the manganese ore that has been shipped from Alabama, reported to be about 75 tons. The other worked deposit in Cleburne County has been dug into to a considerable extent, though none of its ore is known to have been shipped from the State. Some of the diggings had a fine showing of ore, while others indicated but little. The principal operation, when last visited in 1889, had on the dump from 25 to 30 tons of ore said to carry 58 per cent of manganese oxide, though a fair average sample analyzed by Mr. J. L. Beeson showed the following contents:

Analysis of manganese ore from Cleburne County, Alabama.

	Per cent.
Manganese peroxide	62.554
Ferric oxide	9.643
Silicia	*a* 3.670

a Phosphorus appears to have been neglected in this determination.

The ore of this deposit is in a stratified layer of bowlders and gravels, with some intermixed bowlders of quartzite, in a red, sandy loam. The ore of some of the other diggings is not nearly so pure, and is said to carry less than 25 per cent of manganese peroxide. It is a "rough ore" (rocky ore), or occurs in streaks and splotches in bowlders of quartzite.

The principal manganese deposits of Etowah and Blount counties are near the bottom and top of the Fort Payne chert of Murphrees Valley. These deposits were described in the Murphrees Valley report, from which an extract was taken by Mr. Weeks in his report on "The production of maganese in 1894." They occur for a distance of some 5 miles along the top and northwest slope of West Red Mountain, but are not continuous, occurring only at intervals along the strike of the rocks. There is no doubt that they in the aggregate carry a large quantity of ore, but it is equally certain that most of this ore is very impure, or is either rocky or dirty. In a general way that in the lower strata of the Fort Payne chert is, for the most part, in irregular strings and splotches in hard bedded chert, and that in the upper strata, so far as can be seen, is principally a soft, smutty powder mixed with surface soil. Many of the former deposits, however, carry bowlders and nodules of very pure ore, and several of them show pure stratified ore in seams from 1 foot to over 3 feet thick. The latter deposits also show some pure ore in seams and as hard gravels and small nodules. Many shallow test pits have been sunk into these deposits, but they have not been tested sufficiently to determine whether the ore can be worked commercially. The soft, smutty ore, occurring as a fine powder and small gravels in the surface soil, makes a big showing a few miles north of Piedmont, in Cherokee County. The principal known manganese deposit in Cherokee County, however, is in the siliceous (Knox) dolomite and chert group, some 6 miles to the northwest of Piedmont. The ore crops out as large bowlders, associated with limonite and bauxite. It has never been tested to show its extent or quality, though it is seemingly in considerable quantity and of good quality.

Many of the limonite deposits of the State carry more or less pure manganese ore in irregular veins, crusts, and small pockets, and many of the limonites, especially those at the top of the Weisner (Chilhowee) quartzites, are more or less manganiferous.

CALIFORNIA.

In California a small amount of high-grade manganese ore is obtained for use in the manufacture of chlorine gas, the following

table showing the total amount mined annually from 1874 to 1896, inclusive:

Total production of manganese ores in California to December 31, 1896.

Year.	Tons.	Year.	Tons.
1874 to 1888	6,000	1894	278
1889	53	1895	525
1890	386	1896	284
1891	705	Total	8,631
1892	.....		
1893	400		

COLORADO.

According to a statement made by Mr. R. C. Hills, geologist, of the United States Geological Survey, Denver, Colorado, there is no commercially valuable ore of manganese, except the oxide, in Colorado, but rhodocrosite and rhodonite are abundantly disseminated throughout the metal-mining regions.

There are a number of silver mines in this State the ores of which, while not carrying a sufficiently high percentage of precious metals to make the product specially valuable on that account, are, by reason of their associated manganese and iron contents, used as a flux in the smelters, and some of the richer manganese ores are also utilized by the steel works at Chicago, Illinois, and Pueblo, Colorado, in the manufacture of spiegeleisen.

The ores used for the latter purpose showed the following range of composition:

Analyses of Colorado manganese ores used for the manufacture of spiegeleisen.

	1.	2.	3.	4.	5.	6.	7.
Manganese:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent*
Minimum	31.25	22.25	31.30	18.15	26.35	26.40	14.15
Maximum	35.05	25.75	37.90	23.15	33.20	28.30	21.85
Average	33.14	23.52	36.70	19.96	29.96	27.30	19.60
Iron, average	17.05	26.99	8.30	23.70	23.80	22.75	29.70
Silica	7.97	4.31	11.70	10.55	6.75	6.50	10.60
Phosphorus	.061	.060	.053	.047	.033	.115	.052
Lime	1.18	1.55	3.25	1.14	.68	1.84	1.84
Alumina	1.32	1.21	3.50	3.25	1.49	1.53	2.25
Magnesia	.79	.97	1.15	1.06	.45	.85	1.15
Sulphur	.....	.....	.12	.23	.096	.090	.15
Zinc	1.80	.....	2.10	.....	.....	2	.90
Lead	.....	.....	.30	.....	.....	.15	.....
Moisture	14.80	14.96	16.10	12	12.60	14.10	14.28

The ores used for making spiegel are paid for on the basis of an average sample dried at 212° F., analyzing 30 per cent of metallic manganese, 18 per cent metallic iron, and 0.055 per cent phosphorus, for which a basis price is paid per ton at Leadville, with additions as follows per ton of ore:

Value of manganese ores per unit per ton.

	Cents.
For each per cent of metallic manganese over 30 per cent	8
For each per cent of metallic iron over 18 per cent	4
For each per cent of moisture under 12 per cent	3

Deductions to be made as follows:

For each per cent of metallic manganese under 30 per cent	8
For each per cent of metallic iron under 18 per cent	4
For each per cent of moisture over 12 per cent	3
For each per cent of zinc or any fraction thereof over 2 per cent	1
For each 0.001 per cent of phosphorus over 0.055 per cent	1

Of the total amount of manganiferous iron ores produced in Colorado in 1896, but 9,072 tons were used in the production of spiegeleisen, and the balance, 137,597 tons, were classed, as in previous reports, as manganiferous silver ores. They are, however, more strictly iron ores than manganese ores, and, while mentioned here, are also included in the total production of Colorado as iron ores.

The following analyses of manganiferous silver ores have been obtained from various sources, and indicate the wide range in the percentages of manganese and iron carried by the various ores:

Analyses of Colorado manganiferous silver ores.

Name of mine.	Manganese.	Iron.	Silica.	Silver, per ton of ore.
	Per cent.	*Per cent.*	*Per cent.*	*Ounces.*
Grey Eagle	29.65	18.1	11.4	7.5
Do	27.3	17	13.3	6
Do	23.25	25.1	7.42	11.55
Do	27.5	20.6	8.6	.....
Dunkin	7.4	45.5	8.4	7.7
Do	8.9	43.1	12.5	.....
Maid of Erin	11.2	39.4	6.2	4.5
Do	16.8	33.2	9.8	4.6
Do	22.5	28.6	9.4	5.7
Do	14.6	38.2	7.6	3.2
Do	19.5	36.6	5.2	2.7
Little Chief	17.8	32.15	8.3	8.9
Do	15.3	39.9	6.3	.....
Castle View	20	27.5	7.42	6.1
Do	24.9	26.5	4	1.55
Do	25.4	26.1	4.7	1.2
Do	21.6	27.4	7.9	.....
Yankee Doodle	13.1	28.5	14.3	6.7

Analyses of Colorado manganiferous silver ores—Continued.

Name of mine.	Manganese.	Iron.	Silica.	Silver, per ton of ore.
	Per cent.	*Per cent.*	*Per cent.*	*Ounces.*
Coronado	25.2	28.3	7.2	11.6
Do	26.6	25.1	7	.....
Morning Star	17.4	31.2	14	10.3
Morning and Evening Star	17.6	31.5	8.3	.....
Do	20.1	32.3	6.7	.....
Iron Silver	28.8	17.45	10.8	12.7
Do	24.15	21.8	9.8	4.6
Do	24.7	25.65	8.45	6.55
O. K	10.8	38	15.2	5.4
Tobin	9	41.3	11.1	4.6
Horner	20.3	26.8	11.6	2.65
Sulphide Mining Co	9.55	43.4	9	2.9
Do	9.3	41.2	11.8	2.8
Bison	24.7	31.5	8.3	.....
Do	25.8	22.2	10.3	.....
Matchless	6.2	44.7	13.8	.....
Do	6.8	44.4	13.6	.....
Starr Lease	26.2	22.5	6.5	.....
Grey Eagle and Pocahontas	27.5	20.6	8.6	.....
Great Hopes	9.4	45.4	10.2	.....
Little Chief	15.3	39.9	6.3	.....
Leadville Consolidated Mining Co.	33.7	15.2	9	.....
Seneca Mining Co	16.6	35	9.2	.....

The Omaha and Grant Smelting Company give the following as the minimum, maximum, and average of manganese, iron, and silica in the manganiferous silver ores received by them during the years 1895 and 1896 and the relative percentages of iron and silver in these ores:

Analyses of manganese in silver ore received by the Omaha and Grant Smelting Company in 1895 and 1896.

	Manganese.	Iron.	Silica.
1895.	*Per cent.*	*Per cent.*	*Per cent.*
Minimum	*a* 8.5	37.8	16.9
Maximum	19.7	31.2	6.4
Average	10	40	10
1896.			
Minimum	*a* 9	20	14
Maximum	25.25	31.25	4
Average	17	38	12

a Maximum and minimum refer only to manganese content.

The Pueblo Smelting and Refining Company for the same years give similar analyses as representing the fluxing ores received, viz:

Manganese in silver ore received by the Pueblo Smelting Company in 1895 and 1896.

	Manganese.	Iron.	Silica.	Silver.
1895.	*Per cent.*	*Per cent.*	*Per cent.*	*Ounces.*
Minimum	19.33	28.3	15.8	5.3
Maximum	34.80	18.2	5.9	8.5
Average	28.30	23	7.6	6.1
1896.				
Minimum	15.10	35.6	8.95	3.3
Maximum	35	16	5.5	8.4
Average	24.15	26.45	7.04	5.8

The usual smelter rates for working the manganiferous silver ores were $1.25 working charges for ore carrying under 7 ounces of silver, $1.75 if from 7 to 8 ounces, $2.25 if from 8 to 10 ounces, and $2.75 if from 10 to 12 ounces of silver are obtained. Almost all of the so-called iron ores average under 12 ounces of silver. The above prices are based on 40 per cent excess of iron over silica, 15 cents additional to be paid the mine in case the combined iron and manganese excess over the silica is more than 40 per cent; or 15 cents per unit is charged the mine in case the iron and manganese excess over silica falls below 40 per cent. Lead between 1 per cent and 5 per cent is paid for at the rate of 15 cents per unit. These prices are f. o. b. Leadville.

Some of the smelters do not use manganiferous iron ores or manganiferous silver ores as a flux, but utilize the iron sulphides.

Analyses of manganiferous ores located on Taylor River, 30 miles from the town of Gunnison, were made by Mr. A. S. McCreath, as follows:

Analyses of Taylor River, Colorado, manganiferous ores.

	No. 1.	No. 2.
	Per cent.	*Per cent.*
Metallic iron	29.25	24.7
Metallic manganese	19.815	10.492
Phosphorus	.003	.035
Lime	4.46	24.67
Magnesia	3.145	.81
Silica	3.405	.765

The statistics of the production of manganese-bearing ore in Colorado from 1889 to 1896 are as follows:

Production of manganiferous ores in Colorado from 1889 to 1896.

	1889.	1890.	1891.	1892.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Manganiferous iron ores used for spiegeleisen	2,075	.....	964	3,100
Manganiferous silver ores with 20 per cent and over of manganese	9,987	7,826	19,560	17,047
Manganiferous silver ores with less than 20 per cent of manganese	55,000	44,014	59,951	45,262
Total	67,062	51,840	80,475	65,409

	1893.	1894.	1895.	1896.
Manganiferous iron ores used for spiegeleisen	5,766	7,022	13,464	9,072
Manganiferous silver ores with 20 per cent and over of manganese	12,642	12,460	11,789	137,597
Manganiferous silver ores with less than 20 per cent of manganese	41,820	17,727	41,717	
Total	60,228	37,209	66,970	146,669

No attempt was made to separate the ores which in 1896 had 20 per cent or over of manganese from those carrying lower percentages of this metal.

GEORGIA.

Dr. J. W. Spencer, ex-State geologist of Georgia, in his report for 1893, stated that the manganese ores occur in the Archean rocks of Georgia near Mount Airy; in certain semimetamorphic rocks, whose age has not been settled, east of Cartersville; and in the Knox dolomite series of the lower Paleozoic group. In this western manganese belt the clays and cherts have been derived entirely from the earthy and impure Knox dolomites. The ore was originally bedded in the clayey or cherty dolomitic sand, perhaps as the carbonate, but more likely as a hydrous oxide, in position similar to its modern occurrence in the clay. While the depth of decay of the rock is known to exceed 210 feet in places, the exploration for manganese has not been carried to the solid rock, except where occasional protrusions of semiundecayed rock approach the surface, in which ore is sometimes seen.

The manganese is found in the form of grains, nodules, pockets, or lenticular sheets, conforming more or less to the bedding. These len-

ticular beds and pockets are of various sizes and forms, and may be very much disconnected, or occasionally united with stringers. The ore in the individual pockets may amount to hundreds of tons. These pockets sometimes contain massive ores, or else are composed of an aggregation of nodules, the whole following the bedding of the original rock, which generally dips southeastward. There are also thin seams of ore or layers of nodules penetrating the clay or rock in various directions, and brown iron ore is often commingled in the beds. The depth to which the ore descends is not known, but as the lenticular beds sometimes dip 20 degrees or more the pockets of the ore may be eventually reached in solid rock. The ore is scattered through the surface residual clays in small particles, nodules, or even large masses of a ton in weight. It is possible that some of these grains and concretionary masses are of secondary origin.

Mr. William M. Brewer reports that the Cartersville district in Georgia is the principal producer of manganese ore in that State. The Cave Spring district, which until 1892 was a rival in the production of this ore, has been practically abandoned by reason of, first, the somewhat limited demand for manganese and the remoteness of the market; second, the pockety character of the deposits and the crude manner in which the ore has been mined, causing hesitation on the part of operators with sufficient capital to attempt to compete in the market from this point. The investment of a considerable amount of money would be necessary before the mines would be in shape to enter into the competition. The quality of the ore shipped from this section during the past year has been all that could be wished, but the extent of the area over which manganese deposits have been discovered in the district is not so large as that in the Cartersville district, in Bartow County.

The production from this latter district remains practically stationary, although the deposits have not been worked to their capacity; in fact, the manner in which this industry is managed in Georgia is not calculated to produce the best results either to the owner of the mines or to the shippers. The prevailing practice is to lease a property (for a royalty of $1 per ton of manganese ore produced) to operators with limited capital, who work the property more or less irregularly. The product is hauled by wagons from the mine to Cartersville and sold to local shippers. In consequence of this system there are several causes which curtail the production, such as muddy roads in bad weather, the marketing of screened ore instead of washed ore, etc., all of which causes cooperate against carrying on successful work. Some years ago the Etowah Iron Company erected a very complete and extensive plant for preparing manganese ore for shipping, and also built 6 miles of railroad track for the purpose of carrying the ore to the washer. This company, however, failed, and its assets were placed in the hands of a receiver before it was demonstrated what would be the result of operations such as were contemplated.

The deposits of manganese in the vicinity of Cartersville are in pockets; in consequence, the work of mining has been carried on by the same plan as that adopted by the miners of brown iron ore (limonite), because under the lease system it does not appear profitable for the lessee to perform unnecessary work, therefore a thorough exploration of the deposits has never been made, and the miners have scooped out the ore until it became dangerous to work in the openings, and have then searched for outcroppings at other points and resumed the old system. It is impossible to form an estimate as to how much manganese ore remains unmined in the Cartersville district, but the extent of the area covered by the deposits is about 40 square miles.

Some time ago operations of mining manganese on a limited scale were commenced in a new district in Paulding County. The deposits of manganese found here occurred in the crystalline or metamorphic area instead of the Paleozoic area, as is the case in both the Cartersville and Cave Spring districts. Only one deposit has been exploited in this district up to the present time, and that was on a limited scale. Remoteness from the railroad has been the chief reason this district has not been more thoroughly prospected and its capabilities demonstrated. The deposits already discovered are in the vicinity of deposits of iron pyrites, which will probably in the future be worked extensively and shipped to Atlanta. This would result in the building of a spur track to connect the mine with the Southern Railroad, in which event the manganese deposits would undoubtedly be more thoroughly prospected and probably become an important factor in the production from Georgia.

The following table shows the production of manganese ores in Georgia since 1866:

Production of manganese ores in Georgia from 1866 to 1896, inclusive.

Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*
1866	550	1881	1,200
1867		1882	1,000
1868		1883 and 1884	(*a*)
1869		1885	2,580
1870	5,000	1886	5,981
1871		1887	9,024
1872		1888	5,568
1873		1889	8,208
1874	2,400	1890	749
1875	2,400	1891	3,575
1876	2,400	1892	826
1877	2,400	1893	724
1878	2,400	1894	1,277
1879	2,400	1895	3,856
1880	1,800	1896	4,085

a None reported.

LAKE SUPERIOR REGION.

The Lake Superior iron ores which carry low percentages of manganese have but little added value on this account; in fact, this sometimes reduces the price which the iron ore commands, owing to the percentage of manganese being such that it would make a pig iron high enough in manganese to occasion an extra loss in converting into steel, and not sufficiently high to be of special advantage as an ore for making spiegeleisen.

The quantity of iron ore obtained from the Lake Superior district which carries sufficient manganese to entitle it to be considered as manganiferous is large, as will appear from the subjoined statement, which shows the total production of manganiferous iron ore in the Lake Superior region since 1886, so far as it has been ascertained, together with the reported percentage of manganese in the ores:

Production of manganiferous iron ores in the Lake Superior region from 1886 to 1896.

Year.	Product.	Average per cent of manganese.	Year.	Product.	Average per cent of manganese.
	Tons.			*Tons.*	
1886	100,000	2	1893	27,353	4.67
	157,000	4		55,009	7.61
Total	257,000			15,102	7.77
1887	200,000	4		5,051	10.40
	10,000	10		7,833	14
Total	210,000			300	22
1888	189,574	4	Total	110,648	
	11,562	11	1894	50,763	3.07
Total	201,136			57,872	3.55
1889	50,018	6.74		6,264	6.50
	31,341	9+		61,817	7.26
Total	81,359			14,610	7.75
1890	61,863			7,140	18
1891	13,711	4.68–17.96	Total	198,466	
	11,015	10	1895	13,752	8
	9,213	9.68		10,228	7.608
	98,572	5.38		10,000	7.5
Total	132,511			26,500	7.26
1892	6,710	4 893		51,785	3.536
	102,695	5	Total	112,265	
	7,500	8	1896	69,139	7.44
	8,272	9.998		47,000	5.75
	22,254	12.028		18,900	5
Total	147,431			104,156	4.3
				38,590	3.22
				51,855	3.1
			Total	329,640	

MONTANA.

A small amount of manganiferous silver ore was mined in Montana and used as a flux in the smelters. The following table gives the production in the State from 1893 to 1896, inclusive:

Production of manganiferous silver ores in Montana, 1893 to 1896.

Year.	Quantity.	Manganese contained.
	Long tons.	*Per cent.*
1893	1,500	7
1894	1,049	7.70
1895	657	7 to 12
1896	482	5 to 8

NEW JERSEY.

Some of the zinc ores of New Jersey carry varying percentages of iron and manganese, and after the extraction of most of the zinc or zinc oxide the residuum is employed in the manufacture of spiegeleisen. This residuum usually contains 11 to 12 per cent of manganese. The annexed table will show the quantities of this product obtained, from 1889 to and including 1896, by treating the franklinite of New Jersey.

Product of manganiferous zinc ores from 1889 to 1896.

Year.	Quantity.	Value.
	Long tons.	
1889	43,648	$54,560
1890	48,560	60,700
1891	38,228	57,432
1892	31,859	25,937
1893	37,512	30,535
1894	26,981	20,464
1895	43,249	24,451
1896	44,953	20,455

NORTH CAROLINA.

North Carolina contributed small amounts of manganese ores from 1886 to 1890, but subsequent to the latter year the only records of production are 20 tons in 1893 and 2 tons in 1896.

CUBA.

Considerable American capital is invested in the manganese deposits of this island, but owing to the insurrection little if any ore is now being mined. Mr. E. J. Chibas, writing in the American Polytechnic, says:

The ore is found near the southeastern extremity of the island. Here a range of mountains, the highest peak of which is 7,670 feet above sea level, becomes broken into a number of smaller ranges. At the summits, or on the flanks of these, the manganese ore is usually found. Sometimes it is wholly in rock, while at other points it lies in pockets irregularly distributed over many acres of clay, representing the decomposition of the ore-bearing rock. The pockets are usually covered by about a foot of soil, and their number and extent is therefore unknown. An average analysis of several cargoes was as follows:

Average composition of Cuban manganese ore.

Components.	Per cent.
Manganese	47 to 53
Silica	4 to 9
Phosphorus	.03 to .10

One particular cargo from the Gloria mine gave 55.21 per cent of manganese. The most extensive deposits are 12 miles from the Christo Railway station.

The exportation of manganese ores from these mines since 1888, so far as we have received reports of the same, is given in the following table:

Exportation of manganese ores from Santiago district, Cuba, from 1888 to 1895.

Year.	Tons.
1888	1,942
1889	704
1890	21,810
1891	21,987
1892	18,751
1893 (first six months)	10,640
1895	1,394

The Ponupo mines are controlled by an American corporation, which built a branch railroad 11 miles to the mines and started operations. After 500 tons of ore had been extracted all work had to be suspended

on account of the revolution. The manganese ores showed, according to analyses by Mr. Albert Ladd Colby, the following compositions:

Analyses of Ponupo (Cuba) manganese ores.

Designation.	Manganese.	Phosphorus.	Iron.	Silica.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Vencedora	51.9	0.049	0.79	1.09
Do	51.8	.063	.99	1.3
Do	51.1	.033	.48	1.17
Sultana	51.4	.07	.79	1.22

BRAZIL.

Efforts are now being made to exploit deposits of manganese ores in Brazil, the reported analyses of which suggest material of a very satisfactory composition. Until more definite reports are at hand, this simple mention of a possible future source of supply must suffice.

CHILE.

The annual production of manganese ores in Chile since 1885, in tons of 2,240 pounds, is reported as follows:

Production of Chilean manganese ores, 1885 to 1895.

Year.	Total.
	Long tons.
1885	4,041
1886	23,928
1887	47,521
1888	18,713
1889	28,683
1890	47,986
1891	34,462
1892	47,894
1893	36,096
1894	21,426
1895	10,748

UNITED STATES OF COLOMBIA.

The manganese deposits of the department of Panama, Republic of Colombia, were fully described by Mr. Eduardo J. Chibas, in a late paper in the Transactions of the American Institute of Mining Engineers. These deposits, located from 1 to 5 miles south of the Caribbean Sea, and about 45 miles northeast of Colon (Aspinwall), are connected with

the harbor of Nombre de Dios by a railroad 9 miles in length, portions of the line traversing a broken and mountainous country. From 1872 to the close of 1896 the quantity of manganese ore shipped from this region is estimated at 18,215 tons, of which 10,500 were sent forward during the year 1896.

Mr. Chibas states that the mineralogical forms in which the ore occurs, so far as observed, are braunite, pyrolusite, and psilomelane, and gives the following analysis as indicative of the general composition of the ore of the region:

Analysis of Colombian manganese ore.

	Per cent.
Manganese peroxide	16.98
Manganese sesquioxide	59.30
Silica	18.77
Iron oxide	.90
Phosphorus	.031
Alumina	.12
Lime	.98
Magnesia	.30
Copper oxide	.09
Moisture	.38
Combined water and loss in ignition	2.64
Sulphuric acid, ash	.10
Total	100.591

The amount of metallic manganese is 52 per cent.

At present no washing is necessary, the ore being shipped as it comes from the mine, but a large portion of the highly siliceous ore unfit for shipment can, in the future, be rendered merchantable by the establishment of a proper system for crushing, washing, and jigging.

The manganese ore occurs in the form of pockets imbedded in clay, resulting from the decomposition in situ of the original inclosing rock. This rock in places is only partly decomposed, and its sedimentary origin is revealed, although in some localities metamorphism seems to have turned it to red and yellow jasper. The clay has been eroded in many places, and, leaving some of the pockets uncovered, has given them the appearance of isolated bowlders lying on the surface. These bowlders vary from a few pounds to 500 tons. In one case over 1,000 tons of ore of good quality were taken out of a single bowlder. These bowlders have not generally been found of uniform quality. They are often mixed with ore-bearing rock. The clay sometimes assumes various shades of color—red, yellow, white, and purple—due to the stages of oxidation and hydration of the manganese and iron it contains.

The rock underlying the manganese deposits, as far as could be observed, seems to be serpentine. Most of the rocks in the department of Panama seem to have been weathered to a considerable depth. In the cuts in the 9 miles of railroad, very little unaltered rock was encountered, and the larger portion of the material was so decomposed that it gave no clue to its original nature. Those rocks which had not sufficiently deteriorated to prevent recognition were sandstone, shale, and serpentine. No limestones were found in any part of the line, and no outcrops of that rock have been observed in that immediate neighborhood.

Analyses by Lehman and Glaser of four sets of picked samples from the Nispero mine gave the following results:

Analyses of picked samples of manganese ores from Nispero, United States of Colombia.

	1.	2.	3.	4.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Metallic manganese	63.74	62.92	62.76	59.98
Iron oxide	.28	1.13	.98	1.19
Silica	.25	.39	5.42	4.71

The amount of phosphorus was below 0.05 per cent. Ores of this class, although they sometimes occur in small pockets of uniform purity, are more often associated with lower grades of ore (higher in silica), and it becomes necessary to exercise great care to prevent the mixture of the two grades. One cargo of 900 tons analyzed 53 per cent of metallic manganese and 13 per cent of silica; another of 2,560 tons analyzed 47.5 per cent of manganese and 20 per cent of silica. For one cargo of 1,400 tons which arrived in Baltimore in February, 1896, the average of the various analyses made by Prof. A. S. McCreath and by Messrs. Booth, Garrett, and Blair was as follows:

Analysis of 1,400 tons of Colombian manganese ore.

	Per cent.
Metallic manganese	57.502
Silica	4.18
Moisture	2.734
Phosphorus	.054

The average analysis of the next cargo of 1,800 tons, made by the same chemists, gave metallic manganese 56.788 per cent; silica, 5.82 per cent; and moisture, 1.415 per cent. Then followed a cargo of 2,600 tons, the average analysis of which, as determined by McCreath, Lehman, and Glaser, was: Metallic manganese, 54.561; silica, 9.88; and moisture, 5.372 per cent.

Mr. Chibas says:

The manganese probably was originally found as one of the constituents of the igneous rocks of the region in the form of silicate, and when the silicate was chemically decomposed the manganese was carried away in solution until, aided by favorable conditions, it was deposited in the form of oxide or carbonate; but if in the latter state, it was subsequently converted into oxide, as no carbonate of manganese has so far been found in that region. The mineral may have come, not directly from the igneous rocks, but through the medium of sedimentary or metamorphic rocks with which the manganese may have been deposited, in the manner already stated. When these rocks began to decompose the same process was repeated; that is, the manganese was again dissolved, carried away, and redeposited in its present locality. The deposition may have taken place in swamps and lagoons, such as those that at present characterize the topography of portions of the country close to the seashore, where the waters draining from the mountain sides are collected and held for a considerable time before they reach the sea. The waters that carried the manganese in solution carried at the same time argillaceous and siliceous particles of the original rock, that were deposited and afterwards consolidated into rocks of a shaly nature. Portions of these were afterwards turned into jasper by metamorphism. Later on atmospheric weathering set in, and, decomposing and disintegrating the inclosing rock, turned it into the clay which at present surrounds the ore bodies. Subsequently erosion has washed out the clay in many localities, and has left the manganese uncovered, as already described. In some localities the manganese when deposited may have been so finely disseminated through the associated rock as to have been of no economic value; but later on, by a process of resolution and redeposition, it may have been concentrated into bodies of comparatively pure ore and in workable quantities.

GERMANY.

The production of manganese in Germany from 1890 to 1895 is given in the following table:

Production of manganese in Germany from 1890 to 1895.

Year.	Long tons.
1890	41,180
1891	39,698
1892	32,341
1893	40,057
1894	43,012
1895	40,674

Prussia is the principal source of the manganese ores produced in the German Empire, 39,266 long tons being mined in 1895. The following table shows the production and valuation from 1881 to 1895:

Production and value of manganese ores in Prussia from 1881 to 1895.

Year.	Product.	Value.	Year.	Product.	Value.
	Long tons.			*Long tons.*	
1881	10,911	$79,104	1889	43,311	$216,381
1882	4,597	33,745	1890	39,497	174,428
1883	4,502	28,423	1891	36,278	174,624
1884	7,629	43,118	1892	30,892	101,844
1885	14,464	81,302	1893	38,384	93,506
1886	24,649	177,066	1894	41,854	94,992
1887	35,957	228,439	1895	39,266	100,832
1888	26,877	147,250			

FRANCE.

France produced in the year 1895, from 11 mines, 30,385 long tons of manganese ore, valued at $177,698; imported 40,751 long tons, and exported 15,938 tons.

The production and value of manganese ores in France from 1886 to 1895 are given in the following table:

Production and value of manganese ores in France from 1886 to 1895.

Year.	Production	Total value.	Value per ton.	Year.	Production.	Total value.	Value per ton.
	Long tons.				*Long tons.*		
1886	7,555	$53,099	$7.03	1891	15,101	$90,316	$5.98
1887	11,932	50,501	4.23	1892	31,894	205,074	6.43
1888	10,873	60,757	5.59	1893	37,406	290,073	7.75
1889	9,842	59,000	5.99	1894	32,239	192,264	5.96
1890	15,731	89,517	5.69	1895	30,385	177,698	5.85

GREAT BRITAIN.

In late years but little manganese ore has been mined in Great Britain, that produced being more strictly manganiferous iron ore, and that country depends almost entirely on foreign countries, principally Russia and Chile, for the manganese ore used in the steel works and chemical manufactories. Of the 1,273 tons mined in 1895, 102 tons came from Derbyshire, 387 tons from Devonshire, and 2 tons from Somersetshire, making a total for England of 491 tons. The remaining 782 tons came from Wales, 100 tons being credited to Carnarvonshire, and 682 tons to Merionethshire.

The following table shows the annual production and value of manganese ores raised in the United Kingdom from 1884 to 1895, no figures being available as yet for 1896:

Production and value of manganese ores in the United Kingdom from 1884 to 1895.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.			*Tons.*	
1884	909	$6,921	1890	12,444	$32,588
1885	1,688	11,669	1891	9,476	30,071
1886	12,763	52,722	1892	6,078	21,461
1887	13,777	53,772	1893	1,336	3,688
1888	4,342	9,361	1894	1,809	3,582
1889	8,852	31,354	1895	1,273	3,323

ITALY.

The following table shows the production of manganese and manganiferous iron ores in Italy from 1887 to 1895:

Production of manganese and manganiferous iron ores in Italy from 1887 to 1895.

Year.	Manganese ores.		Manganiferous iron ores.	
	Product.	Value.	Product.	Value.
	Long tons.		*Long tons.*	
1887	4,364	$21,872	.....	.....
1888	3,573	15,054	.....	.....
1889	2,168	9,998	.....	.....
1890	2,113	9,949	.....	.....
1891	2,391	12,467	.....	.....
1892	1,220	8,106	4,549	$8,320
1893	797	6,320	8,666	14,439
1894	748	4,536	5,718	8,971
1895	1,544	13,634	None.	.....

SPAIN.

Messrs. Barrington & Holt of Cartagena, Spain, state that the total export of manganese ore proper for 1896 was a little over 100,000 tons, nearly all of which was produced in the district of Huelva. The quantity of manganese ore actually and officially declared as having been produced was 92,000 metric tons in 1896 as against 10,162 metric tons in 1895. The unexpected increase in this industry is due to the discovery of carbonate of manganese in large quantities in the mines in the Province of Huelva, where previously the peroxide of manganese was won. This ore is in good demand for spiegel manufacture. In

this connection the following description of the manganese mines of Huelva, by Mr. Carlos Sundheim, M. E., Huelva, Spain, will be of interest:

Huelva is one of the eight provinces of Andalusia, and is situated in the southwestern part of Spain, on the border of Portugal. The export consists mostly of ores (copper, iron pyrites, and manganese) and aggregates annually about 1,250,000 tons. Geologically the province is built up of Palezoic slate, in which large tracts of eruptive rocks are imbedded. In this Silurian clay slate we find the deposits of copper ore, as those of Rio Tinto, Tharsis, etc., and, combined with quartzite, the deposits of manganese. The latter occurs in lenticular bodies of more or less regular shape. The length of these bodies varies from 65 to 1,000 feet, and their thickness is in proportion, from a few feet to 150 feet or more. Eruptive rocks are always to be noticed in the neighborhood of the ore beds.

The development of the manganese ore beds was commenced about 1860, the ores produced being mostly pyrolusite and psilomelane (75 to 80 per cent), which were found immediately below the surface. At an average depth of about 100 feet the ore gave out, and in 1880 the majority of the mines were abandoned. A few of the larger mines were operated until a few years ago, but the production was small. After a long period of idleness there was found, about three years ago, in some of the abandoned workings, certain rocks which were covered with a black coating. In breaking these rocks it was discovered that the black coating was the product of oxidation of the manganese contained in them. Analyses confirmed this belief, and showed that the mineral was carbonate and silicate of manganese, which, during the earlier exploitation, had been raised along with the other ore.

In 1894 several mines resumed work, and at the end of 1896 fifteen were again in operation. The most important of these are the "Ysabel" and "Resucitada" mines, the latter possessing a vein of compact ore 100 feet thick. The quality of the different ores is shown by the following analyses:

Analysis of crude carbonate ore, Ysabel, Spain.
[Analyst, Bournot, of Jarville.]

	Per cent.
Loss by roasting	28.26
Protoxide of manganese	52.99
Peroxide of iron	2.14
Silica	10.20
Alumina and phosphoric acid	.86
Lime	4.69
Magnesia	.84
Total	99.98
Metallic manganese	40.80
Metallic iron	1.50

Analyses of cargoes of crude manganese carbonate from Huelva, Spain.

	1.	2.	3.
	Per cent.	*Per cent.*	*Per cent.*
Manganese	42.6	41.3	41.2
Silica	10.46	10.5	9
Phosphorus	.07	.10	.08

The Resucitada ore, analyzed by Guitton de Giraudy, of Marseilles, showed the contents indicated below:

Analysis of Resucitada (Spain) manganese ore.

	Per cent.
Protoxide of manganese	4.16
Peroxide of manganese	56.87
Water in combination	6.80
Carbonic acid	9.96
Peroxide of iron	6.57
Silica	9.10
Alumina	1.52
Lime	3.20
Magnesia	.84
Sulphur	.17
Phosphorus	.09
Arsenic	.028
Copper	Trace.
Metallic manganese	39.2
Metallic iron	4.6

Analyses of cargoes of crude carbonate ore, Huelva, Spain.

	1.	2.	3.	4.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Manganese	39.5	37.80	38.78	36.72
Silica	8.5	10.13	8.47	9.99
Phosphorus	.092	.098	.09	.92

An analysis of a small sample of Santa Aqueda mine ore, made by Guitton de Giraudy, of Marseilles, gave the following results:

Analysis of manganese ore, Santa Aqueda, Spain.

	Per cent.
Red oxide of manganese 70.92 per cent = metallic manganese	51.10
Peroxide of iron	3.52
Silica	20.25
Alumina	2.30
Lime	1.17
Magnesia	Trace.
Carbonic acid	1.50
Phosphorus	.036
Arsenic	.028
Copper	Trace.

Analyses of two cargoes of Santa Aqueda manganese ore.

	1.	2.
	Per cent.	*Per cent.*
Protoxide of manganese, 45.47 per cent ..... } Peroxide of manganese, 25.82 per cent ..... } =metallic manganese .	51.60	53.10
Silica	12.30	15.30
Phosphorus	.058	.058

The export of manganese from this province for the period from 1890 to 1894, inclusive, was as follows:

Export of manganese ores from Huelva, Spain, 1890 to 1894.

Year.	Tons.	Year.	Tons.
1890.....	4,720	1893.....	6,394
1891.....	3,884	1894.....	7,321
1892.....	10,410		

The above consisted entirely of manganese oxide. The export in 1895 aggregated 33,353 tons, of which 10,000 tons was oxide, the balance carbonate and silicate of manganese. The export for 1896 is 90,815 tons, of which about 18,000 tons was oxide.

Concerning these ores Mr. Sundheim says:

The production will doubtless increase with each year, as a great number of mines have not yet been reopened, and it is very probable that in a few years the production will reach 200,000 tons per year. The location of the mines in the immediate neighborhood of the port, or not farther distant than 25 to 30 miles, assures commercial success. The roasting of the carbonate ore is carried on by the firm of Sundheim & Doetsch.

The manganese ore is classed in two kinds for export—a high grade, carrying 40 to 47 per cent of manganese and 10 to 13 per cent of silica, and a low grade, carrying 30 to 34 per cent manganese and 18 to 20 per cent of silica. The phosphorus contents are low, ranging from 0.05 to 0.09 per cent, the carbonic acid contents being from 20 to 25 per cent. The low grade ore is exported exclusively to Belgium and Luxemburg, and is in good demand.

The exports of ore for the year 1896 and the countries to which they were sent were:

Exports of Huelva manganese ore in 1896.

Countries.	Tons.
Germany	9,165
England	9,993
France	11,481
Belgium and Luxemburg	60,176
Total	90,815

Mr. Jeremiah Head, in a paper entitled "The manganese ore deposits of northern Spain," describing the Mercurio, Maude, and Excelsior concessions, 45 miles southwest of Santander, and the Magenta, 20 miles farther to the west, says:

Throughout the Dobros range, clearly traceable in several places, is a vertical chasm or fissure, 3 to 4 feet wide, which has been filled with manganese ore, more or less interspersed with limestone. Along the supposed line of the vein the range includes a number of small valleys, which are more or less filled with débris or drift from the rocks above. Where such accumulations are near to and below the vein they usually contain a quantity of manganese ore in lumps or nodules, which are no doubt the products of its gradual disintegration. The Magenta mine adjoins the Asturiana mine, or group of concessions, originally opened in 1874. The Asturiana mine has three openings or pits, the principal one being 75 feet long by 48 feet broad by 48 feet deep. The surface soil appeared to be a kind of bowlder clay. Below that a few feet of blue clay containing limestone nodules was visible, and still lower a red ferruginous clay, known as "red-cap," containing lumps of manganese ore mixed with similar lumps of iron ore. After being brought out the lumps of manganese ore were hand-picked and cleaned with chisel hammers by women sitting on the ground. At the bottom of the pit was a hard rock, which was stated to be the vein itself. The ore was transported for 8 miles by donkeys and then 22 miles in bullock carts to Rivadesella, the port of shipment. The only manganese ore shipped here comes from the Asturiana mine, and, up to the close of 1892, 12,500 tons are estimated to have been obtained from this mine, about 1,200 tons being the maximum yearly output.

The average of five analyses of Asturiana ores as given by Mr. J. A. Jones, and one representing ten specimens of ore collected by Mr. Head from the Asturiana mine and the adjoining Magenta concession, are as follows:

Analyses of Asturiana manganese ores.

	Asturiana ores (average).	Asturiana and Magenta ores.[a]
	Per cent.	*Per cent.*
Manganese	58.26	58.35
Iron	1.42	1.10
Silica	1.66	.90
Phosphorus	.016	.01
Copper	.....	Trace.
Water	1.33	.....

[a] Analysts, Pattison and Stead.

Various samples collected from the Mercurio, Maude, and Excelsior properties were sent to Pattison and Stead and analyzed, with the following results:

Analysis of manganese ore from the Mercurio, Maude, and Excelsior mines, Spain.

	Per cent.
Manganese	54.81
Iron	.70
Silica	6.30
Phosphorus	.08
Copper	None.

Mr. Reginald W. Barrington states that manganiferous ore exists in large quantities in the Sierras in the south of Spain, and the export of this class of ore (ranging from 4 to 22 per cent of manganese) may be roughly estimated as about 400,000 tons in 1895. Much the larger portion of the iron ore produced in the south of Spain is manganiferous. The district of Cartagena, in the province of Murcia, is reported to have produced 162,196 tons of manganiferous iron ore in 1894 and 164,453 tons in 1895. This ore is chiefly exported to the United States, England, and Germany.

A large portion of the iron ore in the province of Almeria is found associated with from 2 to 6 per cent of manganese. The mineral shipped from the districts of Aguilas and Parazuelos also contains about 3 per cent of manganese.

The following analyses are stated to represent the general character of the manganiferous ores in the south of Spain:

Analyses of manganiferous iron ores in the south of Spain.

	Cartagena.	Aguilas.
	Per cent.	*Per cent.*
Ferric oxide	35.84	69.92
Manganese oxide	30.89	7.57
Carbonic acid, combined water, etc.	16.33	12.90
Lime	.....	1.45
Alumina	.31	.61
Silica	5.14	8
Phosphoric acid	.04	.02
Sulphuric acid	.31	.14
Zinc oxide	.84	.....
Magnesia	.45	.23
Metallic iron	25.09	48.67
Metallic manganese	22.26	5.74

The official report of the production of manganese in Spain from 1890 to 1896 is as follows:

Production of manganese ores in Spain from 1890 to 1896.

Year.	Long tons.	Year.	Long tons.
1890	9,716	1894	423
1891	6,883	1895	10,001
1892	16,643	1896	90,546
1893	1,437		

SWEDEN.

The production of manganese ores in Sweden, by districts, in the year 1895 is as follows:

Production of manganese ores in Sweden in 1895.

District.	Production.
	Long tons.
Bolet	1,318
Elfsborg	254
Småland	341
Vermland	1,155
Total	3,068

A considerable quantity of manganiferous iron ore is also won in Sweden, and the production from 1888 to 1895, inclusive, is given in the table below:

Production of manganiferous iron ores in Sweden from 1888 to 1895.

Locality.	Average metallic manganese in ore.	Production.		
		1888.	1889.	1890.
	Per cent.	*Long tons.*	*Long tons.*	*Long tons.*
Dannemora	1.38	55,548	60,816	62,579
Burängsberg	2.59	10,200	11,190	8,035
Viker	3.31	3,982	3,163	3,374
Klackberg and Kolningsberg	4.40	60,032	51,356	52,339
Långvik	6.72	6,976	6,238	6,632
Hilläng	9.95	1,944	3,808	2,163
Svartberg	14.09	.....	1,535	2,598
Total	.....	138,682	138,106	137,720

Production of manganiferous iron ores in Sweden from 1888 to 1895—Continued.

Locality.	Production.				
	1891.	1892.	1893.	1894.	1895.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Dannemora	58,704	60,729	57,697	50,815	44,877
Burängsberg	8,907	6,964	8,552	7,976	7,857
Viker	1,486	2,524	1,739	1,949	2,224
Klackberg and Kolningsberg	50,675	44,448	67,721	60,083	57,924
Långvik	9,960	8,486	8,349	6,634	5,744
Hilläng	2,037	1,781	1,640	1,945	3,136
Svartberg	2,812	2,543	2,030	1,665	1,942
Total	134,581	127,475	147,728	131,067	123,704

TURKEY.

The Turkish manganese mines are worked with good profit, as they lie near the seacoast and do not require costly machinery. The ore is shipped from the port of Stratoni, in Kassandra (Gulf of Salonica). It is impossible to obtain exact statistics, but the annual production has been estimated at about 15,000 tons.

INDIA.

India has a number of valuable manganese deposits in the presidency of Madras, and a considerable quantity has been shipped to this country. The Second Annual Report upon the Mineral Industry of the United Kingdom of Great Britain and Ireland for 1895 gives the production in 1894 at 11,401 long tons, and in 1895, 15,817 long tons.

JAPAN.

The production of manganese ores in Japan from 1881 to 1895 is as follows:

Production of manganese ores in Japan from 1881 to 1895.

Year.	Product.	Year.	Product.
	Long tons.		*Long tons.*
1881	2	1889	945
1882	156	1890	2,604
1883	151	1891	3,178
1884	125	1892	4,948
1885	123	1893	13,945
1886	404	1894	17,160
1887	312	1895	16,052
1888	813		

The ore, while low in phosphorus, was so imperfectly prepared as to cause the shipments to prove unprofitable as a rule, and the chances of further large exportations of manganese ores will depend upon such treatment as will insure a product to be relied upon.

NEW SOUTH WALES.

New South Wales occasionally ships small amounts of manganese ore from her ports, but in 1895 only 3 tons were sent away. The record of production for six years is given below:

Production and value of manganese ores in New South Wales from 1890 to 1895.

Year.	Product.	Value.	Year.	Product.	Value.
	Tons.			*Tons.*	
1890	100	$1,573	1893	.....	.....
1891	138	1,646	1894	14	$213
1892	16	227	1895	3	49

QUEENSLAND.

Queensland also exports manganese ore, the record for 1895 showing that 355 tons, valued at $5,387, were won in that year. This is the largest production reported for this country, the record from 1881 to 1895 being as follows:

Production and value of manganese ores in Queensland from 1881 to 1895.

Year.	Product.	Value.	Year.	Product.	Value.
	Tons.			*Tons.*	
1881	87	$1,263	1891	10	$126
1882	100	1,694	1892	.....	.....
1883	20	290	1893	.....	.....
1884	55	799	1894	140	1,936
1889	4	87	1895	355	5,387
1890	5	97			

SOUTH AUSTRALIA.

South Australia has heretofore produced more manganese ore than any of the other divisions of Australia, the largest recorded output being 2,764 tons in 1890, the amount mined in 1895 being but 48 tons,

valued at $712. The following table gives the production and valuation of the manganese ores in South Australia from 1882 to 1895:

Production and value of manganese ores in South Australia from 1882 to 1895.

Year.	Product.	Value.	Year.	Product.	Value.
	Tons.			*Tons.*	
1882	136	$3,214	1889	1,596	$24,718
1883	333	10,062	1890	2,764	33,991
1884	59	1,142	1891	847	8,349
1885	.....	4,061	1892	704	7,416
1886	1,550	53,163	1893	2,428	30,778
1887	1,452	27,801	1894	.....	.....
1888	1,021	16,974	1895	48	712

NEW ZEALAND.

This island has in late years shown a decided decline from the maximum of 2,611 tons produced in 1880, the amount mined in 1895 being but 210 tons, valued at $2,557. Below will be found the production and valuation of the manganese ores mined in New Zealand from 1878 to 1895, inclusive:

Production and value of manganese ores in New Zealand from 1878 to 1895.

Year.	Product.	Value.	Year.	Product.	Value.
	Tons.			*Tons.*	
1878	2,516	$50,413	1887	305	$4,332
1879	2,140	40,356	1888	1,085	11,635
1880	2,611	50,447	1889	1,080	5,227
1881	1,271	15,890	1890	1,170	12,741
1882	2,181	33,701	1891	1,153	12,801
1883	384	5,590	1892	521	5,022
1884	318	3,911	1893	319	4,564
1885	602	8,305	1894	534	5,595
1886	328½	6,369	1895	210	2,557

THE WORLD'S PRODUCTION OF MANGANESE ORE AND MANGANIFEROUS IRON ORE.

The contemporaneous production of ores of manganese or of manganiferous ores in various portions of the world is difficult to approximate by reason of the different methods followed for the collection of statistics and the various standards of quality adopted. A close estimate can not, therefore, be offered, but in the following table the latest records of production accessible are presented to indicate as closely

as is practicable the apparent output of the world and the relative importance of the various countries as producers:

World's production of manganese and manganiferous ores.

Country.	Year.	Manganese ores.		Manganiferous ores.	
		Product.	Value.	Product.	Value.
North America:		*Long tons.*		*Long tons.*	
United States	1896	10,088	$90,727	9,072	$38,069
Canada	1896	135	8,100	.....	.....
Cuba	1895	1,394	12,887	.....	.....
South America:					
Chile	1895	10,748	.....	.....	.....
Colombia	1896	10,500	.....	.....	.....
Europe:					
Austria-Hungary *a*	1893	2,743	.....	.....	.....
Bosnia	1895	12,538	.....	.....	.....
Belgium *a*	1894	.....	.....	21,700	53,596
France	1895	30,385	177,698	.....	.....
Germany	1895	40,674	118,556	.....	.....
Great Britain	1895	.....	.....	1,273	3,323
Greece	1894	9,172	.....	*b* 143,026	.....
Italy	1895	1,544	13,634	None.	.....
Portugal *a*	1894	6,848	.....	.....	.....
Russia *a*	1894	240,181	.....	.....	.....
Spain	1896	*c* 92,000	.....	400,000	.....
Sweden	1895	3,068	.....	123,704	.....
Turkey	.....	*d* 15,000	.....	.....	.....
Asia:					
India	1895	15,817	.....	.....	.....
Japan	1895	16,052	.....	.....	.....
Oceanica:					
New South Wales	1895	3	49	.....	.....
New Zealand	1895	210	2,557	.....	.....
Queensland	1895	355	5,387	.....	.....
South Australia	1895	48	712	.....	.....
Total	.....	519,503	.....	.....	.....

a Taken from reports of the late Joseph D. Weeks.
b 1895.
c Metric tons.
d Estimated.

NICKEL AND COBALT.

By Joseph Wharton.

These metals may properly be treated together because many ores contain both. The most widely spread and abundant of these ores is nickeliferous pyrrhotite, which in most localities carries about one-twentieth to one-thirtieth as much cobalt as nickel.

SOURCES.

A small quantity of matte containing both metals, with nickel somewhat preponderating, is made as a by-product in the operations of Mine La Motte, an important lead mine in Missouri, which is the only working source of cobalt in the United States. From the matte of Mine La Motte was made most of the small quantity of nickel produced from our own ores in 1894, 1895, and 1896.

First in order of time as an American nickel producer is the Gap Nickel Mine in Lancaster County, Pennsylvania, which for a quarter of a century, say from 1863 to 1888, was the only working nickel mine on this continent, and which had probably yielded up to 1888 as much nickel as any other mine in the world. It has now been idle for several years and is filled with water. Three great masses of nickeliferous pyrrhotite were successively exhausted, and search for other masses was discontinued because of the moderate prices and abundant supplies of nickel matte from Canada. As this mine was worked only to the depth of less than 300 feet, and much ore of about 1 per cent is known to exist above that depth, it is reasonably certain that large resources of ore remain there untouched, awaiting discovery by the diamond drill followed by modern methods of mining and smelting.

The North Carolina nickel deposits, which were considerably discussed a few years ago, consist in effect of green stains upon such hard mineral as chalcedony, of impregnations in the kaolin into which the abundant feldspar has passed near the surface, and of thin plates of nickel silicate or carbonate in the rock seams. The quantity of nickel in all these forms is so trifling as to be totally devoid of economic value; it is apparently all derived by leaching from the important chrysolite masses which permeate in several places the gneiss of western North Carolina. As this chrysolite contains but a fraction of 1 per cent of nickel, and yields by leaching of its metasomatized surface but a part of that fraction, while much that is so leached out runs off in the streams, there is obviously but little reason to hope for any workable nickel in this region, either near the surface or below.

The nickel arsenide and arseniate of Nevada show no recent development. A moderate quantity of arsenide, perhaps in all 50 to 100

tons, has been taken from time to time out of the pits dug south of Lovelocks Station, but no large mass has been demonstrated; the long haul of about 50 miles to railroad and the low prices of nickel discourage further explorations in this region. The staining of adjacent rocks by nickel arseniate derived from arsenide has given rise to exaggerated estimates of the quantity of nickel existing here.

In Oregon attempts have been made to organize a company to develop the nickel-silicate deposits which are disseminated through the hill called Nickel Mountain, but hitherto without practical result. The quantity of nickel in that region is vastly greater than in North Carolina, and some small specimens occur there that are comparable to those of New Caledonia. The nickel is, however, too thinly and widely spread over a large district to pay for working while wages are so high and nickel so cheap as now.

The exploring enterprises which are heard of from time to time in various parts of the United States have brought no nickel into the market, nor have they developed anything to claim serious attention.

Practically all the nickel now made in the United States is derived from matte produced in Canada by roasting and smelting the nickeliferous pyrrhotite of the region about Sudbury, in the province of Ontario. The chief part of this matte is manufactured into nickel oxide and metallic nickel by the Orford Copper Company, at Constable Hook, New Jersey. Smaller quantities of both, together with nickel-ammonia sulphate for nickel plating, are made from Canadian matte at the American Nickel Works, Camden, New Jersey. The nickel mining of this Sudbury region, though still a new industry, is so firmly established that this region, in effect, divides the world's nickel production with the island of New Caledonia; for all other sources combined are insignificant in comparison with either of these.

Disregarding the numerous mere explorations in the Sudbury nickel region of approximately 100 square miles, and also those mines which have been more seriously attacked but have not been systematically prosecuted, let us review, briefly, those only which have been supplemented by smelting furnaces, and which have therefore produced and shipped nickel matte. First of these operations, both in order of time and of magnitude, come those of the Canadian Copper Company, which is working three important mines called Copper Cliff, Stobie, and Evans, and which owns sundry other mining properties that only await the call for larger output. Among those now dormant properties may be named the Vermillion mine, where the new mineral "sperrylite" was discovered, and where specimens of nickel pyrrhotite have been found containing the extraordinary quantity of 40 per cent nickel. A notable quantity of palladium is said to have been recently detected here in connection with sperrylite, which mineral may possibly be accompanied by arsenide of palladium corresponding to the arsenide of platinum.

The Copper Cliff mine, now working at a depth of nearly 1,000 feet, excels all others in Canada for the quantity and uniform excellence of

its ore, which now carries approximately 5 per cent nickel and 7 per cent copper. After appearing to pinch as if approaching exhaustion, this great vein has opened at the increased depth of recent working, now about 800 feet vertical, to larger dimensions and greater richness than before, while back of the hill at whose foot the shaft goes down, and in the same vicinity, the company owns other promising veins that assure an indefinite continuance of the life of this mine.

The Stobie mine, though carrying ore much lower in nickel than that of the Copper Cliff (about 1½ to 2 per cent), is valuable on account of the great magnitude of the deposit and for its copper, which about equals the nickel; also on account of its gangue serving well as flux in the smelting furnaces, where it is mixed with the nickel ore of the Copper Cliff. The Stobie mine, which was first operated by stoping the whole width of the vein, about 50 feet, straight into the face of the hill, is now worked in the usual way by sinking, and looks remarkably well.

The Evans mine differs from the two last named in carrying a smaller proportion of copper. The nickel is about 2½ per cent in a very large mass of remarkably clean pyrrhotite; that is, clean ore nearly free from gangue. But this large mass had been at last accounts pretty well worked out, so that until other masses are developed this mine can not produce ore so largely as hitherto.

The other, undeveloped, properties of the Canadian Copper Company it is unnecessary now to mention in detail.

The ores mined by the Canadian Copper Company are dressed, to the degree that is found by experience with the various ores or mixtures of ores to be best adapted for advantageous smelting, since absolutely clean ore would of course yield no slag-making material to carry off the iron oxide formed in roasting.

The Canadian Copper Company has three large water-jacket smelting furnaces capable collectively of smelting over 300 short tons of roasted ore daily. If we allow the ore to average 2 per cent nickel, which is doubtless below the truth, and each of the furnaces to run 300 days in the year, we find an annual smelting capacity of at least 3,600,000 pounds of nickel in the form of matte carrying approximately 20 per cent of nickel and nearly as much copper, a very large product, which yet can be greatly increased if the demand should arise. Though the staple product of the Canadian Copper Company is this matte of 20 per cent nickel and as much copper, that company's handsome smelting establishment near Sudbury is provided with Bessemer concentrators fitted to convert this staple matte into a richer grade carrying twice as much nickel and copper, but after sufficient experience it has not been found expedient to continue this practice. Some loss of the valuable metals is inevitable and the price obtainable for the richer matte has not compensated for that loss and for the expense of fuel, labor, etc., incurred in the concentration.

Nearly all the nickel consumed in making nickel-steel armor plates for the United States Navy has been derived from the Canadian Copper

Company's mines, and very large quantities in the forms of nickel oxide and metallic nickel manufactured from its matte by the Orford Copper Company at Constable Hook near Bayonne, New Jersey, have been since 1890 exported by the latter company to Europe.

The Dominion Mineral Company, with headquarters at Montreal, Canada, operating at first a mine in Blezard township 3 miles north from Sudbury, and afterwards a mine adjoining Worthington Station on the Canadian Pacific Railroad, about 20 miles west from Sudbury, has produced several thousand tons of 20 per cent matte at its smelting works, with one water-jacket furnace near the Blezard mine. Its mines and works have been idle about three years; the Blezard mine being exhausted unless ore could be found again at greater depth, and the principal shareholder having died. Its Worthington mine, though carrying rather thin and irregular veins, yields ore of superior richness and is supposed to possess considerable resources of such ore.

The Murray mine, the pioneer of the Sudbury region, was discovered by a rock cut when the Canadian Pacific Railroad was being constructed. It is owned and for several years was operated by the Vivian Nickel Company of Swansea, Wales, to which company the matte produced from its ore was shipped for refining.

This ore is not of the highest grade, and is so scattered in the rock as to be rather costly to produce in quality suitable for smelting, yet is supposed to exist in considerable quantity. When discovered, as has been stated, this was supposed to be a copper mine, and the ore carries, in fact, nearly as much copper as nickel—say about 1½ per cent of each metal.

Adjacent to this mine and belonging to the same company is an efficient smelting works with one water-jacket furnace (no longer in very good condition), and Manhes converters for concentrating the matte. It is understood that the matte produced here cost more than it was worth in the prevailing low prices for nickel. The whole establishment has been standing idle for several years, with the mine full of water, and several thousand tons of ore on the surface dressed for smelting—part of it roasted.

The Violet mine, belonging to the same company, at a distance of 3 miles, shows richer ore, but has been too little developed to justify any explicit statement of its value.

The Drury Mining Company, operating a mine and one water-jacket furnace of rather inferior capacity, about 20 miles westward from Sudbury and about 4 miles northward from Worthington, produced nearly 1,500 tons of good matte, carrying about 20 per cent nickel with 2 per cent copper, but at a cost so high, compared with its selling value, that the company became bankrupt in 1894 and its property in 1896 passed into the hands of a new company, the Trill Mining and Manufacturing Company, which in that year commenced operations under a contract to supply a large quantity of concentrated, or Manhes matte. To lessen the disadvantage of 4 miles' distance from the railroad an overhead tram road has lately been constructed.

The openings upon which costly exploring work has been done, besides those above named, are not numerous and need not here be specified, since neither of them is now in work, but very many explorations and prospectings have been made. It is quite beyond doubt that the nickel resources of the Sudbury region are capable of supplying not only all the wants of this country but also a large part of those of Europe for many years to come; indeed, even now the chief obstacle in the way of their further development is the difficulty of finding sale for any increased production.

Another hindrance is the excessively high freight charged by the Canadian Pacific Railroad, which is at present the sole means of transportation, but it is probable that those high charges will cause the construction of a short railroad line to Georgian Bay on Lake Huron to connect with a long and cheap water-carriage to Chicago, Buffalo, and other Lake ports.

It is conceivable that the intimations of an export duty upon nickel ore and matte which from time to time appear in the Canadian journals may some day be realized, and cause serious search to be made in this country for the deposits of nickel ore which doubtless exist and of which the now dormant Gap Mine is an instance. Such an export duty would, no doubt, direct attention afresh to the great deposits of nickeliferous pyrrhotite in Norway and Sweden which have been for several years neglected. Barring such a contingency the Sudbury region seems destined to remain for a long time one of the two chief sources of nickel for the world, the only rival to meet it upon equal terms being the island of New Caledonia with its unlimited resources of nickel silicate, only a part of which are controlled by the French Company "Le Nickel."

MANUFACTURE.

The manufacture of nickel has been greatly improved by cheapening since the demand arose within the last decade for large quantities not necessarily of the highest quality for use in steel making.

Some really novel processes have been introduced; some processes that were known but not largely practiced have been applied upon a large scale; some long used processes have been modified and improved in their details.

The time-honored method of dissolving in hydrochloric acid a concentrated, dead roasted matte, consisting of nickel, cobalt, copper, and iron sulphides, then precipitating successively iron oxide, copper sulphide, cobalt peroxide and nickel oxide, then refining and burning the cobalt oxide for potters' and glassmakers' use, and converting the copper sulphide into copper sulphate, then purifying the nickel oxide and reducing it to metal, is still carried on at the "American Nickel Works," in Camden, New Jersey. The quality of the nickel thus made is appreciated by German-silver makers and others who require great purity, but the demand for that grade being much smaller than for lower price and lower quality, it is improbable that this method will be more largely developed.

The so-called soda process, patented by Mr. John L. Thomson (U. S.

No. 489,882), and assigned to the Orford Copper Company, produces most of the nickel made in this country.

Matte of first fusion as made by the Canadian Copper Company is practically freed from iron by subsequent roasting and smelting, and then smelted in a cupola furnace with sodic sulphate and coke. The product of this fusion drawn off into suitable vessels divides by gravity while fluid into two portions, a lighter and a heavier, easily separable when cold, the lighter, called tops, contains nearly all the soda, copper, and iron, while the heavier, called bottoms, contains nearly all the nickel. As the separation of nickel and copper is not quite complete, the bottoms are again or more than once retreated in substantially the same manner until nickel sulphide of satisfactory purity is obtained. From the tops metallic copper is ultimately produced. The very small quantity of cobalt present goes with the nickel and there remains. The nickel sulphide just named becomes, when dead roasted, nickel oxide, which is considered good enough for use in producing nickel ste l. When this nickel oxide is reduced, melted, and poured into water "shot nickel" is produced, which looks well, but is not approved for nice uses. When the oxide is reduced, melted, and poured into suitable moulds, rough slabs are formed, which, treated as anodes, yield electrolytic nickel of high quality.

Mr. N. V. Hybinette has patented (U. S. No. 579,111) a modification of the above-described process in which he proposes to employ manganese sulphide to replace in whole or in part the sodium sulphide formed in the Orford process by fusing sodic sulphate with coke and matte. The reactions and results are claimed to be similar to those of the Orford process, with some advantage by the recovery of the manganese, but the process has not been practically applied anywhere.

The French company "Le Nickel" melts the nickel silicate of New Caledonia with gypsum, thus producing matte consisting of nickel sulphide and iron sulphide.

By successive roasting and smelting the iron is entirely removed as slag, and a final dead roasting produces nickel oxide of suitable purity to yield, by reduction, good merchantable metallic nickel. Some part of this nickel oxide is sold as oxide to steel makers and others.

Mr. Peter Manhes, taking as material the matte last above mentioned, proposes to concentrate it by blowing air through it when melted in his basic lined "Manhes Converter," thus removing all the iron; then to desulphurize it, after removal of slag, by continued fusion in the converter with lime and lime chloride. This is to result in the production of pure metallic nickel in the bottom of the converter, ready to be poured into any convenient form for sale. See German patents Nos. 77,427 and 80,467.

Mr. Ludwig Mond, having, in connection with Messrs. Lange and Quincke, made the remarkable discovery that carbonic oxide would dissolve nickel from heated nickel sulphide, forming what he called carbonyl of nickel, naturally aimed to found upon this a working process for the production of nickel from its ores, or at least from a matte of first fusion. Experience has however shown, after long-continued trials, that it is necessary in practice to carry the nickel matte almost

to desulphurization and to a fine state of division in order to enable the carbonic oxide to attack it satisfactorily; even then a considerable part of the nickel remains with the copper in a condition analogous to an advanced, almost desulphurized, Canadian matte, so that the residue has to be subjected to reworking. No difficulty occurs in condensing the nickel-laden gas by cooling to make it drop the nickel. On the whole this most interesting process appears to be as yet not economically practicable, although it produces nickel of remarkable purity.

One process remains to be mentioned which for a time was successfully practiced both in Germany and at the Camden works, namely, the production of an alloy of nickel and copper suitable for making the extensively used alloy of copper, zinc, and nickel which is known as German silver.

Matte made from nickeliferous pyrrhotite, and deprived of its iron by successive roasting and smelting, then dead roasted, then reduced and melted in a reverbatory furnace, yields metal consisting of nearly pure nickel and copper, in the proportions at which they stood in the original ore. If these two metals are desired to appear in some definite proportions in the resulting alloy (such, for instance, as one-half of each), that can be accomplished by adding before reduction either metallic oxide, separately prepared, in the quantity shown by analysis to be deficient.

In giving this resumé of processes, it will be understood that sundry methods have been omitted, some of which have been tried to a moderate extent, while others are simply projects. It will also be understood that in describing the successful methods many details are left without mention that are in practice essential.

PRODUCTION.

The following tables show the production of nickel and of cobalt oxide in the United States during the years stated:

Production of nickel from domestic ores in the United States during the years 1887 to 1896, inclusive.

Year.	Amount.	Value.
	Pounds.	
1887	205,566	$133,200
1888	204,328	127,632
1889	252,663	151,598
1890	223,488	134,093
1891	118,498	71,099
1892	92,252	50,739
1893	49,399	22,197
1894	9,616	3,269
1895	10,302	3,091
1896	17,170	4,464

Production of cobalt oxide in the United States, 1869 to 1896, inclusive.

Year.	Pounds.	Year.	Pounds.	Year.	Pounds.
1869	811	1879	4,376	1889	13,955
1870	3,854	1880	7,251	1890	6,788
1871	5,086	1881	8,280	1891	7,200
1872	5,749	1882	11,653	1892	7,869
1873	5,128	1883	1,096	1893	8,422
1874	4,145	1884	2,000	1894	6,763
1875	3,441	1885	8,423	1895	14,458
1876	5,162	1886	8,689	1896	10,700
1877	7,328	1887	*a* 18,340		
1878	4,508	1888	8,491		

a Including cobalt oxide in ore and matte.

IMPORTS.

In the following tables are given the statistics of the imports of cobalt oxide and of nickel into the United States from 1868 to 1896:

Cobalt oxide imported and entered for consumption in the United States, 1868 to 1896, inclusive.

Year ending—	Oxide.		Year ending—	Oxide.	
	Quantity.	Value.		Quantity.	Value.
	Pounds.			*Pounds.*	
June 30, 1868	.....	$7,208	June 30, 1883	13,067	$22,323
1869	.....	2,330	1884	25,963	43,611
1870	.....	5,019	1885	16,162	28,138
1871	.....	2,766	Dec. 31, 1886	19,366	29,543
1872	.....	4,920	1887	26,882	39,396
1873	1,480	4,714	1888	27,446	46,211
1874	1,404	5,500	1889	41,455	82,332
1875	678	2,604	1890	33,338	63,202
1876	4,440	11,180	1891	23,643	43,188
1877	19,752	11,056	1892	32,833	60,067
1878	2,860	8,693	1893	28,884	42,694
1879	7,531	15,208	1894	24,020	29,857
1880	9,819	18,457	1895	36,155	39,839
1881	21,844	13,837	1896	27,180	36,212
1882	17,758	12,764			

Nickel imported and entered for consumption in the United States, 1868 to 1896, inclusive.

Year ending—	Nickel.		Nickel oxide, alloy of nickel with copper, and nickel matte.		Total value.
	Quantity.	Value.	Quantity.	Value.	
	Pounds.		*Pounds.*		
June 30, 1868	.....	$118,058	.....	.....	$118,058
1869	.....	134,327	.....	.....	134,327
1870	.....	99,111	.....	.....	99,111
1871	17,701	48,133	4,438	$3,911	52,044
1872	26,140	27,144	.....	.....	27,144
1873	2,842	4,717	.....	.....	4,717
1874	3,172	5,883	.....	.....	5,883
1875	1,255	3,157	12	36	3,193
1876	.....	.....	156	10	10
1877	5,978	9,522	716	824	10,346
1878	7,486	8,837	8,518	7,847	16,684
1879	10,496	7,829	8,314	5,570	13,399
1880	38,276	25,758	61,869	40,311	66,069
1881	17,933	14,503	135,744	107,627	122,130
1882	22,906	17,924	177,822	125,736	143,660
1883	19,015	13,098	161,159	119,386	132,484
1884	.....	.....	*a* 194,711	129,733	129,733
1885	.....	.....	105,603	64,166	64,166
Dec. 31, 1886	.....	.....	277,112	141,546	*b* 141,546
1887	.....	.....	439,037	205,232	*c* 205,232
1888	.....	.....	316,895	138,290	*d* 138,290
1889	.....	.....	367,288	156,331	*e* 156,331
1890	*f* 566,571	260,665	247,299	115,614	376,279
1891	355,455	172,476	*g* 10,245,200	148,687	321,163
1892	.....	.....	*h* 4,487,890	428,062	428,062
1893	.....	.....	*h* 12,427,986	386,740	386,740
1894	.....	.....	*h* 9,286,733	310,581	310,581
1895	.....	.....	*h* 20,355,749	629,910	629,910
1896	.....	.....	*h* 23,718,411	620,425	620,425

a Including metallic nickel.
b Including $465 worth of manufactured nickel.
c Including $879 worth of manufactured nickel.
d Including $2,281 worth of manufactured nickel.
e Including $131 worth of manufactured nickel.
f Classified as nickel, nickel oxide, alloy of any kind in which nickel is the element or material of chief value.
g Classified as nickel and nickel matte.
h Includes all nickel imports except manufactures: nearly all of this is nickel matte from Canada, containing about 20 per cent nickel.

USES OF NICKEL.

For a number of years after the discovery of nickel by Cronstedt in 1751 no considerable use was found for this metal until the introduction of German silver or albata, an alloy of zinc, copper, and nickel, which attained a large consumption in the manufacture of spoons, forks, tableware, and sundry small articles.

The plating of various metallic objects with nickel by electrolysis, as shown by Becquerel in France, and after some years patented by Adams in this country, opened a new demand for nickel, which yet had at first no great effect on the total consumption, since an iron object nickel-plated sometimes replaced a similar object made of solid German silver.

Coinage.—A third use for nickel was as coin material, beginning with the alloy of 88 per cent copper, 12 per cent nickel, adopted in 1857 by the United States for a 1-cent coin; followed next by Belgium in 1860, with the alloy of 75 per cent copper, 25 per cent nickel, for coins of 20 centimes and 10 centimes, then by this country in 1865 with the same alloy for a 3-cent coin and in 1866 for a 5-cent coin, the earlier 1-cent coin being replaced by bronze; afterwards by a number of smaller countries, and finally by the German Empire, which replaced all the miscellaneous small coins of its various component States by coins of 75 per cent copper, 25 per cent nickel. Still later Switzerland adopted a coinage of pure nickel, an example which has been followed by Austria-Hungary and by Italy, and which is sure to be followed by other nations, since pure nickel is much harder than copper-nickel alloy, keeps the imprint much longer, and is in every way preferable. The property of being strongly attracted by the magnet, which is possessed by pure nickel but not by its alloys (except, of course, those with steel or iron), prevents any cheap counterfeiting of nickel coins. Pure nickel coins afford a very large profit to the government that issues them.

Rolled plate, etc.—Dr. Theodore Fleitmann, of Iserlohn, Prussia, having discovered that the addition of a little magnesium to melted nickel caused the metal to become malleable, followed this by establishing the manufacture of pure nickel in sheets, and of sheets composed of iron plated on one side or on both sides with pure nickel, the last-named sheets being made by welding a plate of nickel upon one side or upon each side of a block of malleable iron and then rolling the mass to the desired thickness. The sheet metal thus made has been largely used in Europe for culinary utensils and other objects, but, being more costly than tinned iron, has not been favored in this country.

Pure nickel wire is used to support the mantle of the Welsbach incandescent light. German silver wire has been largely used for resistance coils in electrical engineering, but is now giving place to wire of nickel steel. The best tubes used in the construction of bicycles are made of high-grade nickel steel.

Nickel steel.—Without attempting to enumerate every one of the minor uses of nickel, we pass to that use which has become the most important, namely, the manufacture of nickel steel.

Although several persons had experimented with alloys of nickel and iron and had taken patents for their discoveries, no important application was made of such alloys until after the patent issued in France to Mr. Henri Marbeau, of Paris. Indeed, not until the practical researches of Mr. James Riley, of Glasgow, demonstrated the considerably greater tensile strength and elastic limit of nickel steel than of plain steel, was the attention of steel workers and engineers seriously drawn to steel containing from 3 per cent to 25 per cent of nickel. Yet even then the consumption of nickel steel was for a number of years disappointing until the competitive trials of armor plates made of nickel steel, plain steel, and iron faced with steel were carried out by our Government at Annapolis, showing beyond all cavil the great superiority of steel containing 3¼ per cent of nickel over plain steel. Since that time all the armor plates made for the battle ships of this country have been made of nickel steel, as have most of the armor plates made for the ships of other countries. It is remarkable, however, that Great Britain has continued to use for many of her ships plain steel armor, and is but recently reported as having decided that all must hereafter be of nickel steel.

In addition to armor plates, turrets, protective deck plates, propeller shafts, crank shafts, and some other parts of naval vessels are made, particularly in this country, of nickel steel. Many shafts, cranks, etc., for merchant vessels and for large stationary engines are now made of nickel steel by the Bethlehem Iron Company. Successful experiments have shown its fitness for large guns, and less uniformly successful trials have led to the belief, not yet an established conviction, that nickel steel is the future material for steam boilers where some extra cost can be afforded for increased strength. There can be little doubt that in great bridges, particularly wire suspension bridges, nickel steel will soon be indispensable. Indeed nothing but the higher cost prevents its application to a host of uses.

COST.

The cost of nickel obviously depends upon two conditions, viz: First, the abundance of suitable nickel ores in easily accessible regions not too far from fuel. Second, the cost of the processes for producing nickel from those ores.

At present either one of the two great nickel regions of the world, namely, that near Sudbury, in Canada, or that upon the Island of New Caledonia, is capable of supplying all the nickel needed for the world's consumption; neither region is worked to half its capacity, and neither need fear exhaustion, even at an increased output, for many years. It can not be seriously maintained that these two rather small districts possess all the available nickel of the world, and we may as reasonably expect some future discoveries of resources still better than these as to apprehend that these will be exhausted or prove inadequate for the world's needs. It seems safest to assume that the supplies of ore will continue to be abundant at about the cost of to-day.

The probable cost of processes can not be foretold. Nothing is now in sight to justify anticipations of any great cheapening in the cost of producing nickel, yet no one can deny the possibility of considerable economies. With the production of nickel crowding hard upon a consumption insufficient to take all that is made, and with the incentive of greatly increased consumption if the price could be lowered to that of copper, it would be unwise to declare that the production cost of nickel has reached its minimum. Yet no combination of any known nickel ore deposits with the best processes that have hitherto been conceived of justify any expectation that commercially pure metallic nickel can ever be produced at even double the cost at which, in the most favored localities and by the best processes, commercially pure metallic copper can now be produced.

Prices.—It must be remembered that prices do not always fall, a fact which the experience of the world during the last five years has temporarily thrown into some obscurity. For many years preceding the Franco-German war the price of nickel had remained rather steady between the limits of 4 shillings and 6 shillings per pound in England, then the chief seat of nickel production; in this country, adding cost of transportation, merchants' profits, and more or less import duty, the price varied from about $1.20 to $1.60 per pound, with some declining tendency after nickel making was established here. But when, after the termination of that war, Germany adopted a coinage of copper-nickel alloy, without having previously provided the needful nickel, this large and sudden demand raised the price by successive leaps to 16 shillings per pound in England and to $3.50 per pound here. At that time considerable shipments of American nickel were made to Germany.

For several years the price remained high, sinking but gradually to $3, $2.50, $2, and so on, per pound, until the output of New Caledonia was added to that of the old sources. Even then the price fell without abruptness until the French company "Le Nickel" became embarrassed by the great accumulation of its New Caledonia ores and products, and was obliged to sell largely, with little regard to price.

It was inevitable that when the Sudbury region began to pour out its nickel further reductions in price should take place, the price falling continuously until the present figures of 33 to 40 cents per pound were reached—the former figure applying to large transactions, the latter to retail sales. The question of quality is also involved in the selling price, for the nickel that is acceptable to steel makers, adding but 3¼ per cent of it to the steel for armor plates or shafts, is not acceptable to German-silver makers. Furthermore, since the nickel in such large masses of steel as are used for armor-plates is frequently applied in the form of nickel oxide, which is mixed with a carbonaceous substance and thrown into the bath of melted steel before pouring it into molds, the cost of reducing nickel oxide to metal can be saved to the steel maker, who thus gets his nickel considerably below the lowest figure above named, except for the finest steels, running very high in nickel, where only the best metallic nickel is used.

INVESTIGATIONS.

In conclusion a few original investigations concerning nickel may be mentioned:

First. In the years 1874 and 1875 I made a number of articles of malleable nickel, the first that had been produced, for though laboratory experiments with minute quantities had shown that pure nickel could be made with toughness resembling that of iron, the only nickel known to metallurgists was in the form of brittle grains or cubes, useful only when alloyed with the tougher metals, copper and zinc.

The hammered rods, rolled sheets, knives, lightning-rod tips, bridle bits, cups, etc., which I made of pure nickel were the first objects ever made of wrought nickel. When some of these were exhibited at the Paris Exposition of 1878 they were at first disregarded, being taken for articles made of an ordinary nickel alloy, but when analysis, at the suggestion of Professor Blake, showed them to be made of pure nickel, a gold medal was awarded to me. Since Dr. Fleitmann's important discovery of the use of magnesium for toughening nickel by the reduction of occluded carbonic oxide and of nickel oxide followed my exhibit at Paris, the latter was perhaps the means of drawing his attention to the problem which he solved—that of making nickel practically malleable on a large scale.

Second. In the years 1875 and 1876 I made a number of pure nickel magnets of horseshoe and bar shapes, thus entering upon an almost unexplored field, though it had long been known that both nickel and cobalt were attracted by steel magnets. Some of these were mounted as magnetic needles, and I also had made several complete ship compasses, the needles of which were of pure nickel. One of these compasses I presented to each of the Governments of the United States, Great Britain, France, and Russia, in order that their properties might be investigated on board ship or otherwise in comparison with ordinary steel-needle compasses, but no notice of them was taken except by France and Russia; probably the nickel compass was never sent to sea by either of these, nor in any way tested in practical working in comparison with a steel-needle compass. In France the matter was referred to the Academy, by whom in due time a report of no great importance was made. In Russia the Imperial Academy of Sciences committed the investigation of my compass to Mr. H. Wild, who on May 15, 1877, made an elaborate and interesting report covering 15 printed octavo pages. His conclusions are:

1. The needle is substantially pure nickel, containing no other metals than one-third of 1 per cent of iron and a scarcely perceptible trace of cobalt.

2. Its temporary magnetism at the time of charging is double that of its permanent magnetic moment, one-half the temporary magnetism of hard steel, and one-fourth the temporary magnetism of which soft iron is susceptible.

3. Its permanent magnetism is from one-third to one-half that of hard steel.

4. Its loss of permanent magnetism by lapse of time is greater than that of hard steel.

Third. In order to ascertain whether the magnetic moment of nickel is increased, as is that of steel, by the addition of tungsten, I caused sundry nickel-tungsten bars containing respectively 1 per cent, 2 per cent, 3 per cent, 4 per cent, 6 per cent, and 8 per cent of tungsten (some of which were forged or rolled, while others were left as cast) to be made in the year 1887 by Mr. George Riddle, of Philadelphia. These bars proved to have the interesting property of extreme hardness. At the request of Prof. John Trowbridge, I committed these bars to him for the determination of their magnetic moment, which was found to exceed greatly that of pure nickel. The results of the researches made by Professor Trowbridge and his colleague, Mr. Samuel Sheldon, are fully stated in their paper presented May 28, 1889, to The American Academy of Arts and Sciences. In brief those results are:

1. Tungsten greatly increases the magnetic moment of nickel if the alloy be forged or rolled, but has little effect if it be simply cast and left unwrought.

2. The magnetic moment of the forged alloys of several grades compares thus with that of pure nickel, of tool steel, and of good steel magnets (the latter, taken as stated by Kohlrausch, may perhaps be of tungsten steel):

Magnetic moment of forged alloys, etc.

	Magnetic moment.
Pure nickel	1.23
Tool steel	7.46
Ni. + 3 per cent W	10.60
Ni. + 4 per cent W	10.40
Ni. + 8 per cent W	5.25
Good steel magnets	40.00

These bars were sent to the Paris Exposition of 1889. No notice was taken of them; they were not returned to me, and no trace of them could be found at the close of the exhibition.

Fourth. The atomic weights of nickel and of cobalt having never been quite satisfactorily established, new determinations were this year made by Prof. Theodore William Richards, of Harvard University, and his assistants, A. S. Cushman and G. P. Baxter, with the following results, attained after extended labor that is not yet quite ended, and which the kindness of Professor Richards enables me to give here in advance of their publication elsewhere:

1. T. W. Richards and A. S. Cushman, from the analysis of nickel bromide, find the atomic weight of nickel to be 58.69, if O. = 16.000.

2. T. W. Richards and G. P. Baxter, from similar analysis of cobalt bromide, find the atomic weight of cobalt to be 58.99, if O. = 16.000.

The possible error in these determinations is extremely small.

ANTIMONY.

By EDWARD W. PARKER.

OCCURRENCE.

Stibnite, or sulphide of antimony, is the usual form in which the metal occurs in nature, but it is also found in combination with other minerals. Among these compounds are berthierite (antimony, iron, and sulphur), wolfsbergite (antimony, copper, and sulphur), bleinierite (antimony, lead, and sulphur), boulangerite, etc. It is also found associated with silver and sulphur, and as antimonial silver and antimonial nickel. Rarely it is found in pure metallic state. Occasionally it is found as an oxide, known as valentinite. This form has been reported in small quantities in Utah. The only commercial product obtained in the United States has been in the form of stibnite. Workable deposits are not found east of the Mississippi, and the western deposits have only been worked on a small scale. The States west of the Mississippi in which ores of antimony have been mined are Arkansas, California, Idaho, Montana, Nevada, and Utah. Only two States produced any ore in 1896, and the amount was so small (33 tons altogether) that it is hardly worth mentioning.

PRODUCTION.

The prices for metallic antimony for the past two years have not only discouraged any attempts to develop new mines, but have caused the closing down of those which have been producing. Two mines only yielded any output in 1896, one in California and one in Montana, their aggregate product being 33 tons of ore, worth $1,380. The antimony smelters have drawn their chief supplies of ore from foreign sources. The total amount of metallic antimony produced in 1896 was 601 short tons, valued at $84,290 against 450 tons, worth $68,000 in 1895. Smelters report that the low prices of antimony metal have stimulated consumption, and think the outlook is good for the use of antimony in many new processes and manufactures. One of the causes leading to the low prices of autimony in this country is a peculiar one. For many years the smelters depended largely upon domestic ores, but the supply was limited and uncertain, so that the smelters could not work systematically or economically. In 1894 the principal smelting company in the United States moved from San Francisco to Staten Island, and began the use of foreign ores almost exclusively. With a regular supply of ore and regular work smelting was carried on with greater economy,

the output has been largely increased and prices to the consumer have been cut in half, having been reduced from 15½ to 16 cents for Cookson's brand in 1892 to 7⅛ to 8⅛ cents in 1896. The product of metallic antimony in 1896 was 601 short tons, the largest on record. In the eight years from 1880 to 1887 the production ranged from 35 to 75 tons. From 1888 to 1894 it averaged a little less than 200 tons annually. During 1895 it increased to 450 tons, 2¼ times the product the year before, and in 1896 it was 33⅓ per cent more than in 1895.

In the following table is shown the annual production of antimony in the United States since 1880:

Production of antimony in the United States since 1880.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Short tons.			*Short tons.*	
1880	50	$10,000	1890	129	40,756
1881	50	10,000	1891	278	47,007
1882	60	12,000	1892:		
1883	60	12,000	Metallic	150	56,466
1884	60	12,000	Ore	380	
1885	50	10,000	1893	250	45,000
1886	35	7,000	1894	200	36,000
1887	75	15,000	1895	*a* 450	68,000
1888	100	20,000	1896	*a* 601	84,290
1889	115	28,000			

a Principally from imported ores.

USES.

Antimony is chiefly valuable as an alloy with other metals. It is used to large extent with lead in the manufacture of type metal, to which it gives hardness, and, what is more valuable, it possesses the peculiarity, when used as an alloy, of expanding at the moment of solidifying, thus giving to the type a clean, sharp impression. From 10 to 16 parts of antimony in 100 are used in making britannia metal. Pewter contains about 7 per cent. It is also used in the manufacture of babbitt metal, an antifriction alloy used in the journals of railroad locomotives and cars and other rapidly moving machinery. It has lately been used as an alloy with aluminum, to which it gives hardness and elasticity. Its effects on some metals is very injurious, particularly copper, an almost inappreciable amount (one part in a thousand) destroying its good qualities. The well-known medicinal preparation, tartar emetic, is a tartrate of antimony and potassium. The trisulphide is also used to some extent in medical practice. The sulphide was used to considerable extent by the ancients as a pigment, and women of the East are said to use it at the present day for darkening their eyebrows.

IMPORTS.

As will be seen from the following table the antimony of domestic production supplies a very small proportion of the consumption. The value of the domestic product has exceeded $50,000 in three years only, while the imports have fallen below $200,000 only twice in the past twelve years, and have exceeded $400,000 twice in that time.

Antimony and antimony ore imported and entered for consumption in the United States, 1867 to 1896.

Year ended—	Crude and regulus.		Ore.		Ground. Value.	Total value.
	Quantity.	Value.	Quantity.	Value.		
	Pounds.		*Pounds.*			
June 30, 1867..	.....	$63, 919	.....	.....	.....	$63, 919
1868..	1, 033, 336	83, 822	.....	.....	.....	83, 822
1869..	1, 345, 921	129, 918	.....	.....	.....	129, 918
1870..	1, 227, 429	164, 179	.....	.....	.....	164, 179
1871..	1, 015, 039	148, 264	.....	$2, 364	.....	150, 628
1872..	1, 933, 306	237, 536	.....	3, 031	.....	240, 567
1873..	1, 166, 321	184, 498	.....	2, 941	.....	187, 439
1874..	1, 253, 814	148, 409	.....	203	.....	148, 612
1875..	1, 238, 223	131, 360	6, 460	609	.....	131, 969
1876..	946, 809	119, 441	8, 321	700	.....	120, 141
1877..	1, 115, 124	135, 317	20, 001	2, 314	.....	137, 631
1878..	1, 256, 624	130, 950	20, 351	1, 259	.....	132, 209
1879..	1, 380, 212	143, 099	34, 542	2, 341	.....	145, 440
1880..	2, 019, 389	265, 773	25, 150	2, 349	.....	268, 122
1881..	1, 808, 945	253, 054	841, 730	18, 199	.....	271, 253
1882..	2, 525, 838	294, 234	1, 114, 699	18, 019	.....	312, 253
1883..	3, 064, 050	286, 892	697, 244	11, 254	.....	298, 146
1884..	1, 779, 337	150, 435	231, 360	6, 489	.....	156, 924
1885..	2, 579, 840	207, 215	215, 913	7, 497	.....	214, 712
Dec. 31, 1886..	2, 997, 985	202, 563	218, 366	9, 761	.....	212, 324
1887..	2, 553, 284	169, 747	362, 761	8, 785	.....	178, 532
1888..	2, 814, 044	248, 015	68, 040	2, 178	.....	250, 193
1889..	2, 676, 130	304, 711	146, 309	5, 568	.....	310, 279
1890..	3, 315, 659	411, 960	611, 140	29, 878	.....	441, 838
1891..	2, 618, 941	327, 307	1, 433, 531	36, 232	.....	363, 539
1892..	3, 950, 864	392, 761	192, 344	7, 338	.....	400, 099
1893..	2, 780, 432	243, 341	116, 495	5, 253	.....	248, 594
1894..	2, 653, 487	193, 988	375, 468	18, 068	$737	212, 793
1895..	3, 499, 901	223, 968	668, 610	14, 718	.....	238, 686
1896..	2, 576, 371	158, 975	1, 180, 828	21, 402	.....	180, 377

PRICES.

A review of the prices of antimony ruling during the past seven years shows a history of steady decline. At the beginning of 1890 the price for Cookson's brand was 22½ cents per pound. During 1895 the price ranged from 7¾ to 8½ cents, and in 1896 a shade lower than this. It will thus be seen that in five years there was a decline of over 66⅔ per cent in price. Since 1892 the decline has been about 50 per cent. In January of that year Cookson's was quoted at 15½ to 16 cents per pound. By December the price had fallen to 11¼ cents. During 1893 prices continued to decline slowly until 10 cents was reached, and in 1894, under continued depression, 8½ cents was quoted before the close of the year. The lowest price reached in 1895 was 7¾ cents, and in 1896, 7⅛ cents.

The following tables show by months and years the ruling prices of the several brands of antimony from 1892 to 1896, inclusive:

Prices of antimony at New York in 1892, by months.

[Cents per pound.]

Month.	Cookson's.	L. X.	Hallett's.
January	15½ to 16	12 to 15	12¼ to 12½
February	15 to 15½	12 to 14	11¼
March	14¾ to 15	11¾ to 13	10¾ to 11⅛
April	14¼ to 15½	12¼ to 12½	10⅞ to 11
May	15	12¾	11½
June	14½	12¾	11¼
July	13¼	12¼	10⅞
August	12	11½	10¾
September	11½ to 11¾	11 to 11¼	10 to 10¼
October	12	11¼	10⅝ to 10¾
November	11¾	11	10½
December	11¼	11	10¼ to 10⅜

Prices of antimony at New York in 1893, by months.

[Cents per pound.]

Month.	Cookson's.	L. X.	Hallett's.
January	11	10½	10¼
February	10¾	10½	9⅞ to 10
March	10¾	10 to 12	10
April	10¾	10⅜	10
May	10½	10¼	10
June	10½	10¼	9⅞
July	10⅜	10⅛	9⅞
August	10¼	10	9¾
September	10¼	10	9¾
October	10¼	10	9¾
November	10	9¾	9⅜
December	10⅛ to 10¼	9½ to 9⅝	9⅛ to 9¼

Prices of antimony at New York in 1894, by months.

[Cents per pound.]

Month.	Cookson's.	Hallett's.	L. X.
January	10¼	9½	9⅛
February	10	9⅜	8⅞
March	10⅛	9½	8⅞
April	10⅛	9⅜	8⅞
May	10⅛	9¼	8¾
June	9¾	9⅛	8⅝
July	10	8¾	8⅜
August	10	8⅞	8¼
September	9½	8⅞	7⅝
October	9⅝	8¼	7½
November	8½	8¼	7⅜
December	8⅜	8⅛	7⅜

Prices of antimony at New York in 1895, by months.

[Cents per pound.]

Month.	Cookson's.	Hallett's.	Japanese.
January	$8\frac{1}{2}$ to $8\frac{5}{8}$	$7\frac{1}{8}$ to $7\frac{1}{4}$	.....
February	$8\frac{1}{4}$ to $8\frac{1}{2}$	$7\frac{1}{8}$ to $7\frac{1}{4}$	.....
March	$8\frac{1}{4}$	$7\frac{1}{8}$ to $7\frac{1}{4}$	.....
April	$7\frac{7}{8}$ to $8\frac{1}{8}$	7 to $7\frac{1}{8}$	$6\frac{7}{8}$ to 7
May	$7\frac{7}{8}$ to 8	7	$6\frac{7}{8}$
June	$7\frac{7}{8}$ to 8	7 to $7\frac{1}{8}$	$6\frac{7}{8}$
July	8 to $8\frac{1}{8}$	$7\frac{1}{8}$ to $7\frac{1}{4}$	7
August	8	$7\frac{1}{8}$	7
September	8	$7\frac{1}{8}$	$6\frac{7}{8}$ to 7
October	$7\frac{3}{4}$ to 8	7 to $7\frac{1}{8}$	$6\frac{7}{8}$
November	$7\frac{3}{4}$ to $7\frac{7}{8}$	7	$6\frac{3}{4}$ to $6\frac{7}{8}$
December	$7\frac{3}{4}$ to $7\frac{1}{8}$	$6\frac{7}{8}$ to 7	$6\frac{3}{4}$ to $6\frac{7}{8}$

Prices of antimony at New York in 1896, by months.

[Cents per pound.]

Month.	Cookson's.	Hallett's.	Japanese.
January	$8\frac{1}{4}$	$7\frac{1}{4}$ to $7\frac{1}{2}$	7
February	$8\frac{1}{4}$	$7\frac{1}{2}$	7
March	$8\frac{1}{4}$	$7\frac{1}{2}$	7
April	$8\frac{1}{4}$	$7\frac{1}{2}$	7
May	8 to $8\frac{1}{4}$	$7\frac{1}{4}$ to $7\frac{1}{2}$	$6\frac{7}{8}$ to 7
June	8	$7\frac{1}{4}$	$6\frac{7}{8}$ to 7
July	8	$7\frac{1}{4}$	$6\frac{7}{8}$ to 7
August	8	$7\frac{1}{4}$	$6\frac{7}{8}$ to 7
September	8	$7\frac{1}{4}$	$6\frac{7}{8}$ to 7
October	$7\frac{1}{4}$ to $7\frac{3}{8}$	$6\frac{1}{2}$	$6\frac{3}{8}$
November	$7\frac{1}{8}$ to $7\frac{3}{8}$	$6\frac{3}{8}$ to $6\frac{1}{2}$	$6\frac{1}{4}$ to $6\frac{3}{8}$
December	$7\frac{1}{4}$ to $7\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{3}{8}$

PLATINUM.

PRODUCTION.

The production in the United States from gold placers amounted to 163 ounces, valued in the crude condition at $944. More attention has been directed to the Republic of Colombia, South America, by the discovery of a nugget weighing 20.4 ounces, which was sent to Messrs. Baker Bros. & Co. It is likely that the South American product will increase, though every effort is being made to prevent the exact localities from being known.

The production in previous years has been as follows:

Product of platinum from the United States.

Year.	Quantity.	Value. (a)
	Ounces.	
1880	100	$400
1881	100	400
1882	200	600
1883	200	600
1884	150	450
1885	250	187
1886	50	100
1887	448	1,838
1888	500	2,000
1889	500	2,000
18 0	600	2,500
1891	100	500
1892	80	550
1893	75	517
1894	100	600
1895	150	900
1896	163	944

a The chief variations in price have been due to the quality of the crude grains.

COAL.

By Edward W. Parker.

INTRODUCTION.

The methods employed in preparing the reports on coal production for previous volumes of Mineral Resources have been continued for the present paper. With the exception of one State (Illinois), the tables have been compiled from direct returns of the operators to the Survey or its duly appointed agents. The agents who have assisted in the collection of the statistics, and who have done so for several years, are Mr. William W. Ruley, of Philadelphia, who prepared the report on anthracite production in Pennsylvania; Mr. Charles J. Norwood, chief mine inspector of Kentucky, and Mr. James D. Hillhouse, mine inspector of Alabama. These two latter gentlemen, as a part of the duties imposed by their official positions in the State governments, collect the statistics of coal production of their respective States, and in connection therewith have gathered the information desired for this report, using the Survey blanks and obtaining reports from every producer. The Bureau of Labor Statistics of Illinois, through its secretaries, has, since this series was organized, furnished the figures of production to this office, and frequently in advance of its own publications. The writer desires here to make grateful acknowledgment to these gentlemen who have so ably assisted in the preparation of this report. Also, and equally, to the secretaries of boards of trade and others regarding the movement of coal at the important trade centers and shipping ports, and whose contributions appear under the general head of "Coal trade review." When any reference has been made to the files of technical periodicals due credit is given in the proper place.

To the coal operators who have furnished statements of their production, etc., for 1896 and previous years the Survey is no less indebted than to the other contributors. It is an evidence that the work of this Bureau is becoming better known and appreciated every year, when individuals, firms, and corporations cooperate more cordially each year, thus rendering the work of the Survey more complete, and contributing to the prompt publication of the results.

Some confusion is apt to occur by the fact that both the long ton of 2,240 pounds and the short ton (2,000 pounds) are used in this chapter. This is unfortunate, but can not be avoided. Pennsylvania anthracite is always measured by the long ton. In cases where Pennsylvania bituminous coal is sold in the Eastern markets the long ton is used. The same is true of West Virginia and of the Tazewell and Wise County coals of Virginia. The laws of Maryland permit the use of the long ton only. In all other cases bituminous coal is sold by the short ton. For the sake of convenience the bituminous product has in this report been reduced to short tons, and when the anthracite and bituminous products are tabulated together the short ton is used. In the section devoted entirely to Pennsylvania anthracite the long ton only is used, and in the table of shipments from the Cumberland region this is also the case.

THE COAL FIELDS OF THE UNITED STATES.

For convenience the coal areas of the United States are divided into two great classes, the anthracite and bituminous.

In a commercial sense, particularly in the East, when the anthracite fields are mentioned the fields of Pennsylvania are considered, though Colorado and New Mexico are now supplying anthracite coal of good quality to the Rocky Mountain region, and small amounts are mined annually in Virginia. This small quantity from Virginia and a semi-anthracite product from Arkansas are considered with the bituminous output. In previous years some coal which was classed as anthracite has been mined and sold in New England. The productive area was confined to the eastern part of Rhode Island and the counties of Bristol and Plymouth in Massachusetts. The classing of this product as anthracite coal was erroneous. The original beds have been metamorphosed into graphite or graphitic coal, and the product requires such a high degree of heat for combustion that it can be used only with other combustible material or under a heavy draft. It is, therefore, not an economical practice to use this product for fuel in competition with the anthracite coal from Pennsylvania or the bituminous coals from the New River and Pocahontas fields, which are now sent in large quantities to New England points, and its mining for fuel purposes has been abandoned.

The Bituminous division includes the following coal fields: (1) The Triassic field, embracing the coal beds of the Triassic or New Red Sandstone formation in the Richmond basin in Virginia and in the coal basins along the Deep and Dan rivers in North Carolina; (2) the Appalachian field, which extends from the State of New York on the north to the State of Alabama on the south, having a length northeast and southwest of over 900 miles and a width ranging from 30 to 180 miles; (3) the Northern field, which is confined exclusively to the central part of Michigan; (4) the Central field, embracing the coal areas in

Indiana, Illinois, and western Kentucky; (5) the Western field, including the coal areas west of the Mississippi River, south of the forty-third parallel of north latitude and east of the Rocky Mountains; (6) the Rocky Mountain field, containing the coal areas in the States and Territories lying along the Rocky Mountains; (7) the Pacific Coast field, embracing the coal districts of Washington, Oregon, and California.

The various fields are described at some length in Mineral Resources for 1886, and also in the report for 1894. The latter also contains some historical information regarding the development of these fields. Mineral Resources for 1892 contains some interesting contributions from State geologists on the coal fields of several States.

The following table contains the approximate areas of the coal fields in the various States, grouped according to the divisions mentioned, with the total output from each from 1887 to 1896:

Classification of the coal fields of the United States.

	Area.	Product in—		
		1887.	1888.	1889.
Anthracite.				
New England (Rhode Island and Massachusetts)	*Sq. miles.* 500	*Short tons.* 6,000	*Short tons.* 4,000	*Short tons.* 2,000
Pennsylvania	480	39,506,255	43,922,897	45,544,970
Colorado and New Mexico	15	36,000	44,791	53,517
	995	39,548,255	43,971,688	45,600,487
Bituminous. (*a*)				
Triassic:				
Virginia	180	30,000	33,000	49,411
North Carolina	2,700	.....	.....	222
Appalachian:				
Pennsylvania	9,000	30,866,602	30,796,727	36,174,089
Ohio	10,000	10,301,708	10,910,946	9,976,787
Maryland	550	3,278,023	3,479,470	2,939,715
Virginia	2,000	795,263	1,040,000	816,375
West Virginia	16,000	4,836,820	5,498,800	6,231,880
Kentucky	11,180	950,903	1,193,000	1,108,770
Tennessee	5,100	1,900,000	1,967,297	1,925,689
Georgia	200	313,715	180,000	225,934
Alabama	8,660	1,950,000	2,900,000	3,572,983
	62,690	55,193,034	60,966,240	62,972,222
Northern:				
Michigan	6,700	71,461	81,407	67,431

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Area.	Product in—		
		1887.	1888.	1889.
Bituminous(a)—Continued.				
Central:	*Sq. miles.*	*Short tons.*	*Short tons.*	*Short tons.*
Indiana	6,450	3,217,711	3,140,979	2,845,057
Kentucky	4,500	982,282	1,377,000	1,290,985
Illinois	36,800	10,278,890	14,655,188	12,104,272
	47,750	14,478,883	19,173,167	16,240,314
Western:				
Iowa	18,000	4,473,828	4,952,440	4,045,358
Missouri	26,700	3,209,916	3,909,967	2,557,823
Nebraska	3,200	1,500	1,500	2,222,443
Kansas	17,000	1,596,879	1,850,000	
Arkansas	9,100	150,000	276,871	279,584
Indian Territory	20,000	685,911	761,986	752,832
Texas	4,500	75,000	90,000	128,216
	98,500	10,193,034	11,842,764	10,036,256
Rocky Mountain, etc				
Dakota	.....	21,470	34,000	28,907
Montana	.....	10,202	41,467	363,301
Idaho	.....	500	400	.....
Wyoming	.....	1,170,318	1,481,540	1,388,947
Utah	.....	180,021	258,961	236,651
Colorado	2,913	1,755,735	2,140,686	2,544,144
New Mexico	.....	508,034	626,665	486,463
	.....	3,646,280	4,583,719	5,048,413
Pacific Coast:				
Washington	.....	772,612	1,215,750	1,030,578
Oregon	.....	31,696	75,000	64,359
California	.....	50,000	95,000	119,820
	.....	854,308	1,385,750	1,214,757
Total product sold	.....	124,015,255	142,037,735	.....
Colliery consumption	.....	5,960,302	6,621,667	.....
Total product, including colliery consumption	.....	129,975,557	148,659,402	141,229,513

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—		
	1890.	1891.	1892.
Anthracite.			
New England (Rhode Island and Massachusetts)	*Short tons.*	*Short tons.* 500	*Short tons.* .....
Pennsylvania	46,468,641	50,665,431	52,472,504
Colorado and New Mexico	(*a*)	(*a*)	64,963
	46,468,641	50,665,931	52,537,467
Bituminous. (*b*)			
Triassic:			
Virginia	19,346	17,290	37,219
North Carolina	10,262	20,355	6,679
Appalachian:			
Pennsylvania	42,302,173	42,788,490	46,694,576
Ohio	11,494,506	12,868,683	13,562,927
Maryland	3,357,813	3,820,239	3,419,962
Virginia	764,665	719,109	637,986
West Virginia	7,394,494	9,220,665	9,738,755
Kentucky	1,206,120	1,222,918	1,231,110
Tennessee	2,169,585	2,413,678	2,092,064
Georgia	228,337	171,000	215,498
Alabama	4,090,409	4,759,781	5,529,312
	73,008,102	77,984,563	83,122,190
Northern:			
Michigan	74,977	80,307	77,990
Central:			
Indiana	3,305,737	2,973,474	3,345,174
Kentucky	1,495,376	1,693,151	1,794,203
Illinois	15,292,420	15,660,698	17,862,276
	20,093,533	20,327,323	23,001,653
Western:			
Iowa	4,021,739	3,825,495	3,918,491
Missouri	2,735,221	2,674,606	2,733,949
Nebraska	2,259,922	1,500	1,500
Kansas		2,716,705	3,007,276
Arkansas	399,888	542,379	535,558
Indian Territory	869,229	1,091,032	1,192,721
Texas	184,440	172,100	245,690
	10,470,439	11,023,817	11,635,185

a Included in bituminous product.
b Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—		
	1890.	1891.	1892.
Bituminous. (*a*)			
Rocky Mountain, etc.:	*Short tons.*	*Short tons.*	*Short tons.*
Dakota	30,000	30,000	40,725
Montana	517,477	541,861	564,648
Wyoming	1,870,366	2,327,841	2,503,839
Utah	318,159	371,045	361,013
Colorado	3,094,003	2,512,632	3,447,967
New Mexico	375,777	462,328	659,230
	6,205,782	7,245,707	7,577,422
Pacific Coast:			
Washington	1,263,689	1,056,249	1,213,427
Oregon	61,514	51,826	34,661
California	110,711	93,301	85,178
	1,435,914	1,201,376	1,333,266
Total product, including colliery consumption	157,788,656	168,566,669	179,329,071

	Product in—			
	1893.	1894.	1895.	1896.
Anthracite.				
New England (Rhode Island and Massachusetts)	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.* .....
Pennsylvania	53,967,543	51,921,121	57,999,337	54,346,081
Colorado and New Mexico	93,578	71,550	67,179	79,492
	54,061,121	51,992,671	58,066,516	54,425,573
Bituminous. (*a*)				
Triassic:				
Virginia	19,878	52,079	57,782	95,670
North Carolina	17,000	16,900	24,900	7,813

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—			
	1893.	1894.	1895.	1896.
Bituminous (*a*)—Continued.				
Appalachian:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Pennsylvania	44, 070, 724	39, 912, 463	50, 217, 228	49, 557, 453
Ohio	13, 253, 646	11, 909, 856	13, 355, 806	12, 875, 202
Maryland	3, 716, 041	3, 501, 428	3, 915, 585	4, 143, 936
Virginia	800, 461	1, 177, 004	1, 310, 542	1, 159, 053
West Virginia	10, 708, 578	11, 627, 757	11, 387, 961	12, 876, 296
Kentucky	1, 245, 785	1, 218, 072	1, 490, 057	1, 486, 016
Tennessee	1, 902, 258	2, 180, 879	2, 535, 644	2, 663, 106
Georgia	372, 740	354, 111	260, 998	238, 546
Alabama	5, 136, 935	4, 397, 178	5, 693, 775	5, 748, 697
	81, 207, 168	76, 278, 748	90, 167, 596	90, 748, 305
Northern:				
Michigan	45, 979	70, 022	112, 322	92, 882
Central:				
Indiana	3, 791, 851	3, 423, 921	3, 995, 892	3, 905, 779
Kentucky	1, 761, 394	1, 893, 120	1, 867, 713	1, 847, 462
Illinois	19, 949, 564	17, 113, 576	17, 735, 864	19, 786. 626
	25, 502, 809	22, 430, 617	23, 599, 469	25, 539, 867
Western:				
Iowa	3, 972, 229	3, 967, 253	4, 156, 074	3, 954, 028
Missouri	2, 897, 442	2, 245, 039	2, 372, 393	2, 331, 542
Nebraska	.....	.....	.....	3, 560
Kansas	2, 652, 546	3, 388, 251	2, 926, 870	2, 884, 801
Arkansas	574, 763	512, 626	598, 322	675, 374
Indian Territory	1, 252, 110	969, 606	1, 211, 185	1, 366, 646
Texas	302, 206	420, 848	484, 959	544, 015
	11, 651, 296	11, 503, 623	11, 749, 803	11, 759, 966
Rocky Mountain, etc.:				
Dakota	49, 630	42, 015	39, 197	78, 050
Montana	892, 309	927, 395	1, 504, 193	1, 543, 445
Wyoming	2, 439, 311	2, 417, 463	2, 246, 911	2, 229, 624
Utah	413, 205	431, 550	471, 836	418, 627
Colorado	4, 018, 793	2, 776, 817	3, 027, 327	3, 054, 711
New Mexico	655, 112	580, 238	709, 130	600, 823
Nevada	.....	150	.....	.....
	8, 468, 360	7, 175, 628	7, 998, 594	7, 925, 280

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—			
	1893.	1894.	1895.	1896.
Bituminous (a)—Continued.				
Pacific Coast:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Washington	1,264,877	1,106,470	1,191,410	1,195,504
Oregon	41,683	47,521	73,685	101,721
California	72,603	67,247	75,453	*b* 93,776
	1,379,163	1,221,238	1,340,548	1,391,001
Total product, including colliery consumption	182,352,774	170,741,526	193,117,530	191,986,357

a Including lignite, brown coal, and scattering lots of anthracite.
b Includes Alaska.

PRODUCTION.

The total production of coal of all kinds in the United States during 1896 amounted to 171,416,390 long tons of 2,240 pounds, equivalent to 191,986,357 short tons of 2,000 pounds, and having a total value at the mines of $196,640,166. With the exception of 1895 this was the largest production in our history. It was effected in the face of the most adverse conditions. At no time in the history of coal mining in the United States has there been so little of encouragement to the operators. This is especially true in regard to bituminous production. In anthracite circles there existed a combination, among the larger interests, of sufficient strength to control the production in some proportion to the demand. The result of this combination was a reduction of 3,261,835 long tons, or 3,653,256 short tons, as compared with 1895. Bituminous production, on the contrary, exceeded that of 1895 by a little over two and a half million tons, for which the operators received nearly a million dollars less than they did for the smaller product in 1895.

The production of pig iron made with bituminous coal and coke, according to the report of Mr. James M. Swank, general manager of the American Iron and Steel Association, shows a decrease in 1896 of 783,597 long tons; the production of coke, sympathizing more directly with the iron production, fell off from 13,333,714 short tons in 1895 to 11,788,773 short tons in 1896. There was also a decreased production in all kinds of iron and steel manufactures with the single exception of open-hearth steel ingots and castings, and this increase was only about 160,000 long tons. The increased product of bituminous coal in 1896 was distributed, therefore, for consumption among other manufacturing industries than those of iron and steel, to transportation companies,

and for domestic use. As general trade conditions were still in a depressed state, the further decline in prices of bituminous coal may be readily understood.

There has been no reaction in the declining prices of bituminous coal since 1887. In that year the average for the United States was $1.12 per ton. In 1888 and 1889 it was about $1 per ton. For the next three years it was fairly steady at 99 cents. The panic of 1893 brought the price down to 96 cents, followed by a drop of 5 cents more in 1894, and another 5 cents in 1895. A further decline of 3 cents in 1896 brought the average price down to 83 cents, the lowest ever recorded.

In considering the coal product these reports include not only the coal marketed, either by shipment to distant points or sold locally, but also that consumed by the mine employees and by the mine operators themselves in locomotives, under stationary boilers, etc., in working the mine, and technically known as colliery consumption. There are occasional exceptions, where operators use only slack or waste, which would otherwise be thrown on the dump and no record kept, the miner not even being paid for it. These exceptions are few and the amount so comparatively small as not to materially affect the total. Coal consumed in the manufacture of coke is also included in this report.

Excluding the colliery consumption, the product in 1896 was 165,001,362 long tons, or 184,801,525 short tons. This may be, and usually is, considered the marketable product.

ANTHRACITE.

The product of Pennsylvania anthracite in 1896 was 48,523,287 long tons, or 54,346,081 short tons, valued at $81,748,651, against 51,785,122 long tons, or 57,999,336 short tons in 1895, valued at $82,019,272, indicating a decrease in output of 3,261,835 long tons, or 3,653,256 short tons, and in value of $270,621. It will be seen by this that the value of anthracite coal marketed in 1896 was comparatively more than that sold in 1895. The better prices obtained in 1896 was not due to improved trade conditions, but to the organization of anthracite operators in a combination to restrict production and maintain prices. In order to accomplish this result the mines were operated only three or four days in the week, but even with this restriction the supply of coal was lessened only about 6 per cent. It appears singular that with the working time cut down one-fourth or one-third the product is decreased only one-twelfth. The explanation is simple. During the busy season, when the mines are running full time, the miners rarely average as much as five days in the week, usually "laying off" one or two week days as well as Sunday. When the mines are running but half or two-thirds' time every miner puts in all the time he can, and probably averages more tonnage per day than when he has all the work he wants.

The decreased output in 1896 averaged to the operator $1.85 per long ton for the marketed product, against $1.72 in 1895, and was about the same as the price obtained in 1894. By the marketed product is meant the total output less the colliery consumption. In making returns to the Survey, operators exclude the amount used at the mines in their valuation. The quantity stated is usually an estimate at most, and consists of culm or slack that would otherwise be thrown on the dump and wasted. It is, therefore, not included in the value of the product. The average price per ton obtained by dividing the total value by the total product (that is, including the colliery consumption) was $1.69 per long ton in 1894, $1.58 in 1895, and $1.69 in 1896. There is another reason besides the restricted production that tended toward better prices in 1896. The same reason occasioned a lower average price in 1895. In order to get rid of the large amount of small sizes of anthracite accumulated in preparing the more desirable furnace, egg, stove, etc., operators created a demand by offering exceedingly low prices to consumers. As a result large quantities of pea, buckwheat, and rice became a part of the marketed product and caused a reduction in the average price. Many manufacturers adapted their furnaces for using the cheaper fuel, for which, the demand increasing, better prices were obtained in 1896.

In addition to the anthracite production of Pennsylvania in 1896 there were 79,492 short tons mined in Colorado and New Mexico, making the total output of anthracite coal in the United States 54,425,573 short tons. Except in the preceding tables, the anthracite product of Colorado and New Mexico, for sake of convenience, is included in the bituminous product, and, unless expressly stated to the contrary, reference in this chapter to anthracite production means that of Pennsylvania only.

The number of men employed in the anthracite mines of Pennsylvania in 1896 was 148,991, who averaged one hundred and seventy-four working days, against 142,917 men for one hundred and ninety-six days in 1895, and 131,603 men for one hundred and ninety days in 1894.

BITUMINOUS.

The product of bituminous coal as collated in these reports includes, in addition to strictly bituminous coals, lignites or brown coals, cannel, splint, block, semibituminous, semianthracite and the anthracite product of Colorado and New Mexico. The aggregate output of these in 1896 amounted to 137,640,276 short tons, valued at $114,891,515, against 135,118,193 short tons in 1895, worth $115,779,771, an increase of 2,522,083 in amount and a decrease of $888,256 in value. It is difficult to account for the continual increase in the production of bituminous coal in the face of such adverse trade conditions. The depressed condition of, and decreased production in all branches of the iron and steel industry lessened to a considerable extent one of the natural outlets

for the bituminous product. The manufacture of coke for metallurgical purposes was much less in 1896 than in 1895, the Connellsville region alone showing a decrease of 2,718,689 tons. The only cause that may reasonably be ascribed for the increased production is an unhealthy spirit of competition. Prices have declined and mining wages have been reduced. Under ordinary conditions the cuts in mining wages would have caused numerous strikes, and some have occurred, but conditions were not favorable for successful strikes. Miners realized that half a loaf was better than no bread, and mines have kept producing coal when in many cases the operators would have welcomed a strike as an excuse for shutting down.

Among the coal-producing States and Territories there were 18 whose product exceeded 1,000,000 tons. Nine of these showed increased production in 1896, and nine reported decreased production. Those in which the production increased were Alabama, Colorado, Illinois, Indian Territory, Maryland, Montana, Tennessee, Washington, and West Virginia—five east and four west of the Mississippi River. Those in which the production decreased were Indiana, Iowa, Kansas, Kentucky, Missouri, Ohio, Pennsylvania, Virginia, and Wyoming—five east and four west of the Mississippi River.

There were 10 States in 1896 whose product exceeded 3,000,000 tons. Pennsylvania, of course, maintains her supremacy with 36 per cent of the total bituminous product, against 37 per cent in 1895. Illinois remains in second place with 14 per cert of the product in 1896 and 13 per cent in 1895, gaining the 1 per cent lost by Pennsylvania. West Virginia and Ohio are almost tied for third place, the former having the advantage by only a thousand tons in a product of nearly 13,000,000. Each State produced about 9½ per cent of the total bituminous output in 1896. Alabama continues in fifth place with 4.2 per cent. Maryland replaces Iowa in sixth place with 3 per cent, Iowa having a little less than 2.9 per cent and being closely followed by Indiana. Kentucky and Colorado continue in the same positions they held in 1895.

The total number of bituminous coal mines (exclusive of small local banks) reporting production in 1896 was 2,599. They employed an average of 237,665 men and were operated an average of one hundred and ninety-two days. The total number of mines reporting in 1895 was 2,555, employing 239,962 men for one hundred and ninety-four days.

The following tables show the production of all kinds of coal in the United States in 1895 and 1896, by States, with the distribution of the product for consumption, the value of the output, number of employees, and the average working time:

Coal product of the United States in 1895, by States.

State or Territory.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Alabama	60	3,610,433	272,551	137,021	1,673,770
Arkansas	13	576,112	14,935	7,275	.....
California	5	60,440	12,171	2,842	.....
Colorado	87	2,445,578	49,088	99,055	489,261
Georgia	2	135,692	150	6,256	118,900
Illinois	319	14,456,524	2,684,607	591,133	3,600
Indiana	113	3,488,876	392,423	104,695	9,898
Indian Territory	16	1,173,399	3,070	21,935	12,781
Iowa	177	3,630,867	460,820	64,387	.....
Kansas	106	2,587,602	279,739	59,142	387
Kentucky	120	3,012,610	254,028	50,294	40,838
Maryland	23	3,840,991	59,950	14,644	.....
Michigan	9	80,403	27,019	4,900	.....
Missouri	122	2,104,452	231,090	36,851	.....
Montana	22	1,404,862	19,168	20,463	59,700
New Mexico	22	695,634	13,045	11,292	683
North Carolina	3	23,400	600	900	.....
North and South Dakota	9	35,380	3,817	.....	.....
Ohio	407	11,933,686	1,227,224	152,277	42,619
Oregon	5	68,108	5,294	283	.....
Pennsylvania	588	35,164,453	1,732,803	468,381	12,851,591
Tennessee	44	1,808,056	51,923	25,477	650,188
Texas	14	475,157	7,705	2,097	.....
Utah	14	376,459	25,097	7,253	63,027
Virginia	22	1,024,200	15,173	22,338	306,613
Washington	22	1,108,868	16,320	43,249	22,973
West Virginia	186	8,858,256	445,023	50,595	2,034,087
Wyoming	25	2,106,937	35,628	81,065	23,281
Total	2,555	106,287,435	8,340,461	2,086,100	18,404,197
Pennsylvania anthracite	349	52,092,854	1,315,044	4,591,439	.....
Grand total	2,904	158,380,289	9,655,505	6,677,539	18,404,197

Coal product of the United States in 1895, by States—Continued.

State or Territory.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.				
Alabama	5,693,775	$5,126,822	$0.90	244	10,346
Arkansas	598,322	751,156	1.25	176	1,218
California	75,453	175,778	2.33	262	190
Colorado	3,082,982	3,675,185	1.20	182	6,125
Georgia	260,998	215,863	.83	312	848
Illinois	17,735,864	14,239,157	.80	182	38,630
Indiana	3,995,892	3,642,623	.91	189	8,530
Indian Territory	1,211,185	1,737,254	1.43	164	3,212
Iowa	4,156,074	4,982,102	1.20	189	10,066
Kansas	2,926,870	3,481,981	1.20	159	7,482
Kentucky	3,357,770	2,890,247	.86	146	7,865
Maryland	3,915,585	3,160,592	.81	248	3,912
Michigan	112,322	180,016	1.60	186	320
Missouri	2,372,393	2,651,612	1.12	163	6,299
Montana	1,504,193	2,850,906	1.89	223	2,184
New Mexico	720,654	1,072,520	1.49	190	1,383
North Carolina	24,900	41,350	1.66	226	61
North and South Dakota	39,197	42,046	1.07	139	65
Ohio	13,355,806	10,618,477	.79	176	24,644
Oregon	73,685	247,901	3.36	69	414
Pennsylvania	50,217,228	35,980,357	.72	206	71,130
Tennessee	2,535,644	2,349,032	.93	224	5,120
Texas	484,959	913,138	1.88	171	1,642
Utah	471,836	617,349	1.31	203	670
Virginia	1,368,324	869,873	.63	225	2,158
Washington	1,191,410	2,577,958	2.16	224	2,840
West Virginia	11,387,961	7,710,575	.68	195	19,159
Wyoming	2,246,911	2,977,901	1.33	184	3,449
Total	135,118,193	115,779,771	.86	194	239,962
Pennsylvania anthracite	57,999,337	82,019,272	1.41	196	142,917
Grand total	193,117,530	197,799,043	1.02	195	382,879

Coal product of the United States in 1896, by States.

State.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Alabama	80	3,555,493	285,416	138,268	1,769,520
Arkansas	14	647,240	8,640	19,494	.....
California and Alaska	5	80,808	7,897	5,071	.....
Colorado	88	2,424,027	65,755	93,128	529,490
Georgia and North Carolina	3	125,852	1,170	9,682	109,655
Illinois	330	16,128,103	2,995,022	659,601	3,900
Indiana	131	3,471,470	511,911	113,442	8,956
Indian Territory	21	1,295,742	12,648	45,560	12,696
Iowa	182	3,360,799	494,443	91,766	7,020
Kansas	96	2,562,779	256,906	63,901	1,215
Kentucky	112	2,980,355	251,897	55,447	45,779
Maryland	22	4,068,558	53,046	22,332	.....
Michigan	11	83,150	6,547	3,185	.....
Missouri	128	2,047,251	243,029	41,262	.....
Montana	21	1,314,873	27,476	17,676	183,420
New Mexico	16	607,319	6,677	7,446	1,184
North Dakota	10	71,447	6,183	420	.....
Ohio	408	11,494,275	1,181,610	172,722	26,595
Oregon	8	88,116	12,951	654	.....
Pennsylvania	569	37,696,555	1,570,161	504,224	9,786,513
Tennessee	45	1,990,538	43,752	40,343	588,473
Texas	16	522,177	12,846	8,992	.....
Utah	15	340,338	9,171	7,411	61,707
Virginia	29	824,042	40,951	38,540	351,190
Washington	21	1,095,484	16,722	44,613	38,685
West Virginia	189	9,838,053	426,441	56,395	2,555,407
Wyoming and Nebraska	29	2,102,528	21,367	68,251	41,038
Total	2,599	110,817,372	8,370,635	2,329,826	16,122,443
Pennsylvania anthracite	355	48,358,783	1,132,292	4,855,006	.....
Grand total	2,954	159,176,155	9,502,927	7,184,832	16,122,443

Coal product of the United States in 1896, by States—Continued.

State.	Total production.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.				
Alabama	5,748,697	$5,174,135	$0.90	248	9,894
Arkansas	675,374	755,577	1.12	168	1,507
California and Alaska	93,776	220,523	2.35	291	177
Colorado	3,112,400	3,606,642	1.16	172	6,704
Georgia and North Carolina	246,359	179,770	.73	301	731
Illinois	19,786,626	15,809,736	.80	186	33,054
Indiana	3,905,779	3,261,737	.84	163	8,806
Indian Territory	1,366,646	1,918,115	1.40	170	3,549
Iowa	3,954,028	4,628,022	1.17	178	9,672
Kansas	2,884.801	3,295,032	1.15	168	7,127
Kentucky	3,333,478	2,684,306	.78	165	7,549
Maryland	4,143,936	3,299,928	.80	204	4,039
Michigan	92,882	150,631	1.62	157	320
Missouri	2,331,542	2,518,194	1.08	168	5,982
Montana	1,543,445	2,279,672	1.47	234	2,335
New Mexico	622,626	930,381	1.49	172	1,559
North Dakota	78,050	84,908	1.09	166	141
Ohio	12,875,202	10,253,461	.79	161	25,500
Oregon	101,721	294,564	2.90	191	254
Pennsylvania	49,557,453	35,368,249	.71	206	72,625
Tennessee	2,663,106	2,281,295	.86	211	6,531
Texas	544,015	896,251	1.65	187	1,953
Utah	418,627	500,547	1.20	202	679
Virginia	1,254,723	848,851	.68	198	2,510
Washington	1,195,504	2,396,078	2.00	221	2,622
West Virginia	12,876,296	8,336,685	.65	201	19,078
Wyoming and Nebraska	2,233,184	2,918,225	1.37	210	2,937
Total	137,640,276	114,891,515	.83	192	237,665
Pennsylvania anthracite	54,346,081	81,748,651	1.50	174	148,991
Grand total	191,986,357	196,640,166	1.02	185	386,656

PRODUCTION IN PREVIOUS YEARS.

The following table shows the annual production of anthracite and bituminous coal since 1880. The quantities are expressed both in long tons of 2,240 pounds and in short tons of 2,000 pounds.

Annual production of coal in the United States since 1880.

Year.	Bituminous coal.		
	Long tons of 2,240 pounds.	Short tons of 2,000 pounds.	Value.
1880	38,242,641	42,831,758	$53,443,718
1881	48,365,341	53,961,012	60,224,344
1882	60,861,190	68,164,533	76,076,487
1883	68,531,500	76,755,280	82,237,800
1884	73,730,539	82,578,204	77,417,066
1885	64,840,668	72,621,548	82,347,648
1886	65 810,676	73,707,957	78,481,056
1887	78,470,857	87,887,360	98,004,656
1888	91,106,998	102,039,838	101,860,529
1889	85,432,628	95,684,543	94,504,745
1890	99,392,871	111,320,016	110,420,801
1891	105,268,962	117,901,237	117,188,400
1892	113,264,792	126,856,567	125,124,381
1893	114,629,671	128,385,231	122,751,618
1894	106,089,647	118,820,405	107,653,501
1895	120,641,244	135,118,193	115,779,771
1896	122,893,104	137,640,276	114,891,515

Year.	Pennsylvania anthracite.		
	Long tons of 2,240 pounds.	Short tons of 2,000 pounds.	Value.
1880	25,580,189	28,649,811	$42,196,678
1881	28,500,016	31,920,018	64,125,036
1882	31,358,264	35,121,256	70,556,094
1883	34,336,469	38,456,845	77,257,055
1884	33,175,756	37,156,847	66,351,512
1885	34,228,548	38,335,974	76,671,948
1886	34,853,077	39,035,446	76,119,120
1887	37,578,747	42,088,197	84,552,181
1888	41,624,611	46,619,564	89,020,483
1889	40,665,152	45,544,970	65,721,578
1890	41,489,858	46,468,641	66,383,772
1891	45,236,992	50,665,431	73,944,735
1892	46,850,450	52,472,504	82,442,000
1893	48,185,306	53,967,543	85,687,078
1894	46,358,144	51,921,121	78,488,063
1895	51,785,122	57,999,337	82,019,272
1896	48,523,287	54,346,081	81,748,651

Annual production of coal in the United States since 1880—Continued.

Year.	Total.		
	Long tons.	Short tons.	Value.
1880	63, 822, 830	71, 481, 569	$95, 640, 396
1881	76, 865, 357	85, 881, 030	124, 349, 380
1882	92, 219, 454	103, 285, 789	146, 632, 581
1883	102, 867, 969	115, 212, 125	159, 494, 855
1884	106, 906, 295	119, 735, 051	143, 768, 578
1885	99, 069, 216	110, 957, 522	159, 019, 596
1886	100, 663, 753	112, 743, 403	154, 600, 176
1887	116, 049, 604	129, 975, 557	182, 556, 837
1888	132, 731, 609	148, 659, 402	190, 881, 012
1889	126, 097, 780	141, 229, 513	160, 226, 323
1890	140, 882, 729	157, 788, 657	176, 804, 573
1891	150, 505, 954	168, 566, 668	191, 133, 135
1892	160, 115, 242	179, 329, 071	207, 566, 381
1893	162, 814, 977	182, 352, 774	208, 438, 696
1894	152, 447, 791	170, 741, 526	186, 141, 564
1895	172, 426, 366	193, 117, 530	197, 799, 043
1896	171, 416, 390	191, 986, 357	196, 640, 166

The statistics of production in the separate States for years prior to 1886 are so incomplete that a statement showing them would be largely a matter of guesswork and of no practical value. Since 1886 the statistics have been collected regularly and systematically by the Geological Survey, with the exception of 1889, when the information was gathered by the Eleventh United States Census. The total amount and value of coal produced in the United States from 1886 to 1896, inclusive, is shown in the following table. The quantities are expressed uniformly in short tons of 2,000 pounds.

Amount and value of coal produced in the United States, by States and Territories, from 1886 to 1896.

State or Territory.	1886.		1887.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	1,800,000	$2,574,000	1,950,000	$2,535,000
Arkansas	125,000	200,000	150,000	252,500
California	100,000	300,000	50,000	150,000
Colorado	1,368,338	3,215,594	1,791,735	3,941,817
Georgia	223,000	334,500	313,715	470,573
Idaho	1,500	6,000	500	2,000
Illinois	9,246,435	10,263,543	10,278,890	11,152,596
Indiana	3,600,000	3,450,000	3,217,711	4,324,604
Indian Territory	534,580	855,328	685,911	1,286,692
Iowa	4,312,921	5,391,151	4,473,828	5,991,735
Kansas	1,400,000	1,680,000	1,596,879	2,235,631
Kentucky	1,550,000	1,782,500	1,933,185	2,223,163
Maryland	2,517,577	2,391,698	3,278,023	3,114,122
Michigan	60,434	90,651	71,461	107,191
Missouri	1,800,000	2,340,000	3,209,916	4,298,994
Montana	49,846	174,460	10,202	35,707
Nebraska	.....	.....	1,500	3,000
New Mexico	271,285	813,855	508,034	1,524,102
North Dakota	25,955	41,277	21,470	32,205
Ohio	8,435,211	8,013,450	10,301,708	9,096,848
Oregon	45,000	112,500	31,696	70,000
Pennsylvania:				
Anthracite	36,696,475	71,558,126	39,506,255	79,365,244
Bituminous	26,160,735	21,016,235	30,866,602	27,806,941
Rhode Island	.....	.....	6,000	16,250
Tennessee	1,714,290	1,971,434	1,900,000	2,470,000
Texas	100,000	185,000	75,000	150,000
Utah	200,000	420,000	180,021	360,042
Virginia	684,951	684,951	825,263	773,360
Washington	423,525	952,931	772,612	1,699,746
West Virginia	4,005,796	3,805,506	4,836,820	4,594,979
Wyoming	829,355	2,488,065	1,170,318	3,510,954
Total product sold	107,682,209	147,112,755	124,015,255	173,595,996
Colliery consumption	5,061,194	.....	5,960,302	8,960,841
Total	112,743,403	147,112,755	129,975,557	182,556,837

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1888.		1889.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	2,900,000	$3,335,000	3,572,983	$3,961,491
Arkansas	276,871	415,306	279,584	395,836
California	95,000	380,000	184,179	434,382
Colorado	2,185,477	4,808,049	2,544,144	3,843,992
Georgia	180,000	270,000	226,156	339,382
Idaho	400	1,800	.....	.....
Illinois	14,655,188	16,413,811	12,104,272	11,755,203
Indiana	3,140,979	4,397,370	2,845,057	2,887,852
Indian Territory	761,986	1,432,072	752,832	1,323,807
Iowa	4,952,440	6,438,172	4,095,358	5,426,509
Kansas	1,850,000	2,775,000	2,220,943	3,297,288
Kentucky	2,570,000	3,084,000	2,399,755	2,374,339
Maryland	3,479,470	3,293,070	2,939,715	2,517,474
Michigan	81,407	135,221	67,431	115,011
Missouri	3,909,967	8,650,800	2,557,823	3,479,057
Montana	41,467	145,135	363,301	880,773
Nebraska	1,500	3,375	1,500	4,500
New Mexico	626,665	1,879,995	486,463	870,468
North Carolina	.....	.....	(*a*)	.....
North Dakota	34,000	119,000	28,907	41,431
Ohio	10,910,946	10,147,180	9,976,787	9,355,400
Oregon	75,000	225,000	(*b*)	.....
Pennsylvania:				
Anthracite	43,922,897	85,649,649	*c*45,598,487	65,873,514
Bituminous	33,796,727	32,106,891	36,174,089	27,953,315
Rhode Island	4,000	11,000	2,000	6,000
Tennessee	1,967,297	2,164,026	1,925,689	2,338,309
Texas	90,000	184,500	128,216	340,620
Utah	258,961	543,818	236,651	377,456
Virginia	1,073,000	1,073,000	865,786	804,475
Washington	1,215,750	3,647,250	1,030,578	2,393,238
West Virginia	5,498,800	6,048,680	6,231,880	5,086,584
Wyoming	1,481,540	4,444,620	1,388,947	1,748,617
Total product sold	142,037,735	204,222,790	141,229,513	160,226,323
Colliery consumption	6,621,667	7,295,834	.....	.....
Total	148,659,402	211,518,624	.....	.....

a Product included in Georgia.
b Product included in California.
c Includes product of anthracite in Colorado and New Mexico.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1890.		1891.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	4,090,409	$4,202,469	4,759,781	$5,087,596
Arkansas	399,888	514,595	542,379	647,560
California	110,711	283,019	93,301	204,902
Colorado	3,094,003	4,344,196	3,512,632	4,800,000
Georgia	228,337	238,315	171,000	256,500
Illinois	15,292,420	14,171,230	15,660,698	14,237,074
Indiana	3,305,737	3,259,233	2,973,474	3,070,918
Indian Territory	869,229	1,579,188	1,091,032	1,897,037
Iowa	4,021,739	4,995,739	3,825,495	4,867,999
Kansas	2,259,922	2,947,517	2,716,705	3,557,303
Kentucky	2,701,496	2,472,119	2,916,069	2,715,600
Maryland	3,357,813	2,899,572	3,820,239	3,082,515
Michigan	74,977	149,195	80,307	133,387
Missouri	2,735,221	3,382,858	2,674,606	3,283,242
Montana	517,477	1,252,492	541,861	1,228,630
Nebraska	1,500	4,500	1,500	4,500
New Mexico	375,777	504,390	462,328	779,018
North Carolina	10,262	17,864	20,355	39,365
North Dakota	30,000	42,000	30,000	42,000
Ohio	11,494,506	10,783,171	12,868,683	12,106,115
Oregon	61,514	177,875	51,826	155,478
Pennsylvania:				
Anthracite	46,468,641	66,383,772	50,665,431	73,944,735
Bituminous	42,302,173	35,376,916	42,788,490	37,271,053
Rhode Island	.....	.....	500	10,000
Tennessee	2,169,585	2,395,746	2,413,678	2,668,188
Texas	184,440	465,900	172,100	412,360
Utah	318,159	552,390	371,045	666,045
Virginia	784,011	589,925	736,399	611,654
Washington	1,263,689	3,426,590	1,056,249	2,437,270
West Virginia	7,394,654	6,208,128	9,220,665	7,359,816
Wyoming	1,870,366	3,183,669	2,327,841	3,555,275
Total product	157,788,656	176,804,573	168,566,669	191,133,135

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1892.		1893.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	5,529,312	$5,788,898	5,136,935	$5,096,792
Arkansas	535,558	666,230	574,763	773,347
California	85,178	209,711	72,603	167,555
Colorado	3,510,830	5,685,112	4,102,389	5,104,602
Georgia	215,498	212,761	372,740	365,972
Illinois	17,862,276	16,243,645	19,949,564	17,827,595
Indiana	3,345,174	3,620,582	3,791,851	4,055,372
Indian Territory	1,192,721	2,043,479	1,252,110	2,235,209
Iowa	3,918,491	5,175,060	3,972,229	5,110,460
Kansas	3,007,276	3,955,595	2,652,546	3,375,740
Kentucky	3,025,313	2,771,238	3,007,179	2,613,569
Maryland	3,419,962	3,063,580	3,716,041	3,267,317
Michigan	77,990	121,314	45,979	82,462
Missouri	2,733,949	3,369,659	2,897,442	3,562,757
Montana	564,648	1,330,847	892,309	1,772,116
Nebraska	1,500	4,500	.....	.....
New Mexico	661,330	1,074,601	665,094	979,044
North Carolina	6,679	9,599	17,000	25,500
North Dakota	40,725	39,250	49,630	56,250
Ohio	13,562,927	12,722,745	13,253,646	12,351,139
Oregon	34,661	148,546	41,683	164,500
Pennsylvania:				
Anthracite	52,472,504	82,442,000	53,967,543	85,687,078
Bituminous	46,694,576	39,017,164	44,070,724	35,260,674
Tennessee	2,092,064	2,355,441	1,902,258	2,048,449
Texas	245,690	569,333	302,206	688,407
Utah	361,013	562,625	413,205	611,092
Virginia	675,205	578,429	820,339	692,748
Washington	1,213,427	2,763,547	1,264,877	2,920,876
West Virginia	9,738,755	7,852,114	10,708,578	8,251,170
Wyoming	2,503,839	3,168,776	2,439,311	3,290,904
Total product	179,329,071	207,566,381	182,352,774	208,438,696

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1894.		1895.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	4,397,178	$4,085,535	5,693,775	$5,126,822
Arkansas	512,626	631,988	598,322	751,156
California	67,247	155,620	75,453	175,778
Colorado	2,831,409	3,516,340	3,082,982	3,675,185
Georgia	354,111	299,290	260,998	215,863
Illinois	17,113,576	15,282,111	17,735,864	14,239,157
Indiana	3,423,921	3,295,034	3,995,892	3,642,623
Indian Territory	969,606	1,541,293	1,211,185	1,737,254
Iowa	3,967,253	4,997,939	4,156,074	4,982,102
Kansas	3,388,251	4,178,998	2,926,870	3,481,981
Kentucky	3,111,192	2,749,932	3,357,770	2,890,247
Maryland	3,501,428	2,687,270	3,915,585	3,160,592
Michigan	70,022	103,049	112,322	180,016
Missouri	2,245,039	2,634,564	2,372,393	2,651,612
Montana	927,395	1,887,390	1,504,193	2,850,906
Nevada	150	475	.....	.....
New Mexico	597,196	935,857	720,654	1,072,520
North Carolina	16,900	29,675	24,900	41,350
North Dakota	42,015	47,049	*a* 39,197	*a* 42,046
Ohio	11,909,856	9,841,723	13,355,806	10,618,477
Oregon	47,521	183,914	73,685	247,901
Pennsylvania:				
Anthracite	51,921,121	78,488,063	57,999,337	82,019,272
Bituminous	39,912,463	29,479,820	50,217,228	35,980,357
Tennessee	2,180,879	2,119,481	2,535,644	2,349,032
Texas	420,848	976,458	484,959	913,138
Utah	431,550	603,479	471,836	617,349
Virginia	1,229,083	933,576	1,368,324	869,873
Washington	1,106,470	2,578,441	1,191,410	2,577,958
West Virginia	11,627,757	8,706,808	11,387,961	7,710,575
Wyoming	2,417,463	3,170,392	2,246,911	2,977,901
Total product	170,741,526	186,141,564	193,117,530	197,799,043

a Includes South Dakota.

Amount and value of coal produced in the United States, etc.—Continued.

State or Territory.	1896.	
	Product.	Value.
	Short tons.	
Alabama	5,748,697	$5,174,135
Arkansas	675,374	755,577
California	*a* 93,776	220,523
Colorado	3,112,400	3,606,642
Georgia	*b* 246,359	179,770
Illinois	19,786,626	15,809,736
Indiana	3,905,779	3,261,737
Indian Territory	1,366,646	1,918,115
Iowa	3,954,028	4,628,022
Kansas	2,884,801	3,295,032
Kentucky	3,333,478	2,684,306
Maryland	4,143,936	3,299,928
Michigan	92,882	150,631
Missouri	2,331,542	2,518,194
Montana	1,543,445	2,279,672
Nebraska	(*c*)	(*c*)
New Mexico	622,626	930,381
North Carolina	(*d*)	(*d*)
North Dakota	78,050	84,908
Ohio	12,875,202	10,253,461
Oregon	101,721	294,564
Pennsylvania:		
Anthracite	54,346,081	81,748,651
Bituminous	49,557,453	35,368,249
Tennessee	2,663,106	2,281,295
Texas	544,015	896,251
Utah	418,627	500,547
Virginia	1,254,723	848,851
Washington	1,195,504	2,396,078
West Virginia	12,876,296	8,336,685
Wyoming	*e* 2,233,184	2,918,225
Total product	191,986,357	196,640,166

a Includes Alaska.
b Includes North Carolina.
c Included in Wyoming.
d Included in Georgia.
e Includes Nebraska.

Comparing the amount and value of the products in 1896 with that of 1895, the following statement of increases and decreases is obtained:

Increases and decreases in coal production during 1896 compared with 1895, by States.

State or Territory.	Increase.		Decrease.	
	Short tons.	Value.	Short tons.	Value.
Alabama	54,922	$47,313		
Arkansas	77,052	4,421		
California	18,323	44,745		
Colorado	29,418			$68,543
Georgia			(*a*) 39,539	77,443
Illinois	2,050,762	1,570,579		
Indiana			90,113	380,886
Indian Territory	155,461	180,861		
Iowa			202,046	354,080
Kansas			42,069	186,949
Kentucky			24,292	205,941
Maryland	228,351	139,336		
Michigan			19,440	29,385
Missouri			40,851	133,418
Montana	39,252			571,234
New Mexico			98,028	142,139
North Carolina *b*				
North Dakota	38,853	42,862		
Ohio			480,604	365,016
Oregon	28,036	46,663		
Pennsylvania bituminous			659,775	612,108
Tennessee	127,462			67,737
Texas	59,056			16,887
Utah			53,209	116,802
Virginia			113,601	21,022
Washington	4,094			181,880
West Virginia	1,488,335	626,110		
Wyoming			13,727	59,676
Total	2,522,083			888,256
Pennsylvania anthracite			3,653,256	270,621
Grand total			1,131,173	1,158,877

a Includes North Carolina.
b Included in Georgia.

LABOR STATISTICS.

The following table shows under one head the total number of employees in the coal mines of the United States for a period of seven years, and the average time made by each:

Labor statistics of coal mining since 1890.

State or Territory.	1890.		1891.		1892.	
	Number of days active.	Average number employed.	Number of days active.	Average number employed.	Number of days active.	Average number employed.
Alabama	217	10,642	268	9,302	271	10,075
Arkansas	214	938	214	1,317	199	1,128
California	301	364	222	256	204	187
Colorado	220	5,827	.....	6,000	229	5,747
Georgia	313	425	312	850	277	467
Illinois	204	28,574	215½	32,951	219½	34,585
Indiana	220	5,489	190	5,879	224	6,436
Indian Territory	238	2,571	221½	2,891	311	3,257
Iowa	213	8,130	224	8,124	236	8,170
Kansas	210	4,523	222	6,201	208½	6,559
Kentucky	219	5,259	225	6,355	217	6,724
Maryland	244	3,842	244	3,891	225	3,886
Michigan	229	180	205	223	195	230
Missouri	229	5,971	218	6,199	230	5,893
Montana	218	1,251	.....	1,119	258	1,158
Nevada	.....	.....	.....	.....	.....	.....
New Mexico	192	827	265	806	223	1,083
North Carolina	200	80	254	80	160	90
North Dakota	.....	.....	.....	.....	216	54
Ohio	201	20,576	206	22,182	212	22,576
Oregon	305	208	125	100	120	90
Pennsylvania bituminous	232	61,333	223	63,661	223	66,655
Tennessee	263	5,082	230	5,097	240	4,926
Texas	241	674	225	787	208	871
Utah	289	429	.....	621	230	646
Virginia	296	1,295	246	820	192	836
Washington	270	2,206	211	2,447	247	2,564
West Virginia	227	12,236	237	14,227	228	14,867
Wyoming	246	3,272	.....	3,411	225	3,133
Total	226	192,204	*a* 223	205,803	219	212,893
Pennsylvania anthracite	200	126,000	203	126,350	198	129,050
Grand total	216	318,204	215	332,153	212	341,943

a General average obtained from the average days made in the different States, exclusive of Colorado, Montana, Utah, and Wyoming.

Labor statistics of coal mining since 1890—Continued.

State or Territory.	1893.		1894.	
	Number of days active.	Average number employed.	Number of days active.	Average number employed.
Alabama	237	11,294	238	10,859
Arkansas	151	1,559	134	1,493
California	208	158	232	125
Colorado	188	7,202	155	6,507
Georgia	342	736	304	729
Illinois	229	35,390	183	38,477
Indiana	201	7,644	149	8,603
Indian Territory	171	3,446	157	3,101
Iowa	204	8,863	170	9,995
Kansas	147	7,310	164	7,339
Kentucky	202	6,581	145	8,083
Maryland	240	3,935	215	3,974
Michigan	154	162	224	223
Missouri	206	7,375	138	7,523
Montana	242	1,401	192	1,782
Nevada	.....	.....	60	2
New Mexico	229	1,011	182	985
North Carolina	80	70	145	95
North Dakota	193	88	156	77
Ohio	188	23,931	136	27,105
Oregon	192	110	243	88
Pennsylvania bituminous	190	71,931	165	75,010
Tennessee	232	4,976	210	5,542
Texas	251	996	283	1,062
Utah	226	576	199	671
Virginia	253	961	234	1,635
Washington	241	2,757	207	2,662
West Virginia	219	16,524	186	17,824
Wyoming	189	3,378	190	3,032
Total	204	230,365	171	244,603
Pennsylvania anthracite	197	132,944	190	131,603
Grand total	201	363,309	178	376,206

Labor statistics of coal mining since 1890—Continued.

State or Territory.	1895.		1896.	
	Number of days active.	Average number employed.	Number of days active.	Average number employed.
Alabama	244	10,346	248	9,894
Arkansas	176	1,218	168	1,507
California	262	190	*a* 291	177
Colorado	182	6,125	172	6,704
Georgia	312	848	*b* 301	731
Illinois	182	38,630	184	39,560
Indiana	189	8,530	163	8,806
Indian Territory	164	3,212	170	3,549
Iowa	189	10,066	178	9,672
Kansas	159	7,482	168	7,127
Kentucky	146	7,865	165	7,549
Maryland	248	3,912	204	4,039
Michigan	186	320	157	320
Missouri	163	6,299	168	5,982
Montana	223	2,184	234	2,335
Nevada	.....	.....	.....	.....
New Mexico	190	1,383	172	1,569
North Carolina	226	61	.....	.....
North Dakota	139	65	166	141
Ohio	176	24,644	161	25,500
Oregon	69	414	191	254
Pennsylvania bituminous	206	71,130	206	72,625
Tennessee	224	5,120	211	6,531
Texas	171	1,642	187	1,953
Utah	203	670	202	679
Virginia	225	2,158	198	2,510
Washington	224	2,840	221	2,622
West Virginia	195	19,159	201	19,078
Wyoming	184	3,449	*c* 210	2,937
Total	194	239,962	192	244,171
Pennsylvania anthracite	196	142,917	174	148,991
Grand total	195	382,879	185	393,162

a Includes Alaska.
b Includes North Carolina.
c Includes Nebraska.

PRICES.

AVERAGE PRICES AT THE MINES SINCE 1886.

The following table will be of interest as showing the fluctuations in the average prices ruling in each State since 1886. Prior to that year the statistics were not collected with sufficient accuracy to make a statement of the average prices of any practical value. These averages are obtained by dividing the total value by the total product, except for the years 1886, 1887, and 1888, when the item of colliery consumption was not considered.

Average prices for coal at the mines since 1886.

State or Territory.	1886.	1887.	1888.	1889.	1890.
Alabama	$1.43	$1.30	$1.15	$1.11	$1.03
Arkansas	1.60	1.68	1.50	1.42	1.29
California	3.00	3.00	4.00	2.36	2.56
Colorado	2.35	2.20	2.20	1.51	1.40
Georgia	1.50	1.50	1.50	1.50	1.04
Illinois	1.11	1.09	1.12	.97	.93
Indiana	1.15	1.34	1.40	1.02	.99
Indian Territory	1.60	1.87	1.88	1.76	1.82
Iowa	1.25	1.34	1.30	1.33	1.24
Kansas	1.20	1.40	1.50	1.48	1.30
Kentucky	1.15	1.15	1.20	.99	.92
Maryland	.95	.95	.95	.86	.86
Michigan	1.50	1.50	1.66	1.71	1.99
Missouri	1.30	1.34	2.21	1.36	1.24
Montana	3.50	3.50	3.50	2.42	2.42
Nevada	.....	.....	.....	.....	.....
New Mexico	3.00	3.00	3.00	1.79	1.34
North Carolina	.....	.....	.....	.....	1.74
North Dakota	1.59	1.50	3.50	1.43	1.40
Ohio	.95	.88	.93	.93	.94
Oregon	2.50	2.20	3.00	.....	2.89
Pennsylvania bituminous	.80	.90	.95	.77	.84
Tennessee	1.15	1.30	1.10	1.21	1.10
Texas	1.85	2.00	2.05	2.66	2.53
Utah	2.10	2.00	2.10	1.59	1.74
Virginia	1.00	.94	1.00	.93	.75
Washington	2.25	2.20	3.00	2.32	2.71
West Virginia	.94	.95	1.10	.82	.84
Wyoming	3.00	3.00	3.00	1.26	1.70
Total bituminous	*a* 1.06	*a* 1.12	*a* 1.00	1.00	.99
Pennsylvania anthracite	*a* 1.95	*a* 2.01	*a* 1.95	1.44	1.43
General average	*a* 1.30	*a* 1.45	*a* 1.42	1.13	1.12

a Exclusive of colliery consumption.

Average prices for coal at the mines since 1886—Continued.

State or Territory.	1891.	1892.	1893.	1894.	1895.	1896.
Alabama	$1.07	$1.05	$0.99	$0.93	$0.90	$0.90
Arkansas	1.19	1.24	1.34	1.22	1.25	1.11
California	2.20	2.46	2.31	2.31	2.33	*a* 2.35
Colorado	1.37	1.62	1.24	1.24	1.20	1.16
Georgia	1.50	.99	.98	.85	.83	.70
Illinois	.91	.91	.89	.89	.80	.80
Indiana	1.03	1.08	1.07	.96	.91	.84
Indian Territory	1.74	1.71	1.79	1.59	1.43	1.40
Iowa	1.27	1.32	1.30	1.26	1.20	1.17
Kansas	1.31	1.31½	1.27	1.23	1.20	1.15
Kentucky	.93	.92	.86	.88	.86	.78
Maryland	.81	.89	.88	.77	.81	.80
Michigan	1.66	1.56	1.79	1.47	1.60	1.62
Missouri	1.23	1.23	1.23	1.17	1.12	1.08
Montana	2.27	2.36	1.99	2.04	1.89	1.47
Nevada	.....	.....	.....	3.15	.....	.....
New Mexico	1.68	1.62	1.47	1.57	1.49	1.49
North Carolina	1.93	1.44	1.50	1.76	1.66	1.50
North Dakota	1.40	.96	1.13	1.12	1.07	1.09
Ohio	.94	.94	.92	.83	.79	.79
Oregon	3.00	4.29	3.57	3.87	3.36	2.90
Pennsylvania bituminous	.87	.84	.80	.74	.72	.71
Tennessee	1.11	1.13	1.08	.97	.93	.86
Texas	2.40	2.32	2.28	2.32	1.88	1.65
Utah	1.80	1.56	1.48	1.40	1.31	1.20
Virginia	.83	.86	.84	.76	.63	68
Washington	2.31	2.28	2.31	2.33	2.16	2.00
West Virginia	.80	.80	.77	.75	.68	.65
Wyoming	1.53	1.27	1.35	1.31	1.33	*b* 1.37
Total bituminous	.99	.99	.96	.91	.86	.83
Pennsylvania anthracite	1.46	1.57	1.59	1.52	1.41	1.50
General average	1.13	1.16	1.14	1.09	1.02	1.02

a Includes Alaska. *b* Includes Nebraska.

PRICES IN 1896 AT POINTS OF CONSUMPTION.

The following table has been compiled from statements received from wholesale and retail coal dealers in the more important cities and towns throughout the United States. It exhibits some very interesting features, the most important of which is the opportunity to study fuel cost, both for domestic and for manufacturing uses. In some cases where bituminous coal is very cheap it will be observed that anthracite coal

is entirely shut out. This is particularly true of the smaller towns. In some of the larger cities near to bituminous mines some anthracite is used for ranges and furnaces, even at a comparatively fancy price, by those who can afford the luxury of smokeless fuel. In other cases, in the vicinity of the anthracite fields, for instance, bituminous coals are the items of luxury where the beauty and healthfulness of open-grate fires are desired. Another interesting fact shown by the table is the almost universal distribution of "Cumberland" coal for smithing purposes. "Cumberland" coal, from a commercial standpoint, includes the product from the mines of Georges Creek, Maryland, and "Davis" coal from the mines on the West Virginia Central and Pittsburg Railroad in West Virginia.

As noted in the Introduction, there is apt to be some confusion on account of the use of both the long ton of 2,240 pounds and the short ton of 2,000 pounds. In nearly all the States east of Ohio and north of the Potomac River the long ton is used as a basis of measurement, particularly when sold at wholesale, and more particularly anthracite. With a few exceptions on the Pacific Coast the short ton is used uniformly throughout the other States.

To have reduced prices as reported to equivalents in one or the other unit would have made this confusion worse and lessened the value of the table. The plan adopted in the following table is to express the prices for long tons in heavy-faced type and the prices for short tons in light-faced type. This plan not only establishes at a glance the unit used, but indicates the localities where the one or the other, or both, are employed.

The table shows that the wholesale prices for Pennsylvania anthracite ranged from $1.75 per long ton at Wilkesbarre and Shenandoah, in the anthracite region, to $17 per short ton (equivalent to $19 per long ton) at Butte, Montana. The prices at Butte were about $5 more than at San Francisco, California, the latter city, while lying at a greater distance from the place of production, having the advantage of water transportation from Philadelphia.

The table also illustrates by low prices of bituminous coal at competitive points, and the comparatively high prices at points whose market is reached by coal from only one field, that railroad freights act as a protective tariff for the isolated fields. Pittsburg and Kanawha coals, for instance, competing with each other and with Ohio coals, are sold at Cincinnati for steam purposes as low as 63 cents per short ton; for domestic purposes (wholesale), at $1.13 and (retail) at $2.25. Indian Territory coals, on the other hand, at Denison, Texas, only a few miles distant, brought as high as $3.30 for steam purposes (lowest price, $1.55), and at retail, for domestic purposes, at from $3.90 to $4.50. By the time Territory coals reach Dallas they are worth from $4 to $5.75 at retail for domestic use; at Austin, from $6 to $6.50; at Houston, from $5.25 to $7.

Wholesale and retail prices of coal in the United States during 1896.

[Heavy faced type indicates use of and prices for long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
	Doll.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
ALABAMA.																			
Anniston	8.25	7.75	9.00	8.50	1.75	1.50	2.50	2.00	2.50	1.50	4.50	2.75	4.00	3.50	5.00	4.00	Alabama	Alabama and Tennessee.	Etna (Tenn.).
Birmingham	.....	.....	9.00	7.00	1.70	.60	1.70	1.10	1.70	1.10	2.50	1.75	1.10	.90	1.90	1.25	.....	.....	
Mobile	6.00	5.00	7.00	5.50	2.10	2.00	3.50	3.00	3.00	3.00	6.00	3.50	2.50	2.50	4.00	4.00	Alabama	.....	
Montgomery	.....	.....	8.75	7.75	2.20	1.90	3.25	2.50	5.00	3.25	5.75	3.50	3.50	3.50	4.00	4.00	.....	.....	
ARKANSAS.																			
Fort Smith	3.50	3.00	5.50	4.75	2.00	1.80	3.00	2.50	2.00	1.80	3.00	2.50	2.00	1.80	3.00	2.50	Arkansas semi-anthracite.	Arkansas semi-anthracite.	
Hot Springs	.....	.....	12.50	12.00	.....	.....	6.00	5.30	.....	.....	7.00	5.75	.....	.....	.....	.....	Jenny Lind, Denning.	Eureka, Jenny Lind, Denning.	
Little Rock	.....	.....	.....	.....	4.00	2.00	5.00	3.00	4.00	2.00	5.00	3.00	.....	.....	.....	.....	.....	.....	
CALIFORNIA.																			
Fresno	13.25	11.30	16.00	14.00	5.00	4.50	5.00	4.50	9.55	9.55	14.00	11.50	12.75	11.80	14.50	13.50	Coalinga, Cal	Utah and Wyoming.	Cumberland.
Los Angeles	.....	.....	15.00	15.00	8.00	7.25	11.00	8.00	8.00	7.25	11.00	8.00	.....	.....	17.00	13.50	Vancouver, B. C	Utah, Wyoming, and New Mexico.	Do.
Oakland	13.00	11.00	15.00	13.00	6.50	6.00	.....	.....	8.50	8.00	10.50	10.00	15.50	14.00	17.50	17.50	Wellington	Wellington	Do.
Sacramento:																			
Colorado egg	.....	.....	14.00	14.00	.....	.....	9.00	9.00	.....	.....	.....	.....	.....	.....	.....	.....	Seattle and Wyoming.	English cannel, Wellington, and Scotch splint.	Do.
Colorado nut	.....	.....	14.00	14.00															
Pennsylvania egg.	.....	.....	**14.00**	**14.00**															

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
CALIFORNIA—con.																			
Sacramento-Continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Pennsylvania nut.	.....	.....	**14.00**	**14.00**															
Welsh egg	.....	.....	**13.00**	13.00	.....	.....	9.00	9.00	.....	.....	14.00	11.00	.....	.....	14.00	14.00	Seattle and Wyoming.	English cannel, Wellington, and Scotch splint.	Cumberland.
Welsh nut	.....	.....	**13.00**	13.00															
San Diego	14.00	13.00	15.00	14.00	8.50	7.00	8.50	7.50	9.00	8.50	10.00	9.00	14.00	12.00	15.00	14.00	.....	.....	
San Francisco:																			
Pennsylvania—carloads.	**14.00**	**10.00**	**16.00**	**12.00**															
Colorado—carloads.	**14.00**	**12.32**	**16.00**	**16.00**	**8.00**	**5.50**	**10.00**	**7.00**	**8.00**	**5.50**	**10.00**	**7.00**	**13.00**	**8.50**	**13.50**	**9.00**	See following table	See following table	Do.
Welsh—carloads.	**6.50**	**5.50**	.....	.....															
Stockton:																			
Pennsylvania	.....	.....	14.00	13.00	.....	.....	10.00	10.00	.....	.....	7.50	7.00	.....	**14.55**	16.50	16.00	Wellington, Seattle.	Coos Bay	Do.
Welsh	.....	.....	12.00	10.00	.....	.....	8.00	7.00											
COLORADO.																			
Colorado Spings	.....	.....	9.00	9.00	.....	.....	2.00	2.00	.....	.....	.....	.....	.....	.....	5.50	5.50	.....	Lignites	Canyon City.
Denver	8.25	7.25	9.25	8.25	2.25	1.25	2.75	1.75	4.00	4.00	5.25	5.25	4.25	4.25	6.00	6.00	.....	.....	
Leadville	.....	.....	10.00	10.00	.....	.....	6.00	5.50	.....	.....	6.00	5.50	.....	.....	10.00	10.00	.....	.....	
Pueblo	.....	.....	.....	.....	2.00	1.50	2.25	1.90	4.50	4.50	5.25	5.00	.....	.....	.....	.....	.....	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
CONNECTICUT.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Ansonia	**4.85**	**3.65**	5.75	5.50	.....	.....	.....	.....	.....	.....	.....	.....	3.25	3.25	5.00	5.00	.....	.....	Cumberland.
Bridgeport	.....	.....	5.50	5.00	**3.75**	**3.25**	.....	.....	.....	.....	.....	.....	.....	.....	4.00	4.00	Alabama	.....	Alabama.
Greenwich	**5.25**	**4.25**	5.50	4.75	.....	**3.50**	.....	.....	.....	.....	12.00	12.00	.....	.....	5.00	5.00	Clearfield (Pa.)	English Cannel	Cumberland.
Hartford	**5.25**	**4.50**	6.00	5.25	.....	.....	**6.00**	6.00	.....	.....	.....	.....	.....	.....	6.00	6.00	do	.....	Do.
Meriden	**6.25**	**5.25**	6.50	5.00	4.50	4.00	5.00	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
New Britain	**6.25**	**5.25**	6.25	5.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
New Haven	**5.15**	**3.25**	5.50	4.00	**3.30**	**3.15**	**4.00**	**3.75**	**3.10**	**2.75**	**3.75**	**3.50**	**3.30**	**3.15**	**4.00**	**3.75**	Pocahontas, Clearfield, Cumberland.	Clearfield	Do.
Norwalk	.....	.....	.....	.....	**3.10**	**2.70**	.....	.....	.....	.....	5.00	4.25	.....	.....	5.50	4.75	.....	.....	
Norwich	**4.50**	**4.25**	5.50	5.00	**3.25**	**2.75**	4.00	3.50	.....	.....	.....	.....	.....	.....	7.00	6.50	Pocahontas	.....	Do.
Stamford	.....	.....	5.50	5.00	.....	.....	3.25	3.25	.....	.....	.....	.....	.....	.....	5.50	5.50	Clearfield	.....	Do.
Waterbury	**5.55**	**4.40**	6.25	5.25	.....	.....	4.40	4.15	.....	.....	.....	.....	**4.10**	**3.95**	5.00	4.25	.....	.....	Do.
DELAWARE.																			
Wilmington	**5.50**	**5.50**	**6.00**	**6.00**	2.90	2.90	3.25	3.25	.....	.....	.....	.....	2.90	2.90	3.25	3.25	Atlas (Pa.)	.....	Atlas.
DISTRICT OF COLUMBIA.																			
Washington:																			
Furnace	**4.50**	**4.25**	**5.75**	**5.50**															
White ash stove.	**5.00**	**4.75**	**6.25**	**6.00**															
Red ash stove	**5.15**	**4.95**	**6.50**	**6.25**	2.75	2.85	3.10	3.35	.....	.....	.....	.....	**2.50**	**2.65**	**3.00**	**3.25**	New River (W. Va.).	.....	Cumberland.
White ash egg.	**4.90**	**4.65**	**6.00**	**5.75**															

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.			
DISTRICT OF COLUMBIA—con.																			
Washington-Continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
White ash nut.	**4.80**	**4.50**	**6.00**	**5.75**															
Red ash egg	**5.15**	**4.90**	**6.50**	**6.25**															
Pea	**3.15**	**3.15**	**4.50**	**4.50**	**2.75**	**2.85**	**3.10**	**3.35**	.....	.....	.....	.....	**2.50**	**2.65**	**3.00**	**3.25**	New River (W. Va.).	.....	Cumberland.
Lykens Valley stove.	**5.50**	**5.25**	**7.00**	**6.75**															
Lykens Valley egg.	**5.40**	**5.15**	**7.00**	**6.75**															
FLORIDA.																			
Apalachicola	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.50	.....	6.50	.....	7.50	.....	9.00	Alabama	.....	
Jacksonville	5.50	5.00	7.00	6.00	3.50	3.50	4.00	4.00	6.00	6.00	6.00	6.00	4.00	4.00	5.00	5.00	do	.....	
Key West	**8.50**	**8.50**	**10.00**	**10.00**	6.00	5.00	8.00	8.00	.....	.....	.....	.....	.....	.....	8.00	8.00	do	.....	Alabama.
Pensacola	6.00	6.00	8.50	7.50	2.75	2.50	3.75	3.50	5.50	4.50	6.50	5.00	4.50	4.00	5.2	5.00	Milldale (Ala.)	Jellico and Alabama.	Standard (Ala.)
GEORGIA.																			
Atlanta	**7.85**	**5.85**	9.00	6.75	2.05	2.05	2.30	2.30	2.55	2.55	4.00	3.25	.....	.....	.....	.....	Corona (Ala.)	do	
					2.25	1.65	2.75	1.90	2.90	.....	4.75	3.50	3.50	3.50	5.00	4.50	.....	Jellico	Etna (Tenn.).
									2.50	.....	3.75	3.00	2.50	2.50	4.00	3.50	.....	Alabama	Alabama.
Augusta	6.50	5.85	7.00	6.75	.....	.....	.....	.....	4.75	4.40	5.50	5.00	.....	.....	.....	.....	.....	Jellico	
Brunswick	5.50	5.00	6.50	5.50	4.25	3.00	4.50	3.50	5.00	4.25	5.50	4.50	5.25	4.25	5.50	4.50	Pocahontas and Jellico.	Alabama	Jellico.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.				
	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	Steam.	Domestic.	Smithing.
GEORGIA—cont'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Columbus	.....	8.80	.....	9.30	.....	0.90	.....	1.30	4.50	3.25	6.00	3.75	.....	.....	.....	6.00	Warrior (Ala.)	Alabama	
Macon	.....	.....	8.50	7.25	2.60	2.15	.....	.....	.....	.....	6.50	3.75	2.90	2.75	3.15	3.00	Tennessee and Alabama.	.....do	Etna (Tenn.).
Savannah	.....	**5.14**	6.50	5.50	**3.25**	**2.90**	4.50	3.50	.....	.....	6.00	4.00	.....	.....	4.50	4.00	.....	.....	
ILLINOIS.																			
Alton	6.40	6.15	7.00	7.00	.65	.65	.80	.80	1.25	1.15	2.00	2.00	.....	.....	.....	.....	Illinois	Illinois	
Aurora	6.25	5.75	7.00	6.50	.....	.....	3.50 3.00	3.00 2.50	2.20	1.85	3.50	3.00	.....	.....	6.00	6.00	Wilmington (Ill.) Seaton (Ill.)	....	 Cumberland.
Belleville	.....	.....	7.50	7.00	.....	.....	.90	.87	.....	.....	1.50	1.25	.....	.....	6.00	5.00	Illinois	Illinois	Do.
Bloomington	6.25	5.60	6.75	6.25	.90	.90	1.40	1.00	1.00	1.00	1.75	1.50	4.80	4.75	6.00	5.25	.....do	.....do	Do.
Cairo	6.65	6.25	7.00	6.50	1.10	.80	1.75	1.00	1.60	1.00	2.25	1.65	.....	.....	.....	.....	.....do	.....do	
Chicago	5.85	5.25	6.75	6.00	.....	.....	.....	.....	2.90 1.45	2.50 1.30	4.75 2.50	3.75 2.50	.....	.....	.....	.....	.....	Hocking Illinois nut	 Do.
Danville	.....	.....	.....	.....	.....	.....	.60	.60	.....	.....	1.50	1.25	.....	.....	.....	.....	Illinois	Illinois	
Decatur	6.25	5.70	7.00	6.50	1.00	.60	.....	.....	.....	.....	2.00	1.50	3.95	3.55	.....	.....	.....	.....	
Elgin	6.56	6.03	7.00	6.75	1.85 1.60 2.00	1.70 1.50 1.80	.....	.....	3.50 3.00	2.75 2.50	.....	.....	.....	.....	.....	.....	Illinois lump Illinois nut Wilmington (Ill.)	.....do .....do Brazil block	
Freeport	7.15	6.30	8.25	7.75	2.16 2.10	1.99 1.89	2.31 3.00	2.14 2.25	2.72 2.86	2.47 2.00	4.00 4.00	3.50 3.50	4.85	4.85	6.00	5.50	La Salle and Pana. Pana (Ill.)	Assumption Southern Illinois	Do.
Galesburg	7.50	7.00	7.50	7.25	1.63	1.50	1.75	1.50	2.50	1.88	2.75	1.75	.....	.....	.....	.....	.....	.....	
Jacksonville	.....	.....	7.00	6.50	1.30	1.28	2.00	1.75	.....	1.50	2.00	1.75	.....	.....	.....	.....	Illinois	Illinois	
Joliet	5.85	5.25	6.50	6.00	1.60	1.30	2.00	1.65	1.85	1.75	3.00	2.50	3.15	3.15	6.50	5.50	Southern Illinois	Wilmington (Ill.)	Do.
Moline	7.15	6.65	8.00	7.00	1.60	1.50	.....	.....	2.30	1.75	3.00	2.50	4.80	4.00	8.00	5.00	Illinois run of mine	.....	Do.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	High-est.	Low-est.	High-est.	Low-est.	High est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.			
ILLINOIS—cont'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Peoria	6.25	5.60	7.00	6.50	1.10	0.40	1.40	0.65	1.25	1.00	1.75	1.40	5.00	3.60	6.50	6.00	Illinois	Illinois	Cumberland.
Quincy	.....	.....	8.00	7.00	.....	.....	2.00	1.75	.....	.....	2.50	2.25	.....	.....	.....	.....	.....	.....	
Rockford	6.80	5.20	8.00	6.00	1.75	1.00	1.85	1.10	4.00	1.75	5.00	3.00	4.75	4.00	7.00	6.00	....do	Indiana and Ohio.	Do.
Rock Island	7.25	5.80	8.25	6.80	1.85	1.85	.....	.....	1.85	1.85	2.25	2.25	.....	.....	.....	.....	.....	.....	
Springfield	6.70	4.40	7.50	6.50	.75	.55	1.00	.85	1.00	.65	1.00	.90	.75	.25	1.00	.25	Illinois run of mine	Illinois run of mine	Illinois slack.
					.65	.40	.70	.45	1.25	.95	1.48	1.20	4.80	4.70	5.50	5.00	Local	Local	Cumberland.
Streator	.....	.....	7.25	6.00	1.25	.90	1.50	1.25	1.40	1.00	1.50	1.00	.....	.....	.....	.....	....do	....do	
INDIANA.																			
Anderson	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.30	.....	3.50	.....	3.30	.....	4.75	.....	.....	
Elkhart	.....	.....	6.75	6.50	.....	.....	3.50	2.50	.....	.....	4.50	4.00	.....	.....	6.00	6.00	Pocahontas and Hocking.	Jackson Hill	
Evansville	.....	.....	.....	.....	.....	.....	.....	.75	.....	.....	.....	1.40	.....	.....	.....	5.75	.....	.....	
Fort Wayne	5.80	5.35	7.00	6.25	3.00	2.10	2.10	1.80	4.50	3.75	2.50	2.10	3.70	3.10	6.60	4.50	Ohio and Indiana.	Ohio	Do.
Indianapolis	6.00	5.25	7.50	6.50	.85	.45	1.50	1.00	1.75	1.45	3.00	2.50	3.00	2.50	5.00	3.50	.....	Brazil block Island City Jackson and Pittsburg.	
									1.50	1.35	2.75	2.25							
									2.25	2.05	3.75	3.00							
Jeffersonville	7.25	6.50	7.25	7.00	1.50	1.35	2.00	1.40	3.05	2.35	3.05	2.78	.....	.....	4.00	3.75	Pittsburg (Pa.)	Pittsburg	New River (W. Va.).
Lafayette	6.03	5.00	7.00	6.50	1.10	1.00	2.50	2.00	2.90	2.45	4.50	4.50	3.90	3.60	6.50	6.50	Slack	....do	Do.
Logansport	6.03	5.78	7.50	7.00	1.75	1.75	.....	.....	3.10	2.85	4.50	4.00	3.75	3.75	5.50	5.00	Indiana	....do	Blossburg.
Michigan City	5.49	5.38	6.75	6.50	2.30	2.25	3.25	3.00	.....	.....	3.50	3.25	.....	.....	.....	.....	Indiana block	Indiana	
Muncie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.65	3.65	5.00	4.50	.....	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
INDIANA—cont'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
New Albany	.....	.....	7.00	6.50	.....	.....	1.50	1.25	.....	.....	2.75	.....	.....	.....	.....	.....	.....	.....	
Richmond	5.90	5.67	6.75	6.50	2.40	1.90	.....	.....	2.75	2.20	3.50	3.00	3.45	3.00	4.50	4.00	.....	.....	
South Bend	.....	.....	6.75	6.00	.....	.....	1.80 2.00	1.55 1.90	.....	.....	3.00	2.50 3.50 4.00	.....	.....	.....	.....	Indiana..... Indiana block.....	Indiana block..... Hocking Valley... Cannel.....	
Terre Haute	6.50	6.05	7.00	6.35	.55	.45	1.00	.75	.85	.80	1.80	1.60	5.00	4.50	6.00	5.00	.....do	Indiana block.....	Cumberland.
IOWA.																			
Burlington	7.22	6.00	8.00	7.75	1.05	.85	2.00	1.60	2.25	1.90	2.75 3.00	2.50 2.50	.....	.....	6.00 6.50	6.00 6.50	Illinois and Iowa.. .....do	Indiana block..... Peoria, Ill	"Davis" (W.Va.)
Cedar Rapids	.....	.....	9.00	8.50	.....	.....	.....	.....	.....	.....	3.75 4.50 5.50 6.00	3.50 4.50 5.50 6.00	.....	.....	.....	.....	.....	Iowa ..... Illinois ..... Ohio ..... West Virginia....	
Clinton	7.15	6.65	7.50	6.90	2.45	1.75	3.25	3.00	2.65	2.00	3.50	3.00	4.25	4.00	5.50	5.00	.....	.....	
Council Bluffs	8.50	7.50	9.00	8.50	1.50	1.00	2.00	1.40	2.50	2.00	3.00	2.50	6.25	6.00	8.00	7.50	.....	.....	
Davenport	7.15	6.65	8.00	7.50	1.50	1.25	3.50	3.00	2.50	2.50	3.00	3.00	.....	.....	7.00	6.00	Illinois	Illinois	
Des Moines	.....	.....	.....	.....	1.00	.20	.....	.....	1.50	1.25	.....	.....	.....	.....	.....	.....	Local	Local	
Dubuque	6.90	6.60	8.00	7.00	2.80	2.00	.....	.....	2.90	2.10	4.00	3.25	4.85	4.80	6.50	6.00	.....	.....	Blossburg.
Keokuk	7.10	6.60	8.00	8.00	1.60	1.25	2.25	1.90	1.75	1.70	2.50	2.25	4.00	4.45	7.50	6.00	.....	.....	Cumberland.
Muscatine	7.35	6.50	8.25	7.50	1.34	1.14	1.65	1.45	2.80	2.30	3.50	3.00	4.80	4.50	8.00	6.00	Oskaloosa (Iowa) .	La Salle (Ill.).....	"Davis" (W.Va.)
Ottumwa	.....	.....	9.50	8.50	.....	.....	.75	.75	.....	.....	2.00	2.00	.....	.....	9.00	9.00	.....	.....	Cumberland.
Sioux City	8.85	7.35	.....	.....	5.16	4.50	.....	.....	3.81	3.66	.....	.....	5.10	5.05	.....	.....	Hocking Valley (O.)	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
KANSAS.																			
Arkansas City:	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
New Mexico	7.75	7.25	10.00	9.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Pennsylvania	10.80	9.80	11.50	11.00	.....	2.40	3.00	2.65	.....	5.80 4.35 3.40	7.50 6.00 5.00	7.00 5.00 4.25	.....	7.60	12.00	12.00	Arkansas slack...	Canyon, Colo ..... McAlester, Ind. T. Weir City, Kans..	Cumberland.
Atchison	8.35	6.00	9.50	8.00	1.90	1.00	2.00	1.50	2.80	1.75	4.50	2.50	5.60	5.15	8.00	7.50	.....	.....	
Fort Scott	.....	.....	10.00	9.50	.....	.....	1.35	1.25	.....	.....	2.50	1.50	.....	.....	10.00	8 50	.....	.....	Do.
Kansas City	8.85	6.60	10.00	8.00	2.00	1.00	3.00	1.50	2.40	1.75	3.75	2.50	5.90	5.60	8.50	8.50	.....	.....	
Leavenworth	9.50	8.00	9.75	8.50	.75	.63	1.50	1.25	2.00	1.75	2.63	2.50	7.50	6.35	10.00	8.50	Local	Local	Do.
Topeka	8.50	6.50	10.50	8.00	1.90	1.50	2.00	1.60	2.40	2.10	3.25	2.50	.....	.....	9.00	9.00	Southern Kansas slack.	Osage City (Kans.)	Do.
Wichita:																			
Pennsylvania	10.00	8.00	12.00	10.00	2.00	1.90	2.50	2.25	3.10	2.85	4.00	3.50	.....	.....	.....	.....	Weir City slack ..	Weir City lump...	
Arkansas semianthracite.	6.60	6.00	8.25	7.25	2.20	2.10	2.75	2.50	3.10	3.10	4.25	4.25	7.50	7.50	12.00	12.00	Jenny Lind (Ark.)	Oolagah lump	Do.
KENTUCKY.																			
Covington	6.00	5.50	6.75	6.25	1.00	.75	1.25	1.25	1.50	1.13	2.25	1.50	1.50	1.25	2.25	2.25	.....	.....	
Lexington	6.60	6.40	8.00	7.50	1.40	.65	1.96	.85	1.80	1.40	2.80	1.96	2.10	1.85	2.75	2.75	Kentucky pea, nut and slack.	Kentucky lump...	Jellico and West Virginia.
Louisville	6.85	5.90	7.50	6.75	1.70 1.37	1.30 1.12	2.90 2.25	2.60 2.00	1.96	1.68	3.08	2.80	.....	.....	.....	.....	Pittsburg (Pa.)... Kentucky	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
KENTUCKY—con.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Newport *a*	6.25	5.15	7.00	5.90	1.15	1.00	1.65	1.35	1.70	1.55	2.50	1.92	2.00	1.65	2.75	2.25	West Virginia nut and slack.	New and Kanawha Rivers (W. Va.).	New River and Loup Creek (W. Va.).
Paducah	.....	.....	8.25	7.85	.....	.....	.....	2.25	.....	.....	.....	2.50	2.25	.....	.....	.....	Pittsburg and Kanawha.	.....do	
LOUISIANA.																			
Baton Rouge	.....	.....	9.50	8.50	3.25	2.50	3.50	3.25	5.00	2.70	5.00	2.70	3.00	2.50	3.00	2.50	Pittsburg (Pa.)	.....	
New Orleans	6.50	6.00	8.50	8.00	3.25	2.75	3.90	3.00	3.15	2.85	5.00	4.20	.....	.....	.....	.....	Milner (Ala)	Corona (Ala.) and splint.	
					3.25	2.75	3.75	3.50	3.50	3.25	4.50	4.00	3.00	2.75	3.50	3.00	Pittsburg	Pittsburg	Pittsburg.
Shreveport	.....	.....	10.25	9.25	2.40	2.40	.....	.....	.....	5.00	6.50	.....	5.00	5.00	6.50	6.50	Slack and lignite. Alabama run of mine.	Pittsburg lump. Alabama lump.	Do.
					2.90	2.90	.....	.....	.....	4.00	6.00								
MAINE.																			
Auburn	6.50	6.50	7.00	7.00	4.25	4.25	5.00	5.00	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00	Cumberland	Cumberland	Cumberland.
Augusta	.....	.....	6.50	6.50	.....	.....	5.50	5.50	.....	.....	5.50	5.50	.....	.....	5.50	5.50	.....do	.....do	Do.
Bangor	**5.00**	**4.50**	5.00	5.00	**3.75**	**3.25**	4.50	3.75	.....	.....	.....	.....	.....	.....	5.00	4.00	.....	.....	
Bath	4.00	3.75	5.00	4.50	.....	.....	.....	.....	5.75	5.00	6.50	6.00	4.00	3.75	5.00	5.00	.....	.....do	Do.
Biddeford	**5.25**	.....	6.50	.....	**3.75**	.....	5.00	4.50	.....	.....	.....	.....	.....	.....	.....	.....	Pocahontas and Cumberland.	.....	
Lewiston	7.00	5.50	8.00	6.50	4.00	4.00	5.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	6.00	6.00	Cumberland	Cumberland	Do.
Portland	.....	.....	6.25	5.50	.....	.....	4.00	4.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

a Wholesale prices are f. o. b. Newport. Retail prices are for coal delivered in Newport.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
MARYLAND.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Annapolis	**5.75**	**5.50**	**6.00**	**5.50**	.....	.....	**5.00**	**4.50**	.....	.....	.....	.....	.....	.....	**5.00**	**4.50**	.....	.....	
Baltimore:																			
Pea	**2.90**	**2.90**	**3.75**	**3.75**															
Stove	**5.50**	**5.25**	**7.25**	**6.65**	**2.70**	**2.50**	**3.75**	**2.75**	**2.70**	**2.50**	**3.75**	**2.75**	**2.75**	**2.50**	**3.75**	**2.75**	Cumberland	Cumberland	Cumberland.
Furnace	**4.75**	**4.50**	**5.75**	**5.25**															
Cumberland	.....	.....	6.50	6.00	**1.75**	**1.60**	.....	.....	.....	.....	2.75	2.50	.....	.....	**1.25**	**1.15**	Cumberland run of mine.	Cumberland lump	Cumberland slack.
Hagerstown	**5.50**	**5.30**	6.00	5.50	**2.45**	**2.20**	3.00	3.00	**3.25**	**3.00**	3.25	3.00	**2.50**	**2.50**	2.50	2.50	Clearfield (Pa.); Pocahontas (W. Va.).	Myersdale	Cumberland.
MASSACHUSETTS.																			
Adams:																			
Stove	**5.55**	**4.80**	6.50	6.00	**3.80**	**3.80**	6.00	6.00	.....	.....	.....	.....	**4.75**	**4.75**	8.00	8.00	.....	.....	Do.
Egg and nut	**5.30**	**4.55**																	
Amesbury	**5.30**	**4.70**	6.00	5.75	.....	**3.10**	.....	**4.00**	.....	.....	.....	.....	.....	**3.60**	.....	**4.25**	Cambria Co. (Pa.)	.....	Do.
Beverly	**4.75**	**4.10**	6.00	5.00	**2.90**	**2.80**	3.50	2.96	.....	.....	.....	.....	.....	.....	.....	.....	Cumberland	.....	
					2.90	**2.65**	3.25	2.87	.....	.....	.....	.....	.....	.....	4.50	4.00	Clearfield (Pa.)	.....	Do.
Boston	**5.15**	**4.65**	5.75	5.25	**3.47**	**3.17**	3.80	3.65	**3.47**	**3.17**	**3.80**	**3.65**	3.47	3.17	3.80	3.65	.....	.....	
Brockton	6.25	5.35	7.25	6.00	.....	4.25	5.00	4.35	7.25	5.00	8.25	5.50	.....	4.50	5.25	4.50	.....	.....	
Cambridge:																			
Broken	**4.50**	**3.75**	5.50	5.00															
Egg	**4.75**	**4.00**	5.75	5.25	3.00	3.00	3.80	3.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Stove	**5.00**	**4.25**	6.00	5.50															
Chelsea	5.70	4.70	6.00	5.00	3.80	3.65	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	New River (W. Va.).	Cumberland	Do.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
MASSACHUSETTS—continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Chicopee	**5.80**	**5.15**	**6.50**	**5.75**	**4.60**	**4.20**	**4.90**	**4.60**	.....	.....	.....	.....	.....	.....	.....	.....	New River (W. Va.).	.....	
Everett	.....	.....	6.00	5.50	.....	.....	3.80	3.65	.....	.....	.....	.....	.....	.....	4.00	.....	.....	Cumberland	Cumberland.
Fall River:																			
Franklin	.....	.....	6.50	5.50															
White ash	.....	.....	5.25	4.25	.....	.....	**4.00**	**3.40**	.....	.....	.....	.....	.....	.....	4.25	4.90	New River (W. Va.).	.....	Do.
Lehigh	.....	.....	5.50	4.75															
Fitchburg	**6.25**	**5.50**	7.00	6.50	**4.10**	**3.90**	5.25	4.75	.....	.....	.....	.....	**4.25**	**4.10**	5.25	4.75	.....	.....	
Holyoke	**5.80** **5.20**	**5.00** **4.50**	6.50	5.75	**4.25**	**3.75**	5.00	4.50	.....	.....	.....	.....	**4.30**	**4.10**	5.50	5.00	Victor (Pa.)	.....	Do.
Hyde Park:																			
Furnace	5.25	4.75	6.25	6.00															
Egg	5.50	4.75	6.25	6.25	4.05	3.80	4.50	4.50	.....	.....	.....	.....	.....	.....	.....	.....	Cumberland	.....	
Stove	5.50	5.00	6.50	6.50															
Lawrence:																			
Broken	**5.45**	**5.00**	6.00																
Egg	**5.75**	**5.25**	6.00	5.00	**3.95**	**3.95**	5.50	4.50	.....	.....	.....	.....	3.95	3.95	5.50	4.50	do	.....	Do.
Stove	**6.00**	**5.50**	6.25																
Lowell	**6.25**	**5.75**	7.25	6.50	**5.00**	**4.15**	5.50	4.75	**6.25**	**5.90**	6.25	5.90	6.00	6.00	7.00	6.50	.....	.....	
Lynn:																			
Franklin stove.	.....	.....	7.25	7.00	.....	.....	4.00	4.00	.....	.....	.....	.....	.....	.....	4.50	4.50	Cumberland	.....	Do.
Franklin egg	.....	.....	7.00	6.75															

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type. long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
MASSACHUSETTS—continued.																			
Lynn—Cont'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Lackawanna stove.	.....	.....	6.00	5.75	.....	.....	4.00	4.00	.....	.....	.....	.....	.....	.....	4.50	4.50	Cumberland	.....	Cumberland.
Lackawanna egg and nut.	.....	.....	5.75	5.50															
Malden, stove	**4.95**	**4.50**	6.25	5.75	**3.85**	**3.45**	4.00	3.80	.....	.....	.....	.....	**4.00**	**3.60**	4.25	4.00	New River	.....	Do.
Marlboro	.....	.....	7.75	5.75	.....	.....	4.45	4.45	.....	.....	.....	.....	.....	.....	4.75	4.75	.....	.....	
Medford:																			
Broken	.....	.....	5.75	5.25	.....	.....	4.50	4.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Egg	.....	.....	6.00	5.50															
Stove	.....	.....	6.25	5.75															
New Medford	**5.00**	**4.00**	6.50	6.00	**3.25**	**3.00**	4.50	4.50	.....	.....	.....	.....	**3.25**	3.00	4.50	4.50	Pocahontas	.....	Do.
Newton	.....	.....	6.25	5.50	.....	.....	4.25	4.00	.....	.....	12.00	12.00	.....	.....	.....	.....	Cumberland	Cannel	
Newburyport	**5.40**	**4.65**	5.00	4.50	**3.40**	**3.20**	.....	.....	**4.25**	**3.37**	.....	.....	**3.65**	**3.35**	.....	4.50	.....	.....	
North Adams	5.35	4.35	6.00	5.25	3.50	.....	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Northampton	.....	.....	6.00	5.75	.....	.....	**5.00**	**4.40**	.....	.....	.....	.....	.....	.....	6.00	6.00	.....	.....	
Pittsfield	**5.45**	**4.45**	6.00	5.25	**3.70**	**3.55**	4.25	4.00	.....	.....	.....	.....	4.20	4.20	7.00	6.00	.....	.....	
Quincy	6.00	4.75	7.00	5.50	.....	.....	5.00	3.80	.....	.....	.....	.....	.....	.....	5.00	4.50	Pocahontas	.....	Do.
Somerville:																			
Stove	5.00	4.50	6.00	5.50	.....	.....	3.80	3.30	.....	.....	3.80	3.30	.....	.....	3.75	3.25	Pocahontas	Cumberland	Clearfield.
Egg	4.75	4.25	5.75	5.25															
Broken	4.50	4.00	5.50	5.00															

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
MASSACHUSETTS—continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Springfield	**5.75**	**4.50**	6.75	5.50	**3.95** **3.75** **3.95**	**3.95** **3.75** **3.50**	**4.50** **4.25** 4.65	**4.50** **4.25** 4.25	.....	.....	.....	.....	**3.95**	**3.95**	**4.50**	**4.50**	Cumberland Clearfield Reynoldsville (Pa.)	....	 Cumberland. Do.
Taunton	**5.75**	**5.25**	6.25	5.75	**5.00**	**4.50**	5.50	5.00	**5.75**	**5.25**	6.25	5.75	**5.00**	**4.50**	5.50	5.00	.....	.....	Do.
Waltham	**5.30**	**4.83**	6.25	6.00	**4.10**	**3.70**	5.00	4.50	.....	.....	.....	.....	**3.85**	**3.60**	**4.60**	**3.98**	Cumberland	.....	Clearfield.
Weymouth, E	.....	.....	5.75	5.25	**4.60**	**4.50**	5.00	4.35	.....	.....	.....	.....	.....	.....	.....	.....	Pocahontas and Cumberland.	.....	
Woburn	**5.40**	**4.80**	6.50	6.00	**4.05**	**3.65**	4.50	4.20	.....	.....	.....	.....	.....	.....	.....	.....	Cumberland	.....	
Worcester	**5.95**	**5.20**	7.00	6.50	**4.35**	**3.95**	*a* **5.50**	**4.25**	**4.35**	**3.95**	*a* **5.50**	**4.25**	**4.35**	**3.95**	*a* **5.50**	**4.25**	do	Cumberland	Cumberland.
MICHIGAN.																			
Adrian	5.71	5.18	6.75	6.25	2.45 3.00	1.80 2.65	2.75 3.75	2.36 3.15	2.95 3.60	2.05 3.60	3.75 5.00	2.36 3.15	..... 3 65	..... 3.65	..... 5.50	..... 5.50	Hocking lump Pocahontas	Jackson (Ohio) Cannel	Cumberland. Do.
Alpena	.....	6.00	7.00	6.00	3.25	3.00	3.50	3.50	3.25	3.00	3.50	3.50	6.00	5.50	6.00	5.50	Pittsburg (Pa.)	.....	Youghiogheny (Pa).
Ann Harbor	.....	.....	6.50	6.00	.....	.....	4.00	2.75	.....	.....	5.00	4.50	.....	.....	6.00	5.00	.....	.....	
Battle Creek	5.94	5.49	7.00	6.50	3.30	2.65	4.50	4.00	3.70	2.65	5.00	5.00	.....	.....	.....	.....	.....	.....	
Bay City	.....	.....	6.00	6.00	.....	.....	3.00	2.75	.....	....	6.50	3.00	.....	.....	6.00	3.75	.....	.....	
Detroit	5.35 5.00	4.20 4.82	6.00 6.00	5.00 5.25	2.10	1.75	4.00	2.25	2.90	2.10	4.50	3.00	4.00	4.00	5.00	4.50	Pittsburg and Hawkeye lump.	Jackson Hill and Massillon.	Blossburg.
Grand Rapids	**6.75**	**6.15**	7.10	5.70	.....	....	.....	....	2.10	.....	4.75	.....	.....	.....	.....	.....	.....	.....	
Ishpeming	.....	.....	7.50	6.25	.....	.....	.....	4.00	.....	.....	.....	.....	.....	.....	.....	6.00	.....	.....	

a Retail prices for 2,200 pounds.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
MICHIGAN—con'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Jackson	5.80	5.27	6.75	5.75	2.60	2.20	5.00	4.50	2.40	2.00	4.00	3.50	4.00	3.25	6.00	6.00	Hocking	Jackson Hill	Massillon.
Kalamazoo	6.03	4.82	7.37	5.94	2.60	2.10	3.80	2.60	3.60	2.20	5.50	3.50	3.60	3.40	6.00	6.00	Hocking Valley	do	"Lilly" (Pa.)
Lansing	6.25	5.84	6.75	6.25	3.25	2.05	4.00	3.00	3.50	2.05	5.00	2.50	3.75	3.45	7.00	6.00	Hocking	Hocking lump	Pennsylvania and West Virginia.
Manistee				7.00				3.75											
Marquette				7.00				4.25								6.00	Pennsylvania		
Muskegon	6.10	5.36	7.25	6.75	2.85	1.98	2.80	2.80	3.00	2.15	4.00	3.50	5.75	4.00	7.00	5.00	Hocking (carlots)	Hocking lump	Hocking.
Port Huron	5.36	4.91	6.00	5.00	3.10	2.70	4.00	2.35	3.20	3.00	4.00	2.75	4.00	3.50	5.00	4.50	Ohio	Pennsylvania and West Virginia.	
Saginaw			6.25	5.50			4.50	3.30			3.35	2.50					do	Michigan local	
MINNESOTA.																			
Duluth	5.85	5.35	6.75	5.75	2.95 2.75	2.75 2.50	3.50 3.10	3.10 2.85					4.65	4.15	5.50	5.10	Youghiogheny lump. Hocking lump		
Minneapolis	7.60	5.50	8.35	6.25	3.95		5.20						5.95	5.70	6.65	6.40	Youghiogheny		Cumberland.
St. Paul	7.60	7.10	8.35	8.10	3.75 3.50	2.75 2.50	4.00	3.00	4.00 3.00	4.00 2.85	5.00 4.00	5.00 3.75	5.65		6.40		Youghiogheny Illinois	Hocking Illinois	Do.
Stillwater	7.35	7.10	8.35	7.50															
MISSISSIPPI.																			
Meridian	7.50	7.00	8.50	8.00	1.10	.85			5.00	3.00	5.50	3.50					Carbon Hill (Ala.)	Montevallo (Ala.)	
Vicksburg					2.00	1.75			3.10	2.60	4.50	3.50			4.50	4.00	Pittsburg and Alabama.	Pittsburg and Alabama.	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
	Doll.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll*	*Doll.*	*Doll.*	*Doll.*			
MISSOURI.																			
Hannibal	7.50	6.50	8.00	7.50	1.85 1.50 1.25	1.50 1.25 1.00	2.00 2.00 1.50	2.25 2.25 1.25	1.85	1.70	2.75	2.25	4.55	4.45	6.75	6.00	Illinois lump Illinois nut Illinois slack	Illinois lump	
Joplin	10.00	8.50	10.50	9.50	1.80	1.15	2.50	2.00	2.00	1.50	2.75	2.25	.....	.....	8.00	7.50	.....	.....	
Kansas City	8.60	7.35	10.00	9.00	2.35 2.38 2.00	1.85 2.00 1.50	2.50 3.50 3.25	2.20 2.75 2.50	3.00 ..... 2.50	2.75 ..... 1.75	3.50 ..... 3.50	2.50 ..... 2.75	.... 6.75	.... 6.50	.... 8.50	.... 8.50	Cherokee (Kans.) Cherokee lump Cherokee nut	Cherokee (Kans.) Missouri	Cumberland.
Sedalia	8.50	7.50	9.00	8.00	1.80	1.75	2.25	2.00	.....	.....	3.50	2.25	.....	.....	8.00	8.00	.....	.....	Do.
Springfield	8.75	.....	9.75	.....	2.50	.....	3.50	.....	2.50	.....	3.50	.....	6.10	.....	12.50	.....	Weir (Kans.) lump.	Weir lump	Do.
St. Joseph	8.65	4.75	9.25	7.25	1.75	.95	1.85	1.15	2.75	1.75	3.00	2.00	8.50	6.00	9.50	8.25	Mine run	Screened lump	Do.
St. Louis	6.50	6.00	8.00	7.00	1.3[illegible]	1.00	2.75	2.25	2.50	2.00	3.00	2.25	5.00	.....	5.50	5.25	.....	.....	
MONTANA.																			
Butte	17.00	13.50	18.00	14.00	3.50	3.50	6.50	4.00	7.50	5.00	7.50	7.00	16.00	12.00	20.00	14.00	Rock Springs (Wyo.) slack.	Rock Springs	Do.
Helena	.....	.....	18.00	17.00	.....	2.25	.....	.....	.....	4.75 4.25 3.50	....	5.00 4.50 3.75	.....	.....	.....	17.00	.....	Montana lump Montana egg Montana nut	Do.
NEBRASKA.																			
Beatrice:																			
Pennsylvania	9.85	8.25	10.50	9.00	2.50	2.40	3.00	2.50	3.40	3.15	4.50	4.00	6.45	.....	11.00	.....	Weir (Kans.)	Weir (Kans.)	
Colorado	8.35	7.25	9.50	8.50					6.10	6.10	7.50	7.50						Canyon (Colo.)	
Hastings	.....	.....	10.50	9.60	.....	.....	3.00	2.75	.....	.....	7.25	4.25	.....	.....	.....	.....	.....	.....	
Lincoln	8.85	7.60	9.40	7.50	1.90	1.55	2.40	2.00	6.00	5.25	7.65	6.65	5.50	.....	9.00	.....	Rich Hill (Mo)	Rock Springs (Wyo.).	Do.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
NEBRASKA—c't'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Nebraska City	8.60	8.20	10.00	9.50	1.80	1.60	2.25	2.00	3.00 5.25 4.00	2.15 5.25 3.80	4.00 6.50 5.50	3.50 6.50 5.25	6.30	5.60	10.00	9.00	Iowa and Missouri	Mendota (Mo.) Rock Springs (Wyo.) Hurricane (Ill.)	Cumberland.
Omaha	8.75	6.50	9.50	7.50	1.60	1.40	1.75	1.50	2.75	2.60	3.00	2.75	5.75	5.40	7.50	6.50	Iowa	Missouri	Do.
NEW HAMPSHIRE.																			
Concord			7.25	6.50			6.00	4.35							7.00	5.50	Cumberland		Do.
Dover			6.50	5.00	4.25	4.00	4.25	4.00			6.50	5.00			5.00	4.50	Pocahontas	Pocahontas	Pocahontas.
Manchester	**6.25**	**6.00**	7.00	6.25	**5.00**	**4.65**	6.00	6.00											
Nashua			7.00	6.75			5.50	5.00			5.50	5.00			5.50	5.00			
NEW JERSEY.																			
Atlantic City	5.00	4.80	5.25	5.00									4.00	3.75					
Bayonne	4.25	3.50	5.00	4.25															
Bridgeton	5.20	4.85	5.35	5.00	2.65	2.50	3.15	3.00					3.05	3.05	3.35	3.25			
Camden, stove	**4.85**	**4.60**	5.25	4.25	2.75								2.65		5.00	4.00	Clearfield		Cumberland.
Elizabeth	**4.35**	**3.55**	5.50	4.75	**3.00**	**2.85**							**3.00**	**2.85**			Cumberland		Do.
Hoboken (Haddock's Plymouth coal):																			
Broken	**3.85**	**3.10**																	
Egg	**4.10**	**3.10**																	
Stove	**4.25**	**3.30**																	
Nut	**4.00**	**3.03**																	
Pea	**2.40**	**2.05**																	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
NEW JERSEY—c'd.																			
Jersey City:	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Stove	**4.50**	**3.60**	5.25	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Egg	**4.25**	**3.35**	5.25	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Chestnut	**4.25**	**3.35**	5.25	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Millville	.....	.....	5.75	5.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.00	3.75	.....	.....	
Newark	4.50	3.75	5.25	4.50	2.85	2.60	.....	.....	.....	.....	.....	.....	3.30	3.00	5.00	4.00	.....	.....	
Orange:																			
Stove	**4.50**	**3.75**	5.25	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Egg and nut	**4.25**	**3.50**	5.25	4.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Pea	**2.50**	**2.25**	3.25	2.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Passaic:																			
Free burning (*a*).	**4.50**	**3.50**	5.25	4.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.00	5.00	.....	.....	
Lehigh (*a*)	**4.90**	**4.20**	5.40	4.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Paterson	**4.50**	**3.75**	**5.00**	**4.25**	3.25	3.25	4.00	3.50	.....	.....	.....	.....	3.41	3.41	5.00	5.00	.....	.....	Cumberland.
Plainfield	**4.65**	**4.10**	5.50	5.00	.....	3.20	.....	4.00	.....	.....	.....	.....	.....	3.50	.....	5.00	.....	.....	
Trenton	4.65	4.30	5.75	5.25	2.90	2.70	4.25	3.75	2.90	2.70	4.25	3.75	2.90	2.70	5.00	5.00	Cumberland	Cumberland	Do.
NEW MEXICO.																			
Albuquerque	5.25	5.25	6.00	6.00	2.25 1.50	2.25 1.50	3.25	3.25	4.00	4.00	4.75	4.75	.....	.....	.....	.....	New Mexico nut, slack.	New Mexico lump	

a Small sizes anthracite.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
NEW YORK.																			
Amsterdam:	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Stove	4.80	3.95	5.50	4.50	.....	.....	2.65	2.55	.....	.....	5.50	5.50	.....	.....	5.00	5.00	.....	.....	
Nut	4.55	3.70																	
Albany:																			
Grate	**4.20**	**3.45**	5.25	4.50	**3.00**	**2.90**	3.50	2.90	.....	.....	.....	.....	**3.70**	**3.15**	7.00	4.00	Reynoldsville and Clearfield.	.....	Cumberland.
Egg	**4.45**	**3.70**																	
Stove	**4.70**	**3.95**																	
Nut	**4.45**	**3.70**																	
Auburn	**4.80**	**4.20**	5.60	5.00	2.36	2.20	2.61	2.50	.....	.....	.....	.....	4.28	.....	5.00	.....	.....	.....	
Binghamton	**4.40**	**3.80**	4.40	4.00	2.32	2.10	4.00	2.40	.....	.....	.....	.....	**3.75**	2.95	5.00	4.00	Eureka (Pa.)	.....	Do.
Brooklyn:																			
Broken	3.62	3.40	5.25	4.50	2.68	2.68	3.50	3.50	2.68	2.68	3.50	3.50	2.86	2.86	4.00	3.75	Clearfield	Clearfield	Clearfield.
Egg	4.06	3.67																	
Stove	4.29	3.71																	
Nut	4.06	3.62																	
Buffalo:																			
Grate	**4.75**	**4.00**	5.00	4.00	**1.55**	**1.40**	1.70	1.55	.....	.....	.....	.....	**3.00**	**2.65**	4.00	3.25	Run of mine	.....	Run of mine.
Egg, stove, nut.	**5.00**	**4.25**	5.25	4.25															
Cohoes	**4.60**	**4.00**	5.50	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Elmira	**4.50**	**3.90**	5.00	4.25	**2.40**	.....	3.00	2.50	.....	.....	.....	.....	.....	.....	.....	.....	Powelton	.....	
Gloversville	.....	.....	6.00	4.50	.....	.....	3.60	3.60	.....	.....	.....	.....	.....	.....	6.00	6.00	Reynoldsville and Clearfield.	.....	
Hornellsville	**5.00**	**4.40**	5.25	4.75	2.05	1.80	3.00	2.70	.....	.....	.....	.....	3.50	3.50	4.00	3.50	.....	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	High. est.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
NEW YORK—c't'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Ithaca	**4.50**	**3.90**	4.80	4.25	2.90	2.90	4.00	4.00	.....	.....	.....	.....	3.65	3.65	4.50	4.50	Pittsburg lump	.....	Cumberland.
Jamestown	**5.25**	**4.75**	5.50	4.75	2.35	1.90	.....	.....	3.00	2.75	.....	.....	3.25	.....	5.00	5.00	.....	.....	
Kingston	4.40	3.65	4.90	4.15	3.15	.....	.....	.....	.....	.....	.....	.....	4.05	.....	5.50	5.50	.....	.....	
Lansingburg	.....	.....	5.75	5.00	.....	.....	4.00	2.50	.....	.....	5.75	5.00	.....	.....	5.50	5.50	.....	.....	Do.
Long Island City	4.50	4.00	5.25	4.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Middletown	.....	.....	5.60	4.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.00	8.00	.....	.....	
Mount Vernon	.....	.....	5.75	5.25	.....	.....	4.00	3.90	.....	.....	.....	.....	.....	.....	.....	.....	Reynoldsville (Pa.)	.....	
New Brighton	.....	.....	5.00	4.75	.....	.....	.....	.....	.....	.....	11.00	.....	.....	.....	5.00	.....	.....	Cannel	Clearfield.
Newburg	**4.10**	**3.60**	4.40	3.80	**4.20**	**4.20**	.....	.....	.....	.....	.....	.....	.....	.....	5.00	5.00	.....	.....	Cumberland.
New York City	**4.50**	**3.90**	**5.50**	**4.50**	**2.15**	**2.00**	.....	.....	.....	.....	.....	.....	**3.00**	**2.85**	**4.00**	**3.50**	Clearfield	.....	
Ogdensburg	**5.25**	**4.75**	5.40	5.40	2.70	2.70	3.50	3.50	4.25	4.25	5.25	5.00	4.25	4.25	5.25	5.25	Reynoldsville	Cannel	Do.
Olean	**4.80**	**4.20**	5.25	5.00	.....	1.40	2.50	2.00	.....	1.60	3.00	.....	2.85	2.80	5.00	4.50	.....	.....	
Oswego	**4.90**	**4.00**	5.25	4.75	3.00	2.60	3.10	2.85	.....	.....	.....	.....	3.40	3.30	4.00	3.50	.....	.....	
Poughkeepsie:																			
Stove	**4.70**	**3.70**	5.00	4.38	.....	.....	.....	.....	.....	.....	.....	.....	**3.50**	**3.20**	5.00	4.65	.....	.....	
Pea	**2.95**	**2.95**	3.50	3.15															
Rochester	**4.80**	**4.05**	5.25	4.75	2.20	1.50	2.40	1.85	.....	.....	.....	.....	3.00	2.31	4.50	3.50	.....	.....	
Rome	4.85	4.00	5.50	4.50	2.40	2.14	3.25	2.75	6.00	6.00	8.00	8.00	4.50	4.15	5.50	5.00	Loyalhanna	Cannel	
Saratoga Springs	**5.20**	**4.20**	5.50	4.75	.....	3.08	4.50	4.00	.....	.....	.....	.....	.....	3.69	5.00	4.50	.....	.....	
Schenectady	**4.20**	**3.70**	5.50	5.00	**2.95**	**2.65**	.....	.....	.....	.....	.....	.....	.....	.....	7.00	6.00	.....	.....	
Syracuse	**4.09**	**3.64**	5.00	4.00	**2.25**	**2.25**	3.00	3.00	**2.25**	**2.25**	3.00	3.00	**4.00**	**4.00**	5.00	5.00	Morris Run	Morris Run	Do.
Utica	**4.85**	**4.00**	5.50	5.25	**2.85**	**2.60**	3.25	3.25	.....	.....	.....	.....	**3.50**	**3.50**	6.00	5.00	.....	.....	
Watertown	**5.55**	**5.20**	6.00	5.50	3.30	3.08	4.00	3.75	.....	.....	.....	.....	4.15	.....	6.00	6.00	.....	.....	Do.
Yonkers	.....	.....	5.25	4.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
NORTH CAROLINA.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Asheville	8.00	8.00	8.50	8.00	2.50	2.10	3.00	2.20	4.00	3.50	4.25	3.75	.....	.....	.....	.....	Jellico	Jellico	
Charlotte	7.50	6.00	8.00	7.50	3.40	2.80	4.00	.....	5.00	.....	5.50	.....	.....	.....	7.00	4.00	.....	.....	
Raleigh	7.25	6.00	8.00	7.25	3.40	.....	3.80	3.55	4.50	4.25	5.50	4.75	.....	.....	5.00	3.80	New River	New River	New River.
Wilmington	5.00	4.75	6.00	5.50	**4.00**	**3.55**	4.50	4.25	.....	....	4.50	4.25	.....	.....	5.00	4.50	Pocahontas	Pocahontas	Pocahontas.
OHIO.																			
Bellaire	.....	.....	.....	.....	.50	.25	.....	.....	.....	.....	1.13	.75	.....	.....	.....	.....	Local slack	Local lump and mixed.	
Canton	5.25	5.15	6.00	5.75	1.25	1.05	1.75	1.50	1.65 1.25	1.55 1.15	2.50 2.35	2.25 2.00	2.40	2.30	4.00	3.75	Massillon run of mine.	Massillon Pittsburg	Blossburg.
Cincinnati	6.00	5.60	6.50	6.25	.75	.63	.....	.....	1.38	1.13	2.50	2.25	.....	.....	4.25	4.00	Kanawha nut and stove.	.....do Kanawha lump	Cumberland.
Cleveland:																			
Egg, stove, nut	5.13	4.60	6.00	5.60	1.60	1.50	.....	.....	2.10	2.00	3.10	3.00	2.35	2.25	3.75	3.50	Pittsburg lump	Massillon	
Grate	4.90	4.38	5.75	5.40															
Columbus	.....	.....	6.25	5.75	1.50	.90	2.50	.90	1.65	.90	2.25	1.25	.....	.....	.....	.....	Hocking Valley.	Hocking Valley	
Dayton	.....	.....	6.50	5.00	.....	.....	.....	.....	.....	.....	3.25	1.75	.....	.....	.....	.....	.....	Jackson	
East Liverpool	6.50	5.50	7.00	6.50	1.90	1.25	2.50	2.00	1.90	1.25	2.50	2.00	1.50	1.15	2.00	1.50	Pittsburg lump	Pittsburg lump	Pittsburg run of mine.
Hamilton	6.15	6.15	6.50	6.50	2.00	2.00	.....	.....	2.90	2.90	3.15	3.15	3.50	3.50	4.25	4.25	Jackson	Youghiogheny and Campbell's Creek.	Cumberland.
Lima	.....	.....	6.50	6.00	.....	.....	.....	.....	.....	.....	3.25	2.25	.....	.....	.....	.....	.....	Hocking Valley and Jackson.	
Massillon	.....	.....	.....	.....	.....	....	.....	.....	1.34	1.33	2.25	2.15	.....	.....	.....	.....	.....	Local	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
OHIO—continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll*			
Sandusky	5.36	4.83	6.25	5.50	2.35	1.75	3.00	2.50	2.35	1.75	3.25	2.75	3.10	2.70	6.00	4.00	.....	.....	
Steubenville	5.18	5.18	7.00	6.50	.85	.80	1.15	.....	1.10	1.00	1.75	.....	.....	.....	.....	.....	.....	.....	
Tiffin	5.36	4.82	6.50	6.00	1.90	1.35	1.90	1.45	2.05	1.95	3.50	3.00	2.90	2.90	6.00	6.00	.....	.....	
Toledo	5.36	4.69	6.25	5.75	1.90	1.33	2.25	1.35	2.20	1.60	3.75	3.25	2.90	2.90	5.25	3.95	Hocking lump	Jackson lump	Lilly (Pa.).
Zanesville	5.81	5.20	.....	.....	.....	.....	.75	.63	1.00	.85	1.75	1.25	.....	.....	.....	.....	Local slack	Local lump	
OREGON.																			
Portland	11.00	10.00	12.50	12.00	**4.00**	**4.00**	4.25	4.25	**4.50**	**4.50**	6.00	5.75	9.75	9.50	12.25	10.50	Newcastle (Wash.)	Newcastle (Wash.)	Cumberland.
					4.40	.....	.....	.....	.....	.....	.....	.....					Australian	.....	
					3.78	.....	.....	.....	.....	.....	.....	.....					Roslyn	.....	
					4.50	**4.25**	5.50	5.25	**4.50**	**4.50**	6.00	5.75					Gilman (Wash.)	.....	
					5.25	**5.00**	6.00	5.75									Franklin (Wash.)	Gilman lump	
PENNSYLVANIA.																			
Allegheny	5.25	5.05	5.75	5.50	1.05	.....	.....	.....	1.85	.....	2.50	1.63	.....	.....	.....	.....	.....	.....	
Allentown:																			
Chestnut	**4.25**	.....	**4.90**	.....															
Egg	**4.40**	.....	**5.00**	.....															
Stove	**4.50**	.....	**5.10**	.....	3.75	3.75	4.50	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Jeddo stove	**4.35**	**4.00**	**5.25**	**4.90**															
Jeddo egg	**4.15**	**3.90**	**5.05**	**4.80**															
Altoona	**5.00**	**4.50**	.....	.....	1.32	1.30	2.00	1.80	3.00	1.50	4.00	2.50	1.10	1.10	1.90	1.50	Sonman	Sonman	Sonman.
Bradford	**5.00**	.....	5.25	4.50	2.05	1.85	2.75	2.50	.....	.....	3.00	2.75	.....	.....	6.00	2.75	.....	.....	
Chester	.....	.....	5.50	5.50	.....	.....	4.50	4.50	.....	.....	.....	.....	.....	.....	4.50	4.50	Cumberland	.....	Cumberland.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
PENNSYLVANIA—continued.																			
Columbia:	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Egg	.....	.....	**3.40**	**3.25**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Nut	.....	.....	**4.80**	**4.25**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Pea	.....	.....	**5.25**	**4.75**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Easton	**4.25**	**4.00**	**5.00**	**4.90**	3.00	2.15	4.75	3.25	.....	.....	.....	.....	2.85	2.85	6.00 4.75	5.00 3.50	Conemaugh	.....	Cumberland. Conemaugh.
Erie	5.45	3.75	5.75	5.00	1.75	1.55	.....	2.25	2.00	1.75	.....	3.50	2.50	2.50	3.00	3.00	Pittsburg, ¾ in.	Pittsburg 1½ in.	Lilly.
					1.15	1.10	1.20	1.12	3.50	3.50	4.50	4.50	2.40	2.40	2.47	2.42	Nut and slack	Ohio block	Sonman.
					1.50	1.45	2.50	2.50	1.20 1.50	1.15 1.45	1.50 2.50	1.50 2.50	5.00	5.00	5.00	5.00	Run of mine	Slack Run of mine	
Harrisburg:																			
Prepared	**4.80**	**3.50**	**6.00**	**4.75**	**2.15**	**1.90**	**3.50**	**3.00**	.....	.....	.....	.....	**2.15**	**1.90**	**3.50**	**3.00**	Clearfield	.....	Clearfield.
Pea	**2.90**	**2.25**	**3.75**	**3.00**															
Johnstown	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.75	.60	.....	.....	.....	.....	.....	Local	
Lancaster:																			
Stove	.....	.....	**5.25**	**4.75**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Egg	.....	.....	**5.00**	**4.25**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Nut	.....	.....	**5.00**	**4.50**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Furnace	.....	.....	**4.75**	**4.00**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Lebanon:																			
Nut	**4.45**	**4.15**	**5.88**	**5.60**	**2.44**	**2.24**	**5.04**	**4.48**	.....	.....	.....	.....	**2.44**	**2.24**	**5.04**	**4.48**	Clearfield	.....	Broad top.
Pea	**2.60**	**2.55**	**3.50**	**3.25**															
McKeesport	4.80	.....	6.00	5.90	.50	.....	1.04	.....	.80	.65	1.56	1.43	.....	.....	.....	.....	Local	Local	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
PENNSYLVANIA—continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Meadville	**5.25**	**4.65**	6.00	4.80	2.10	1.30	2.50	1.70	3.00	1.70	4.00	2.10	2.55	2.45	5.00	3.55			
Newcastle	**5.25**		**6.50**	**6.00**	1.50	1.34	2.40	2.20									Saw Mill Run (Pa.)		
Norristown:																			
Schuylkill stove.	**4.70**	**4.45**	**5.75**	**5.50**															
Lehigh stove.	**4.85**	**4.50**	**5.75**	**5.50**															
Oil City	4.50	4.25	5.50	5.25	1.25	1.15	2.00	2.00	1.45	1.35	2.50	2.25	3.00	2.85	4.00	4.00			
Philadelphia	**4.70**	**4.45**	**5.75**	**4.75**															
Pittsburg	4.60	4.15	5.50	5.25	1.30	.65	2.00	1.25	1.25	1.00	2.00	1.75	.60	.50	1.25	1.00	Pittsburg lump	Pittsburg lump	
Pottstown:																			
Stove	**4.55**	**4.30**	**5.65**	**5.40**															
Egg	**4.45**	**4.20**	**5.40**	**5.15**															
Nut	**4.35**	**4.05**	**5.40**	**5.15**															
Pea	**2.65**		**3.75**	**5.50**															
Pottsville (average.)	**2.58**	**2.33**	**2.68**	**2.43**									2.52	2.20					
Reading			5.25	3.85															
Shenandoah	**2.24**	**1.75**	**2.50**	**2.00**															
South Bethlehem:																			
Stove and nut.			**3.10**	**3.00**															
Egg			**3.00**	**2.80**															

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.			
PENNSYLVANIA—continued.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Wilkesbarre (average).	**2.50**	**1.75**	**3.00**	**3.00**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Williamsport	**4.50**	**4.00**	**5.25**	**4.60**	**1.60**	**1.50**	.....	.....	**1.60**	**1.50**	.....	.....	**1.60**	**1.50**	.....	.....	Clearfield	Clearfield	Clearfield.
York	**6.00**	**5.00**	**6.00**	**5.25**	2.90	2.90	3.00	3.00	.....	.....	.....	.....	.....	.....	3.50	3.50	do	.....	Do.
RHODE ISLAND.																			
Newport	6.00	5.15	7.50	6.00	6.00	5.15	6.25	5.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Pawtucket (stove).	.....	.....	6.00	5.00	**3.85**	**3.50**	4.25	3.50	.....	.....	.....	.....	5.00	5.00	.....	.....	Eureka, Pa.; Clearfield.	.....	Cumberland.
Providence	4.90	4.00	5.75	5.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
SOUTH CAROLINA.																			
Charleston	5.50	5.25	5.75	5.50	3.25	3.15	3.50	3.25	.....	.....	5.50	5.50	.....	.....	5.00	4.00	.....	Splint	
Columbia	**6.40**	**6.17**	**8.00**	**6.50**	4.00	3.50	5.00	4.50	4.00	3.75	6.00	4.75	5.00 **7.00**	4.00 **6.00**	6.00 **8.00**	5.00 **7.00**	Jellico	Jellico	Etna. Cumberland.
SOUTH DAKOTA.																			
Sioux Falls	8.85	6.50	9.50	7.50	2.40	2.30	.....	.....	5.16	4.40	7.00	6.50	6.00	5.80	8.00	8.00	Iowa	Ohio	Cumberland.
TENNESSEE.																			
Chattanooga	7.00	6.25	8.50	7.75	1.10	1.00	3.00	2.25	2.05	1.50	.....	.....	.....	.....	1.50	1.00	Jellico, Paint Rock.	Soddy	Brushy Mountain.
					1.30	1.05	1.50	1.25	2.10	1.75	3.00	2.50	2.25	1.00	3.25	1.50	Soddy, Durham, Salt Creek.	Glen Mary, Jellico	Etna.
Jackson	.....	.....	9.50	8.75	.....	.....	2.50	2.35	.....	.....	4.00 3.25	3.50 3.00	.....	.....	5.50	5.00	Kentucky	Alabama Kentucky	Pittsburg (Pa.)

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low. est.			
TENNESSEE—c't'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Knoxville	.....	.....	8.00	7.50	1.10	.85	1.50	1.25	2.55	2.25	3.50	3.00	.....	.....	1.75	1.50	Tennessee nut and slack.	Tennessee lump	Tennessee, slack.
Memphis	7.05	6.65	9.00	9.00	1.56	1.56	2.25	2.25	2.25	2.10	3.75	3.00	2.25	2.00	3.25	2.75	Pittsburg	Pittsburg	Kentucky.
Nashville	8.50	7.50	10.00	8.50	1.75 1.25	1.50 1.25	2.25 1.50	2.00 1.50	2.25 2.00	2.00 1.75	3.25 2.75	2.50 2.25	4.00	4.00	4.00	4.00	Run of mine Pea and slack	Lump Nut	Alabama washed.
TEXAS.																			
Austin	8.75	8.00	12.00	10.50	4.05	1.25 3.25	.....	.....	.....	.....	6.50 4.90	6.00 4.50	.....	.....	.....	.....	Lignite McAlester	McAlester Laredo	
Dallas	8.60	7.70	12.00	9.50	2.55	1.35 1.75	3.00 2.50	2.50	4.35	2.60	5.75	4.00	8.00	6.70	12.00	10.00	Arkansas, Colorado, and Texas. McAlester	....	
Denison	8.65	8.50	10.00	9.85	3.30	1.55	3.55	1.80	3.55	2.95	4.50	3.90	.....	.....	.....	.....	Indian Territory	Indian Territory	
El Paso	8.55	8.20	12.00	10.50	6.40	5.50	.....	.....	6.00	5.85	10.00	7.50	9.25	7.00	16.00	12.00	.....	.....	
Gainesville	.....	8.50	.....	10.00	.....	3.15	.....	.....	.....	3.50	5.50	4.00	.....	3.50	5.00	.....	.....	.....	
Galveston	7.40	5.65	10.00	7.00	4.50	4.00	5.25	4.75	5.15	4.65	7.50	6.00	4.50	4.00	7.50	6.00	New River, Pocahontas; Cumberland.	Pittsburg lump	"Davis" (W. Va.).
Houston	7.50	7.00	10.00	8.50	4.25	4.00	5.50	4.50	.....	.....	7.00	5.25	6.00	5.50	8.00	6.50	McAlester	McAlester	Cumberland.
Laredo	.....	.....	.....	.....	1.50	1.50	.....	.....	3.25	3.25	5.00	5.00	.....	.....	20.00	.....	Local	Local	Do.
Marshall	8.05	8.05	9.50	9.50	5.25 4.65	5.25 4.50	6.00 5.75	5.75 5.25	4.75 3.85	4.75 3.85	5.75 4.50	5.25 4.50	8.65	8.65	9.50	9.50	Pittsburg Colorado	McAlester Thurber (Tex.)	Do.
Paris	9.50	.....	12.50	.....	2.50	.....	3.75	.....	4.25	.....	5.50	.....	9.00	.....	12.50	.....	Indian Territory	Indian Territory	Do.
San Antonio	8.65	8.35	10.00	10.00	.....	.....	.....	.....	4.50	4.10	6.50	6.00	.....	.....	.....	.....	.....	.....	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.				
	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High-est.	Low-est.	High est.	Low. est.	High-est.	Low-est.	High-est.	Low-est.	Steam.	Domestic.	Smithing.
TEXAS—cont'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Sherman	9.00	9.00	11.00	10.00	3.55 3.05	3.50 3.00	4.50 3.75	4.00 3.50	3.05	2.85	3.75	3.50	7.50	6.50	10.00	8.00	McAlester lump McAlester nut	Briar Creek	Cumberland and Alabama.
Waco	.....	.....	.....	.....	4.25	3.75	7.00	5.00	2.25	1.75	4.00	3.00	.....	.....	12.00	9.00	Indian Territory	Texas lignite	Blossburg.
UTAH.																			
Ogden	8.35	7.85	9.50	9.50	2.25	1.75	3.00	2.25	3.75	2.75	4.50	4.00	3.25	3.25	4.00	4.00	.....	.....	
Salt Lake City	9.25	8.75	9.75	9.25	2.25	2.00	3.00	2.50	4.50 4.00	4.00 3.75	5.00 4.50	4.50 4.00	10.50	10.50	10.50	10.50	Slack	Lump Nut	Cumberland.
VERMONT.																			
Burlington	**5.50**	**5.00**	6.50	6.00	.....	.....	4.50	4.25	.....	.....	.....	.....	4.75	4.75	5.00	5.00	.....	Reynoldsville	Reynoldsville.
Rutland	.....	5.60	.....	6.00	.....	3.20	.....	.....	.....	.....	.....	.....	.....	3.20	.....	.....	.....	do	Do.
VIRGINIA.																			
Alexandria stove	.....	.....	5.75	5.75	.....	.....	3.50	3.50	.....	.....	4.50	4.50	.....	.....	.....	.....	.....	Lump	
Danville	6.15	5.90	7.25	6.60	**4.00**	**3.85**	4.25	4.00	**4.75**	**4.25**	5.25	4.75	**5.00**	**4.75**	6.50	6.25	West Virginia	West Virginia	West Virginia.
Lynchburg	**7.00**	**6.75**	7.00	6.75	**3.50**	**3.50**	4.00	4.00	**4.00**	**4.00**	4.50	4.50	**2.00**	**2.00**	3.50	3.00	Pocahontas and New River.	.....	
Norfolk	**5.00**	**4.60**	**5.50**	**5.00**	**2.85**	**2.75**	**3.50**	**3.40**	**3.50**	**3.50**	**5.50**	**5.50**	2.95	2.95	5.00	5.00	Pocahontas and Clearfield.	Thacker	Cumberland.
Petersburg	.....	.....	6.50	6.00	.....	.....	5.00	3.35	.....	.....	5.50	.....	.....	.....	5.00	.....	Pocahontas	Splint	
Portsmouth	.....	.....	**6.00**	**5.50**	.....	.....	**5.00**	**4.50**	.....	.....	**5.00**	.....	.....	.....	**5.50**	**5.00**	do	Pocahontas	Pocahontas.
Richmond	5.00	4.25	6.00	5.00	**2.85**	**2.85**	**4.00**	**3.50**	3.60	3.50	5.50	5.00	.....	.....	.....	.....	Pocahontas and New River.	Splint	
Roanoke	**6.60**	**6.30**	7.50	7.00	**2.85**	**2.75**	4.00	3.75	**3.20**	**3.10**	4.50	4.00	**2.25**	**2.00**	2.25	2.00	Pocahontas	Pocahontas	Do.

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
WASHINGTON.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Seattle	.....	.....	.....	.....	2.00	1.00	2.50	1.00	3.00	2.00	4.00	2.00	.....	.....	.....	.....	Gilman lump and slack.	Gilman lump and nut.	
Spokane	17.50	17.00	20.00	18.00	5.50	5.00	5.75	5.50	.....	.....	.....	.....	18.00	15.50	20.00	18.00	Roslyn (Wash.)	.....	Cumberland.
Tacoma	.....	.....	.....	.....	3.50	2.25	3.50	2.25	4.25	2.75	4.25	2.75	.....	.....	5.00	.....	South Prairie and Bucoda.	.....	Wilkeson.
WEST VIRGINIA.																			
Huntington	6.00	5.80	7.50	7.00	.....	.....	1.25	.75	.....	.....	2.25	2.00	.....	.....	2.50	2.25	Nut and slack	Kanawha splint	New River.
Parkersburg	**7.00**	**7.00**	**7.75**	**7.50**	**1.35**	**1.10**	**1.50**	**1.50**	**1.91**	**1.62**	**2.36**	**2.06**	.....	.....	.....	.....	Slack	Lump	
Wheeling	5.22	4.80	6.75	6.25	1.15	1.10	1.20	1.15	1.25	1.20	2.00	2.00	2.40	2.30	3.25	3.25	Monongah	Monongah	Davis.
WISCONSIN.																			
Appleton	.....	.....	7.50	6.50	.....	.....	5.00	.....	.....	.....	.....	.....	.....	.....	7.00	7.00	Hocking	.....	Cumberland.
Eau Claire	7.50	.....	8.25	.....	4.00	3.50	5.00	4.25	.....	.....	.....	.....	6.00	5.50	7.00	6.50	do	.....	Do.
Fond du Lac	6.35	5.75	7.00	6.50	3.65	2.65	4.25	3.25	6.00	3.75	7.00	4.00	.....	.....	.....	.....	Ohio and Illinois	Cannel	
Janesville	6.70	5.05	7.00	5.50	2.70	2.00	3.50	3.00	3.75	3.60	5.00	5.00	4.65	4.35	7.00	6.50	Illinois	Hocking	Do.
La Crosse	8.05	7.00	8.50	7.75	3.10	2.70	4.00	3.50	4.85	4.50	5.75	5.50	5.75	5.10	7.00	6.25	Wilmington (Ill.)	West Virginia splint.	Do.
Madison	.....	.....	7.50	6.00	.....	.....	4.00	3.25	.....	.....	5.00	4.00	.....	.....	7.50	.....	Ohio and Illinois	Ohio and Illinois	
Marinette	6.50	5.75	6.50	5.75	3.50	3.50	4.00	3.50	.....	.....	.....	.....	5.00	4.50	5.50	5.00	Mansfield	.....	Do.
Milwaukee	5.85	3.75	6.75	4.50	2.85	2.40	3.50	2.60	.....	.....	4.50	2.75	4.50	3.25	5.50	4.25	Pittsburg	Pittsburg	Do.
Oshkosh	.....	.....	7.00	6.00	.....	.....	4.50 4.00	3.50 3.00	.....	.....	4.50	4.00	.....	.....	7.00	6.00	Hocking Illinois	Hocking	

Wholesale and retail prices of coal in the United States during 1896—Continued.

[Heavy faced type, long tons; light faced type, short tons.]

State and town, and kinds of anthracite used.	Anthracite.				Bituminous.												Kinds of bituminous coal used.		
					Steam coal.				Domestic.				Smithing.						
	Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Wholesale.		Retail.		Steam.	Domestic.	Smithing.
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.			
WISCONSIN—c't'd.	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*	*Doll.*			
Racine	5.85	5.25	6.75	6.00	2.54	1.85	4.00	4.00	2.60	2.25	5.00	5.00	4.50	2.75	6.00	5.50	Illinois and Indiana.	Ohio and West Virginia.	Cumberland.
					2.30	1.85	3.00	2.50									Illinois	.....	
					2.40	2.05	3.50	3.00									Indiana	.....	
					2.60	2.49	3.75	3.00									Indiana block	.....	
					3.40	3.30	4.50	3.75									Hocking	.....	
					3.50	3.25	4.50	3.75									Pittsburg	.....	
					4.00	3.00	4.50	3.25									West Virginia	.....	
Sheboygan	5.85	5.25	6.50	6.00	2.50	2.30	3.00	2.75	2.75	2.60	3.25	3.00	4.00	3.50	5.00	5.00	Hocking	Hocking	
West Superior	5.85	5.60	6.75	6.25	2.95	2.85	3.70	3.70	2.75	2.75	3.50	3.50	4.15	4.15	4.90	4.90	Youghiogheny	Youghiogheny	Hocking.
WYOMING.																			
Cheyenne	.....	.....	13.00	12.50	2.50	2.50	3.00	2.90	4.75	4.75	6.00	5.50	.....	.....	.....	.....	Rock Springs slack.	Rock Springs lump.	
					1.80	1.80	2.50	2.15	4.00	4.00	5.00	4.50	.....	.....	.....	.....		Rock Springs nut.	
									3.25	3.25	4.25	4.00	.....	.....	.....	.....		Hanna lump	
									3.00	3.00	4.00	3.75	.....	.....	.....	.....	Hanna pea	Hanna egg	
									2.25	2.25	3.25	3.00	.....	.....	.....	.....		Hanna nut	

The details of prices in San Francisco for all kinds of coal received at that port are reported by Mr. Charles R. Allen as follows:

Average prices for screened coal at San Francisco.

Source.	Name.	San Francisco agent—sales.	Character.	Cargo price.	Wholesale price (2,240 pounds).		Retail price.			
							Highest.		Lowest.	
					Highest.	Lowest.	2,240 bulk.	2,000 sacks.	2,240 bulk.	2,000 sacks.
California	Pittsburg Coal Mining Co	Charles R. Allen	Steam	$3.00						
Oregon	Coos Bay	Oregon Coal and Navigation Co.	Domestic		$5.00	$4.25	$7.00	$7.00	$6.25	$6.25
	Beaver Hill	Wm. G. Stafford & Co	do		4.75	4.25	6.75	6.75	6.25	6.25
Washington	Bryant	Central Coal Co	do		5.50	5.00	7.50	7.50	7.00	7.00
	Seattle	Oregon Improvement Co	do		5.50	5.00	7.50	7.50	7.00	7.00
	Roslyn	R. D. Chandler	Domestic and steam	5.00	6.00	6.00	8.00	8.00	8.00	8.00
	South Prairie	Thos. C. Pedlar	Steam and gas	4.00						
	Franklin	Oregon Improvement Co	Steam	4.50						
	White Ash	P. B. Cornwall	do	5.00						
Vancouver Island	Southfield Wellington	Charles R. Allen	Domestic and steam	5.50	7.50	7.50	9.50	9.50	9.50	9.50
	Nanaimo	do	do	5.50	7.50	7.50	9.50	9.50	9.50	9.50
	Dunsmuir Wellington	R. Dunsmuir & Son	do		8.00	8.00	10.00	10.00	10.00	10.00
	Comox	do	Steam	5.50						
Wyoming	Peacock	Charles R. Allen	Domestic	7.56	8.12	7.56	10.00	10.00	9.50	9.50
Colorado	Ruby anthracite	do	do	12.32	14.00	12.32	16.00	16.00	16.00	16.00
	Crested Butte anthracite	do	do	12.32	14.00	12.32	16.00	16.00	16.00	16.00
	Sopris foundry coke	do		13.40						
	Sopris blacksmith coal	do		11.75						
	Canyon City coal	do	Domestic	10.65						
Pennsylvania	Anthracite		do	10.00	14.00	10.00	16.00	16.00	12.00	12.00
Maryland	Cumberland		Blacksmith		13.00	8.50	13.50		9.00	
Great Britain	Welsh anthracite		Steam		6.50	5.50				
	Westminster Brymbo		do		7.50	6.50	9.50	9.50	8.50	8.50
	West Hartly		Domestic		7.50	7.00	9.50	9.50	9.00	9.00

Average prices for screened coal at San Francisco—Continued.

Source.	Name.	San Francisco agent—sales.	Character.	Cargo price.	Wholesale price (2,240 pounds).		Retail price.			
							Highest.		Lowest.	
					Highest.	Lowest.	2,240 bulk.	2,000 sacks.	2,240 bulk.	2,000 sacks.
Great Britain	Scotch		Domestic		$7.50	$6.50	$9.50	$9.50	$8.50	$8.50
	Cardiff		Steam	$6.00						
Australian	Various		do	4.50 5.50						
Japanese			do	3.50 4.00						
Tonquin	Anthracite		do	5.00						

IMPORTS AND EXPORTS.

The following tables have been compiled from official returns to the Bureau of Statistics of the Treasury Department, and show the imports and exports of coal from 1867 to 1896, inclusive. The values given in both cases are considerably higher than the average "spot" rates by which the values of the domestic production have been computed.

The tariff from 1824 to 1843 was 6 cents per bushel, or $1.68 per long ton; from 1843 to 1846, $1.75 per ton; 1846 to 1857, 30 per cent ad valorem; 1857 to 1861, 24 per cent ad valorem; 1861, bituminous and shale, $1 per ton; all other, 50 cents per ton; 1862 to 1864, bituminous and shale, $1.10 per ton; all other, 60 cents per ton; 1864 to 1872, bituminous and shale, $1.25 per ton; all other, 40 cents per ton. By the act of 1872 the tariff on bituminous coal and shale was made 75 cents per ton, and so continued until the act of August, 1894, changed it to 40 cents per ton. On slack or culm the tariff was made 40 cents per ton by the act of 1872; was changed to 30 cents per ton by the act of March, 1883, and so continued until the act of August, 1894, changed it to 15 cents per ton. Anthracite coal has been free of duty since 1870. During the period from June, 1854, to March, 1866, the reciprocity treaty was in force, and coal from the British Possessions in North America was admitted into the United States duty free.

The exports consist both of anthracite and bituminous coal, the amount of bituminous being the greater in the last few years. They are made principally by rail over the international bridges and by lake and sea to the Canadian Provinces. Exports are also made by sea to the West Indies, to Central and South America, and elsewhere.

The imports are principally from Australia and British Columbia to San Francisco, from Great Britain to the Atlantic and Pacific coasts, and from Nova Scotia to Atlantic Coast points.

Coal importea and entered for consumption in the United States, 1867 to 1896.

Year ended—	Anthracite.		Bituminous and shale.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
June 30, 1867	.....	.....	509, 802	$1, 412, 597
1868	.....	.....	394, 021	1, 250, 513
1869	.....	.....	437, 228	1, 222, 119
1870	.....	.....	415, 729	1, 103, 965
1871	973	$4, 177	430, 508	1, 121, 914
1872	390	1, 322	485, 063	1, 279, 686
1873	2, 221	10, 764	460, 028	1, 548, 208
1874	471	3, 224	492, 063	1, 937, 274
1875	138	963	436, 714	1, 791, 601
1876	1, 428	8, 560	400, 632	1, 592, 846
1877	630	2, 220	495, 816	1, 782, 941
1878	158	518	572, 846	1, 929, 660
1879	488	721	486, 501	1, 716, 209
1880	8	40	471, 818	1, 588, 312
1881	1, 207	2, 628	652, 963	1, 988, 199
1882	36	148	795, 722	2, 141, 373
1883	507	1, 172	645, 924	3, 013, 555
1884	1, 448	4, 404	748, 995	2, 494, 228
1885	4, 976	15, 848	768, 477	2, 548, 432
Dec. 31, 1886	2, 039	4, 920	811, 657	2, 501, 153
1887	14, 181	42, 983	819, 242	2, 609, 311
1888	24, 093	68, 710	1, 085, 647	3, 728, 060
1889	20, 652	117, 434	1, 001, 374	3, 425, 347
1890	15, 145	46, 695	819, 971	2, 822, 216
1891	37, 607	112, 722	1, 363, 313	4, 561, 105
1892	65, 058	197, 583	1, 143, 304	3, 744, 862
1893	53, 768	148, 112	*a* 1, 082, 993	3, 623, 892
1894	90, 068	234, 024	*b* 1, 242, 714	3, 785, 513
1895	141, 337	328, 705	*c* 1, 212, 023	3, 626, 623
1896	101, 689	237, 717	1, 211, 448	3, 453, 742

a Including 14,632 tons of slack or culm, valued at $16,906.
b Including 30,453 tons of slack or culm, valued at $32,267.
c Including 18,174 tons of slack or culm, valued at $15,309.

Coal of domestic production exported from the United States, 1867 to 1896.

Year ended—	Anthracite.		Bituminous and shale.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
June 30, 1867	192,912	$1,333,457	92,189	$512,742
1868	192,291	1,082,745	86,367	433,475
1869	283,783	1,553,115	.....	.....
1870	121,098	803,135	106,820	503,223
1871	134,571	805,169	133,380	564,067
1872	259,567	1,375,342	141,311	586,264
1873	342,180	1,827,822	242,453	1,086,253
1874	401,912	2,236,084	361,490	1,587,666
1875	316,157	1,791,626	203 189	828,943
1876	337,934	1,869,434	230,144	850,711
1877	418,791	1,891,351	321,665	1,024,711
1878	319,477	1,006,843	340,661	1,352,624
1879	386,916	1,427,886	276,000	891,512
1880	392,626	1,362,901	222,634	695,179
1881	462,208	2,091,928	191,038	739,532
1882	553,742	2,589,887	314,320	1,102,898
1883	557,813	2,648,033	463,051	1,593,214
1884	649,040	3,053,550	646,265	1,977,959
1885	588,461	2,586,421	683,481	1,989,541
Dec. 31, 1886	667,076	2,718,143	544,768	1,440,631
1887	825,486	3,469,166	706,364	2,001,966
1888	969,542	4,325,126	860,462	2,529,472
1889	857,632	3,636,347	935,151	2,783,592
1890	794,335	3,272,697	1,280,930	4,004,995
1891	861,251	3,577,610	1,615,869	5,104,850
1892	851,639	3,722,903	1,645,869	4,999,289
1893	1,333,287	6,241,007	2,324,591	6,009,801
1894	1,440,625	6,359,021	2,195,716	4,970,270
1895	1,470,710	5,937,130	2,211,983	4,816,847
1896	1,350,000	5,925,506	2,276 202	5,072,818

WORLD'S PRODUCT OF COAL.

In the following table is given the coal product of the principal countries for the years nearest the one under review for which figures could be obtained. For the sake of convenience the amounts are expressed in the unit of measurement adopted in each country and reduced for comparison to short tons of 2,000 pounds. In each case the year is named for which the product is given.

The world's product of coal.

Country.	Usual unit in producing country.	Equivalent in short tons.
Great Britain (1896) ..... long tons..	195, 361, 260	218, 804, 611
United States (1896) ..... do....	171, 416, 390	191, 986, 357
Germany (1896) ..... metric tons..	112, 437, 741	123, 906, 391
France (1896) ..... do....	29, 310, 832	32, 300, 537
Austria-Hungary (1895) ..... do....	32, 654, 777	35, 985, 564
Belgium (1895) ..... do....	21, 213, 000	23, 376, 726
Russia (1896) ..... do....	9, 079, 138	10, 005, 210
Canada (1896) ..... short tons..	3, 743, 234	3, 743, 234
Japan (1893) ..... do....	3, 400, 000	3, 400, 000
India (1895) ..... long tons..	4, 441, 890	4, 974, 917
New South Wales (1895) ..... do....	3, 737, 536	4, 186, 040
Spain (1896) ..... metric tons..	1, 878, 399	2, 069, 996
New Zealand (1894) ..... long tons..	719, 546	805, 892
Sweden (1895) ..... metric tons..	223, 652	246, 464
Italy (1895) ..... do....	305, 321	336, 563
Transvaal (1895) ..... long tons..	1, 152, 206	1, 290, 471
Queensland (1895) ..... do....	322, 977	361, 734
Victoria (1895) ..... do....	194, 171	217, 472
Natal (1895) ..... do....	153, 951	172, 425
Cape Colony (1895) ..... do....	87, 985	98, 543
Tasmania (1895) ..... do....	36, 856	41, 279
Other countries (*a*)	2, 000, 000	2, 240, 000
Total	.....	660, 550, 426
Percentage of the United States	.....	29. 06

a Includes China, Turkey, Servia, Portugal, United States of Colombia, Chile, Borneo and Labuan, Mexico, Peru, Greece, etc.

In the following pages will be found a statement of the production of coal in the more important producing countries since 1868. This statement is interesting as showing the remarkable development of the industry in the United States. In 1868 this country produced only 14.35 per cent of the world's total. Great Britain's output was more than 3.6 times that of the United States, and more than half of the world's total.

Germany's product was nearly 15 per cent more than that of this country and more than 15 per cent of the total output in the world. France produced nearly half as much as the United States.

The table shows that in 1896 this country produced 29.06 per cent of the world's total, while Great Britain's output was only 14 per cent more than that of the United States. Great Britain's percentage of the total in 1896 was 33. Germany increased her percentage from 15 in 1868 to 19 in 1896, but her total was only 65 per cent of that of the United States. The output of France was only 5 per cent of the total in 1896, and about one-sixth of that of the United States.

World's production of coal, by countries, since 1868.

Year.	United States.		Great Britain.	
	Long tons.	Short tons.	Long tons.	Short tons.
1868	28, 258, 000	31, 648, 960	103, 141, 157	115, 518, 096
1869	28, 268, 000	31, 660, 160	107, 427, 557	120, 318, 864
1870	32, 863, 000	36, 806, 560	110, 431, 192	123, 682, 935
1871	41, 384, 000	46, 350, 080	117, 352, 028	131, 434, 271
1872	45, 416, 000	50, 865, 920	123, 497, 316	138, 316, 994
1873	51, 004, 000	57, 124, 480	128, 680, 131	144, 121, 747
1874	46, 916, 000	52, 545, 920	126, 590, 108	141, 780, 921
1875	46, 686, 000	52, 288, 320	133, 306, 485	149, 303, 263
1876	47, 500, 000	53, 200, 000	134, 125, 166	150, 220, 186
1877	53, 948, 000	60, 421, 760	134, 179, 968	150, 281, 564
1878	51, 655, 000	57, 853, 600	132, 612, 063	148, 525, 511
1879	59, 333, 000	66, 452, 960	133, 720, 393	149, 766, 840
1880	63, 822, 830	71, 481, 569	146, 969, 409	164, 605, 738
1881	76, 865, 357	85, 881, 030	154, 184, 300	172, 686, 416
1882	92, 219, 454	103, 285, 789	156, 499, 977	175, 279, 974
1883	102, 867, 969	115, 212, 125	163, 737, 327	183, 385, 806
1884	106, 906, 295	119, 735, 051	160, 757, 779	180, 048, 712
1885	99, 069, 216	110, 957, 522	159, 351, 418	178, 473, 588
1886	100, 663, 753	112, 743, 403	157, 518, 482	176, 420, 700
1887	116, 049, 604	129, 975, 557	162, 119, 812	181, 574, 189
1888	132, 731, 609	148, 659, 402	169, 935, 219	190, 327, 445
1889	126, 097, 780	141, 229, 514	176, 916, 724	198, 146, 731
1890	140, 882, 729	157, 788, 657	181, 614, 288	203, 408, 003
1891	150, 505, 954	168, 566, 668	185, 479, 126	207, 736, 621
1892	160, 115, 242	179, 329, 071	181, 786, 871	203, 601, 296
1893	162, 814, 977	182, 352, 774	164, 325, 795	184, 044, 890
1894	152, 447, 791	170, 741, 526	188, 277, 525	210, 870, 828
1895	172, 426, 366	193, 117, 530	189, 661, 362	212, 320, 725
1896	171, 416, 390	191, 986, 357	195, 361, 260	218, 804, 611

World's production of coal, by countries, since 1868—Continued.

Year.	Germany.		France.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868	32, 879, 123	36, 249, 233	13, 330, 826	14, 697, 236
1869	34, 343, 913	37, 864, 164	13, 509, 745	14, 894, 494
1870	34, 003, 004	37, 488, 312	13, 179, 788	14, 530, 716
1871	37, 856, 110	41, 736, 361	13, 240, 135	14, 597, 249
1872	42, 324, 467	46, 662, 725	16, 100, 773	17, 751, 102
1873	46, 145, 194	50, 875, 076	17, 479, 341	19, 270, 973
1874	46, 658, 145	51, 440, 605	16, 907, 913	18, 640, 974
1875	47, 804, 054	52, 703, 970	16, 956, 840	18, 694, 916
1876	49, 550, 461	54, 629, 383	17, 101, 448	18, 854, 346
1877	48, 229, 882	53, 173, 445	16, 804, 529	18, 526, 993
1878	50, 519, 899	55, 698, 188	16, 960, 916	18, 699, 410
1879	53, 470, 716	58, 951, 464	17, 110, 979	18, 864, 854
1880	59, 118, 035	65, 177, 634	19, 361, 564	21, 346, 124
1881	61, 540, 485	67, 848, 385	19, 765, 983	21, 791, 996
1882	65, 378, 211	72, 079, 478	20, 603, 704	22, 715, 584
1883	70, 442, 648	77, 663, 019	21, 333, 884	23, 520, 607
1884	72, 113, 820	79, 505, 487	20, 023, 514	22, 075, 924
1885	73, 675, 515	81, 227, 255	19, 510, 530	21, 510, 359
1886	73, 682, 584	81, 235, 049	19, 909, 894	21, 950, 658
1887	76, 232, 618	84, 046, 461	21, 287, 589	23, 469, 567
1888	81, 960, 083	90, 360, 992	22, 602, 894	24, 919, 691
1889	84, 788, 609	93, 479, 441	24, 303, 509	26, 794, 619
1890	89, 051, 527	98, 179, 309	26, 083, 118	28, 756, 638
1891	94, 252, 278	103, 913, 136	26, 024, 893	28, 692, 444
1892	92, 544, 030	102. 029, 793	26, 178, 701	28, 862, 018
1893	95, 426, 153	105, 207, 334	25, 650, 981	28, 280, 207
1894	98, 876, 105	109, 010, 906	27, 459, 137	30, 273, 699
1895	103, 876, 813	114, 524, 186	28, 020, 000	30, 878, 040
1896	112, 437, 741	123, 906, 391	29, 310, 832	32, 300, 537

World's production of coal, by countries, since 1868—Continued.

Year.	Austria-Hungary.		Belgium.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868	7, 021, 756	7, 741, 486	12, 298, 589	13, 559, 194
1869	7, 663, 043	8, 448, 505	12, 943, 994	14, 270, 753
1870	8, 355, 945	9, 212, 429	13, 697, 118	15, 101, 073
1871	8, 437, 401	9, 302, 235	13, 733, 176	15, 140, 827
1872	8, 825, 896	9, 730, 550	15, 658, 948	17, 263, 990
1873	10, 104, 769	11, 140, 508	15, 778, 401	17, 395, 687
1874	12, 631, 364	13, 926, 079	14, 669, 029	16, 172, 604
1875	13, 062, 738	14, 395, 137	15, 011, 331	16, 549, 992
1876	13, 000, 000	14, 327, 300	14, 329, 578	15, 798, 360
1877	13, 500, 000	14, 883, 750	13, 669, 077	15, 070, 157
1878	13, 900, 000	15, 324, 750	14, 899, 175	16, 426, 340
1879	14, 500, 000	15, 986, 250	15, 447, 292	17, 030, 640
1880	14, 800, 000	16, 317, 000	16, 886, 698	18, 617, 585
1881	15, 304, 813	16, 873, 556	16, 873, 951	18, 603, 531
1882	15, 555, 292	17, 149, 709	17, 590, 989	19, 394, 065
1883	17, 047, 961	18, 795, 377	18, 177, 754	20, 040, 974
1884	18, 000, 000	19, 845, 000	18, 051, 499	19, 901, 778
1885	20, 435, 463	22, 530, 098	17, 437, 603	19, 224, 957
1886	20, 779, 441	22, 909, 334	17, 285, 543	19, 057, 311
1887	21, 879, 172	24, 121, 787	18, 378, 624	20, 262, 433
1888	23, 859, 608	26, 305, 218	19, 218, 481	21, 188, 375
1889	25, 328, 417	27, 924, 580	19, 869, 980	21, 906, 653
1890	27, 504, 032	30, 323, 195	20, 365, 960	22, 453, 471
1891	28, 823, 240	31, 777, 622	19, 675, 644	21, 692, 398
1892	29, 037, 978	32, 014, 371	19, 583, 173	21, 590, 448
1893	30, 449, 304	33, 570, 358	19, 410, 519	21, 400, 097
1894	31, 492, 000	34, 704, 184	20, 458, 827	22, 555, 857
1895	32, 654, 777	35, 985, 564	20, 414, 849	22, 507, 371
1896	.....	.....	21, 213, 000	23, 376, 726

World's production of coal, by countries, since 1868—Continued.

Year.	Russia.		Other countries.	Total.	Per cent of United States.
	Metric tons.	Short tons.	Short tons.	Short tons.	
1868	.....	.....	1,152,665	220,566,870	14.35
1869	.....	.....	1,107,395	228,564,335	13.85
1870	696,673	768,082	1,086,717	238,676,824	15.42
1871	.....	.....	1,128,822	259,689.845	17.85
1872	.....	.....	1,293,835	281,885,116	18.04
1873	.....	.....	1,514,191	301,442,662	18.95
1874	.....	.....	2,697,160	297,204,263	17.68
1875	1,709,718	1,884,964	2,638,491	308,459,053	16.95
1876	.....	.....	2,601,761	309,631,336	17.18
1877	.....	.....	2,823,109	315,180,778	19.17
1878	2,483,575	2,738,141	3,176,050	318,441,990	18.17
1879	2,874,790	3,169,456	3,362,605	333,585,069	19.92
1880	3,238,470	3,570,413	3,621,342	364,737,405	19.60
1881	3,439,787	3,792,365	5,185,974	392,663,253	21.87
1882	3,672,782	4,049,242	6,128,631	420,082,472	24.58
1883	3,916,105	4,317,506	6,930,279	449,865,693	25.61
1884	3,869,689	4,266,332	7,367,309	452,745,593	26.45
1885	4,207,905	4,639,215	7,570,507	446,133,501	24.87
1886	4,506,027	4,967,895	9,058,136	448,342,486	25.15
1887	4,464,174	4,921,752	*a*10,838,437	479,210,183	27.12
1888	5,187,312	5,719,011	12,848,758	520,328,892	28.57
1889	6,215,577	6,852,674	14,779,474	531,113,686	26.59
1890	6,016,525	6,633,219	16,048,616	563,591,108	28.00
1891	6,233,020	6,871,905	18,289,656	587,540,450	28.69
1892	6,816,323	7,514,996	18,603,435	593,545,428	30.21
1893	7,535,000	8,307,337	18,087,484	581,250,481	31.37
1894	8,629,000	9,509,158	*b*21,678,204	609,344,362	28.02
1895	9,079,138	10,005,210	*c*23,770,079	643,108,705	30.03
1896	.....	.....	.....	.....	.....

a From 1887 to 1893, inclusive, the total includes, in addition to the countries named on the following pages, the estimated output of countries not specified. The amounts added for this factor each year are as follows: 1887, 1,000,000 tons; 1888, 2,000,000 tons; 1889, 3,000,000 tons; 1890, 4,000,000 tons; 1891, 4,500,000 tons; 1892, 5,000,000 tons; 1893, 5,000,000 tons.

b This includes, in addition to the countries named on the following pages, the output of Japan (1893), 3,400,000 tons; Transvaal, 910,172 tons; Natal, 169,702 tons; Cape Colony, 78,053 tons; Tasmania, 34,633 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 6,832,560 tons.

c This includes, in addition to the countries named on the following pages, the output of Japan (1893), 3,400,000 tons; Transvaal, 1,290,471 tons; Natal, 172,425 tons; Cape Colony, 98,543 tons; Tasmania, 41,279 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 7,242,718 tons.

Product of minor coal-producing countries since 1868.

Year.	New South Wales.		Queensland.		New Zealand.	
	Long tons.	Short tons.	Long tons.	Short tons.	Long tons.	Short tons.
1868	954, 231	1, 068, 739	19, 611	21, 964	.....	.....
1869	919, 774	1, 030, 147	11, 120	12, 454	.....	.....
1870	868, 564	972, 791	22, 639	25, 356	.....	.....
1871	898, 784	1, 006, 638	17, 000	19, 040	.....	.....
1872	1, 012, 426	1, 133, 917	27, 727	31, 054	.....	.....
1873	1, 192, 862	1, 336, 005	33, 613	37, 647	.....	.....
1874	1, 304, 567	1, 461, 115	43, 443	48, 656	.....	.....
1875	1, 329, 729	1, 489, 296	32, 107	35, 960	.....	.....
1876	1, 319, 918	1, 478, 308	50, 627	56, 702	.....	.....
1877	1, 444, 271	1, 617, 584	60, 918	68, 228	.....	.....
1878	1, 575, 497	1, 764, 556	52, 580	58, 890	162, 218	181, 684
1879	1, 583, 381	1, 773, 387	55, 012	61, 613	231, 218	258, 964
1880	1, 466, 180	1, 642, 122	58, 052	65, 018	299, 923	335, 913
1881	1, 769, 597	1, 981, 949	65, 612	73, 485	337, 262	377, 733
1882	2, 109, 282	2, 362, 396	74, 436	83, 368	378, 272	423, 665
1883	2, 521, 457	2, 824, 032	104, 750	117, 320	421, 764	472, 376
1884	2, 749, 109	3, 079, 002	120, 727	135, 214	480, 831	538, 531
1885	2, 878, 863	3, 224, 327	209, 698	234, 862	511, 063	572, 390
1886	2, 830, 175	3, 169, 796	228, 656	256, 094	534, 353	598, 475
1887	2, 922, 497	3, 273, 197	238, 813	267, 470	558, 620	625, 654
1888	3, 203, 444	3, 587, 857	311, 412	348, 781	613, 895	687, 562
1889	3, 655, 632	4, 094, 308	265, 507	297, 368	586, 445	656, 818
1890	3, 060, 876	3, 428, 181	338, 344	378, 945	637, 397	713, 885
1891	4, 037, 929	4, 522, 480	271, 603	304, 195	668, 794	749, 049
1892	3, 780, 968	4, 234, 684	265, 086	296, 896	673, 315	754, 113
1893	3, 278, 328	3, 671, 727	264, 403	296, 131	691, 548	774, 534
1894	3, 672, 076	4, 112, 725	270, 705	303, 190	719, 546	805, 892
1895	3, 737, 536	4, 186, 040	322, 977	361, 734	(*a*)	(*a*)
1896	.....	.....	.....	.....	.....	.....

a Latest figures available have been used in making up the total for the year.

Product of minor coal-producing countries since 1868—Continued.

Year.	Victoria.		Canada (short tons).	India.	
	Long tons.	Short tons.		Long tons.	Short tons.
1868	.....	.....	.....	.....	.....
1869	.....	.....	.....	.....	.....
1870	.....	.....	.....	.....	.....
1871	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....
1873	.....	.....	.....	.....	.....
1874	.....	.....	1, 058, 446	.....	.....
1875	.....	.....	984, 905	.....	.....
1876	.....	.....	933, 803	.....	.....
1877	.....	.....	1, 002, 395	.....	.....
1878	.....	.....	1, 034, 081	.....	.....
1879	.....	.....	1, 123, 863	.....	.....
1880	.....	.....	1, 424, 635	.....	.....
1881	.....	.....	1, 487, 182	997, 543	1, 117, 248
1882	.....	.....	1, 811, 708	1, 130, 242	1, 265, 871
1883	.....	.....	1, 806, 259	1, 315, 976	1, 473, 893
1884	.....	.....	1, 950, 080	1, 266, 312	1, 418, 269
1885	.....	.....	1, 879, 470	1, 294, 221	1, 449, 528
1886	.....	.....	2, 091, 976	1, 401, 295	1, 569, 450
1887	.....	.....	2, 418, 494	1, 560, 393	1, 747, 640
1888	.....	.....	2, 658, 134	1, 802, 876	2, 019, 221
1889	14, 421	16, 152	2, 719, 478	2, 045, 359	2, 290, 802
1890	20, 750	23, 240	3, 117, 661	2, 168, 521	2, 438, 744
1891	22, 834	25, 574	3, 623, 076	2, 328, 577	2, 608, 006
1892	23, 363	26, 166	3, 292, 547	2, 537, 696	2, 842, 220
1893	91, 726	102, 733	3, 201, 742	2, 529, 855	2, 833, 438
1894	175, 175	196, 196	3, 903, 913	2, 810, 929	3, 158, 240
1895	194, 171	217, 472	3, 512, 504	4, 370, 503	4, 894, 963
1896	.....	.....	3, 743, 234	.....	.....

Product of minor coal-producing countries since 1868—Continued.

Year.	Spain.		Italy.		Sweden.	
	Metric tons.	Short tons.	Metric tons.	Short tons.	Metric tons.	Short tons.
1868	.....	.....	56, 201	61, 962	.....	.....
1869	.....	.....	58, 770	64, 794	.....	.....
1870	.....	.....	80, 336	88, 570	.....	.....
1871	.....	.....	93, 555	103, 144	.....	.....
1872	.....	.....	116, 884	128, 864	.....	.....
1873	.....	.....	127, 473	140, 539	.....	.....
1874	.....	.....	116, 955	128, 943	.....	.....
1875	.....	.....	116, 399	128, 330	.....	.....
1876	.....	.....	120, 588	132, 948	.....	.....
1877	.....	.....	122, 360	134, 902	.....	.....
1878	.....	.....	124, 117	136, 839	.....	.....
1879	.....	.....	131, 318	144, 778	.....	.....
1880	.....	.....	139, 369	153, 654	.....	.....
1881	.....	.....	134, 582	148, 377	.....	.....
1882	.....	.....	164, 737	181, 623	.....	.....
1883	.....	.....	214, 421	236, 399	.....	.....
1884	.....	.....	223, 322	246, 213	.....	.....
1885	.....	.....	190, 413	209, 930	.....	.....
1886	1, 001, 432	1, 104, 079	243, 325	268, 266	.....	.....
1887	1, 038, 305	1, 144, 731	327, 665	361, 251	.....	.....
1888	1, 036, 565	1, 142, 813	366, 794	404, 390	.....	.....
1889	1, 153, 755	1, 272, 015	390, 320	432, 533	.....	.....
1890	1, 212, 089	1, 336, 328	376, 326	415, 500	187, 512	206, 132
1891	1, 287, 988	1, 420, 007	289, 286	318, 938	198, 033	218, 331
1892	1, 461, 196	1, 610, 969	295, 713	326, 024	199, 380	219, 816
1893	1, 484, 794	1, 636, 986	317, 249	349, 767	199, 933	220, 426
1894	1, 657, 010	1, 830, 853	271, 295	299, 103	213, 633	235, 532
1895	1, 783, 783	1, 965, 729	305, 321	336, 563	223, 652	246, 464
1896	1, 878, 399	2, 069, 996	.....	.....	.....	.....

COAL TRADE REVIEW.

The coal trade in 1896 was marked by two distinct features, namely, the harmony and cooperation among the anthracite producers and the entire lack of harmony and cooperation in the bituminous trade. The results of these conditions are reflected throughout the statistical tables presented in this report. The determination of the anthracite producers to maintain prices and restrict tonnage was settled early in the year at a meeting of the presidents of the mining and carrying companies. The lesson of 1895 had been a severe one, but it was generally felt that one course of such instruction was sufficient. The year had been one of enormous tonnage, obtained not only at a sacrifice of profit, but at an actual loss of millions of dollars to the stockholders. It was not difficult, therefore, to secure a meeting of representatives of the companies, nor was much time lost in arriving at an understanding. As a result of this understanding, prices of anthracite coal were advanced from time to time throughout the year. In January broken coal was quoted at $3.25 at tide water. On May 1, July 1, and September 1 advances of 25 cents a ton on all sizes were made, but it can hardly be said that the prices were at any time excessive. While consumers were obliged to pay more for their coal in 1896 than in 1895, it should be borne in mind that the prices in 1895 were not yielding living revenue to the operator, the carrier, or the miner. The production of anthracite coal in 1896 was only a little more than 3,000,000 tons less than in 1895—a difference of about 6 per cent. This slight decrease, however, enabled the operators to hold prices well up to the circular figures. It shows conclusively that the surplus product is what demoralizes prices. Five per cent of output above the market demands is apt to cause a sacrifice of 25 per cent in the price of the entire output.

The use of the smaller sizes of anthracite coal, particularly those classed as pea, buckwheat, etc., is on the increase, consumers being encouraged to their use by the low prices at which they were offered. The large amount of small-sized anthracite used is reflected in the comparatively slight advance in the average price at the mines when considered with the advance in the price of standard sizes at tide water. The prices for standard sizes (broken, egg, stove, and chestnut) advanced 75 cents per ton from February 1 to September 1, and were from $1 to $1.25 above the prices in 1895, whereas the average selling price for all sizes at the mines only advanced from $1.72 in 1895 to $1.85 in 1896.

In the bituminous trade continued overproduction, keen competition for trade, and reckless disregard for profits seemed to be the leading features throughout the year, and reference to the statistical tables and the remarks concerning them will show how, throughout the entire country, prices steadily declined. A remarkable circumstance in connection with this was that, while wages fell in more or less proportion

to the lower prices, there were few strikes of any consequence. Operators doubtless would have been glad to have a strike on hand as an excuse for closing down the mines, and by doing so wipe out the stocks of coal accumulated at all points. But the strike did not come. Miners seemed to prefer to get along with little rather than nothing. But while 1896 was thus free of strikes, except in a local way, the present year (1897) promises to be a rival of 1894 in the magnitude of a strike, inaugurated on July 5, 1897, just as this report goes to press. The strike is based upon a demand of the miners in the Pittsburg (Pa.) district for an advance to the rate of 69 cents per ton of 2,000 pounds. In the present condition of the trade it is doubtful if it can be brought to a successful issue, from the miners' standpoint. In the review of the coal trade of 1895, contained in the preceding volume of this series, mention was made of a strenuous effort to secure a uniformity agreement among the operators in the Pittsburg district during the spring of 1896. The effort failed for the lack of a few signatures.

The present strike, which extends over western Pennsylvania, Ohio, Indiana, Illinois, and a part of West Virginia, has again brought forward the uniformity idea, but the outcome of another effort in this line is as difficult to foresee as the result of the strike.

The usual review of the coal trade of the principal sea, lake, and river ports is presented in the following pages. This review contains original contributions from recognized authorities, reports from secretaries of boards of trade, etc., and extracts from trade journals. Proper credit is given in each instance.

NEW YORK CITY.

The following review of the conditions affecting the wholesale and retail coal trade of New York City is extracted from Mr. F. E. Saward's annual report, The Coal Trade:

During the past year there was a wide range of fluctuation in the price of anthracite coal. An agreement was made in January looking forward to better things in the way of prices, but it was some time before the increased rates were had, and the average realized for the year was not much in excess of that for 1895, for it must be remembered that in the year referred to there was a gradually advancing schedule and the realization was greater than many persons seem to be aware was the case. There was a great hue and cry about the advancing list prices during 1896, but a very small tonnage was disposed of at the higher circular rates which were made.

The nominal opening prices were as below, free on board at the loading ports, in the beginning of the years named:

Opening prices for free burning coal at New York.

Year.	Free-burning coal.			
	Broken.	Egg.	Stove.	Chestnut.
1890	$3.40	$3.50	$3.50	$3.25
1891	3.50	4.60	3.75	3.50
1892	3.65	3.75	3.90	3.65
1893	3.90	3.90	4.15	4.15
1894	3.50	3.50	3.75	3.75
1895	3.35	3.35	3.50	3.35
1896	3.25	3.50	3.75	3.50

There were advances in the list until September 1, figures stood at $4 for grate, $4.25 for egg, $4.50 for stove, and $4.25 for chestnut, but this list was more honored in the breach than in the observance. The financial reports of the several anthracite companies show that the result was not so good in 1896 as in 1895 by reason of the less tonnage that was done. The average increase in the price per ton one year with another was but a few cents per ton. It was a peculiar feature of the year's trade that egg coal was in more demand than any other size for a continued period of time. This is said to have been owing to the low price, comparatively, at which it was offered. Stove coal, as usual, brought the highest price, but chestnut seems to have been a drag almost the entire year, while the small coals, such as pea, buckwheat, etc., were in over supply, and this is said to have been due to the fact that soft coal could be had at nearly the same price as these small anthracites, with better economic results.

In the spring of the year a soft-coal tonnage agreement was made and prices were put at $2.35 at Norfolk, $2.28 at Baltimore, $2.20 at Philadelphia, with $2.60 and $2.80 at New York loading ports, and $2.80 and $3 at New York alongside. It was fairly well adhered to and the proprietors of the better grades of coal had a good year, though there was some tonnage placed at less than schedule rates.

A fair exhibit of the course of prices of the best Georges Creek coal is shown below:

1889	$3.50	1893	$3.25
1890	3.50	1894	3.00
1891	3.50	1895	2.75
1892	3.40	1896	3.00

Retail prices were advanced somewhat, in accordance with the changes in the wholesale list, and $4.75 was an average rate, but the

retailers did not get anything like the margin of profit during 1896 that many of them secured in the preceding year.

The use of gas is growing and it is now used very largely in the winter season. A fuel-gas franchise may be granted this year. The gas proposed to be supplied is now being successfully manufactured and used in Bridgeport, Connecticut. It shows by tests 350 heat units, as compared with 600 heat units in an equal quantity of the gas of the Consolidated Company. As the rate for the latter is $1.25 per 1,000 feet, the rate for fuel gas is, in proportion to its efficiency, equal to a rate of 73 cents for Consolidated gas. Retail coal dealers will do well to watch developments in this connection.

After several protracted meetings in New York, the presidents of the several anthracite "initial interests," or coal-carrying roads, during the last week in January, 1896, reached an agreement allotting to each interest a percentage of the year's coal output. The various percentages were as follows: Philadelphia and Reading, 20.50; Lehigh Valley, 15.65; Central of New Jersey, 11.7; Delaware, Lackawanna and Western, 13.35; Delaware and Hudson, 9.6; Pennsylvania Railroad, 11.4; Pennsylvania Coal Company, 4; Erie, 4; New York, Ontario and Western, 3.1; Coxe Bros., 3.5, and New York, Susquehanna and Western, 3.2. These figures were agreed to, and during the year tonnage was sent forward on this basis.

From time to time during the year four circulars were issued to the trade. At tide water there were three advances of 25 cents each, following the first circular.

Circular prices for anthracite coal at New York in 1896.

Size.	January 31.	May 1.	July 1.	September 1.
Broken	$3.25	$3.50	$3.75	$4.00
Egg	3.50	3.75	4.00	4.25
Stove	3.75	4.00	4.25	4.50
Chestnut	3.50	3.75	4.00	4.25

Very little coal was sold at the last quoted list.

The old question of the rate per ton per mile on soft coal as against that on anthracite has again come up to vex the shippers of the latter grade of fuel. The soft-coal rates vary from 2.19 to 4.50 mills to tide water. Freight on anthracite coal is five times as much as the lowest and more than double the highest charge on the bituminous fuel. The individual operator feels the hardness of this, and, it is stated, not only are the freight charges extortionate, but they are divided among the different sizes in a purely arbitrary manner, without a shadow of justification. For instance, prepared sizes in January, 1897, sold for an average of $3.717 and the freight charge was $1.480. Pea coal sold for

$2.012 and the freight was $1.106. Buckwheat sold for only $1.801 and was charged $1.224 for freight. The freight on the latter size was only 25 cents less than on a coal that sold for $3.717, or $1.916 more at tide water than was received for the buckwheat.

BOSTON, MASSACHUSETTS.

Mr. Elwyn G. Preston, secretary of the Boston Chamber of Commerce, presents the following review of the coal trade of that city.

The receipts of coal at Boston for the past fourteen years have been as follows:

Receipts of coal at Boston for fourteen years.

Year.	Domestic.			Foreign.	Total.
	By water.		All rail (largely bituminous).		
	Anthracite.	Bituminous.			
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1883	.....	.....	.....	.....	2, 273, 068
1884	.....	.....	.....	.....	2, 225, 740
1885	.....	.....	.....	.....	2, 221, 220
1886	.....	.....	.....	44, 464	2, 500, 000
1887	.....	.....	.....	13, 966	2, 400, 000
1888	2, 057, 279	1, 004, 195	.....	10, 081	3, 071, 555
1889	1, 647, 348	914, 966	.....	5, 538	2, 567, 852
1890	1, 740, 564	964, 857	.....	14, 072	2, 719, 493
1891	2, 039, 443	1, 070, 088	.....	5, 842	3, 115, 373
1892	2, 163, 984	919, 815	.....	1, 416	3, 085, 215
1893	2, 227, 086	1, 100, 384	50, 000	17, 097	3, 394, 567
1894	2, 237, 599	958, 701	71, 303	41, 779	3, 309, 382
1895	2, 518, 441	977, 762	90, 999	21, 009	3, 608, 211
1896	2, 092, 798	1, 391, 949	104, 080	61, 071	3, 649, 898

The total receipts for the year 1896 are shown by the above table to slightly exceed those of 1895, which themselves were the largest in the history of the port. The figures of the anthracite and bituminous coal during 1895 are in error as regards the relative proportions, the figures of anthracite being by some 250,000 tons too large and the receipts of bituminous by a like amount too small, owing to error in tabulation. With this correction the figures for 1896 still show a slight falling off in the receipts of anthracite and a slight increase in the receipts of bituminous.

Of the total amount of coal received, 1,095,302 tons, or nearly one-third, were forwarded to interior New England points, making the consumption of the city of Boston 2,554,596 tons, as compared with 2,578,698 tons in 1895.

Owing to favorable weather conditions, trade was good during the early part of the year and prices were fairly well maintained. In April, owing to the combination formed by the general agents to maintain prices, purchases fell off and a light business was done during the summer months.

In the retail trade prices have been maintained by agreement between the large handlers in Boston and a satisfactory business has been done.

The receipts of coal from the Provinces show a considerable increase, although they have not reached such proportions as to make them a factor in the market.

Carriers' rates have averaged lower than during 1895, and much of the year there was a surplus of tonnage. The range of published prices during the year was as follows:

Coal freights to Boston, Massachusetts.

From—	Per ton.
	Cents.
Philadelphia	45@95
Baltimore	55@90
Norfolk and Newport News	45@90
New York	40@70

The highest rates were quoted in January and the lowest in the month of August.

Stove coal was quoted at the opening of the year at $5.75. Owing to the severity of the first three months of the year, there was a good demand and a strength which communicated itself, to a certain degree, to the bituminous market. In April the demand fell off and some restriction was caused, owing to the combination prices that were put in force during the month, the quotation remaining at $5.50 during the early spring and summer months. An advance was made to $6 per ton in September, coincident with the improved demand, the year closing at that price, the demand being brisk and steady.

The price of Georges Creek Cumberland coal in this market on contract orders was $3.80 during the entire year, owing to the combination between the principal local coal dealers, with small orders filled at from $4 to $4.20 per ton. The year opened with only a fair demand, owing to large stocks held by the trade. Flood damages to mills resulted in a decreasing demand temporarily during February, a slight improvement being noticeable in March in sympathy with an improved demand for anthracite. Trade was dull in the early summer months, buyers holding off from making contracts at existing prices. An improved trade was observed commencing with the fall, as stocks had largely disappeared and the necessities of the case demanded immediate purchases.

Monthly receipts of coal at Boston during 1896.

Month.	Domestic.			Foreign.	Total.
	By water.		All rail (anthracite and bituminous.)		
	Anthracite.	Bituminous.			
January	168,720	81,670	9,601	3,946	263,937
February	150,054	81,632	7,558	2,149	241,393
March	148,385	103,578	7,076	231	259,270
April	149,980	147,715	7,286	2,335	307,316
May	238,063	151,522	8,025	2,800	400,410
June	159,432	122,936	8,038	4,727	295,133
July	167,484	113,405	9,470	3,364	293,723
August	180,486	104,695	8,194	7,729	301,104
September	141,425	120,381	8,663	12,559	283,028
October	238,242	132,466	10,380	8,056	389,144
November	165,733	120,760	8,913	10,901	306,307
December	184,794	111,189	10,876	2,274	309,133
Total	2,092,798	1,391,949	104,080	61,071	3,649,898

PHILADELPHIA, PENNSYLVANIA.

Mr. John S. Arndt, financial editor of the Inquirer, furnishes the following interesting contribution regarding the coal trade of Philadelphia, continuing and supplementing previous reports by him in Mineral Resources for 1894 and 1895:

The coal trade of Philadelphia in 1896 aggregated about 8,859,736 long tons, as against 9,914,077 long tons in 1895, a decrease of 1,054,341 tons, or, say, 10½ per cent. For this decrease there were three main causes:

First. The agreement by producers of anthracite and bituminous coal for the better maintenance of prices and the better regulation of mining and selling.

Second. The industrial depression in this country, causing many mills and manufactories to curtail or suspend operations.

Third. The unsettled condition of political affairs in Cuba, which restricted our shipments to that island.

The settlement of the trade differences could hardly fail to exert an unfavorable influence upon production, particularly in the anthracite trade. The low price of anthracite coal in 1895 greatly stimulated its use and consumers laid in larger stocks than they really required. The agreement by the presidents of the producing companies in February, 1896, to restrict the output to the needs of the trade, to apportion the total business and to advance prices to a remunerative level had the natural result of causing the demand to fall off sharply. Stove coal

which sold as low as $2.65 per ton, free on board vessels, for shipment beyond the Delaware Capes in the summer of 1895, was sold as high as $4 under the same conditions during the fall of 1896, and consumers bought less. It will be noticed, however, that so far as anthracite coal is concerned the coastwise trade of Philadelphia was slightly greater than in 1895, but this was due to the fact that the Philadelphia and Reading Railroad handled a larger proportion of its business at its Philadelphia shipping port and less at its shipping depots on New York Harbor. The local anthracite trade decreased sharply. As for the bituminous trade, the Pennsylvania producers assert that their strict observance of the agreement to maintain prices resulted in some important business going to producers in other sections whose understanding of the agreement does not seem to have been as rigid as that which prevailed among Philadelphia shippers. There is no question that some important contracts that had been filled many years from this port were transferred to new interests, and this materially affected the coastwise shipments of bituminous coal. The vessel supply was ample at all times, and shippers had no difficulty in making charters at from 50 to 65 cents per ton to Boston during most of the season.

LOCAL ANTHRACITE CONSUMPTION.

The consumption of anthracite coal in Philadelphia in the year 1896 was approximately 3,500,000 long tons, as against 3,960,000 long tons in 1895 and 3,540,000 long tons in 1894. As the great expansion in the consumption for 1895 over 1894 was due to low prices, so the contraction in 1896 to former proportions was due to the restoration of prices to the old level. In the late summer of 1895 stove coal sold at the mines for Philadelphia delivery at $1.95 per ton,[1] whereas at the same season in 1896 the price was $2.90 and $3. These price circulars were issued by the Philadelphia and Reading Coal and Iron Company to the Philadelphia trade in 1896, the prices quoted being given below The circulars for 1895 are given for the purpose of comparison:

Prices at mines of anthracite coal for Philadelphia delivery in 1895 and 1896.

Sizes.	1895.			1896.		
	January.	October.	November.	January.	July.	September.
Lump and steamboat	$2.50	$2.50	$2.50	$2.50	$2.50	$2.50
Broken	2.20	2.00	2.25	2.25	2.40	2.50
Egg	2.30	2 40	2.65	2.65	2.80	2.90
Stove	2.55	2.50	2.75	2.75	2.90	3.00
Chestnut	2.40	2.15	2.50	2.50	2.65	2.80
Pea	1.40	1.30	1.30	1.30	1.30	1.30
Buckwheat	.85	.85	.85	.85	.85	.85

[1] This was a "cut" price from the circular figures quoted in the subsequent table.

These prices are subject to the usual agents' commission of 15 cents per ton.

The 1895 circulars were completely ignored, cuts of 50 cents or more being frequently made, and no explanation has ever been given why price circulars were issued which neither buyer nor seller regarded for a moment. But the 1896 circulars were rigidly adhered to after the month of February. There was, however, the usual cutting by individual operators and by some of the smaller companies, but these concessions did not much exceed 25 cents and were frequently attended by conditions as to deliveries that occasioned more or less trouble, so that these sales did not aggregate a large quantity. The important advance in prices did not produce the effect, seen in some Eastern cities, of causing gas to be substituted for coal. The production of gas by the city gas works was 16 per cent greater than in 1895, but there is no evidence to show that its increase was due to any other cause than better illumination. The real effect of the higher prices was to cause consumers to abandon stove and chestnut sizes and to use pea, which is becoming more popular as a domestic fuel every year. It can be bought by the dealer, delivered in his yard, at $2.65 per ton, and is sold at $3.50 and $3.75, and the profit is just as great as on stove coal, which sells at $5.75. Pea coal comes very well prepared, the slate and dirt having been removed at the breaker by a thorough process of "jigging" and washing, and it is a perfectly satisfactory fuel to the multitude of small householders who desire to build a small fire quickly. There was an urgent demand for this size all the year, and many manufacturers who had been accustomed to its use found it advisable to substitute buckwheat, which costs 70 cents less, and some even began using rice. The trolley roads, the waterworks, and some consumers who can not well use the smaller sizes insisted upon pea, but it is evident it is fast losing its character as a manufacturing size in this city. Fully 40 per cent of the pea coal sent to Philadelphia in 1896 was used by domestic consumers, and this year the proportion will be larger. Of course, the use of pea displaces so much high-priced stove and chestnut, and the companies are now considering the question of making good this loss in their revenues by advancing the price of pea coal at the mines or by advancing the freight rate.

There was no change in anthracite freight rates for local delivery during the year. The coal companies controlled by the Pennsylvania Railroad make sales at a delivered price, paying the freight charges themselves, but all other producers doing business in this market make sales at the mines, the consignee being required to settle the railroad charges himself. The freight rates per gross ton from the different regions to Philadelphia in 1896 were as follows:

Freight rates on anthracite coal from regions to Philadelphia.

Regions.	Prepared sizes.	Pea.	Buckwheat.
Schuylkill	$1.70	$1.40	$1.25
Lehigh	1.75	1.45	1.30
Wyoming	1.80	1.50	1.35

LOCAL BITUMINOUS CONSUMPTION.

The consumption of bituminous coal in Philadelphia in 1896 was about 935,000 tons, as against 1,060,000 tons in 1895. The decrease is due entirely to the depression in manufacturing, practically all of our mills running on short time the greater part of the year, while our shipyards and locomotive works had little new business. The city gas works used 313,000 tons of coal, as against 286,000 tons in 1895, so that the coal used for purely steam-raising or mechanical purposes was but 622,000 tons, as against 774,000 tons in 1895, a decrease of say 150,000 tons, or about 20 per cent. Had it not been for the advance in anthracite prices the shrinkage would have been even greater, as many manufacturers were constrained to use bituminous in place of the higher-priced anthracite. In most establishments mixed fuel is used, and the change effected, therefore, was to diminish the proportion of anthracite and increase that of bituminous. As there is no ordinance prohibiting the use of soft coal in the city limits, the board of health is the only authority that can interfere with consumers, and this body moves but infrequently in the matter. Practically all the soft-coal consumers are located in the outskirts of the city, and no inconvenience has been experienced as yet from their choice of fuel. The price of bituminous coal ruled very steady throughout the year at $2.50 and $2.65 per long ton delivered on tracks, an advance of 15 cents over the price of 1895.

THE EXPORT TRADE.

Nearly all the export trade in coal is done with Canada and Cuba. A few cargoes of anthracite are sent to other ports of the world, but the business is unimportant and does not seem to be growing. Cuba is an important purchaser, and as the vessels can get a return cargo of iron ore for the furnaces in the Lehigh Valley, the business can be done on such favoroble terms as to render competition by other countries somewhat difficult. The insurrection in the island and the depression in the iron trade in this country reduced this business considerably in 1896.

Through the courtesy of the officers of the Pennsylvania Railroad, the Philadelphia and Reading Railroad, and the Baltimore and Ohio Railroad the data have been obtained from which the appended sum-

mary of the coal trade of Philadelphia has been compiled. The distribution of coal to the export trade, the coastwise and harbor trade, and the local trade is shown. The figures for 1895 are added for the purpose of comparison:

Distribution of coal at Philadelphia in 1895 and 1896.

[In tons of 2,240 pounds.]

	1895.		1896.	
	Anthracite.	Bituminous.	Anthracite.	Bituminous.
Export	23,068	411,009	19,181	315,555
Coastwise and harbor	1,750,000	2,710,000	1,770,000	2,320,000
Local	3,960,000	1,060,000	3,500,000	935,000
Total	5,733,068	4,181,009	5,289,181	3,570,555

BUFFALO, NEW YORK.

The following review of the coal trade of Buffalo is obtained from the annual report of Mr. William Thurstone, secretary of the Buffalo Merchants' Exchange:

The anthracite coal trade of Buffalo for 1896 was without any particular features of importance. Prices advanced 60 cents from opening quotations to the close at wholesale per long ton, and 25 cents at retail per short ton delivered. The receipts by railroads for the year fell off about 320,000 short tons, and the shipments by lake 85,187 short tons. The movement by canal eastward and westward was very light. Lake freight on coal fluctuated from 20 to 60 cents to Chicago and Milwaukee, and from 20 to 50 cents to Duluth and Lake Superior ports; the average rate to Chicago was 39 cents; to Milwaukee 37 cents, and to Duluth 27 cents per short ton free on and off. Trade was only moderate all the year, as so many citizens use natural gas for fuel, and the range of temperature during the winter months was comparatively high. There was more or less trouble during the year in consequence of dealers cutting prices, in spite of the efforts of the coal exchange to prevent it. However, trade was done at a profit, an improvement over 1895 in this respect.

The use of electricity has lessened materially the consumption of illuminating gas. At the beginning of December 1,000 horsepower of electricity was received daily from Niagara Falls, the precursor of a supply of many thousand horsepower next year.

The bituminous coal trade was of only moderate volume, as the consumptive demand was smaller for manufacturing and vessels' use; the supply during the year was plentiful and the assortment good. Railroad companies reaped the benefit of higher freight rates, but operators, dealers, and consumers were not benefited to any extent. Why

the special low rate to Canada (15 cents less than to Buffalo) was made and put in force was a conundrum to the trade. No labor disturbances of any consequence interfered with the trade of 1896, as far as Buffalo was concerned, and the supply of cars was fully adequate to the requirements of business. Stocks at close only moderate on railroad sidings and coal on the docks about all cleared up on the close of navigation. Standard brands of Pittsburg coal sold as low as inferior brands from other districts many times during the year.

The coke trade was quiet early in the year, but improved materially the latter half.

It may not be generally known, but the retail coal dealers of Buffalo draw their supplies direct from the companies' trestles, thereby saving the expense of keeping yards. The dealers do their own carting.

Natural gas is still extensively used for fuel purposes. The supply is mainly piped from Canada and Pennsylvania, with many small wells within 10 miles of Buffalo. This accounts for the decreased consumption of coal for several years, which should have increased according to the increase of population.

Fifty-four years have passed since the first record was made of the receipts of anthracite coal at Buffalo. In 1842 only 900 short tons were reported; in 1852, 23,000 short tons; in 1862, 132,500 short tons; in 1872, 521,000 short tons; in 1892, 4,804,700 short tons. Before 1882 statistics of the bituminous receipts are missing, but in that year only 65,000 short tons were received by the railroads and lake. Ten years after, viz, 1892, 2,280,470 short tons were reported.

Coal receipts at Buffalo for several years.

Year.	Anthracite.	Bituminous.	Blossburg.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*
1842	.....	.....	.....	1,800
1852	.....	.....	.....	57,560
1862	.....	.....	.....	239,873
1872	.....	.....	.....	790,876
1882	.....	.....	.....	3,021,791
1886	2,673,778	1,420,956	30,000	4,124,734
1887	3,497,203	1,776,217	25,000	5,298,420
1888	4,549,015	1,892,823	22,500	6,464,338
1889	4,338,570	2,198,327	22,500	6,559,397
1890	4,500,000	2,200,000	25,500	6,725,500
1891	4,800,000	2,450,000	25,500	7,275,000
1892	4,804,760	2,627,441	25,000	7,457,201
1893	4,770,546	2,896,614	25,000	7,692,160
1894	4,272,130	2,280,470	25,000	6,577,600
1895	4,764,038	2,727,548	25,000	7,516,586
1896	4,588,061	2,662,080	25,000	7,275,141

Lake shipments of anthracite coal from Buffalo.

Year.	Tons.	Year.	Tons.
1883	1,467,778	1890	2,157,810
1884	1,431,081	1891	2,365,895
1885	1,428,086	1892	2,822,230
1886	1,531,210	1893	2,681,173
1887	1,894,060	1894	2,475,255
1888	2,514,906	1895	2,612,768
1889	2,151,670	1896	2,379,068

Lake shipments of bituminous and Blossburg coal from Buffalo.

Year.	Bituminous.	Blossburg.
	Tons.	*Tons.*
1887	8,706	10,000
1888	7,452	5,000
1889	11,673	5,000
1890	25,872	5,000
1891	34,066	5,000
1892	54,216	5,000
1893	15,000	7,500
1894	2,500	7,500
1895	2,000	6,000
1896	15,000	6,000

Shipments of bituminous coal by canal.

Year.	Short tons.	Year.	Short tons.
1890	25,872	1894	8,840
1891	34,060	1895	4,259
1892	29,216	1896	956
1893	19,336		

Anthracite wholesale circular prices at Buffalo in 1896.

Date.	Free on board vessels at Buffalo.				On cars at Buffalo or Suspension Bridge.			
	Grate.	Egg.	Stove.	Chestnut.	Grate.	Egg.	Stove.	Chestnut.
January 1	$4.45	$4.70	$4.70	$4.70	$4.15	$4.40	$4.40	$4.40
June 1	4.55	4.80	4.80	4.80	4.25	4.50	4.50	4.50
July 1	4.80	5.05	5.05	5.05	4.50	4.75	4.75	4.75
September 1 to close of year	5.05	5.30	5.30	5.30	4.75	5.00	5.00	5.00

Anthracite retail prices at Buffalo in 1896.

Date.	Grate.	Egg.	Stove.	Nut.	Pea.	Blossburg.
January 1 to August 30	$4.75	$5.00	$5.00	$5.00	$3.75	$4.00
September 1 to close of year	5.00	5.25	5.25	5.25	4.00	4.00

CLEVELAND, OHIO.

Mr. F. A. Scott, secretary of the transportation committee of the Cleveland Chamber of Commerce, furnishes the following history of the coal trade of that city:

The bituminous coal trade at Cleveland during the year 1896 was somewhat larger in volume than in 1895, owing largely to the fact, as stated in our previous report, that the docks at the upper end of the lakes were almost bare of fuel at the beginning of the season.

The ruling prices were lower, with some little fluctuation owing to the low price of Ohio and Pennsylvania product. Little West Virginia or other foreign coals came to this market; this enabled the operators of Ohio and near-by Pennsylvania mines to work their mines a little over one-half time. Anthracite prices ruled considerably higher than for several years past.

The volume of shipments via lake are daily increasing, and it is expected that the lake business during this year will equal, and possibly exceed, that of 1896. An encouraging increase in the consumption of coal for manufacturing purposes is also expected.

Coal and coke receipts and shipments at Cleveland since 1887.

RECEIPTS.					
	1887.	1888.	1889.	1890.	1891.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Bituminous	1,454,744	1,737,781	1,600,000	1,506,208	2,838,586
Anthracite	176,769	181,551	160,000	205,856	201,927
Coke	114,924	124,827	150,000	194,527	189,640
Total	1,746,437	2,044,159	1,910,000	1,960,591	3,230,153
SHIPMENTS.					
Anthracite by rail	20,296	29,735	25,000	29,056	34,910
Bituminous by rail / Bituminous by lake	703,506	1,000,000	1,100,000	1,200,000	1,525,000
Total	723,802	1,029,735	1,125,000	1,229,056	1,559,910
RECEIPTS.					
	1892.	1893.	1894.	1895.	1896.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Bituminous	3,651,080	3,603,984	2,715,540	2,842,333	2,994,802
Anthracite	259,150	262,266	207,604	201,022	142,832
Coke	351,527	235,248	298,061	432,216	338,678
Total	4,261,757	4,101,498	3,221,205	3,475,571	3,476,312
SHIPMENTS.					
Anthracite by rail	50,742	49,497	44,177	31,894	20,299
Bituminous by rail	1,728,831	24,128	30,000	64,908	25,872
Bituminous by lake		1,257,326	1,106,000	1,125,624	1,803,709
Total	1,779,573	1,330,951	1,180,177	1,222,426	1,849,880

The Cuyahoga customs district includes the ports of Cleveland, Ashtabula, Fairport, Lorain, and Conneaut. The following table shows the clearances from this district for the past ten years:

Clearances of coal from the Cuyahoga (Ohio) district for ten years.

Year.	Tons.	Year.	Tons.
1887	1,433,035	1892	2,957,988
1888	1,855,260	1893	3,052,342
1889	2,020,996	1894	2,239,829
1890	2,328,663	1895	2,948,324
1891	2,635,461	1896	3,863,645

As previously explained, the figures include only the coal actually rehandled. Bituminous coal received via Ohio Canal at Cleveland, to the amount of 35,000 tons or more a year, is not included in preceding figures.

The following table shows the wholesale prices ruling at Cleveland during 1896:

Wholesale prices of coal at Cleveland, Ohio, in 1896.

Kind.	Average price per ton.	Kind.	Average price per ton.
Bituminous:		Bituminous—Continued.	
Massillon	$1.90	Coshocton	$1.60
Palmyra	2.10	Hocking	1.60
Pittsburg	1.55	Anthracite:	
Salineville	1.35	Grate	4.37
Kentucky cannel	4.50	Egg	4.60
Goshen	1.45	Stove	4.60
Sherodsville	1.40	Chestnut	4.60
Osnaburg	1.45		

TOLEDO, OHIO.[1]

The movements of coal from the Ohio mines in 1896 present a strong and gratifying contrast compared with 1895, and the increased receipts at Toledo present a natural comment on the change. By reference to the table below it will be seen that the increase in receipts here over 1895 was 999,797 tons, or an aggregate of 2,934,711 tons, compared with 1,934,914 tons in 1895. The increase in the coal movement bears significant testimony to a fair increase in the general manufacturing interest of the country. We all know that this improvement has only partially recovered from its late paralysis, and in the ratio of its future improvement so will the traffic in Toledo in this commodity increase.

The table below gives a summary of receipts for eleven years.

[1] Extract from the annual report of Mr. Denison B. Smith, secretary Toledo Produce Exchange.

Coal receipts at Toledo since 1886.

	1886.	1887.	1888.	1889.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Wabash R. R	12, 598	9, 637	10, 375	8, 586
Lake Shore and Michigan Southern Rwy	165, 382	206, 099	201, 064	35, 693
Cincinnati, Hamilton and Dayton R. R	8, 198	11, 741	37, 831	51, 746
Pennsylvania Co	201, 427	330, 020	339, 750	234, 675
Michigan Central R. R	9, 594	13, 864	16, 504	19, 935
Columbus, Hocking Valley and Toledo Rwy	1, 039, 200	955, 620	1, 358, 025	923, 745
Toledo, Ann Arbor and North Michigan Rwy	1, 910	552	24, 700	96
Toledo, St. Louis and Kansas City R. R	3, 828	.....	1, 359	3, 287
Toledo and Ohio Central Rwy	404, 684	590, 000	637, 000	706, 950
Lake	87, 120	117, 921	140, 963	90, 282
Wheeling and Lake Erie Rwy	391, 086	454, 813	755, 155	763, 055
Toledo, Columbus and Cincinnati Rwy	15, 832	5, 446	2, 014	2, 210
Cincinnati, Jackson and Mackinaw R. R	.....	.....	45	54
Total	2, 340, 859	2, 695, 713	3, 524, 785	2, 840, 314

	1890.	1891.	1892.	1893.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Wabash R. R	3, 620	600	500	.....
Lake Shore and Michigan Southern Rwy	20, 592	8, 872	43, 252	31, 110
Cincinnati, Hamilton and Dayton R. R	25, 753	35, 356	82, 053	100, 000
Pennsylvania Co	214, 765	172, 325	92, 894	241, 395
Michigan Central R. R	3, 152	524	420	.....
Columbus, Hocking Valley and Toledo Rwy	931, 717	604, 039	394, 895	854, 740
Toledo, St. Louis and Kansas City R. R	8, 420	6, 891	5, 041	.....
Toledo and Ohio Central Rwy	826, 049	800, 429	450, 000	984, 000
Lake	133, 813	83, 800	112, 199	134, 750
Wheeling and Lake Erie Rwy	853, 940	1, 007, 042	1, 080, 000	1, 100, 000
Toledo, Columbus and Cincinnati Rwy	.....	35, 065	30, 000	.....
Cincinnati, Jackson and Mackinaw R. R	65	.....	101	.....
Total	3, 021, 886	2, 754, 943	2, 291, 355	3, 445, 995

Coal receipts at Toledo since 1886—Continued.

	1894.	1895.	1896.
	Tons.	*Tons.*	*Tons.*
Wabash R. R	.....	1,000	5,000
Lake Shore and Michigan Southern Rwy	22,126	38,000	44,000
Cincinnati, Hamilton and Dayton R. R	72,000	30,000	35,000
Pennsylvania Co	78,792	.....	529,968
Columbus, Hocking Valley and Toledo Rwy	540,000	500,000	850,000
Toledo and Ohio Central Rwy	767,670	721,914	705,272
Lake	116,000	124,000	119,000
Wheeling and Lake Erie Rwy	914,220	520,000	646,471
Total	2,510,808	1,934,914	2,934,711

CHICAGO, ILLINOIS.

The statistics of coal receipts at and shipments from Chicago are collected by the Chicago Bureau of Coal Statistics. The tables for 1896 compiled by the bureau were published in the Black Diamond, January 16.

The figures show that there was very little difference in the aggregate business done in the two years, though if anything 1896 was a shade less satisfactory than 1895. The receipts of anthracite coal were larger in 1896 than in 1895, but the shipments and the local consumption both decreased. The stocks of anthracite coal on hand January 1, 1896, amounted to 474,156 tons. The aggregate receipts by lake and rail were 1,960,693 tons, making a total supply of 2,434,849 tons. Deducting 685,161 tons, stock on hand December 31, 1896, the amount of coal sold is shown to have been 1,749,688 tons. In 1895 the stocks on hand January 1 amounted to 604,655 tons and the receipts to 1,789,197, making a total supply of 2,393,852 tons. The stocks on hand December 31 were 474,156 tons, indicating 1,919,696 tons marketed. These figures show that the actual anthracite coal sales and shipments in 1896 were 170,000 tons less than in 1895.

Receipts of bituminous coal increased from 4,783,643 tons to 4,851,626 tons. Local bituminous consumption increased about 85,000 tons, or about 2 per cent, while shipments fell off about 28,000 tons. Receipts of coke increased about 15,000 tons; shipments increased 45,000 tons, and local consumption decreased 50,000 tons.

The details of receipts and shipments by months, together with the sources of the bituminous coal, in 1895 and 1896, are shown in the following table:

Receipts of coal at Chicago in 1895 and 1896.

Month.	Anthracite by lake.		Anthracite by rail.	
	1896.	1895.	1896.	1895.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	.....	.....	54, 121	43, 624
February	.....	.....	24, 933	35, 083
March	.....	.....	23, 682	36, 324
April	5, 826	16, 236	14, 999	39, 176
May	141, 858	83, 245	11, 251	11, 340
June	185, 839	129, 400	39, 641	15, 292
July	104, 746	93, 458	68, 790	41, 810
August	135, 537	99, 335	60, 003	56, 993
September	175, 565	146, 607	78, 281	49, 244
October	175, 403	233, 753	99, 144	44, 676
November	224, 553	243, 423	101, 969	40, 821
December	170, 366	224, 055	64, 186	105, 302
Total	1, 319, 693	1, 269, 512	641, 000	519, 685

Month.	Total anthracite.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	54, 121	43, 624	10, 497	.....
February	24, 933	35, 083	.....	10, 150
March	23, 682	36, 324	.....	12, 642
April	20, 825	55, 412	.....	34, 587
May	153, 109	94, 585	58, 524	.....
June	225, 480	144, 692	80, 788	.....
July	173, 536	135, 268	38, 268	.....
August	195, 540	156, 328	39, 212	.....
September	253, 846	195, 851	57, 995	.....
October	274, 547	278, 429	.....	3, 882
November	326, 522	284, 244	42, 278	.....
December	234, 552	329, 357	.....	94, 805
Total	1, 960, 693	1, 789, 197	171, 496	.....

Receipts of coal at Chicago in 1895 and 1896—Continued.

Month.	Pennsylvania.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	43,590	15,940	27,650	.....
February	9,443	15,212	.....	5,769
March	6,332	19,843	.....	13,511
April	5,034	13,177	.....	8,143
May	5,523	7,075	.....	1,552
June	16,752	8,281	8,471	.....
July	12,998	9,541	3,457	.....
August	15,234	15,467	.....	233
September	14,292	7,105	7,187	.....
October	12,646	17,408	.....	4,762
November	24,016	18,109	5,907	.....
December	18,795	35,011	.....	16,216
Total	184,655	182,169	2,486	.....

Month.	Ohio.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	43,517	33,239	10,278	.....
February	21,374	24,724	.....	3,350
March	25,982	29,879	.....	3,897
April	16,155	21,591	.....	5,436
May	15,122	6,331	8,791	.....
June	17,299	15,953	1,346	.....
July	16,573	15,075	1,498	.....
August	22,058	17,138	4,920	.....
September	33,495	20,744	15,734	.....
October	31,058	54,095	.....	23,037
November	50,363	58,342	.....	10,820
December	37,841	53,045	.....	15,654
Total	330,837	350,156	.....	19,319

Receipts of coal at Chicago in 1895 and 1896—Continued.

Month.	West Virginia and Kentucky.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	38,062	29,282	8,780	.....
February	28,495	31,154	.....	2,659
March	26,345	24,499	1,846	.....
April	29,378	20,370	9,008	.....
May	21,869	10,262	11,607	.....
June	22,448	20,841	1,607	.....
July	30,727	16,388	14,339	.....
August	27,143	28,579	.....	1,436
September	25,137	29,787	.....	4,650
October	38,870	35,172	3,698	.....
November	50,109	42,085	8,024	.....
December	55,966	51,454	4,512	.....
Total	394,549	339,873	54,676	.....

Month.	Illinois.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	240,499	224,141	16,358	.....
February	220,889	236,977	.....	16,088
March	219,133	202,179	16,954	.....
April	216,409	231,283	.....	14,874
May	163,048	100,138	62,910	.....
June	187,848	130,995	56,853	.....
July	181,099	162,667	18,432	.....
August	179,466	186,355	.....	6,889
September	211,811	186,326	25,485	.....
October	263,809	240,680	23,129	.....
November	228,363	247,040	.....	18,677
December	277,363	252,839	24,524	.....
Total	2,589,737	2,401,620	188,117	.....

Receipts of coal at Chicago in 1895 and 1896—Continued.

Month.	Indiana.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	147,221	159,969	.....	12,748
February	130,132	164,573	.....	34,441
March	160,480	130,530	29,950	.....
April	120,954	151,746	.....	30,792
May	50,557	29,390	21,167	.....
June	64,375	76,823	.....	12,448
July	73,642	93,654	.....	20,012
August	63,718	99,056	.....	35,338
September	106,813	105,293	1,520	.....
October	122,360	155,126	.....	32,766
November	139,558	179,719	.....	40,161
December	172,038	163,946	8,092	.....
Total	1,351,848	1,509,825	.....	157,977

Month.	Coke.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	50,920	30,935	19,985	.....
February	35,900	22,565	13,335	.....
March	40,893	38,485	2,408	.....
April	41,740	31,375	10,365	.....
May	47,698	11,939	35,759	.....
June	47,960	35,322	12,638	.....
July	33,250	27,995	5,255	.....
August	27,388	32,340	.....	4,952
September	11,600	20,034	.....	8,434
October	9,472	50,480	.....	41,008
November	20,130	27,780	.....	7,650
December	30,860	53,600	.....	22,740
Total	397,811	382,850	14,961	.....

Shipments from Chicago.

Month.	Anthracite.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	55,568	32,645	22,923	.....
February	19,850	33,499	.....	13,649
March	17,722	19,600	.....	1,878
April	11,585	12,692	.....	1,107
May	3,964	10,872	.....	6,908
June	20,192	10,080	10,112	.....
July	29,458	28,223	1,235	.....
August	21,307	30,162	.....	8,855
September	25,258	41,114	.....	15,856
October	52,928	36,291	16,637	.....
November	31,027	32,910	.....	1,883
December	30,932	49,622	.....	18,690
Total	319,791	337,710	.....	17,919

Month.	Bituminous coal.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	48,331	55,155	.....	6,824
February	36,903	68,420	.....	31,517
March	52,092	51,120	972	.....
April	38,818	42,964	.....	4,146
May	22,182	29,887	.....	7,705
June	26,289	41,665	.....	15,376
July	39,204	37,859	1,345	.....
August	39,905	38,310	1,595	.....
September	53,887	36,656	17,231	.....
October	95,351	76,264	19,087	.....
November	75,182	60,799	14,383	.....
December	65,642	72,499	.....	6,857
Total	593,786	611,598	.....	17,812

Shipments from Chicago—Continued.

Month.	Coke.		1896.	
	1896.	1895.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	33,337	22,319	11,018	.....
February	30,041	26,291	3,750	.....
March	33,499	21,254	12,245	.....
April	26,165	22,996	3,169	.....
May	34,180	10,759	23,421	.....
June	47,363	13,969	33,394	.....
July	29,965	12,923	17,042	.....
August	20,740	18,052	2,688	.....
September	13,865	30,148	.....	16,283
October	18,839	35,261	.....	16,422
November	13,350	33,895	.....	20,545
December	24,018	32,007	.....	7,989
Total	325,362	279,874	45,488	.....

The following table gives a correct statement of anthracite coal received at Chicago by lake during the season of 1896, as obtained from custom-house reports and compared with actual weights as shown on the books of the different consignees:

Lake receipts of anthracite coal at Chicago.

Consignee.	Tons.
O. S. Richardson & Co	234,906
Lehigh Valley Coal Co	201,519
Coxe Bros. & Co	152,000
E. L. Hedstrom & Co	150,375
Robert Law	124,291
Crescent Coal and Mining Co	116,535
Philadelphia and Reading Coal and Iron Co	113,710
Peabody Coal Co	80,739
Youghiogheny and Lehigh Coal Co	57,953
Pennsylvania Coal Co	43,988
Wm. Drieske	28,545
Drieske & Hinners	8,495
Otto Scheunemann	6,637
Total	1,319,693

Summary of Chicago coal and coke trade for 1895 and 1896.

	1896.	1895.
	Tons.	*Tons.*
Stock of anthracite coal on hand January 1	474, 156	604, 655
Receipts of anthracite by lake	1, 319, 693	1, 269, 512
Receipts of anthracite by rail	641, 000	519, 685
Receipts of bituminous coal	4, 851, 626	4, 783, 643
Receipts of coke	397, 811	382, 850
Shipments of anthracite to country	319, 791	337, 710
Shipments of bituminous coal to country	593, 786	611, 598
Shipments of coke	325, 362	279, 874
Local consumption—anthracite	1, 429, 897	1, 581, 986
Local consumption—bituminous	4, 257, 840	4, 162, 044
Local consumption—coke	72, 449	102, 976
Stock of anthracite on hand December 31	685, 161	474, 156

MILWAUKEE, WISCONSIN.

Mr. William J. Langson, secretary of the Chamber of Commerce at Milwaukee, has kindly allowed the use of the manuscript copy of that portion of his report bearing upon the coal trade of that city in advance of its publication:

Receipts of coal at Milwaukee in 1896 went slightly over the hitherto largest amount recorded, reaching a total of 1,587,795 tons, a gain of 141,372 tons over the receipts of 1895. Compared with the business of the latter year, the respective quantities of hard and soft coal received were as follows:

Receipts of coal at Milwaukee, Wisconsin, in 1895 and 1896.

Kind.	1895.	1896.
	Tons.	*Tons.*
Hard coal	853, 680	813, 487
Soft coal	592, 743	774, 308
Total	1, 446, 423	1, 587, 795

The above figures include 100,312 tons of Illinois coal received by rail, showing the receipts of Pennsylvania and Ohio coal by lake to have been 1,487,483 tons. The following table will show the lake ports from which the supplies of coal were entered at the Milwaukee custom-house during each of the past twelve years.

Receipts of coal at Milwaukee for twelve years.

	1885.	1886	1887.	1888.	1889.	1890.
By lake from—	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Buffalo	392,003	395,971	464,972	631,263	542,167	510,598
Erie	50,915	41,847	61,222	74,610	47,862	46,378
Oswego	10,043	.....	1,153	1,348	.....	2,408
Cleveland	126,741	91,997	78,259	98,631	89,071	135,413
Ashtabula	35,360	11,096	38,881	23,105	48,599	24,671
Black River	5,549	.....	.....	.....	.....	.....
Lorain	19,452	12,417	11,757	13,533	15,367	15,351
Sandusky	19,307	57,412	46,606	19,733	51,816	26,193
Toledo	31,875	69,079	14,115	38,452	71,516	59,305
Charlotte	19,491	31,744	2,781	14,292	22,526	6,120
Fairport	.....	.....	10,517	30,253	5,552	11,100
Ogdensburg	.....	.....	.....	7,700	4,953	7,026
Huron, Ohio	.....	.....	.....	8,244	7,726	9,720
Other ports	.....	2,679	4,331	.....	588	*a* 49,375
Total, lake	710,736	714,242	724,594	961,164	907,743	903,658
By railroad	65,014	45,439	118,385	161,079	72,935	92,999
Receipts	775,750	759,681	842,979	1,122,243	980,678	996,657

	1891.	1892.	1893.	1894.	1895.	1896.
By lake from—	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Buffalo	659,388	819,570	629,243	658,978	755,831	745,870
Erie	55,202	65,190	78,947	97,995	86,332	19,879
Oswego	17,022	26,177	46,065	41,891	33,364	60,309
Cleveland	143,776	132,051	189,539	105,800	105,469	232,689
Ashtabula	22,726	30,549	38,317	58,179	99,521	114,625
Lorain	3,983	.....	18,406	22,552	27,017	40,460
Sandusky	10,692	19,039	5,360	7,250	5,179	28,238
Toledo	53,644	12,229	64,548	90,357	74,603	114,501
Charlotte	10,013	55,909	763	.....	1,153	.....
Fairport	5,775	5,359	16,483	122,573	126,955	97,532
Ogdensburg	5,179	18,134	1,635	2,065	.....	2,800
Huron, Ohio	12,307	12,173	26,342	3,275	11,229	29,605
Other ports	*a* 6,949	19,485	1,800	18,395	9,950	975
Total, lake	1,006,656	1,210,865	1,117,448	1,229,310	1,336,603	1,487,483
By railroad	149,377	163,549	132,284	107,736	109,920	100,312
Receipts	1,156,033	1,374,414	1,249,732	1,337,046	1,446,423	1,587,795

a Including cargoes from all ports not reported at the custom-house.

It will be noticed that while the receipts of hard coal in 1896 were about 40,000 tons less than in 1895, the supply of soft coal exceeded

that of the preceding year about 182,000 tons. While the receipts of coal were the largest on record the amount shipped hence by rail to interior points was less by 193,787 tons than during the preceding year, owing probably to the prevailing mild weather at the beginning of the past winter, while the local trade, keeping pace with the growth of the city shows a steady increase under all conditions. An examination of the table showing the annual receipts of coal at Milwaukee from 1862 to 1896, inclusive, will be found very interesting in this connection.

Shipments of coal from Milwaukee for fourteen years.

Shipped by—	1883.	1884.	1885.	1886.	1887.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Chicago, Milwaukee and St. Paul Rwy	146, 295	140, 630	179, 883	177, 286	166, 120
Chicago and Northwestern Rwy.	41, 746	37, 314	56, 591	70, 420	79, 258
Wisconsin Central R. R	6, 725	7, 469	8, 943	11, 745	18, 953
Milwaukee, Lake Shore and Western Rwy	30, 575	11, 757	12, 804	13, 072	13, 886
Milwaukee and Northern R. R.	10, 075	7, 556	10, 872	12, 011	15, 627
Lake	355	335	184	269	1, 595
Total	235, 771	205, 061	269, 277	284, 803	295, 439

Shipped by—	1888.	1889.	1890.	1891.	1892.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Chicago, Milwaukee and St. Paul Rwy	283, 269	258, 281	378, 090	406, 455	252, 168
Chicago and Northwestern Rwy	107, 193	97, 207	103, 279	114, 847	163, 063
Wisconsin Central R. R	12, 624	11, 727	15, 929	14, 449	14, 930
Milwaukee, Lake Shore and Western Rwy	16, 146	25, 413	5, 884	7, 998	11, 041
Milwaukee and Northern R. R.	34, 480	20, 556	19, 386	26, 723	27, 185
Lake	125	224	50	416	757
Total	453, 837	413, 408	522, 618	600, 888	469, 144

Shipped by—	1893.	1894.	1895.	1896.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Chicago, Milwaukee and St. Paul Rwy	321, 960	246, 620	398, 053	264, 650
Chicago and Northwestern Rwy	199, 457	167, 753	221, 357	169, 409
Wisconsin Central R. R	10, 967	12, 377	17, 990	12, 318
Milwaukee, Lake Shore and Western Rwy	.....	.....	.....	.....
Milwaukee and Northern R. R	.....	.....	.....	.....
Lake	609	6, 018	3, 070	306
Total	532, 993	432, 768	640, 470	446, 683

Receipts of coal at Milwaukee by lake and rail annually from 1862 to 1896, inclusive.

Year.	Tons.	Year.	Tons.
1862	21,860	1880	368,568
1863	43,215	1881	550,027
1864	44,503	1882	593,842
1865	36,369	1883	612,584
1866	66,616	1884	704,166
1867	74,568	1885	775,750
1868	92,992	1886	759,681
1869	87,690	1887	842,979
1870	122,865	1888	1,122,243
1871	175,526	1889	980,678
1872	210,194	1890	996,657
1873	229,784	1891	1,156,033
1874	177,655	1892	1,374,414
1875	228,674	1893	1,249,732
1876	188,444	1894	1,337,046
1877	264,784	1895	1,446,423
1878	239,667	1896	1,587,795
1879	350,840		

Yard prices per ton of coal at Milwaukee during the year 1896, reported by R. P. Elmore Company.

Month.	Lackawanna and Scranton.	Briar Hill.	Cannel.	Steam coal, Ohio and Erie.
January	$6.50	$6.00	$5.50@7.00	$2.75
February	6.50	6.00	5.50@7.00	2.75
March	6.00	6.00	5.50@7.00	2.75
April	6.00	6.00	5.50@7.00	2.75
May	6.00	6.00	5.50@7.00	2.75
June	6.00	6.00	5.50@7.00	2.75
July	6.50	6.00	5.50@7.00	2.75
August	6.50	6.00	5.50@7.00	2.75
September	6.75	6.00	5.50@7.00	2.75
October	6.75	6.00	5.50@7.00	2.75
November	6.50	6.00	5.50@7.00	2.75
December	6.50	6.00	5.50@7.00	2.75

Lake freights per ton on coal from Buffalo to principal upper lake ports during the season of 1896 were as follows:

Freight rates from Buffalo to upper lake ports in 1896.

Week ending—	Chicago.	Milwaukee.	Duluth and Superior.	Gladstone.
	Cents.	*Cents.*	*Cents.*	*Cents.*
April 25	40	40	25	.....
May 2	40	40	25	.....
May 9	40	40	25	.....
May 16	50	40@45	25	25
May 23	50	45	25	.....
May 30	50@60	45@55	25	.....
June 6	60	55	25	25
June 13	60@50	55@45	30	.....
June 20	50	45	30	35
June 27	50	45	30	.....
July 4	50@40	45@35	30@25	.....
July 11	40	35	25	.....
July 18	40@30	35@30	25	.....
July 25	30	30	25	25
August 1	30@25	30@25	25	25
August 8	20	20	20	20
August 15	20	20	20	20
August 22	20	20	20	20
August 29	20	20	20	20
September 5	20	20	20	20
September 12	20	20	20	20
September 19	20	20	20	20
September 26	20	20	20	20
October 3	20	20	20	.....
October 10	20	20	20	20
October 17	20@30	20@30	20	30
October 24	30	30	20	30
October 31	30	30	20	20
November 7	30	30	20	20
November 14	30	30	20	20
November 21	30@40	30@40	30	30
November 28	60	60	50	50
December 5 to close	60	60	50	.....

CINCINNATI, OHIO.

The Survey is indebted to Mr. Charles B. Murray, superintendent of the Chamber of Commerce, for the statement of coal receipts at Cincinnati since 1891. Statistics for previous years were furnished by the former superintendent, Col. S. D. Maxwell. Prior to 1892 the statistics in the following table were collected for fiscal years ending August 31. The figures since 1892 are for calendar years. The receipts in 1891 from September 1 to December 31 are stated separately.

Receipts of coal at Cincinnati since September 1, 1871.

Year.	Pittsburg (Youghiogheny).	Kanawha.	Ohio River.	Canal.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*
1871-72	19, 254, 716	.....	*b* 10, 359, 906	1, 104, 003
1872-73	24, 962, 373	.....	*b* 11, 075, 072	1, 162, 052
1873-74	24, 014, 681	.....	*b* 10, 398, 153	710, 000
1874-75	24, 225, 002	4, 476, 619	4, 277, 327	565, 352
1875-76	27, 017, 592	6, 004, 675	4, 400, 792	409, 358
1876-77	28, 237, 572	3, 631, 823	5, 141, 150	322, 171
1877-78	26, 743, 055	6, 386, 623	3, 288, 008	380, 768
1878-79	20, 769, 027	6, 134, 039	4, 068, 452	333, 549
1879-80	31, 750, 968	8, 912, 801	4, 268, 214	202, 489
1880-81	23, 202, 084	10, 715, 459	3, 151, 934	67, 684
1881-82	37, 807, 961	13, 950, 802	3, 560, 881	77, 336
1882-83	33, 895, 064	13, 260, 347	3. 309, 534	180, 621
1883-84	32, 239, 473	15, 926, 743	2, 956, 688	293, 010
1884-85	32, 286, 133	14, 588, 573	3, 007, 078	314, 774
1885-86	34, 933, 542	17, 329, 349	939, 746	205, 717
1886-87	37, 701, 094	20, 167, 875	338, 435	129, 503
1887-88	41, 180, 713	20, 926, 596	1, 533, 358	26, 098
1888-89	36, 677, 974	23, 761, 853	544, 940	12, 129
1889-90	42, 601, 615	19, 221, 196	454, 385	.....
1890-91	43, 254, 460	19, 115, 172	1, 479, 670	15, 111
1891, 4 months	13, 766, 390	6, 288, 442	234, 940	.....
1892 *a*	42, 272, 348	19, 214, 704	768, 588	.....
1893	28, 643, 562	24, 971, 261	405, 202	.....
1894	40, 156, 667	16, 398, 039	158, 334	.....
1895	26, 675, 823	15, 106, 095	14, 400	.....
1896	36, 696, 759	22, 015, 133	130, 217	.....

a Calendar years since 1892. *b* Including Kanawha coal.

Receipts of coal at Cincinnati since September 1, 1871—Continued.

Year.	Anthracite.	Other kinds.	Total.
	Bushels.	*Bushels.*	*Bushels.*
1871–72	72, 171	.....	30, 790, 796
1872–73	75, 000	.....	37, 274, 497
1873–74	112, 000	.....	35, 234, 834
1874–75	248, 750	1, 597, 260	35, 390, 310
1875–76	282, 578	2, 068, 322	40, 183, 317
1876–77	376, 125	1, 913, 793	39, 622, 634
1877–78	439, 350	1, 654, 425	38, 892, 229
1878–79	768, 750	2, 136, 850	34, 210, 667
1879-80	712, 075	2, 351, 699	48, 198, 246
1880–81	770, 525	2, 336, 752	40, 244, 438
1881–82	779, 925	3, 090, 715	59, 267, 620
1882–83	977, 250	2, 997, 216	54, 620, 032
1883–84	1, 085, 350	3, 910, 795	56, 412, 059
1884–85	1, 257, 900	2, 683, 864	54, 138, 322
1885–86	1, 287, 925	2, 720, 250	57, 416, 529
1886–87	1, 314, 775	3, 693, 850	63, 345, 532
1887–88	1, 328, 225	5, 710, 649	70, 705, 639
1883–89	1, 020, 525	3, 075, 000	65, 092, 421
1889–90	1, 001, 175	4, 709, 775	67, 988, 146
1890–91	1, 118, 671	7, 362, 698	72, 345, 782
1891, 4 months	402, 528	4, 437, 139	25, 129, 439
1892 *a*	1, 268, 170	13, 335, 006	76, 858, 816
1893	759, 626	25, 832, 374	80, 612, 025
1894	661, 548	19, 083, 527	76, 458, 115
1895	1, 227, 000	27, 119, 823	70, 143, 141
1896	1, 171, 000	19, 676, 000	79, 689, 109

a Calendar years since 1892.

Receipts of coal at Cincinnati during the past sixteen years have been as follows:

Coal receipts at Cincinnati, Ohio.

Year.	Tons.	Year.	Tons.
1881	1, 492, 817	1889	2, 348, 055
1882	2, 197, 407	1890	2, 452, 253
1883	2, 025, 859	1891	2, 608, 923
1884	2, 092, 551	1892	2, 718, 809
1885	2, 008, 850	1893	2, 905, 071
1886	2, 130, 354	1894	2, 755, 137
1887	2, 350, 026	1895	2, 530, 061
1888	2, 551, 415	1896	2, 873, 492

With one exception the receipts of coal at Cincinnati in 1896 were the largest on record. The exception was in 1893 when the total receipts were 2,905,071 tons, while in 1896 they amounted to 2,873,492 tons. Compared with 1895 there was an increase in the receipts during 1896 of 343,431 tons, or 13.6 per cent. This increase was entirely in receipts of Pittsburg and Kanawha coals. The receipts of Pittsburg coal increased about 10,000,000 bushels, or nearly 40 per cent, while the arrivals of Kanawha were nearly 7,000,000 bushels, or about 46 per cent more than 1895. Receipts of anthracite coal fell off from 1,227,000 bushels in 1895 to 1,171,000 bushels in 1896, a decrease of 56,000 bushels. Coal from "other sources" decreased nearly 7,500,000 bushels.

Mr. Murray, in his review of the trade in 1896, says:

The coal trade was favored with a navigable stage of the Ohio River throughout nearly the entire year, a condition which is not usual. In the preceding year there was such a low stage of water a large part of the time as to seriously interfere with navigation and the movement of coal by such transportation. Under such conditions there was an important enlargement in the receipts of coal by railroad, while in the past year such receipts were reduced and the movement by water was very decidedly increased. The large supply and offerings of coal were attended with continuous low prices, so that the year's average was below that of any previous year covered by statistics of the Chamber of Commerce, and not influenced by temporary conditions usually incident to reduced supplies.

The aggregate receipts of coal at Cincinnati in 1896 were 79,689,000 bushels, compared with 70,143,000 in 1895, 76,458,000 in 1894, and an annual average of 70,096,000 for ten years prior to 1896. The year's shipments were 14,934,000 bushels, leaving 64,755,000 bushels as the net supply for local purposes. The year began with low supplies and ended with a considerable quantity, so that the consumption during the period was somewhat less than the indicated net supply, as stated.

Of the total receipts of coal for the year, the arrivals by water were 59,689,000 bushels and by railroad 20,000,000. In the preceding year the receipts by railroad were 27,263,000 bushels.

The year's receipts from the Pittsburg district were 36,697,000 bushels, or 46 per cent of the total; from Kanawha, 22,015,000 bushels, or about 28 per cent; from other sources, 20,977,000 bushels, or about 26 per cent.

The year's range of prices of Pittsburg coal, afloat at Cincinnati, was 5½ to 6 cents per bushel, averaging 5.73 cents, or $1.59 per ton. This class of coal, delivered to consumers, ranged at $2.25 to $2.50 per ton, and averaged $2.34, compared with $2.51 in 1895, $2.53 in 1894, and $3.07 in 1893; for ten years ending with 1895 the annual average was $2.90. The influence of the enlarged facilities of railroads for supplying this market with coal in late years has been important in

regulating prices, especially at times of reduced supplies under interruption of navigation by low water.

The proportion of the annual supply of coal consumed for household purposes is estimated, on the basis of reported sales by various dealers, at about 50 per cent of the total, implying that of the whole quantity approximately half is absorbed by industrial and other concerns, other than for household purposes.

The yearly range and average prices of Pittsburg coal, afloat and delivered, per bushel, based on weekly records, compare for eleven years as shown in the following compilation:

Yearly range and average prices of Pittsburg coal.

Years.	Afloat.			Delivered.		
	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
1885-86	5¼	8	6.58	9	11	10.05
1886-87	6½	15	7.55	9½	16	11.04
1887-88	7	18	10.01	10¾	22	13.96
1888-89	6	8½	6.71	9	11¾	9.95
1889-90	6	8	6.78	9	10¾	9.69
1890-91	6½	8½	7.28	10	10¾	10.24
1892	6½	8½	7.49	9	12½	10.36
1893	6½	8¾	7.58	9	19¾	11.04
1894	5¼	9	6.34	7¼	10¾	9.11
1895	5½	6½	6.00	8⅛	10¾	9.00
1896	5½	6	5.73	8⅛	9	8.21

The bulk of coal from the Kanawha, Virginia, and West Virginia regions sells at the same, or about the same, prices as are obtained for the product from the Pittsburg district.

The receipts of coke for the year were 2,536,000 bushels, and the quantity locally manufactured was 4,380,000 bushels, making a total of 6,916,000 bushels, compared with 6,747,000 bushels the preceding year. For city manufacture the average price for the year was 8 cents per bushel; of gas house, 8 cents; of Connellsville, $5.80 per ton.

ST. LOUIS, MISSOURI.

The following review of the coal trade of St. Louis in 1896 is furnished by Mr. James Cox, secretary of the Business Men's League of that city:

With the exception of about sixty days immediately preceding the election, the coal trade was active in St. Louis during 1896. Domestic consumption was greater than in any previous year, owing to a steady increase in the population, which has grown from about 460,000 in 1890

to at least 640,000 in 1896, the calculation being based on the number of inhabited houses. The claim of St. Louis that it has felt the "hard times" less than any other city has been borne out by the continuous building of dwelling houses in all seasons, and this is still a marked feature.

The falling off in the demand of coal for manufacturing purposes was confined almost entirely to the months of September and October. That it was not alarming even during that period is shown by the fact that the receipts of soft coal for the year were about equal to those of 1893, 10 per cent greater than those of 1894, and within 1 per cent of those of 1895. The year ended with business active, prices steady, and prospects encouraging.

Although the great bulk of soft coal consumed in St. Louis still comes from the southern Illinois coal field, a few miles on the other side of the Mississippi, the supply from other sources is increasing. The Chicago, Burlington and Quincy Railroad brought in 300,000 bushels during 1896, the first year during which shipments were made by this route. The "K" road, a branch of the Burlington, figures for the first time in this connection, having hauled in nearly 100,000 bushels. Although these figures are small, they indicate a possibility of increased shipments from coal fields west of the Mississippi River, and a saving thereby of the arbitrary bridge charges. The receipts from Ohio River points also increased more than 140 per cent as compared with the preceding year.

Prices for soft coal ruled very low. For standard lump the highest price during the year was $1.50, delivered in St. Louis. The lowest quoted was $1.20. On very large contracts a better rate than this was made. In the course of negotiations with an Eastern cotton factory to remove to St. Louis, an offer was made to deliver steam-producing coal at about $1 per ton all the year round, and it was admitted that the saving in fuel between New England rates and this price would equal a good dividend on the capitalization of the mill. High grade domestic coal was also cheap, never reaching $2 a ton all year, and falling as low as $1.67½.

The increase in the receipts of hard coal, referred to last year, was maintained, and at the present time the deliveries are twice what they were in 1890. This is due largely to the increase in the number of dwelling houses, and also to the enforcement of the smoke-abatement ordinances, several concerns having changed to hard coal in order to comply with the law. If anthracite coal prices were a little lower, the increase in its use would be marked.

Following are the quotations for coal free on board at St. Louis, Missouri, during the year 1896:

Coal prices at St. Louis, Missouri, during 1896.

	Highest.	Lowest.	Closing.
Standard Illinois lump coal	$1.50	$1.20	$1.50
High-grade Illinois lump coal	1.92½	1.67½	1.92½
Anthracite, large	6.45	6.20	6.45
Anthracite, small	6.70	6.45	6.70
Connellsville coke	5.50	4.35	4.35
New River coke	4.65	4.20	4.30
Indiana coke	3.45	3.30	3.30
Kentucky coke	3.40	3.25	3.30
Gas coke	3.25	3.25	3.25

In the following table are shown the receipts of coal and coke at St. Louis during the past seven years:

Coal and coke receipts at St. Louis since 1890.

Year.	Soft coal.	Hard coal.	Coke.
	Bushels.	*Tons.*	*Bushels.*
1890	69,477,225	124,335	9,919,850
1891	72,078,225	139,050	6,924,250
1892	82,302,228	187,327	8,914,400
1893	87,769,375	173,653	7,807,000
1894	74,644,375	186,494	6,365,900
1895	88,589,935	207,784	7,130,300
1896	87,677,600	218,955	5,395,900

MOBILE, ALABAMA.

Mr. A. C. Danner, president of the Mobile Coal Company, has for several years contributed a review of the coal trade of Mobile. In regard to the trade in 1896, Mr. Danner says:

"The sale of coal at this port continues to increase, as shown by the accompanying statement. The increase is almost entirely from the larger demand coming from steamships. Shipments of timber and lumber from the Gulf ports are being made more and more by steamers instead of sailing vessels as heretofore, and this also applies to cotton and other products shipped from Mobile. The improved channel of 23 feet from the wharves at Mobile to the Gulf enables larger steamers to come to Mobile, and they are coming in increased numbers. This necessarily makes a demand for more coal, though many of the English steamers do not take their coal from Mobile. Some of them bring

sufficient from England for the round trip. Others are of such deep draft they find they can not load fully on 23 feet with their bunkers full of coal, so they go out from here with only sufficient coal to carry them to Norfolk or Newport News, where they call and fill up their bunkers. The work that has been done by the Government to improve the Warrior and Tombigbee rivers so as to enable coal to be brought down from Tuscaloosa to Mobile by river has not had much effect in that direction yet. The locks and dams contemplated by the plans have not all been constructed. For this reason it is not practicable to make the trip except when the river is well up, though it can be made in perfect safety when the water is high enough. Some coal has been brought down from that territory, and it has been sold for less than the coal that has come to Mobile by all rail, but so far this business has not assumed sufficient magnitude to cut any figure in the trade."

The receipts of coal at Mobile since 1883 are shown in the following table:

Receipts of coal at Mobile, Alabama, since 1883.

Year.	Alabama coal. (a)	Anthracite and English.	Total.
	Tons.	*Tons.*	*Tons.*
1883	25, 304	1, 229	26, 533
1884	17, 808	891	18, 699
1885	40, 301	775	41, 076
1886	30, 310	2, 022	32, 332
1887	39, 232	910	40, 142
1888	38, 785	648	39, 433
1889	43, 620	1, 454	45, 074
1890	39, 320	1, 327	40, 647
1891	51, 267	1, 775	53, 042
1892	70, 298	1, 500	71, 798
1893	90, 000	4, 130	94, 130
1894	104, 340	3, 600	107, 940
1895	156, 996	4, 200	161, 196
1896	165, 000	3, 000	168, 000

a This does not include the amount of coal used by the railroads on their locomotives and at their shops.

NORFOLK, VIRGINIA.

Col. William Lamb, of the firm of William Lamb & Co., agents for Pocahontas coal at Norfolk, Virginia, makes the following comments on the coal trade of that city:

"The effect of the tariff of August, 1894, was to demoralize prices of Pocahontas coal, and caused the coal-carrying roads to decrease the price paid operators in other regions. This in time led to a decrease of the miners' wages, and resulted in the widespread strike of that

year. The Norfolk and Western Railroad stood in the breach and prevented a decrease in the wages of miners in the Pocahontas region, to which the strike did not extend, hence the large coastwise output of 1894. In the next year, 1895, the Norfolk and Western Railroad went into the hands of receivers, wages were decreased, and the Pocahontas region had its strike, to which was principally due the decrease in the coastwise output. In 1896 prices continued low, and coastwise shipments were not materially increased. Up to June, 1897, prices continued on the decline, there was no encouragement for increased sales, and there was no margin of profit for anyone concerned in the trade."

The following statement shows the amount of coal handled at Lamberts Point coal piers for a period of seven years:

Pocahontas coal shipments from Lamberts Point piers since 1890.

Year.	Foreign.	Bunkers.	Coastwise.	Local.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1890.....	37, 723	102, 755	941, 019	71, 010	1, 152, 507
1891.....	27, 997	135, 112	1, 215, 028	90, 606	1, 468, 743
1892.....	25, 653	129, 627	1, 400, 984	98, 034	1, 654, 298
1893.....	34, 969	125, 688	1, 512, 931	100, 453	1, 774, 041
1894.....	44, 328	105, 382	1, 810, 480	96, 841	2, 057, 031
1895.....	34, 174	75, 714	1, 430, 144	100, 442	1, 640, 474
1896.....	41, 600	99, 867½	1, 433, 068½	96, 928¾	1, 671, 464¾

SAN FRANCISCO, CALIFORNIA.

Mr. J. W. Harrison reports the coal trade for the year as follows:

Our consumption of coal this year is over 10 per cent less than in 1895, which is an assurance that the outgoing year has not been a profitable one for our manufacturing industries. There is no article of commerce which so quickly evinces prosperity or adversity as "fuel;" it is the infallible indicator. This is demonstrated clearly in our case; every branch of business will show a discouraging balance sheet for 1896, caused partially by the low prices for most of our products and partly it being Presidential election year, causing so much lack of confidence in commercial circles. Now the election is over, our coming harvest promises well, foreign markets are liberal buyers of our products at full figures, and unless all premonitory signs fail we should have a banner year before us. The prices for coal have been unprecedentedly low for the past twelve months—the lowest on record; hence the failure of our local factories to make money can not be attributed to their fuel expense. The extremely cheap Australian offered here has diminished the imports of British Columbia and Seattle coals fully 20 per cent, but values are now shaping themselves for an advance; hence our coast coal trade should become materially enlarged. Crude oil has lost a

number of its former consumers, as it ceased to be classed as economical with cheap coals as competitors. We are promised liberal shipments in the near future from the Corral Hollow colliery; its contiguity to market should make it a formidable competitor in 1897.

The following table of prices will show the monthly fluctuations of foreign coals for "spot" cargoes. The *average* price is given for each month:

Prices of coal at San Francisco by months.

	Jan.	Feb.	Mar.	Apr.	May.	June.
Australian (gas)	$5.10	$5.00	$5.10	$5.10	$5.15	$5.15
English steam	5.75	5.75	6.00	6.00	6.00	6.00
Scotch splint	6.00	6.00	6.00	6.00	6.00	6.00
West Hartley	6.50	6.50	6.50	6.50	6.50	6.50
	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Australian (gas)	$5.10	$5.05	$5.00	$5.00	$5.25	$5.25
English steam	6.00	6.00	6.00	6.25	6.50	6.50
Scotch splint	6.12	6.25	6.25	6.25	6.50	6.50
West Hartley	6.50	6.75	6.75	6.75	7.00	7.00

The various sources from which we have derived our supplies are as follows:

Sources of coal consumed in California.

Source.	1890.	1891.	1892.	1893.
	Tons.	*Tons.*	*Tons.*	*Tons.*
British Columbia	441,759	652,657	554,600	588,527
Australia	194,725	321,197	314,280	202,017
English and Welsh	35,662	168,586	210,660	151,269
Scotch	1,610	31,840	24,900	18,809
Eastern (Cumberland and anthracite)	32,550	42,210	35,720	18,960
Franklin, Green River, and Cedar River	216,760	178,230	164,930	167,550
Carbon Hill and South Prairie	191,109	196,750	218,390	261,435
Mount Diablo and Coos Bay	74,210	90,684	66,150	63,460
Japan, etc	13,170	20,679	4,220	7,758
Total	1,204,555	1,702,833	1,593,850	1,479,785

Sources of coal consumed in California—Continued.

Source.	1894.	1895.	1896.
	Tons.	*Tons.*	*Tons.*
British Columbia	647, 110	651, 295	551, 852
Australia	211, 733	268, 960	273, 851
English and Welsh	157, 562	201, 180	156, 368
Scotch	18, 636	4, 098	8, 356
Eastern (Cumberland and anthracite)	16, 640	26, 863	17, 907
Franklin, Green River, and Cedar River	153, 199	150, 888	128, 919
Carbon Hill and South Prairie	241, 974	256, 267	255, 923
Mount Diablo and Coos Bay	65, 263	84, 954	110, 237
Japan, etc	15, 637	9, 015	2, 247
Total	1, 527, 754	1, 653, 520	1, 505, 660

Included in the above statement of annual supplies are the amounts received by water at port Los Angeles, also at San Diego—aggregating 154,875 tons at the two places.

Coke.—The total arrivals this year have been 36,132 tons, over 50 per cent more than in 1895. Fully 75 per cent of this was imported from England and Belgium. As regular monthly shipments may be shortly expected from British Columbia, where large ovens have been recently erected, the quantity to come from Great Britain must become materially diminished in 1897.

SEATTLE, WASHINGTON.

The Trade Register of Seattle publishes annually a review of Seattle's trade and commerce, from which the following relating to the coal trade has been taken:

Seattle is the leading coal city of the State, receiving and distributing the output of the several mines of King County and one or two outside mines. The Gilman, Newcastle, Franklin, Lawton, Renton, Cedar Mountain, Black Diamond, Danville, and two or three small mines are regular shippers to this market. The Carbonado mine, in Pierce County, has recently had bunkers put up here, and the Carbon mine is the latest shipper, contributing 452 tons during November. The King County mines' output for 1895 was 382,158 tons. The amounts received at and distributed from Seattle this year were as follows, in tons.

Receipts and exports of coal at Seattle, Washington, in 1896, by months.

Month.	Receipts.	Exports.
	Tons.	*Tons.*
January	52,952	17,222
February	26,843	15,591
March	34,976	17,805
April	31,093	13,333
May	37,462	20,620
June	35,570	18,180
July	32,444	19,825
August	26,448	11,861
September	29,320	11,826
October	40,045	15,987
November	43,450	15,021
December	42,450	18,515
Total	433,053	195,786

The coal trade has been gaining recently, and with the demands of the new steamship lines running to this port and the increased activity of industries that may confidently be counted upon throughout 1897, the trade in coal will show a much greater gain next year.

MACHINE-MINED BITUMINOUS COAL.

In the following table are presented some interesting statistics in regard to the progress made in the use of coal-mining machines during the past five years. These statistics are not complete, but they are sufficiently accurate for practical purposes. They show that in fifteen States the amount of coal mined by machines has increased from 2,739,743 short tons in 1891 to 12,553,522 tons in 1896, or about 4.6 times, while the aggregate output of these fifteen States has increased only about 16 per cent. The percentage of the total product that was mined by machines in 1891 was 3.3. In 1896, 13 per cent of the total product of the fifteen States was mined by machines. Eight of the fifteen States named in the table did not use mining machines in 1891, but the amount mined by machines in these eight States in 1896 was less than 900,000 tons. Montana was the most important of them. Of the total machine-mined tonnage in these States, Montana had more than 65 per cent, and the Indian Territory about 22 per cent. The amount produced by machines in the other six of these eight States in 1896 was only a little over 100,000 tons. Montana's machine-mined coal in 1896 was more than the entire output of the State in 1891 and more than one-third of the total product of the State in 1896.

Of the other seven States, Pennsylvania furnishes the most striking example. The number of tons reported as mined by machines in 1891

was only 213,402, about 0.5 per cent of the total. In 1896 the machine-mined product exceeded 6,000,000 tons, more than 12 per cent of the total product. The product of machine-mined coal in Ohio about doubled in the five years. West Virginia's, also, was about double. The coal mined by machines in Indiana in 1896 was over four times that of 1891.

Coal mined by machines in fifteen States in 1891 and 1896.

State.	Number firms using machines in 1896.	Number machines in use in 1896.	Number tons mined by machines.		Total tonnage.		Percentage of total product mined by machines.	
			1896.	1891.	1896.	1891.	1896.	1891.
Alaska	1	6	15,232	.....	15,232	.....	100	.....
Arkansas	1	14	21,094	.....	675,374	542,379	3.12	.....
Colorado	6	34	318,172	58,000	3,112,400	3,512,632	10.22	1.65
Indiana	11	186	964,378	212,830	3,905,779	2,973,474	24.69	7.16
Indian Territory	3	56	191,585	.....	1,366,646	1,091,032	14.02	.....
Iowa	5	45	84,556	41,540	3,954,028	3,825,495	2.14	1.09
Missouri	1	4	47,827	.....	2,331,542	2,674,606	2.05	.....
Montana	3	62	579,414	.....	1,543,445	541,861	37.54	.....
North Dakota	1	1	15,000	.....	78,050	30,000	19.22	.....
Ohio	31	209	3,368,349	1,654,081	12,875,202	12,868,683	26.16	12.85
Pennsylvania	41	454	6,092,644	213,402	49,557,453	42,788,490	12.29	.50
Utah	1	1	760	.....	418,627	371,045	.18	.....
Washington	1	3	3,920	.....	1,195,904	1,056,249	.33	.....
West Virginia	7	25	430,944	205,784	12,876,296	9,220,665	3.35	2.23
Wyoming	2	39	419,647	354,106	2,229,624	2,327,841	18.82	15.21
United States	115	1,139	12,553,522	2,739,743	96,135,602	83,824,452	13.06	3.27

PRODUCTION OF COAL BY STATES.

In the list of coal-producing States, Pennsylvania not only continues to hold first place, but, notwithstanding a decreased output of both anthracite and bituminous coal, aggregating nearly 5,000,000 tons, she maintains her supremacy by contributing more than 50 per cent of the total coal product. So far as we have any records, Pennsylvania has always produced more than half of the coal mined in the United States. Pennsylvania's percentage of the total has been as much as 65; the lowest was 52, in 1888. Each of these extremes has been reached but once. The average percentage mined in Pennsylvania has averaged 56 for the past seventeen years. It is not probable that any person living to-day will see Pennsylvania take other than first place as a coal producer.

The State second in importance as a coal producer is Illinois. Her product in 1896 was 19,786,626 short tons, a little more than 10 per cent of the total. West Virginia and Ohio are closely tied for third place in 1896, each producing 6.7 per cent of the total, and the former leading

the latter by only a little over 1,000 tons in a total of over 12,875,000 tons each. Alabama remains in fifth place, with 3 per cent of the total product; Maryland advances from eighth to sixth place, with 2.2 per cent; Iowa and Indiana follow, each with a little over 2 per cent; Kentucky occupies ninth place, with 1.7 per cent of the total; Colorado, tenth, with 1.6 per cent; Kansas, eleventh, 1.5 per cent; Tennessee, twelfth, 1.4 per cent; Missouri, thirteenth, 1.2 per cent, and Wyoming, fourteenth, 1.16 per cent. None of the other States produced as much as 1 per cent of the total.

The details of the production in the various States are discussed separately in the following pages:

ALABAMA.

Total product in 1896, 5,748,697 short tons; spot value, $5,174,135.

The exceptionally favorable conditions that exist in Alabama for the manufacture of iron at low cost were exemplified in the statistics of pig iron and coal production in 1896. Alabama is the fourth State in the Union in importance of pig iron production, and fifth in the production of coal. The three States preceding Alabama in pig-iron production are (1) Pennsylvania, (2) Ohio, and (3) Illinois. In each of these three States the production of pig iron in 1896 was less than in 1895. Pennsylvania's output of pig iron decreased 15 per cent, Ohio's 18 per cent, and Illinois's 8 per cent. The total decrease in pig-iron production throughout the United States was about 9 per cent. In opposition to this Alabama increased her pig-iron production from 854,667 long tons to 922,170 long tons, about 8 per cent. While the production of coal did not increase in the same proportion, there was an increase from 5,693,775 short tons in 1895 to 5,748,697 tons in 1896, the value of the product increasing in about the same proportion.

In a contribution to the American Manufacturer, of Pittsburg, Pennsylvania (June 24, 1897), Mr. William M. Brewer, of Birmingham, makes the following statement in regard to the coal and iron resources of Alabama:

The geological formations in Jefferson and adjacent counties are such that coal, red hematite, and limonite iron ores are found within easy access of each other, while limestone and dolomite for fluxing also occur in close proximity. It is impossible to enter into a discussion of the geology in a short article, but the reports published by the State survey are voluminous and very thorough. These can be obtained from Dr. Eugene A. Smith, State geologist, University, Alabama.

To illustrate the advantageous occurrences of these mineral resources, it is only necessary to visit the property of the Woodward Iron Company, where a short haul over the company's private railroad transports the coal to the coke ovens, and ore to the furnaces. These plants are located at Woodward, a few miles from Birmingham. To a great extent the same rule applies to the properties of the other iron companies in

the district. Another advantage which should not be overlooked is the presence of such quantities of lime combined with the hard variety of red hematite as to render that ore almost self-fluxing.

In the early days of iron making in the South, so little attention was paid to the laboratory practice that much of the natural advantages gained through the location of the coal and ore was lost. In consequence of the neglect of laboratory work, the grade of iron was not as good as it should have been. But for the past four or five years this has been corrected, and to-day a proper appreciation is being shown toward the grade of ore, coke, and fluxing stone, as well as mixture of ores which constitute the furnace burdens. As a result the quality of the pig iron has been very materially advanced, while the production of the furnaces has been more than doubled at a very slight increase in cost for labor.

There are at present in the Birmingham district proper four companies operating, viz: The Tennessee Coal, Iron, and Railroad Company, with its furnaces located in Birmingham, Ensley, and Bessemer; the Sloss Iron and Steel Company, with furnaces on the outskirts of Birmingham; the Woodward Iron Company, with its furnaces at Woodward, a few miles west from Birmingham; and the Pioneer Mining and Manufacturing Company, with its furnaces at Thomas, between Birmingham and Ensley. Each of these companies owns its coal and iron ore mines and manufactures its own coke, but for commercial reasons the Pioneer purchases coal from the Tennessee company, the coal being delivered at the coke ovens at Thomas, and coked by the Pioneer company.

Besides these four iron companies there are in the brown-iron-ore district within 100 miles of Birmingham several companies which a few years since manufactured charcoal iron exclusively for the manufacture of car wheels. At Ironaton and Anniston there are also coke furnace plants as well as charcoal. The limited demand for charcoal pig since about 1893 has caused the suspension of operations at all those furnaces, except at Rock Run, in Cherokee County, which is owned by the Bass Furnace Company. Most of the product of this furnace is used in their car-wheel foundry at Fort Wayne, Indiana.

The coal industry is represented by about 80 companies within 100 miles from Birmingham. These are actively operating nearly 200 openings, and producing at the present time an aggregate of about 400,000 tons per month. Twenty-five years ago there were only two coal mines in active operation, and the price paid for mining was $1.60 per ton, while to-day it averages about 40 cents.

Since the Warrior River has been made navigable above Tuscaloosa the mines in that vicinity have been enabled to transport much of their production by barge to Mobile, and only recently a towage of 2,000 tons of this coal was delivered on consumer's premises in Mobile at $2 per ton. The appropriation of $15,000 by the Government for the

survey of a canal from Birmingham to the Warrior River to insure a water haul for the coal from that immediate vicinity to Mobile is considered by some as likely to prove of important benefit to the coal industry. Even if it should be demonstrated that the construction of such a canal is practicable, the completion of it would be so far in the future that the subject is hardly worthy of discussion at the present time, so far as its influence on the coal industry is concerned.

In the following tables are exhibited the details of production in 1895 and 1896:

Coal product of Alabama in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bibb	3	600,006	4,765	25,180	23,781	653,732	$653,732	$1.00	198	1,259
Jefferson	22	1,879,665	249,540	75,926	1,521,194	3,726,325	3,249,287	.87	267	5,825
St. Clair	2	30,531	125	150	.....	30,806	14,893	.48	126	96
Shelby	5	50,524	100	2,130	.....	52,754	91,350	1.73	169	198
Tuscaloosa	6	130,851	574	2,965	73,727	208,117	202,512	.97	282	612
Walker	23	855,556	4,947	30,670	55,068	946,241	847,748	.90	210	2,231
Blount, Etowah, Winston	3	63,300	4,500	.....	.....	67,800	55,300	.82	252	125
Small mines	.....	.....	8,000	.....	.....	8,000	12,000	1.50	.....	.....
Total	64	3,610,433	272,551	137,021	1,673,770	5,693,775	5,126,822	.90	244	10,346

Coal product of Alabama in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bibb	5	661,801	1,944	31,740	15,357	710,842	$634,478	$0.89	232	1,195
Jefferson	32	1,804,763	245,378	75,760	1,603,818	3,729,719	3,304,949	.89	290	5,134
St. Clair	2	32,062	245	1,061	.....	33,368	33,368	1.00	154	162
Shelby	5	50,633	2,060	230	.....	52,923	92,669	1.75	139	302
Tuscaloosa	6	115,915	7,996	3,480	77,832	205,223	230,979	1.13	258	588
Walker	26	852,099	2,333	25,697	72,513	952,642	813,712	.85	189	2,403
Blount, Cullman, Etowah, Winston	4	38,220	460	300	.....	38,980	38,980	1.00	143	110
Small mines	.....	.....	25,000	.....	.....	25,000	25,000	1.00	.....	.....
Total	80	3,555,493	285,416	138,268	1,769,520	5,748,697	5,174,135	.90	248	9,894

The following table shows the annual output of coal in the State since 1870, with the exception of 1871 and 1872, for which no statistics were obtained:

Annual coal product of Alabama since 1870.

Year.	Short tons.	Value.	Average price per ton.	Average number of days worked.	Average number of employees.
1870	13,200				
1873	44,800				
1874	50,400				
1875	67,200				
1876	112,000				
1877	196,000				
1878	224,000				
1879	280,000				
1880	380,800				
1881	420,000				
1882	896,000				
1883	1,568,000				
1884	2,240,000				
1885	2,492,000				
1886	1,800,000	$2,574,000	$1.43		
1887	1,950,000	2,535,000	1.30		
1888	2,900,000	3,335,000	1.15		
1889	3,572,983	3,961,491	1.10	248	6,975
1890	4,090,469	4,202,469	1.03	217	10,642
1891	4,759,781	5,087,596	1.07	268	9,302
1892	5,529,312	5,788,898	1.05	271	10,075
1893	5,136,935	5,096,792	.99	237	11,294
1894	4,397,178	4,085,535	.93	238	10,859
1895	5,693,775	5,126,822	.90	244	10,346
1896	5,745,617	5,171,055	.90	248	9,894

It will be seen from the above table that the product in 1894 was the smallest since 1890 and the total value less than in any year since 1889. The average price obtained in 1895 and 1896 was the lowest in the history of coal mining in the State.

In the following table is shown the coal product in Alabama, by counties, for a period of eight years, with the increase or decrease in each county during 1896 as compared with 1895:

Coal product of Alabama, by counties, since 1889.

County.	1889.	1890.	1891.	1892.	1893.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bibb	500,525	221,811	619,809	793,469	806,214
Blount	.....	.....	.....	.....	.....
Dekalb	.....	.....	.....	.....	40
Etowah	.....	.....	.....	.....	.....
Jackson	.....	.....	.....	.....	.....
Jefferson	2,437,446	2,665,060	2,905,343	3,399,274	3,093,277
St. Clair	40,557	33,653	66,096	24,950	72,000
Shelby	84,333	25,022	34,130	27,968	55,339
Tuscaloosa	16,141	65,517	142,184	168,039	167,516
Walker	488,226	767,346	980,219	1,103,612	927,349
Winston	.....	.....	.....	.....	3,200
Small mines	5,255	12,000	12,000	12,000	12,000
Total	3,572,983	4,090,409	4,759,781	5,529,312	5,136,935

County.	1894.	1895.	1896.	Increase, 1896.	Decrease, 1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bibb	401,061	653,732	710,842	57,110	.....
Blount	8,000	62,400	32,760	.....	29,640
Cullman	.....	.....	1,000	1,000	.....
Dekalb	.....	.....	.....	.....	.....
Etowah	.....	900	3,080	2,180	.....
Jackson	6,011	.....	.....	.....	.....
Jefferson	2,766,302	3,726,325	3,729,719	3,394	.....
St. Clair	43,517	30,806	33,368	2,562	.....
Shelby	76,619	52,754	52,923	169	.....
Tuscaloosa	191,081	208,117	205,223	.....	2,894
Walker	891,953	946,241	952,642	6,401	.....
Winston	4,634	4,500	2,140	.....	2,360
Small mines	8,000	8,000	25,000	17,000	.....
Total	4,397,178	5,693,775	5,748,697	*a* 54,922	.....

a Net increase.

Previous to 1889 the statistics of coal production in Alabama did not show the value by counties nor the average prices. The following table exhibits the average price per ton realized in counties producing 10.000 tons in each year since 1889:

Average prices for Alabama coal at the mines since 1889, by counties.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Bibb	$1.20	$1.10	$1.17	$1.08	$1.00	$1.00	$1.00	$0.89
Blount	.....	.....	.....	.....	.....	.....	.80	1.00
Jefferson	1.07	1.00	1.04	1.03	.98	.90	.87	.89
St. Clair	1.25	1.18	1.14	1.10	1.06	.96	.48	1.00
Shelby	1.79	2.50	2.60	2.61	1.82½	1.44	1.73	1.75
Tuscaloosa	1.23	1.05	1.03	1.07	1.05	1.06	.97	1.13
Walker	1.04	1.00	1.03	1.02	.98	.91	.90	.85
General average	1.10	1.03	1.07	1.05	.99	.93	.90	.90

In the above table only those counties are considered whose annual product exceeds 10,000 tons. Instead of discussing each county by itself, the foregoing tables have been given as showing in compact form the essential matters of interest in regard to the product and value for a series of years. Similarly the following table shows the statistics of the number of men employed and the average working time in counties producing more than 10,000 tons in each year:

Statistics of labor employed and working time at Alabama coal mines.

County.	1890.		1891.		1892.		1893.	
	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.
Bibb	250	1,340	243	1,175	290	1,500	216	1,280
Blount	.....	.....	.....	.....	.....	.....	.....	.....
Jefferson	267	6,209	274	5,405	289	5,860	258	7,033
St. Clair	250	1,340	242	180	200	75	198	135
Shelby	200	150	265	200	225	150	200	255
Tuscaloosa	157	268	287	298	261	281	247	412
Walker	210	1,500	219	2,044	217	2,209	187	2,158
The State	217	10,642	268	9,302	271	10,075	237	11,294

Statistics of labor employed and working time at Alabama coal mines—Continued.

County.	1894.		1895.		1896.	
	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.
Bibb	204	1,089	198	1,259	232	1,195
Blount	.....	.....	275	95	225	46
Jefferson	272	6,567	267	5,825	290	5,134
St. Clair	225	98	126	96	154	162
Shelby	114	405	169	198	139	302
Tuscaloosa	261	363	282	612	258	588
Walker	180	2,252	210	2,231	189	2,403
The State	238	10,859	244	10,346	248	9,894

ALASKA.

The Territory of Alaska appears as a commercial coal producer for the first time in 1896. The product amounted to 15,232 short tons, valued at $54,400. About three-fourths of the product was shipped from the mines for use principally on steamers engaged in coastwise traffic. The other fourth was consumed locally. The output was from Cook Inlet, the deposits of which have been described in previous volumes of Mineral Resources.

ARKANSAS.

Total product in 1896, 675,374 short tons; spot value, $755,577.

The production of coal in Arkansas has with two exceptions increased each year since 1882. The exceptions were in 1892 and 1894. In 1894 the product was 62,137 short tons, or about 11 per cent, less than 1893. The product in 1895 was 85,696 short tons, or nearly 17 per cent, more than in 1894; exceeded the output in 1893 by 23,559 short tons and was the largest obtained up to that time. A further increase of 77,052 short tons, or 13 per cent, was made in 1896, bringing the output up to 675,374 tons. The value, however, increased only $4,421, or a little more than one-half of one per cent, being $755,577 against $751,156 in 1895, so that while the total production was the largest ever obtained, the value per ton was the lowest on record.

In the following tables are shown the statistics of production in Arkansas in 1895 and 1896, with the distribution of the product for consumption:

Coal product of Arkansas in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Franklin ..... Pope	3	123,012	1,000	1,000	125,012	$176,114	$1.41	251	240
Johnson	2	125,926	1,000	1,000	127,926	153,311	1.20	193	220
Sebastian	8	327,174	6,935	5,275	339,384	409,731	1.21	148	758
Small mines ...	.....	.....	6,000	.....	6,000	12,000	2.00	.....	.....
Total	13	576,112	14,935	7,275	598,322	751,156	1.25	176	1,218

Coal product of Arkansas in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Franklin	2	111,280	800	3,300	115,380	$134,812	$1.17	147	269
Johnson ..... Pope	3	103,281	750	3,300	107,331	160,854	1.48	156	285
Sebastian	9	432,679	1,090	12,894	446,663	447,911	1.00	180	953
Small mines ...	.....	.....	6,000	.....	6,000	12,000	2.00	.....	.....
Total	14	647,240	8,640	19,494	675,374	755,577	1.12	168	1,507

According to the Tenth Census of the United States (1880) the coal output of Arkansas was 14,778 short tons, worth at the mines $33,535. No statistics were obtained in 1881. Since 1882 the statistics of production, as far as have been ascertained, have been as follows:

Annual production of coal in Arkansas since 1882.

Year.	Short tons.	Value.	Average price per ton.	Average number of days worked.	Average number of employees.
1882	5,000	.....	.....	.....	.....
1883	50,000	.....	.....	.....	.....
1884	75,000	.....	.....	.....	.....
1885	100,000	.....	.....	.....	.....
1886	125,000	$200,000	$1.60	.....	.....
1887	129,600	194,400	1.50	.....	.....
1888	276,871	415,306	1.50	.....	978
1889	279,584	395,836	1.42	.....	677
1890	399,888	514,595	1.29	214	938
1891	542,379	647,560	1.19	214	1,317
1892	535,558	666,230	1.24	199	1,128
1893	574,763	773,347	1.34	151	1,559
1894	512,626	631,988	1.22	134	1,493
1895	598,322	751,156	1.25	176	1,218
1896	675,374	755,577	1.12	168	1,507

In the following table is shown the annual product since 1887, by counties:

Coal product of Arkansas since 1887, by counties.

County.	1887.	1888.	1889.	1890.	1891.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Franklin	.....	.....	.....	.....	.....
Johnson	81,900	106,037	105,998	89,000	80,000
Pope	8,200	10,240	6,014	4,000	5,000
Sebastian	39,500	160,594	165,884	300,888	451,379
Small mines	.....	.....	*a* 1,688	6,000	6,000
Total	129,600	276,871	279,584	399,888	542,379

County.	1892.	1893.	1894.	1895.	1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Franklin	.....	9,879	147,728	252,938	222,711
Johnson	91,960	97,733			
Pope	17,500	12,250	17,788		
Sebastian	420,098	448,901	341,110	339,384	446,663
Small mines	6,000	6,000	6,000	6,000	6,000
Total	535,558	574,763	512,626	598,322	675,374

a Product of Franklin County according to Eleventh Census.

CALIFORNIA.

Total product in 1896, 78,544 short tons; spot value $166,123.

California's coal product increased from 75,453 short tons in 1895 to 78,544 short tons in 1896, a gain of 3,091 short tons. The value of the product, on the other hand, declined from $175,778 to $166,123, a loss of $9,655.

The coals of California are all lignitic, and are confined to a comparatively local market. They will not compete with the true bituminous coals in a common market, but their availability is of advantage in keeping prices for other coals at a moderate figure. When the prices of true coals get beyond a certain limit, consumers find it to their advantage to buy lignite. As the markets of the large towns are well supplied by superior coals from Washington and foreign sources, as well as better lignites from Coos Bay, Oregon, it is not probable that the coal production of California will ever obtain very great importance.

The following tables show the production of coal in California during 1895 and 1896:

Coal product of California in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Contra Costa	2	41,220	1,191	2,842	45,253	$121,247	$2.68	251	135
Amador, Orange, Riverside	3	19,220	10,980	.....	30,200	54,531	1.81	288	55
Total	5	60,440	12,171	2,842	75,453	175,778	2.33	262	190

Coal product of California in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Contra Costa	2	48,008	1,398	3,599	53,005	$128,209	$2.42	301	122
Amador, San Diego	2	21,600	3,139	800	25,539	37,914	1.48	284	35
Total	4	69,608	4,537	4,399	78,544	166,123	2.12	297	157

The following table shows the total output of California since 1883, with the value, when it has been reported, and the statistics of the number of employees and the average working time during the past seven years:

Coal product of California since 1883.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1883	76,162	.....	.....	.....	.....
1884	77,485	.....	.....	.....	.....
1885	71,615	.....	.....	.....	.....
1886	100,000	$300,000	$3.00	.....	.....
1887	50,000	150,000	3.00	.....	.....
1888	95,000	380,000	4.00	.....	.....
1889	121,820	288,232	2.36	.....	.....
1890	110,711	283,019	2.56	301	364
1891	93,301	204,902	2.20	222	256
1892	85,178	209,711	2.46	204	187
1893	72,603	167,555	2.31	208	158
1894	67,247	155,620	2.31	232	125
1895	75,453	175,778	2.33	262	190
1896	78,544	166,123	2.12	297	157

COLORADO.

Total product in 1896, 3,112,400 short tons; spot value, $3,606,642.

Colorado maintained the same position in the rank of coal-producing States as she occupied in 1895, tenth place. Among the States west of the Mississippi River she ranks second, being preceded by Iowa. There was a slight increase (29,418 short tons) in 1896 over the product of 1895, but the State has not recovered the prominence occupied in 1891, 1892, and 1893. In each of these years the output exceeded 3,500,000 and in one, 1893, exceeded 4,000,000 tons. The great strike of 1894 brought the production down to 2,831,409 tons, from which the State has not yet recovered.

On February 18, 1896, a terrific explosion and fire occurred at the Vulcan mine, near Newcastle, in Garfield county, in which 50 lives were lost.

The force of the explosion was such that the buildings and trestle at the mouth of the slope were completely wrecked, a hole 100 feet square carved out of the hillside at the mouth of the incline, while timbers 2 feet square were blown into the ground and river 400 feet away. One miner was on his way down the slope when the explosion occurred, and his mangled remains were subsequently found several hundred feet

away from the mouth of the slope. There were 140 men employed in and about the mine at the time, and about 50 were at work underground.

State Coal Mine Inspector Griffith was at the mine February 8, and pronounced it in better condition than it had ever been before. An immense fan in the slope, which was about 500 feet in depth, seemed to afford complete ventilation, and every possible precaution was taken to prevent an explosion of the gas known to exist in the mines of this district. It was believed at first that a high-lighted fuse ignited the gas in one of the new rooms while the men were blasting down coal. The old Vulcan mine has been abandoned for several years, and was in no way connected with the present property, a new slope having been driven into the hillside.

At the time of the explosion the mine was being worked to its full capacity, the output being from 17 to 20 cars per day.

Inspector Griffith made an examination after the fire was extinguished. There was nothing found to indicate how the accident happened. Mr. Griffith, from his experience in like disasters, concluded that it was probably caused by a small shot put in to open a chute that had been clogged. Though there was not an appreciable amount of the extremely explosive powder in the air, the conditions may have been such that the slight discharge of a small shot set off the dust. All lamps on the dead miners were found closed and locked, so they surely did not cause the explosion. The injury done by the explosion and fire to the underground workings and exterior buildings was so complete that it is not probable any attempt will be made to reopen the mine. The mine was operated by the Colorado Fuel and Iron Company.

During 1896 an arrangement was perfected between the Atchison, Topeka and Santa Fe Railroad Company and the Colorado Fuel and Iron Company by which the former leased to the latter all of their coal mines in Colorado. The railroad company leased also its mines in Kansas and withdrew entirely from the coal-mining business.

In the latter part of 1896 it was reported that a combination had been formed among the lignite coal-mining companies operating in Boulder County. The arrangement is on the order of a clearing house, granting to each company a certain percentage of the total output, the percentage being based upon the size of each mine and its capacity. Twenty-six mines are said to be participating in the arrangement.

Coal product of Colorado in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Boulder	13	356,360	7,755	13,280	.....	377,395	$521,985	$1.38	160	868
Delta	3	1,610	2,854	50	.....	4,514	6,234	1.38	265	10
El Paso	2	47,940	750	3,150	.....	51,840	52,994	1.02	219	117
Fremont	5	293,262	3,976	18,106	.....	315,344	526,434	1.67	150	1,016
Garfield	3	152,345	204	12,379	109,343	274,271	293,926	1.07	246	398
Gunnison	7	160,338	981	6,126	71,737	239,182	380,754	1.60	238	393
Huerfano	6	354,744	2,056	29,896	.....	386,696	402,905	1.04	167	816
La Plata	7	92,528	8,431	310	4,830	106,099	155,107	1.42	80	502
Las Animas	9	922,861	11,354	15,583	303,351	1,253,149	1,212,527	.97	214	1,839
Mesa	2	40,000	1,000	150	.....	41,150	77,225	1.88	290	47
Montezuma	3	.....	190	.....	.....	190	790	4.16	54	5
Rio Blanco	4	.....	1,761	.....	.....	1,761	3,177	1.80	187	6
Routt	16	.....	2,752	15	.....	2,767	4,396	1.59	63	27
Weld	5	23,590	4,344	.....	.....	27,934	35,306	1.26	220	74
Arapahoe, Montrose	2	.....	680	10	.....	690	1,425	2.07	71	7
Total	87	2,445,578	49,088	99,055	489,261	3,082,982	3,675,185	1.20	182	6,125

Coal product of Colorado in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Boulder	15	415,878	17,388	14,240	1,200	448,706	$593,523	1.32	144	682
Fremont	9	269,930	7,456	17,436	.....	294,822	464,615	1.58	110	1,407
Garfield	3	155,585	604	9,608	.....	165,797	173,230	1.05	136	314
Gunnison	7	160,782	3,725	6,872	89,217	260,596	397,508	1.53	189	576
Huerfano	7	324,626	2,264	26,448	.....	353,338	375,228	1.06	219	647
La Plata	8	86,768	10,826	448	6,619	104,661	154,475	1.46	215	179
Las Animas	10	929,822	9,927	15,621	306,185	1,261,555	1,185,113	.94	192	2,578
Mesa	3	28,200	779	.....	.....	28,979	43,354	1.50	234	54
Montezuma	3	.....	203	.....	.....	203	791	3.90	110	4
Pitkin	2	39,342	347	2,455	126,269	168,413	189,951	1.13	267	187
Rio Blanco	4	.....	1,400	.....	.....	1,400	2,500	1.79	173	7
Routt	8	550	1,282	.....	.....	1,832	2,702	1.47	65	17
Weld	2	.....	4,300	.....	.....	4,300	5,120	1.19	207	13
Arapahoe, El Paso, Larimer	3	12,544	1,398	.....	.....	13,942	13,298	.95	177	23
Delta, Montrose	4	.....	3,856	.....	.....	3,856	5,234	1.36	163	16
Total	88	2,424,027	65,755	93,128	529,490	3,112,400	3,606,642	1.16	172	6,704

In the table below is shown the total product of the State, by counties, since 1887, with the increases and decreases in 1896 as compared with 1895.

Coal product of Colorado since 1887, by counties.

[Short tons.]

County.	1887.	1888.	1889.	1890.	1891.	1892.
Arapahoe	16,000	1,700	823	700	1,273	654
Boulder	297,338	315,155	323,096	425,704	498,494	545,563
Dolores	1,000	200	.....	800	3,475	.....
El Paso	47,517	44,114	54,212	25,617	34,364	23,014
Fremont	417,326	438,789	274,029	397,418	545,789	538,887
Garfield	30,000	115,000	239,292	183,884	191,994	277,794
Gunnison	243,122	258,374	252,442	229,212	261,350	225,260
Huerfano	131,810	159,610	333,717	427,832	494,466	541,733
Jefferson	12,000	9,000	10,790	10,984	17,910	21,219
Las Animas	506,540	706,455	993,534	1,154,668	1,219,224	1,171,069
La Plata	22,880	33,625	34,971	43,193	72,471	81,500
Mesa	.....	300	1,100	1,000	5,000	5,050
Park	23,421	46,588	41,823	49,594	52,626	76,022
Pitkin	4,000	28,113	.....	74,362	91,642	.....
Weld	39,281	28,054	28,628	46,417	22,554	2,205
Routt	.....	.....	1,491	705	.....	330
Larimer	.....	.....	100	1,500	.....	.....
Douglas	3,500	400	260	700	.....	200
San Miguel	.....	.....	1,800	1,500	.....	.....
Delta	.....	.....	1,357	775	.....	200
Montezuma	.....	.....	816	238	.....	30
Montrose	.....	.....	.....	.....	.....	.....
Rio Blanco	.....	.....	2,900	200	.....	100
Total	1,795,735	2,185,477	2,597,181	3,077,003	3,512,632	3,510,830

County.	1893.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Arapahoe	633	559	540	398	.....	142
Boulder	663,220	419,734	377,395	448,706	71,311	.....
Dolores	.....	.....	.....	.....	.....	.....
El Paso	19,415	30,268	51,840	12,544	.....	39,296
Fremont	536,787	245,616	315,344	294,822	.....	20,522
Garfield	212,918	75,663	274,271	165,797	.....	108,474
Gunnison	258,539	200,325	239,182	260,596	21,414	.....
Huerfano	521,205	408,045	386,696	353,338	.....	33,358
Jefferson	1,895	34,108	.....	.....	.....	.....
Las Animas	1,587,338	1,153,863	1,253,149	1,261,555	8,406	.....
La Plata	104,992	53,571	106,099	104,661	.....	1,438

Coal product of Colorado since 1887, by counties—Continued.

[Short tons.]

County.	1893.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Mesa	18,100	31,750	41,150	28,979	.....	12,171
Park	39,095	28,943	.....	.....	.....	.....
Pitkin	99,211	97,724	.....	168,413	168,413	.....
Weld	35,355	42,818	27,934	4,300	.....	23,634
Routt	816	2,710				
Larimer	.....	.....				
Douglas	200	.....				
San Miguel	.....	.....				
Delta	2,580	3,697	9,382	8,291	.....	1,091
Montezuma	90	235				
Montrose	.....	100				
Rio Blanco	.....	1,680				
Total	4,102,389	2,831,409	3,082,982	3,112,400	*a* 29,418	.....

a Net increase.

In connection with the above table it will be of interest to note the variations in the average prices in each county. The statistics of value by counties were not obtained prior to 1889, when the Eleventh Census was taken. Since that year, with the exception of 1891, the statistics have been collected in that way by the Geological Survey, and the average prices for seven years are shown in the following table. Only those counties are considered whose product averages 10,000 tons or over.

Average prices for Colorado coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1892.	1893.	1894.	1895.	1896.
Boulder	$1.53	$1.32	$1.36	$1.28	$1.28	$1.38	$1.32
El Paso	1.27	1.10	1.25	1.20	1.17	1.02	.89
Fremont	2.12	1.54	1.92	1.60	1.67	1.67	1.58
Garfield	1.64	1.46	2.00	1.19	1.13	1.07	1.05
Gunnison	2.28	1.95	1.84	1.67	1.65	1.60	1.58
Huerfano	1.37	1.31	2.00	1.15	1.08	1.04	1.06
Jefferson	2.54	2.99	1.90	2.50	2.00	.....	.....
La Plata	1.91	2.76	1.76	1.45	1.63	1.42	1.46
Las Animas	1.16	1.16	1.22	1.01½	1.01	.97	.94
Park	2.49	3.00	2.40	2.50	3.15	.....	.....
Pitkin	.....	1.45	.....	1.12	1.13	.....	1.13
Weld	1.51	1.38	2.00	1.49	1.73	1.26	.....
The State	1.54	1.40	1.62	1.24	1.24	1.20	1.16

In the following table is shown the number of men employed during 1890, 1892, 1893, 1894, 1895, and 1896, in counties producing 10,000 tons or over, together with the average working time for the past five years:

Statistics of labor employed and working time at Colorado coal mines.

County.	1890.	1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.
Boulder	979	193	1,128	142	1,143
El Paso	54	200	40	143	88
Fremont	1,049	195	1,040	182	1,268
Garfield	334	248	423	121	300
Gunnison	389	259	368	168	576
Huerfano	907	253	947	172	999
Jefferson	79	233	50	250	7
La Plata	97	288	124	235	152
Las Animas	1,531	246	1,450	229	2,243
Park	150	266	140	236	185
Pitkin	96	.....	.....	211	115
Weld	118	300	4	217	79
The State	5,827	229	5,747	188	7,202

County.	1894.		1895.		1896.	
	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.
Boulder	150	1,091	160	868	144	682
El Paso	241	70	219	117	192	15
Fremont	104	1,580	150	1,016	110	1,407
Garfield	142	122	246	398	136	314
Gunnison	156	332	238	393	189	576
Huerfano	186	753	167	816	219	647
Jefferson	162	25	.....	.....	.....	.....
La Plata	46	349	80	502	215	179
Las Animas	199	1,699	214	1,839	192	2,578
Park	231	108	.....	.....	.....	.....
Pitkin	266	135	.....	.....	267	187
Weld	145	145	220	74	.....	.....
The State	155	6,507	182	6,125	172	6,704

The State is divided, for sake of convenience, into four geographical divisions, known, respectively, as the northern, central, southern, and

western. The first mentioned contains the counties of Arapahoe, Boulder, Jefferson, Larimer, Routt, and Weld. The central division embraces Douglas, El Paso, Fremont, and Park counties. The southern division contains the counties of Dolores, Huerfano, La Plata, and Las Animas, while Delta, Garfield, Gunnison, Mesa, Montezuma, Montrose, Pitkin, Rio Blanco, and San Miguel counties lie in the western district.

The following table shows the annual product of coal in Colorado since 1864, that for the years previous to 1877 being given by counties and subsequent to 1878 by districts:

Coal product of Colorado from 1864 to 1896.

Year.	Locality.	Product.	
		Short tons.	
1864	Jefferson and Boulder counties		500
1865	do		1,200
1866	do		6,400
1867	do		17,000
1868	do		10,500
1869	do		8,000
1870	do		13,500
1871	do		15,600
1872	Jefferson and Boulder counties	14,200	
	Weld County	54,340	
			68,540
1873	Jefferson and Boulder counties	14,000	
	Weld County	43,790	
	Las Animas and Fremont counties	12,187	
			69,977
1874	Jefferson and Boulder counties	15,000	
	Weld County	44,280	
	Las Animas and Fremont counties	18,092	
			77,372
1875	Jefferson and Boulder counties	23,700	
	Weld County	59,860	
	Las Animas and Fremont counties	15,278	
			98,838
1876	Jefferson and Boulder counties	28,750	
	Weld County	68,600	
	Las Animas and Fremont counties	20,316	
			117,666
1877			160,000
1878	Northern division	87,825	
	Central division	73,137	
	Southern division	39,668	
			200,630
1879	Northern division	182,630	
	Central division	70,647	
	Southern division	69,455	
			322,732

Coal product of Colorado from 1864 to 1896—Continued.

Year.	Locality.	Product.	
		Short tons.	
1880	Northern division	123,518	
	Central division	136,020	
	Southern division	126,403	
	Western division	1,064	
	Unreported mines	50,000	
			437,005
1881	Northern division	156,126	
	Central division	174,882	
	Southern division	269,045	
	Western division	6,691	
	Unreported mines	100,000	
			706,744
1882	Northern division	300,000	
	Central division	243,694	
	Southern division	474,285	
	Western division	43,500	
			1,061,479
1883	Northern division	243,903	
	Central division	396,401	
	Southern division	501,307	
	Western division	87,982	
			1,229,593
1884	Northern division	253,282	
	Central division	296,188	
	Southern division	483,865	
	Western division	96,689	
			1,130,024
1885	Northern division	242,846	
	Central division	416,373	
	Southern division	571,684	
	Western division	125,159	
			1,356,062
1886	Northern division	260,145	
	Central division	408,857	
	Southern division	537,785	
	Western division	161,551	
			1,368,338
1887	Northern division	364,619	
	Central division	491,764	
	Southern division	662,230	
	Western division	273,122	
			1,791,735
1888	Northern division	353,909	
	Central division	529,891	
	Southern division	899,690	
	Western division	401,987	
			2,185,477

Coal product of Colorado from 1864 to 1896—Continued.

Year.	Locality.	Product.	
		Short tons.	
1889	Northern division	364, 928	
	Central division	370, 324	
	Southern division	1, 362, 222	
	Western division	499, 707	
			2, 597, 181
1890	Northern division	486, 010	
	Central division	473, 329	
	Southern division	1, 626, 493	
	Western division	491, 171	
			3, 077, 003
1891	Northern division	540, 231	
	Central division	632, 779	
	Southern division	1, 789, 636	
	Western division	549, 986	
			3, 512, 632
1892	Northern division	569, 971	
	Central division	638, 123	
	Southern division	1, 794, 302	
	Western division	508, 434	
			3, 510, 830
1893	Northern division	701, 919	
	Central division	694, 708	
	Southern division	2, 213, 535	
	Western division	492, 227	
			4, 102, 389
1894	Northern division	499, 929	
	Central division	304, 827	
	Southern division	1, 615, 479	
	Western division	411, 174	
			2, 831, 409
1895	Northern division	408, 636	
	Central division	367, 184	
	Southern division	1, 745, 944	
	Western division	561, 218	
			3, 082, 982
1896	Northern division	456, 236	
	Central division	307, 366	
	Southern division	1, 719, 554	
	Western division	629, 244	
			3, 112, 400

GEORGIA.

Total product in 1896, 238,546 short tons; spot value, $168,050.

The entire product of Georgia continues to come from two counties, Dade and Walker, in the northwestern corner of the State, and which contain within their boundaries the extreme northeastern extremity of the Warrior coal field of Alabama.

The first output of coal in Georgia of which there is any record was obtained in 1884, the product amounting to 150,000 short tons. The largest production was in 1893, in which year 372,740 short tons are credited to Georgia. Since then the amount of coal mined has decreased each year. In 1894 the output decreased 18,629 tons, about 5 per cent. The following year it decreased 93,113 tons, or about 26 per cent. In 1896 the product was 22,452 tons, or about 8 per cent, less than in 1895. The output in 1896 was only a little more than 60 per cent of that of 1893.

In the following table it will be observed that the number of employees and average working time in the past two years have not decreased in porportion to the production. This is probably due to the employment of State convicts in the mines—500 in 1895 and 360 in 1896.

The following table exhibits the tendency of coal production in the State, with the distribution of the product, value, etc., since 1889:

Coal product of Georgia since 1889.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days worked.	Average number of employees.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
1889	46,131	158	15,000	164,645	225,934	$338,901	$1.50	.....	.....
1890	57,949	.....	.....	170,388	228,337	238,315	1.04	313	425
1891	15,000	1,000	5,000	150,000	171,000	256,500	1.50	312	850
1892	52,614	250	3,756	158,878	215,498	212,761	.99	277	467
1893	196,227	.....	4,869	171,644	372,740	365,972	.98	342	736
1894	178,610	.....	8,978	166,523	354,111	299,290	.85	304	729
1895	135,692	150	6,256	118,900	260,998	215,863	.83	312	*a* 848
1896	120,496	875	7,520	109,655	238,546	168,050	.70	303	*b* 713

a Includes 500 State convicts.
b Includes 360 State convicts.

The following table shows the total annual product since 1884:

Coal product of Georgia since 1884.

Year.	Short tons.	Year.	Short tons.
1884	150,000	1891	171,000
1885	150,000	1892	215,498
1886	223,000	1893	372,740
1887	313,715	1894	354,111
1888	180,000	1895	260,998
1889	225,934	1896	238,546
1890	228,337		

ILLINOIS.[1]

Total product in 1896, 19,786,626 short tons; spot value, $15,809,736.

Statistics relating to the production of coal in the State of Illinois have been compiled under the direction of the State Bureau of Labor Statistics for the past fifteen years. Following the usual custom, the Geological Survey has relied upon the report of the State bureau for the statistics of coal production in 1896. Illinois is the only State for which the statistics of production have not been compiled from direct returns by the operators to the Survey or its duly appointed and sworn special agents.

During the fifteen years in which the State bureau has carried on its work the coal-mining industry has made great advancement both in regard to the quantity and cost of production. While the total number of mines has increased only 28 per cent, the total amount of coal produced has been augmented nearly 80 per cent and the number of men employed about 82 per cent, indicating that, while the increase in product and number of employees has been uniform and parallel, the capacity of individual mines and the consequent economy of production has been increased in a much greater ratio.

In this, the fifteenth annual report, the form of most of the tables will be found to differ materially from those in preceding reports. These changes have been made partly for the sake of condensation and the avoidance of useless repetitions and partly from necessity, in consequence of the redistricting, by the thirty-ninth general assembly of the State into seven instead of five inspection districts.

The following table contains a brief summary of the items of chief interest in this industry for 1896 compared with 1895:

Comparative statement of coal production in Illinois in 1895 and 1896.

Subject of inquiry.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Number of counties in which coal is mined	54	51	.....	3
Number of mines and openings of all kinds	874	901	27	.....
Number of shipping mines	319	330	11	.....
Number of mines in local trade	555	571	16	.....
Number of tons of coal mined, all grades	17,735,864	19,786,626	2,050,762	.....
Number of tons of lump coal (2,000 pounds)	14,045,962	14,210,024	164,062	.....
Number of tons of other grades of coal	3,689,902	5,576,602	1,886,700	.....

[1] Abstract from the fifteenth annual report of the Bureau of Labor Statistics of Illinois.

Comparative statement of coal production in Illinois in 1895 and 1896—Continued.

Subject of inquiry.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Number of acres worked out (estimated)	2,950.69	3,292.49	341.80	.....
Number of employees of all kinds	38,630	37,032	.....	1,598
Number of boys over 14 years of age under ground	811	911	100	.....
Number of employees under ground	34,648	33,175	.....	1,473
Number of employees above ground	3,982	3,857	.....	125
Average number of days active operation—shipping mines	182.2	186	3.8	.....
Aggregate spot value of total product	$14,239,157	$15,809,736	$1,570,579	.....
Aggregate spot value of lump coal	$13,090,836	$12,565,334	.....	$525,502
Aggregate value of other grades of coal	$1,148,321	$3,244,402	$2,096,081	.....
Average value of lump coal per ton at the mine	$0.932	$0.899	.....	$0.033
Average value of other grades of coal at the mine	$0.349	$0.585	$0.236	.....
Average price paid for hand mining—the year	$0.573	$0.530	.....	$0.043
Number of tons of lump coal mined by hand	7,868,006	9,371,582	1,503,576	.....
Number of mining machines in use	322	307	.....	15
Number of tons of coal, all grades, mined by machines	3,531,436	3,871,410	339,974	.....
Number of tons of lump coal mined by machines	2,469,804	2,503,739	33,935	.....
Number of tons of other grades mined by machines	824,235	964,591	140,356	.....
Number of kegs of powder used	324,888	369,505	44,617	.....
Number of men killed	75	77	2	.....
Number of wives made widows	42	44	2	.....
Number of children left fatherless	111	155	44	.....

Comparative statement of coal production in Illinois in 1895 and 1896—Continued.

Subject of inquiry.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Number of men injured so as to lose time	605	672	67	.....
Number of tons of coal mined to each life lost	236,478	256,969	20,491	.....
Number of tons of coal mined to each man injured	29,312	29,444	132	.....
Number of employees to each life lost	515	481	.....	34
Number of employees to each man injured	64	55	.....	9
Number of new mines opened and old ones reopened	115	142	27	.....
Number of mines closed or abandoned	78	115	37	.....

An examination of this table shows a considerable increase in the output over that of 1895, the tonnage reaching a total equaled but once, in 1893, in the history of coal mining in this State.

The average price of lump or screened coal was less than in 1895, but the average price of other grades shows a considerable advance. This, taken by itself, would appear remarkable, but when the relatively large increase in the tonnage of other grades is taken into consideration, the solution seems to be that the general effort on the part of the operators to introduce larger screens is having a very perceptible effect both on the amount and value of the coal which passes through them.

The number of accidents, both fatal and nonfatal, was greater in 1896 than in 1895; and this despite the fact that strenuous efforts have been made to enforce the laws having for their purpose the protection and preservation of the life and health of the miner. This steady increase in the number of casualties seems to be due partly to defects in the laws themselves, but mainly to a condition which is not controlled by any statute.

The prevailing hard times have forced large numbers of men into the ranks of the army of the unemployed. Among these the struggle for a mere existence is constant and intense. The opportunity to earn the bare necessities of life, even at the hardest and most hazardous employment, is a prize to be fought for. The lower the intelligence of the individual, the lower the standard of living, and to that extent he has an advantage over his fellows.

The same cause which has operated to swell the ranks of those seeking employment has also served to make fiercer the competition between

those to whom they must look for employment. The coal operators have extensive and costly plants, representing, in the aggregate, many millions of dollars. Every day of idleness means enormous losses. But to operate them without a vastly greater loss, there must be a sale for the product. This means lower prices, and lower prices means reduced cost of operation, and when this object is sought to be attained wages are always the first point of attack.

These two conditions, operating together, have had their inevitable result. The general intelligence of the coal miners, as a class, has become lower with each succeeding year. Each year finds in the coal mines men of lower skill in their craft, less appreciation of its dangers and less knowledge of the methods of avoiding them. This seems to be the true solution of the constant and deplorable increase in the number of casualties, and, under the present economic conditions, there seems to be but little hope for a betterment.

SHIPPING AND LOCAL MINES.

The mines of this State may, roughly, be divided into two classes, shipping and local. Tbe former are for the most part extensive and costly plants, involving a large outlay of capital, employing a large number of men and not depending for a market upon the local trade.

The local mines, on the other hand, are generally small affairs, working only a small part of the year, employing few men and disposing of their entire product for consumption in their immediate neighborhood. Many of these so-called mines are mere outcroppings of coal on some hillside where the owner of the land, a farmer at other times, finds employment during the winter months for himself and one or two hired hands in getting out a few tons of coal for his own use and that of a few neighbors.

In 1896 there were 571 local mines, over 63 per cent of the total number, which yielded only 739,247 tons, or less than 8 per cent of the total product.

On account, therefore, of the relative unimportance of the local mines, all computations in this report having for their purpose the determination of questions pertaining to coal mining as a distinct industry are based upon data gathered from the 330 shipping mines since it is this class of mines, producing more than 92 per cent of the total tonnage of the State and employing over 76 per cent of the total number of men, which must determine these conditions.

Comparison of output of shipping and local mines, four years.

Districts.	Shipping mines.					Local mines.				
	Total output, all grades.	Total output, lump coal.	Total tons.	Lump coal, tons.	Average number of days of active operation of mines.	Total output, all grades.	Total output, lump coal.	Total tons.	Lump coal, tons.	Average number of days of active operation of mines.
	Short tons.	*Short tons.*	*Pr. ct.*	*Pr. ct.*		*Short tons.*	*Short tons.*	*Pr. ct.*	*Pr. ct.*	
First	2,919,676	2,452,870	96.2	96.2	166	115,101	106,836	3.8	3.8	150
Second	2,491,985	1,953,846	92.6	91.2	198	198,235	192,721	7.4	8.8	155
Third	496,726	395,692	78.9	75.4	157	132,109	128,969	21.1	24.6	160
Fourth	2,666,330	1,433,381	95.1	92.1	210	136,630	122,402	4.9	7.9	147
Fifth	4,656,075	3,166,866	99.2	98.1	197	33,905	33,095	0.8	1.9	187
Sixth	3,725,888	2,838,732	98.7	98.6	196	50,276	49,643	1.3	1.4	199
Seventh	2,090,699	1,281,858	96.6	96.0	164	72,991	53,113	3.4	4.0	118
The State:										
1896	19,047,379	13,523,245	92.3	95.2	186	739,247	686,779	7.7	4.1	159
1895	16,578,890	13,014,249	93.5	92.7	171	1,156,974	1,031,713	6.5	7.3	155
1894	16,106,613	12,892,581	94.1	93.0	174	1,006,963	972,703	5.9	7.0	157
1893	19,257,682	15,430,562	96.5	95.8	225	691,882	682,337	3.5	4.2	161

MINES CLASSIFIED ACCORDING TO THEIR OUTPUT.

In the production of coal, as in all other activities of modern industrialism, the constant tendency is to converge about certain centers, to concentrate into fewer hands. Certain localities have natural advantages, either as to ease of access or facilities for distribution; extensive concerns are able to profit themselves in many directions not open to their humbler competitors; large effective capital enables them to take advantage of new and improved methods and the employment of large numbers of men permits of a subdivision of labor and consequent economy of production, which is unattainable by the smaller operators.

It is natural, therefore, to assume that the major part of the tonnage of the State should be the product of comparatively few mines. A glance at the following tables will demonstrate the correctness of this assumption.

During 1896 there were 16 mines, each having an output of more than 200,000 tons, comprising only 1¾ per cent of the whole number, yet yielding over 23 per cent of the entire product. In addition to these there were 45 mines each having a total output of not less than 100,000 but less than 200,000 tons. These 45 mines, about 5 per cent of the whole number, yield over 30 per cent of the entire product. Combining the two, we find 61 mines, or about 6¾ per cent of the entire number, producing 53 per cent of the entire yield of the State. In other words, these 61 concerns produce more coal than the remaining 840 mines of the State.

A better appreciation of the relative importance of these large plants may be obtained from the following comparisons:

Of the 27 coal-producing States, other than Illinois, only 3—Pennsylvania, Ohio, and West Virginia—produced more coal than the combined output of these 61 mines. The 16 mines having an output of over 200,000 tons each had a greater tonnage of all grades of coal than the whole of British North America, including Nova Scotia, British Columbia, the Northwest Territories, and New Brunswick. These same 16 mines produced nearly four times as much coal in 1896 as was imported into this country during the same period from all the other countries of the world.

Production of coal in Illinois from mines having an output of 100,000 tons or over.

Districts.	Mines having a total output, all grades, of 200,000 tons and over.				Mines having a total output, all grades, of 100,000 tons and less than 200,000.				All mines of 100,000 tons output and over.			
	Number of mines.	Number of tons.	Per cent of mines.	Per cent of tons.	Number of mines	Number of tons.	Per cent of mines.	Per cent of tons.	Number of mines.	Number of tons.	Per cent of mines.	Per cent of tons.
First	2	542,568	2.32	17.84	10	1,366,536	11.62	45.03	12	1,909,104	13.94	62.87
Second	3	895,303	1.61	33.27	7	865,073	3.76	32.16	10	1,760,376	5.37	65.43
Third	....	.....	.....	.....	1	137,614	.47	21.88	1	137,614	.47	21.88
Fourth	2	652,504	2.04	23.28	6	838,613	6.12	29.24	8	1,491,117	8.16	52.52
Fifth	7	1,888,910	7.52	44.97	8	1,039,874	8.60	22.17	15	2,928,784	16.12	67.14
Sixth	1	274,629	.98	7.01	9	1,244,200	8.92	32.95	10	1,518,829	9.90	39.96
Seventh	1	218,696	.79	10.11	4	528,460	3.17	24.52	5	747,156	3.96	34.63
The State:												
1896	16	4,472,610	1.77	23.60	45	6,020,370	4.99	30.43	61	10,492,980	6.76	53.03
1895	9	2,344,591	1.03	13.21	45	6,346,937	5.15	35.77	54	8,691,528	6.18	48.98
1894	6	1,473,550	.72	8.61	44	6,035,084	5.25	35.27	50	7,508,634	5.97	43.88
1893	14	3,501,768	1.78	17.55	45	6,291,965	5.71	31.54	59	9,793,743	7.49	49.09
1892	10	2,373,599	1.19	13.29	42	5,955,091	5.01	33.37	52	8,328,690	6.20	46.66
1891	6	1,475,503	.65	9.42	37	5,175,336	4.03	33.04	43	6,650,839	4.68	42.46

LUMP OR SCREENED COAL.

In the following table is an analysis of the production of lump or screened coal, the mines being classified according to their output:

Classification of mines according to output of lump coal for six years.

Districts.	Mines producing less than 10,000 tons.		Mines producing 10,000 tons and less than 50,000.		Mines producing 50,000 tons and less than 100,000.		Mines producing 100,000 tons and over.		Total.	
	Number of mines.	Tons lump coal produced.	Number of mines.	Tons lump coal produced.	Number of mines.	Tons lump coal produced.	Number of mines.	Tons lump coal produced.	Number of mines.	Tons lump coal produced.
First	52	72,412	13	310,498	12	832,420	9	1,344,376	86	2,559,706
Second	153	271,878	16	354,014	8	536,351	5	984,324	182	2,146,567
Third	197	168,485	11	252,064	.....	.....	1	104,112	209	524,661
Fourth	67	151,389	10	219,488	12	792,601	3	392,305	92	1,555,783
Fifth	49	67,328	22	725,602	14	1,027,368	8	1,379,663	93	3,199,961
Sixth	38	94,200	43	1,062,374	15	1,030,374	5	701,427	101	2,888,375
Seventh	68	149,957	20	415,562	9	558,190	2	211,262	99	1,334,971
The State:										
1896	624	975,649	135	3,339,602	70	4,777,304	33	5,117,469	862	14,210,024
1895	607	1,032,518	151	3,634,750	67	4,906,444	30	4,470,737	855	14,045,962
1894	596	922,083	169	4,157,293	66	4,537,347	32	4,248,561	836	13,865,284
1893	522	869,932	146	3,679,239	80	5,552,257	40	6,011,471	788	16,112,899
1892	577	928,814	154	3,583,870	69	4,677,285	39	5,540,994	839	14,730,963
1891	668	1,076,283	164	3,774,456	55	3,835,984	31	4,273,501	918	12,960,224

The following table shows the product of lump coal and other grades of coal in Illinois, compared with the total output since 1882:

Total number of mines, men, and product, lump and other grades, since 1882.

Year.	Whole number of mines.	Whole number of men employed.	Total product in tons (2,000 pounds).	Total tons of lump coal.	Total tons of other grades.
1882	704	20,290	11,017,069	9,115,653	1,901,506
1883	639	23,939	12,123,456	10,030,991	2,092,465
1884	741	25,575	12,208,075	10,101,005	2,107,070
1885	778	25,946	11,834,459	9,791,874	2,402,585
1886	787	25,846	11,175,241	9,246,435	1,928,806
1887	801	26,804	12,423,066	10,278,890	2,144,176
1888	822	29,410	14,328,181	11,855,188	2,472,993
1889	854	30,076	14,017,298	11,597,963	2,419,335
1890	936	28,574	15,274,727	12,638,364	2,636,363
1891	918	32,951	15,660,698	12,960,224	2,700,474
1892	839	33,632	17,062,276	14,730,963	3,131,313
1893	788	35,390	19,949,564	16,112,899	3,836,655
1894	836	38,477	17,113,576	13,865,284	3,248,292
1895	874	38,630	17,735,864	14,045,962	3,689,902
1896	901	37,032	19,786,626	14,210,024	5,576,602

The product of lump coal, other grades, and total output, by districts, in 1896, with acreage worked out, number of employees, etc., are condensed in the following table:

Product of lump coal, etc., in Illinois during 1896, by districts.

Districts.	Lump coal.		Other grades.		Total product.	Increase in total output over 1882. (First Report.)		Estimated number of acres worked out.	Whole number of mines.	Highest number of men employed during year.
	Tons—2,000 pounds.	Per cent total output.	Tons—2,000 pounds.	Per cent total output.	Tons—2,000 pounds.	Tons.	Per cent.			
First	2,559,706	84.34	475,071	15.66	3,034,777	.....	.....	698.73	86	9,380
Second	2,146,567	79.79	543,653	20.21	2,690,220	.....	.....	585.09	186	7,103
Third	524,661	83.43	104,174	16.57	628,835	.....	.....	158.48	210	2,134
Fourth	1,555,783	55.55	1,247,177	44.46	2,802,960	.....	.....	444.54	98	4,467
Fifth	3,199,961	68.28	1,490,019	31.72	4,689,980	.....	.....	681.20	93	5,758
Sixth	2,888,375	76.51	887,789	23.49	3,776,164	.....	.....	418.20	102	4,374
Seventh	1,334,971	62.61	828,719	37.84	2,163,690	.....	.....	305.65	126	3,816
Total	14,210,024	71.86	5,576,602	28.14	19,786,626	8,769,557	79.59	3,202.49	901	37,032

In the following table is shown a comparison between the value of the total product and that of lump coal in 1896, by districts, together with the rate paid for mining and the ratio between the cost of mining and the selling price. Appended to this statement is a similar one for the State covering fifteen years. It will be observed that the selling price of coal has shown an almost steady decline since 1882, the total decline amounting to 61 cents, or about 40 per cent, an average drop per year of 4 cents a ton. The price paid for hand mining has fallen from 80 cents in 1882 to 53 cents in 1896, a decrease of 27 cents, or about 34 per cent, showing that the price paid for mining has not decreased in as great proportion as the selling value:

Values and mining prices for Illinois coal in fifteen years, 1882–1896.

Districts.	All grades.	Lump coal.						
	Aggregate value of total product at the mine.	Aggregate value of lump coal at the mine.	Average value at the mine, per ton.	Decrease from 1882, per ton.	Number of tons considered in finding price paid for mining.	Average price paid for hand mining, per ton.	Decrease from 1883.	Ratio of mining price to selling value.
First	$3,055,234	$2,904,988	$1.061	.....	2,510,149	$0.703	.....	66.2
Second	2,860,358	2,568,448	1.149	.....	2,372,958	.625	.....	54.4
Third	565,669	532,449	1.014	.....	498,436	.515	.....	50.8
Fourth	2,130,415	1,396,195	.897	.....	1,457,413	.362	.....	40.4
Fifth	3,754,472	1,318,854	.739	.....	2,399,839	.348	.....	47.1
Sixth	1,995,819	1,805,011	.625	.....	589,550	.387	.....	61.9
Seventh	1,447,769	1,039,389	.841	.....	701,916	.285	.....	33.9
The State:								
1896	15,809,736	12,565,334	.899	$0.611	9,371,582	.530	$0.272	58.9
1895	14,239,157	13,090,836	.932	.578	7,868,006	.573	.229	61.4
1894	15,282,111	13,998,588	1.009	.501	7,368,850	.671	.131	66.5
1893	17,827,595	16,517,960	1.025	.485	6,061,413	.714	.088	69.7
1892	16,243,645	15,158,430	1.029	.481	7,353,831	.719	.083	69.8
1891	14,237,094	13,068,854	1.008	.502	6,694,004	.715	.087	70.9
1890	.....	12,882,936	1.019	.491	9,056,109	.683	.119	67.0
1889	.....	12,496,885	1.078	.432	9,251,250	.731	.071	67.9
1888	.....	13,312,376	1.123	.387	9,611,978	.717	.085	63.9
1887	.....	11,153,596	1.085	.425	10,278,890	.727	.075	67.0
1886	.....	10,171,078	1.10	.41	9,246,435	.676	.126	61.5
1885	.....	11,456,493	1.17	.34	9,791,874	.725	.077	62.0
1884	.....	12,727,266	1.26	.25	10,101,005	.783	.019	62.1
1883	.....	14,845,867	1.48	.03	10,030,991	.802	.....	54.2
1882	.....	13,764,636	1.51	.....	.....	.....	.....	.....

In the following table will be found all the coal-producing counties of the State, named and assembled by districts, together with the output of each from 1887 to 1896:

Output of coal in Illinois, by counties, for ten years.

Districts and counties.	Lump coal.		
	1887.	1888.	1889.
	Short tons.	*Short tons.*	*Short tons.*
First district	2, 686, 829	2, 877, 794	2, 530, 453
Counties:			
Grundy	792, 954	862, 866	698,033
Kankakee	97, 000	82, 000	67, 380
Lasalle	1, 125, 235	1, 090, 435	1, 039, 703
Livingston	387, 600	495, 388	382, 965
Will	284, 040	347, 105	342, 372
Second district	1, 069, 027	1, 293, 187	1, 087, 848
Counties:			
Bureau	459, 580	635, 097	493, 730
Hancock	6, 208	6, 515	6, 028
Henry	117, 533	108, 831	101, 716
Knox	64, 324	57, 013	57, 588
Marshall	73, 928	87, 013	59, 784
McDonough	110, 103	104, 274	98, 386
Mercer	127, 708	167, 931	175, 690
Rock Island	85, 282	57, 872	47, 363
Schuyler	22, 686	34, 403	16, 243
Stark	17, 865	18, 690	19, 171
Warren	13, 810	15, 518	12, 149
Third district	1, 781, 395	2, 192, 121	2, 050, 349
Counties:			
Cass	2, 325	7, 300	4, 414
Fulton	337, 215	461, 589	366, 577
Logan	159, 000	174, 330	138, 700
McLean	141, 700	117, 110	129, 322
Menard	155, 621	181, 075	181, 621
Peoria	452, 123	533, 817	454, 731
Tazewell	51, 847	59, 324	67, 973
Vermilion	359, 119	499, 076	537, 411
Woodford	122, 445	158, 500	169, 600

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	Lump coal.		
	1887.	1888.	1889.
	Short tons.	*Short tons.*	*Short tons.*
Fourth district	2, 568, 291	2, 854, 540	3, 164, 835
Counties:			
Bond	36, 076	38, 200	59, 724
Calhoun	.....	1, 036	1, 078
Christian	149, 973	147, 030	249, 774
Coles	34, 612	27, 210	.....
Effingham	.....	.....	.....
Greene	12, 578	14, 494	19, 048
Jasper	.....	.....	.....
Jersey	2, 684	3, 949	4, 040
Macon	118, 183	280, 805	233, 309
Macoupin	926, 588	1, 016, 624	1, 202, 187
Madison	521, 705	512, 948	490, 181
Montgomery	10, 220	14, 295	24, 425
Morgan	6, 669	12, 545	13, 019
Pike	.....	.....	.....
Richland	.....	.....	.....
Sangamon	730, 391	764, 970	846, 012
Scott	9, 802	12, 491	15, 028
Shelby	8, 810	7, 943	7, 010
Fifth district	2, 173, 348	2, 637, 546	2, 764, 478
Counties:			
Clinton	55, 238	66, 463	121, 557
Franklin	.....	.....	.....
Gallatin	31, 437	45, 374	30, 044
Hardin	.....	.....	.....
Hamilton	.....	.....	.....
Johnson	28, 000	28, 210	3, 000
Jackson	375, 718	445, 575	477, 474
Jefferson	.....	.....	.....
Marion	98, 915	156, 975	180, 777
Perry	319, 552	306, 235	381, 347
Randolph	74, 263	167, 321	98, 202
Saline	19, 518	32, 550	35, 496
St. Clair	1, 018, 149	1, 184, 579	1, 198, 100
Washington	40, 220	43, 600	36, 220
Williamson	112, 338	160, 664	202, 261
The State	10, 278, 890	11, 855, 188	11, 597, 963

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	Lump coal.		1891—All grades.
	1890.	1891.	
	Short tons.	*Short tons.*	*Short tons.*
First district	2, 303, 326	2, 701, 652	3, 082, 915
Counties:			
Grundy	654, 017	861, 507	921, 907
Kankakee	62, 460	84, 808	90, 908
Lasalle	926, 214	1, 174, 961	1, 378, 168
Livingston	372, 504	355, 800	458, 329
Will	288, 131	224, 576	233, 603
Second district	1, 002, 600	1, 215, 883	1, 440, 266
Counties:			
Bureau	372, 701	612, 292	701, 064
Hancock	6, 948	6, 740	6, 740
Henry	98, 734	116, 173	131, 986
Knox	51, 653	44, 974	44, 974
Marshall	56, 574	53, 319	65, 219
McDonough	83, 401	73, 596	81, 732
Mercer	238, 290	222, 237	314, 360
Rock Island	39, 696	38, 654	41, 540
Schuyler	21, 836	15, 369	20, 122
Stark	18, 672	20, 157	20, 157
Warren	14, 095	12, 372	12, 372
Third district	2, 375, 970	2, 336, 500	2, 794, 004
Counties:			
Cass	4, 650	5, 680	6, 466
Fulton	404, 417	391, 721	484, 117
Logan	164, 650	155, 048	176, 052
McLean	173, 492	184, 629	230, 129
Menard	230, 662	171, 784	204, 583
Peoria	482, 725	498, 601	564, 119
Tazewell	81, 141	85, 692	107, 252
Vermilion	704, 509	728, 156	880, 466
Woodford	129, 724	115, 189	140, 820
Fourth district	3, 716, 464	3, 532, 233	4, 428, 109
Counties:			
Bond	66, 746	76, 067	102, 535
Calhoun	1, 468	2, 773	2, 773
Christian	439, 451	513, 315	718, 326

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	Lump coal.		1891—All grades.
	1890.	1891.	
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
Coles	.....	.....	.....
Effingham	796	*a* 487	*a* 487
Greene	11, 714	16, 442	16, 442
Jasper	152	(*b*)	(*b*)
Jersey	7, 500	4, 252	4, 252
Macon	179, 050	126, 569	207, 286
Macoupin	1, 369, 919	1, 149, 380	1, 461, 344
Madison	646, 228	600, 294	719, 308
Montgomery	58, 617	94, 975	107, 190
Morgan	16, 601	6, 584	7, 610
Pike	135	(*b*)	(*b*)
Richland	154	(*b*)	(*b*)
Sangamon	879, 888	912, 643	1, 051, 604
Scott	20, 022	14, 255	14, 755
Shelby	18, 023	14, 197	14, 197
Fifth district	3, 240, 004	3, 173, 956	3, 915, 404
Counties:			
Clinton	170, 416	146, 903	174, 166
Franklin	700	200	200
Gallatin	52, 383	31, 119	34, 462
Hardin	40	24	24
Hamilton	450	280	280
Johnson	12, 110	424	424
Jackson	580, 521	477, 330	681, 859
Jefferson	2, 100	1, 104	1, 104
Marion	218, 499	251, 283	321, 652
Perry	497, 768	457, 431	604, 152
Randolph	134, 699	162, 717	172, 321
Saline	45, 845	38, 729	54, 269
St. Clair	1, 332, 978	1, 389, 429	1, 595, 839
Washington	25, 160	56, 500	68, 200
Williamson	166, 335	160, 483	206, 452
The State	12, 638, 364	12, 960, 224	15, 660, 698

a Includes Jasper, Pike, and Richland counties.
b Included in Effingham County.

Output of coal in Illinois, by counties, for ten years.—Continued.

Districts and counties.	1892.		
	Lump coal.	Other grades.	All grades.
	Short tons.	*Short tons.*	*Short tons.*
First district	2,965,067	492,999	3,458,066
Counties:			
Grundy	1,108,419	66,665	1,108,419
Kankakee	81,793	10,365	92,158
Lasalle	1,261,467	282,844	1,544,311
Livingston	404,491	128,176	532,667
Will	108,897	4,949	113,846
Second district	1,461,224	272,384	1,733,608
Counties:			
Bureau	809,009	134,487	943,496
Hancock	5,380	.....	5,380
Henry	142,762	13,974	156,736
Knox	43,137	.....	43,137
Marshall	64,276	14,300	78,576
McDonough	82,001	9,126	91,127
Mercer	233,244	95,298	328,542
Rock Island	34,017	2,092	36,109
Schuyler	13,685	3,107	16,792
Stark	22,349	.....	22,349
Warren	11,364	.....	11,364
Third district	2,711,574	549,377	3,260,951
Counties:			
Cass	13,270	2,060	15,330
Fulton	535,288	131,185	666,473
Logan	163,002	24,354	187,356
McLean	170,912	51,460	222,372
Menard	237,419	48,276	285,695
Peoria	541,659	91,280	632,939
Tazewell	94,190	25,966	120,156
Vermilion	827,893	144,696	972,589
Woodford	127,941	30,100	158,041
Fourth district	4,090,921	1,026,679	5,117,600
Counties:			
Bond	92,308	29,504	121,812
Calhoun	4,637	.....	4,637
Christian	525,746	241,608	767,354

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1892.		
	Lump coal.	Other grades.	All grades.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
Coles	.....	.....	.....
Effingham	*a* 302	.....	302
Greene	19, 870	.....	19, 870
Jasper	(*b*)	.....	.....
Jersey	3, 378	.....	3, 378
Macon	198, 375	28, 645	227, 020
Macoupin	1, 434, 021	389, 115	1, 823, 136
Madison	703, 980	169, 790	873, 770
Montgomery	119, 850	28, 020	147, 870
Morgan	4, 266	.....	4, 266
Pike	(*b*)	.....	.....
Richland	(*b*)	.....	.....
Sangamon	951, 517	139, 497	1, 091, 014
Scott	17, 006	500	17, 506
Shelby	15, 665	.....	15, 665
Fifth district	3, 502, 177	789, 874	4, 292, 051
Counties:			
Clinton	156, 376	35, 497	191, 873
Franklin	200	.....	200
Gallatin	13, 782	720	14, 502
Hardin	.....	.....	.....
Hamilton	220	.....	220
Johnson	2, 200	.....	2, 200
Jackson	674, 161	195, 353	869, 514
Jefferson	100	.....	100
Marion	306, 019	70, 500	376, 519
Perry	362, 926	98, 142	461, 068
Randolph	160, 532	8, 447	168, 979
Saline	41, 992	19, 610	61, 602
St. Clair	1, 519, 472	240, 350	1, 759, 822
Washington	54, 183	8, 783	62, 966
Williamson	210, 014	112, 472	322, 486
The State	14, 730, 963	3, 131, 313	17, 862, 276

a Includes Jasper, Pike, and Richland counties.
b Included in Effingham County.

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1893.		
	Lump coal.	Other grades.	All grades.
	Short tons.	*Short tons.*	*Short tons.*
First district	2, 913, 144	481, 542	3, 394, 686
Counties:			
Grundy	1, 106, 574	80, 345	1, 186, 919
Kankakee	83, 700	5, 000	88, 700
Lasalle	1, 242, 566	252, 260	1, 494, 826
Livingston	402, 370	140, 146	542, 516
Will	77, 934	3, 791	81, 725
Second district	1, 708, 909	291, 755	2, 000, 664
Counties:			
Bureau	976, 572	166, 698	1, 143, 270
Hancock	5, 060	.....	5, 060
Henry	148, 324	7, 937	156, 261
Knox	49, 808	.....	49, 808
Marshall	78, 700	13, 444	92, 144
McDonough	92, 096	10, 830	102, 926
Mercer	273, 390	89, 816	363, 206
Rock Island	34, 058	250	34, 308
Schuyler	15, 955	2, 780	18, 735
Stark	23, 070	.....	23, 070
Warren	11, 876	.....	11, 876
Third district	2, 860, 299	537, 134	3, 397, 433
Counties:			
Cass	21, 370	1, 780	23, 150
Fulton	610, 854	161, 643	772, 497
Logan	157, 699	31, 620	189, 319
McLean	153, 027	51, 800	204, 827
Menard	230, 296	51, 339	281, 635
Peoria	537, 928	82, 221	620, 149
Tazewell	113, 597	15, 360	128, 957
Vermilion	873, 597	123, 171	996, 768
Woodford	161, 931	18, 200	180, 131
Fourth district	4, 508, 382	1, 276, 484	5, 784, 866
Counties:			
Bond	56, 120	22, 480	78, 600
Calhoun	4, 584	.....	4, 584
Christian	593, 602	246, 048	839, 650

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1893.		
	Lump coal.	Other grades.	All grades.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
Coles	.....	.....	.....
Effingham	520	.....	520
Greene	10,995	.....	10,995
Jasper	(*a*)	(*a*)	(*a*)
Jersey	5,904	.....	5,904
Macon	237,442	42,791	280,233
Macoupin	1,509,594	478,475	1,988,069
Madison	758,288	193,606	951,894
Montgomery	123,920	51,792	175,712
Morgan	2,142	.....	2,142
Pike	(*a*)	(*a*)	(*a*)
Richland	(*a*)	(*a*)	(*a*)
Sangamon	1,170,854	239,492	1,410,346
Scott	22,157	600	22,757
Shelby	12,260	1,200	13,460
Fifth district	4,122,165	1,249,750	5,371,915
Counties:			
Clinton	174,994	80,101	255,095
Franklin	120	.....	120
Gallatin	14,972	2,485	17,457
Hardin	.....	.....	.....
Hamilton	244	.....	244
Johnson	.....	.....	.....
Jackson	674,943	251,299	926,242
Jefferson	90	.....	90
Marion	352,793	127,736	480,529
Perry	620,502	239,649	860,151
Randolph	161,565	9,490	171,055
Saline	24,929	11,507	36,436
St. Clair	1,778,787	355,083	2,133,870
Washington	63,500	8,700	72,200
Williamson	254,726	163,700	418,426
The State	16,112,899	3,836,665	19,949,564

a Included in Effingham County.

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1894.		
	Lump coal.	Other grades.	All grades.
	Short tons.	*Short tons.*	*Short tons.*
First district	2,367,298	317,946	2,685,244
Counties:			
Grundy	1,052,233	78,187	1,130,420
Kankakee	50,883	7,000	57,883
Lasalle	968,243	165,854	1,134,097
Livingston	276,654	65,473	342,127
Will	19,285	1,432	20,717
Second district	1,449,356	254,267	1,703,623
Counties:			
Bureau	743,764	135,173	878,937
Hancock	10,290	25	10,315
Henry	105,453	6,187	111,640
Knox	50,581	949	51,530
Marshall	117,612	17,084	134,696
McDonough	50,223	3,144	53,367
Mercer	286,445	87,558	374,003
Rock Island	40,041	1,600	41,641
Schuyler	11,774	2,054	13,828
Stark	22,182	443	22,625
Warren	10,991	50	11,041
Third district	2,569,268	508,650	3,077,918
Counties:			
Cass	13,300	5,600	18,900
Fulton	444,896	112,807	557,703
Logan	154,025	32,275	186,300
McLean	125,053	42,241	167,294
Menard	235,873	59,979	295,852
Peoria	517,957	93,835	611,792
Tazewell	85,399	8,200	93,599
Vermilion	842,615	147,198	989,813
Woodford	150,150	6,515	156,665
Fourth district	3,877,110	1,296,193	5,173,303
Counties:			
Bond	54,091	25,500	79,591
Calhoun	3,478	.....	3,478
Christian	671,278	334,222	1,005,500

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1894.		
	Lump coal.	Other grades.	All grades.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
Coles	.....	.....	.....
Effingham	5,440	.....	*a* 5,440
Greene	18,400	200	18,600
Jasper	.....	.....	.....
Jersey	2,238	.....	2,238
Macon	190,388	37,432	227,820
Macoupin	1,173,392	401,653	1,575,045
Madison	682,520	207,248	889,768
Montgomery	122,742	55,298	178,040
Morgan	.....	.....	.....
Pike	.....	.....	.....
Richland	.....	.....	.....
Sangamon	912,700	229,599	1,142,299
Scott	18,525	500	19,025
Shelby	21,909	4,541	26,450
Fifth district	3,602,252	871,236	4,473,488
Counties:			
Clinton	150,159	50,761	200,920
Franklin	.....	.....	.....
Gallatin	153,116	2,235	155,351
Hardin	.....	.....	.....
Hamilton	620	.....	*b* 620
Johnson	.....	.....	.....
Jackson	566,540	199,974	766,514
Jefferson	.....	.....	.....
Marion	354,670	124,087	478,757
Perry	394,702	135,788	530,490
Randolph	180,971	12,276	193,247
Saline	24,864	12,049	36,913
St. Clair	1,427,714	195,970	1,623,684
Washington	48,435	1,400	49,835
Williamson	300,461	136,696	437,157
The State	13,865,284	3,248,292	17,113,576

a Includes Cumberland, Jasper, Morgan, Pike, and Richland counties.
b Includes Franklin and Jefferson counties.

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1895.		
	Lump coal.	Other grades.	All grades.
	Short tons.	*Short tons.*	*Short tons.*
First district	2,294,063	441,648	2,735,711
Counties:			
Grundy	1,126,810	135,028	1,261,838
Kankakee	54,658	28,855	83,513
Lasalle	881,773	202,779	1,084,552
Livingston	197,847	69,286	267,133
Will	32,975	5,700	38,675
Second district	1,673,056	322,242	1,995,298
Counties:			
Bureau	716,313	118,228	834,541
Hancock	10,186	88	10,274
Henry	127,484	8,483	135,967
Knox	55,502	2,828	58,330
Marshall	275,070	71,211	346,281
McDonough	49,709	3,678	53,387
Mercer	384,681	113,330	462,011
Rock Island	42,237	3,348	45,585
Schuyler	11,552	1,048	12,600
Stark	22,131	.....	22,131
Warren	14,191	.....	14,191
Third district	2,543,517	408,743	2,952,260
Counties:			
Cass	14,120	5,000	19,120
Fulton	379,438	89,354	468,792
Logan	163,975	18,000	181,975
McLean	137,095	27,045	164,140
Menard	235,199	42,539	277,738
Peoria	381,883	55,574	437,457
Tazewell	82,086	12,020	94,106
Vermilion	1,033,305	144,070	1,177,375
Woodford	116,416	15,141	131,557
Fourth district	4,154,538	1,458,226	5,612,764
Counties:			
Bond	66,797	26,718	93,515
Calhoun	9,200	.....	9,200
Christian	496,235	239,126	735,361
Coles	.....	.....	.....

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1895.		
	Lump coal.	Other grades.	All grades.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
Effingham	.....	.....	.....
Greene	11,345	.....	11,345
Jasper	.....	.....	.....
Jersey	.....	.....	.....
Macon	190,000	41,000	231,000
Macoupin	1,406,372	542,620	1,948,992
Madison	721,561	256,600	978,161
Montgomery	147,452	50,390	197,842
Morgan, Pike, Richland	*a* 7,800	.....	7,800
Sangamon	1,033,923	284,169	1,318,092
Scott	17,280	450	17,730
Shelby	46,573	17,153	63,726
Fifth district	3,380,788	1,059,043	4,439,831
Counties:			
Clinton	216,655	67,832	284,487
Franklin	.....	.....	.....
Gallatin	11,590	8,740	20,330
Hardin	.....	.....	.....
Hamilton	4,645	.....	4,645
Johnson	.....	.....	.....
Jackson	538,241	201,420	739,661
Jefferson	27,080	800	27,880
Marion	395,869	143,031	538,900
Perry	393,260	194,184	587,444
Randolph	161,481	33,000	194,481
Saline	30,628	14,574	45,202
St. Clair	1,267,862	211,244	1,479,106
Washington	50,220	6,000	56,220
Williamson	283,257	178,218	461,475
The State	14,045,962	3,689,902	17,735,864

a Includes Cumberland, Effingham, Jasper, and Jersey counties.

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1896. Total amount of coal produced.
	Short tons.
First district	3,034,777
Counties:	
Grundy	1,247,394
Kankakee	72,395
Lasalle	1,409,085
Livingston	218,953
Will	86,950
Second district	2,690,220
Counties:	
Bureau	1,042,304
Henry	136,415
Marshall	389,429
Mercer	450,071
Peoria	457,061
Rock Island	34,065
Stark	18,085
Woodford	162,790
Third district	628,835
Counties:	
Fulton	516,349
Hancock	4,497
Knox	39,557
McDonough	47,821
Schuyler	7,915
Warren	12,696
Fourth district	2,802,960
Counties:	
Cass	8,612
Logan	166,000
Macon	188,207
Menard	347,865
McLean	156,891
Tazewell	113,541
Vermilion	1,822,344

Output of coal in Illinois, by counties, for ten years—Continued.

Districts and counties.	1896. Total amount of coal produced.
	Short tons.
Fifth district	4,689,980
Counties:	
Calhoun	6,000
Christian	763,228
Greene	8,270
Macoupin	2,097,539
Montgomery	171,099
Sangamon	1,587,812
Scott	18,410
Shelby	35,297
Morgan and Jersey	2,325
Sixth district	3,776,164
Counties:	
Bond	71,058
Clinton	309,504
Madison	1,080,718
Marion	643,561
St. Clair	1,671,323
Seventh district	2,163,690
Counties:	
Gallatin	26,350
Hamilton	1,000
Jackson	771,384
Jefferson	10,100
Johnson	1,250
Perry	626,507
Randolph	202,838
Saline	46,495
Washington	33,360
Williamson	444,406
The State	19,786,626

EMPLOYEES AND DAYS OF OPERATION.

The following table gives the total number of employees in the whole 901 mines of the State:

Total number of employees in Illinois coal mines in 1896.

Districts.	Number of employees under ground.			Number of employees above ground.			All employees in and about mines.			Boys under 16 years of age employed under ground (included in foregoing).
	Winter.	Summer.	Average for year.	Winter.	Summer.	Average for year.	Winter.	Summer.	Average for year.	
First	8,826	7,353	8,089.5	554	523	538.5	9,380	7,876	8,628	242
Second	6,493	4,648	6,070.5	610	508	559.0	7,103	5,156	6,129	230
Third	1,959	1,116	1,537.5	175	125	150.0	2,134	1,241	1,687	53
Fourth	3,871	2,834	3,352.5	596	554	575.0	4,467	3,388	3,927	117
Fifth	5,131	3,943	4,537.0	627	576	601.5	5,758	4,519	5,138	121
Sixth	3,839	3,218	3,528.5	535	502	518.5	4,374	3,720	4,047	70
Seventh	3,346	2,734	3,040.0	470	442	456.0	3,816	3,176	3,496	78
The State	33,465	25,846	29,656.0	3,567	3,230	3,399.0	37,032	29,076	33,054	911

The following table deals with shipping mines exclusively, and gives a comprehensive view of the activity and productivity of this class of mines and the number and proportion of men employed in them, as well as the average number of days' employment afforded each man:

Product of shipping mines in Illinois in 1896 and days of operation, together with number of employees and days of employment.

Districts.	Number of mines.	Average number of tons of coal, all grades, per mine.	Average tons lump coal per mine.	Average tons other grades per mine.	Average number of days' active operation of mines.	Total number of men employed.	Per cent of employees in shipping mines to total number employed in all mines.	Average number of men to each mine.	Average number of days' employment per man.
First	38	76,833	64,549	12,021	166	8,279	88.2	218	162
Second	46	50,854	39,874	10,981	198	3,405	47.7	117	199
Third	27	17,740	14,132	3,608	157	1,128	52.8	42	159
Fourth	40	66,658	35,834	30,824	210	3,043	68.1	90	236
Fifth	50	93,021	63,337	29,784	197	5,053	87.7	101	203
Sixth	72	49,024	37,351	11.673	196	4,091	93.5	57	205
Seventh	49	40,992	25,693	15,301	164	3,186	83.4	65	173
The State	322	57,719	41,066	16,653	186	28,185	76.1	95	191

INDIANA.

Total product in 1896, 3,905,779 short tons; spot value, $3,261,737.

The output of coal in Indiana during 1896 was about 90,000 tons less than in 1895. The decrease in product, while small, was sufficient

to cause Indiana to drop from seventh to eighth place. Maryland increased her product 200,000 tons and advanced from eighth to sixth place, Iowa and Indiana falling to seventh and eighth places, respectively. While the product in 1896 was not 3 per cent below that of 1895, the value declined more than 10 per cent, and was less in 1896 than in any year since 1891, in which year the product was nearly 1,000,000 tons less, while the value was within $200,000 of that of 1896. Prices have declined steadily since 1892, the average for the State in 1896 being 22 per cent less than in the former year. The past year was very unsatisfactory to the producers. Severe competition brought down the market price without compensating relief in the cost of mining. The miners' organization refused to accept a reduction from 60 to 55 cents for mining coal, claiming that the miners would prefer to mine less coal at 60 cents than more coal at 55 cents. President Talley, of the Indiana bituminous operators, expresses the opinion that under such conditions the coal-mining industry must go from bad to worse until the market for Indiana coal will be limited to a dribbling local trade and the miners forced into idleness or to seek employment in other fields.

The following tables show that the average price per ton declined from 91 cents in 1895 to 84 cents in 1896. The most of this loss was met by the more important producing counties. In the smaller counties, where the product is consumed by a comparatively local demand, the decrease in prices was not so pronounced, and in two cases there were increases. Clay and Sullivan counties were the two largest producers in 1896. Clay County has always led in coal production, and yielded nearly one-third of the total product in 1896. With an increased output in Clay County of 9,249 tons in 1896 the value decreased about $122,000, the average price per ton declining 11 cents from $1.07 in 1895 to 96 cents in 1896. Sullivan County, which produced 13 per cent of the total in 1896, shows a decline of 17 cents, or 20 per cent, in the average price. Vermilion County, the third in importance, exhibits a loss of 6 cents, and Parke County, fourth, which adjoins Clay and produces the same kind of coal, shows a decline, like Clay County, of 11 cents a ton.

According to the twentieth annual report of the State geologist, Mr. W. S. Blatchley, there are 7,000 square miles, or one-fifth of the area of the State of Indiana, underlaid with coal. This area is found in the western and southwestern parts of the State, and ranges from 10 to 60 miles in width. It extends from Warren County southward 150 miles to the Ohio River, where it is widest in extent, stretching across the counties of Vanderburg, Warrick, Spencer, and part of Perry. Workable veins are found in nineteen counties in the area mentioned and thin outcrops occur in three additional ones. At least seven distinct veins of workable thickness occur in the State. These vary from 7 to 11 feet in thickness and aggregate in a few places from

25 to 28 feet. The coals of the State are of two varieties, which in places merge into each other. These are the noncaking or block coal and the caking or bituminous coal. The former is one of the most valuable fuels found in the United States.

There were fourteen counties producing coal on a commercial scale in 1895 and fifteen in 1896, Fountain County not reporting any output the former year. The details of production for the past two years are shown in the following table:

Coal product of Indiana in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Clay	31	1,184,484	19,570	19,132	.....	1,223,186	$1,307,256	$1.07	195	3,319
Daviess	3	80,520	600	200	.....	81,380	76,658	.94	129	258
Greene	8	396,620	3,600	8,860	.....	409,080	281,583	.69	180	646
Knox	3	14,946	10,106	1,391	.....	26,443	26,023	.98	140	69
Parke	16	444,088	24,692	10,829	.....	479,609	472,357	.98	166	1,225
Pike	4	218,566	1,638	4,848	7,898	232,950	179,722	.77	191	392
Spencer	10	5,609	4,920	350	.....	10,879	10,960	1.01	129	61
Sullivan	8	325,699	106,500	18,968	2,000	453,167	379,873	.84	185	607
Vanderburg	5	38,220	144,040	10,450	.....	192,710	199,296	1.03	233	281
Vermilion	3	299,600	400	6,000	.....	306,000	249,300	.81	245	572
Vigo	12	376,006	9,524	16,805	.....	402,335	312,725	.78	187	869
Warrick	12	87,758	27,033	6,462	.....	121,253	87,495	.72	186	146
Gibson and Perry	3	16,700	3,800	400	.....	20,900	23,375	1.12	151	85
Small mines	.....	.....	36,000	.....	.....	36,000	36,000	.....	.....	.....
Total	117	3,488,876	392,423	104,695	9,898	3,995,892	3,642,623	.91	189	8,530

Coal product of Indiana in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Clay	29	1,182,967	16,810	32,658	.....	1,232,435	$1,185,230	$0.96	171	3,290
Daviess	4	180,768	10,767	1,240	.....	192,775	168,270	.87	176	440
Fountain	2	101,300	4,000	350	.....	105,650	84,970	.80	240	122
Greene	8	280,484	3,497	6,065	.....	290,046	222,157	.77	157	659
Gibson and Knox	4	31,700	20,255	3,320	.....	55,275	42,500	.77	165	105
Parke	16	324,451	5,354	9,872	.....	339,677	294,121	.87	116	1,138
Perry	2	20,227	5,500	500	.....	26,227	30,005	1.12	174	83
Pike	5	184,879	3,522	5,240	7,776	201,417	138,986	.69	162	384

Coal product of Indiana in 1896, by counties—Continued.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into Coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Spencer	12	235	16,463	5	.....	16,703	22,448	1.34	157	50
Sullivan	11	475,614	7,972	30,519	1,180	515,285	343,094	.67	186	724
Vanderburg	5	49,570	115,735	5,450	.....	170,755	175,862	1.03	222	293
Vermilion	3	339,316	1,000	6,850	.....	347,166	258,833	.75	214	657
Vigo	7	225,092	6,807	5,748	.....	237,647	167,840	.70	116	674
Warrick	23	74,867	58,229	5,625	.....	138,721	91,421	.66	175	187
Small mines	.....	.....	36,000	.....	.....	36,000	36,000	.....	.....	.....
Total	131	3,471,470	311,911	113,442	8,956	3,905,779	3,261,737	.84	163	8,806

Previous to 1889 the statistics of production by counties were not obtained. The following table shows the annual product by counties since that year, with a statement of the increase or decrease in each county in 1896 as compared with 1895:

Coal product of Indiana since 1889, by counties.

[Short tons.]

County.	1889.	1890.	1891.	1892.	1893.
Clay	695,649	1,161,730	980,921	1,146,897	1,209,703
Daviess	191,585	189,696	155,358	174,560	319,787
Dubois	15,848	13,994	7,700	.....	10,142
Fountain	41,141	24,000	23,700	13,888	4,000
Gibson	1,267	.....	.....	.....	.....
Greene	185,849	197,338	164,965	228,574	259,930
Knox	9,040	.....	.....	14,314	13,357
Martin	710	.....	.....	.....	.....
Owen	3,958	.....	12,600	8,200	5,785
Parke	357,434	345,460	307,382	394,335	491,847
Perry	40,050	40,201	35,400	37,796	36,252
Pike	154,524	115,836	122,066	78,760	243,553
Spencer	18,456	11,656	15,340	8,426	7,647
Sullivan	317,252	286,323	181,434	316,893	290,482
Vanderburg	183,942	192,284	205,731	190,346	186,053
Vermilion	187,651	173,000	228,488	301,063	264,224
Vigo	371,903	429,160	400,255	307,113	350,143
Warren	2,160	.....	.....	.....	.....
Warrick	66,638	89,059	96,134	84,009	58,946
Small mines	.....	36,000	36,000	40,000	40,000
Total	2,845,057	3,305,737	2,973,474	3,345,174	3,791,851

Coal product of Indiana since 1889, by counties—Continued.

[Short tons.]

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Clay	890,714	1,223,186	1,232,435	9,249	.....
Daviess	100,833	81,380	192,775	111,395	.....
Dubois	.....	.....	.....	.....	.....
Fountain	18,931	.....	105,650	105,650	.....
Gibson	19,021	1,940	24,775	22,835	.....
Greene	300,474	409,080	290,046	.....	119,034
Knox	28,862	26,443	30,500	4,057	.....
Martin	.....	.....	.....	.....	.....
Owen	7,575	.....	.....	.....	.....
Parke	356,265	479,609	339,677	.....	139,932
Perry	30,696	18,960	26,227	7,267	.....
Pike	173,556	232,950	201,417	.....	31,533
Spencer	10,183	10,879	16,703	5,824	.....
Sullivan	537,077	453,167	515,285	62,118	.....
Vanderburg	175,881	192,710	170,755	.....	21,955
Vermilion	296,222	306,000	347,166	41,166	.....
Vigo	321,539	402,335	237,647	.....	164,688
Warren	.....	.....	.....	.....	.....
Warrick	120,092	121,253	138,721	17,468	.....
Small mines	36,000	36,000	36,000	.....	.....
Total	3,423,921	3,995,892	3,905,779	.....	*a* 90,113

a Net decrease.

The following table is of interest as showing the total amount and value of coal produced in the State from 1886 to 1896, and the total number of employees and average number of working days in each year since 1889:

Statistics of coal production in Indiana since 1886.

Year.	Short tons.	Value.	Average price per ton.	Number of days active.	Average number of employees.
1886	3,000,000	$3,450,000	$1.15	.....	.....
1887	3,217,711	4,324,604	1.03	.....	.....
1888	3,140,979	4,397,370	1.40	.....	.....
1889	2,845,057	2,887,852	1.02	.....	6,448
1890	3,305,737	3,259,233	.99	220	5,489
1891	2,973,474	3,070,918	1.03	190	5,879
1892	3,345,174	3,620,582	1.08	225	6,436
1893	3,791,851	4,055,372	1.07	201	7,644
1894	3,423,921	3,295,034	.96	149	8,603
1895	3,995,892	3,642,623	.91	189	8,530
1896	3,905,779	3,261,737	.84	163	8,806

In the following table is shown the total annual product of coal in the State since 1873:

Product of coal in Indiana from 1873 to 1896.

Year.	Short tons.	Year.	Short tons.
1873	1,000,000	1885	2,375,000
1874	812,000	1886	3,000,000
1875	800,000	1887	3,217,711
1876	950,000	1888	3,140,979
1877	1,000,000	1889	2,845,057
1878	1,000,000	1890	3,305,737
1879	1,196,490	1891	2,973,474
1880	1,500,000	1892	3,345,174
1881	1,771,536	1893	3,791,851
1882	1,976,470	1894	3,423,921
1883	2,560,000	1895	3,995,892
1884	2,260,000	1896	3,905,779

In accordance with the plan adopted in discussing the production in other States, the following tables are given to show the tendency in prices and the statistics of labor employed and average working time by counties for such years as they have been obtained. They include only those counties whose annual product averages 10,000 tons or over.

Average prices for Indiana coal since 1889 in counties averaging 10,000 tons or over.

County.	1889.	1890.	1891	1892.
Clay	$1.14	$1.01	$1.15	$1.25
Daviess	1.02	1.04	1.12	1.11
Fountain	1.29	1.00	.99	.89
Gibson	.....	.....	.....	.....
Greene	.91	.94	.91	.84
Knox	.....	.....	.....	.84
Parke	1.05	1.09	1.13	1.09
Perry	1.18	1.05	1.10	.86
Pike	.83	.98	.90	.87
Spencer	1.15	.96	.88	.80
Sullivan	.94	.94	1.01	.89
Vanderburg	1.16	1.02	1.09	1.06
Vermilion	.89	1.17	.98	.96
Vigo	.88	.80	.80	1.14
Warrick	.....	.....	.77	.81
The State	1.02	.99	1.03	1.08

Average prices for Indiana coal since 1889 in counties averaging 10,000 tons or over—Continued.

County.	1893.	1894.	1895.	1896.
Clay	$1.29	$1.13	$1.07	$0.96
Daviess	.97	1.03	.94	.87
Fountain	1.00	1.08	.....	.80
Gibson	.....	.78	.....	.75
Greene	.83	.96	.69	.77
Knox	1.10	.84	.98	.78
Parke	1.16	1.07	.98	.87
Perry	1.13	1.12½	1.12	1.12
Pike	.76	.77	.77	.69
Spencer	.84	1.03	1.01	1.34
Sullivan	.88	.82	.84	.67
Vanderburg	1.08	.96	1.03	1.03
Vermilion	.96	.82	.81	.75
Vigo	.95	.95	.78	.70
Warrick	.89	.72	.72	.66
The State	1.07	.96	.91	.84

Statistics of labor employed in Indiana coal mines.

County.	1889.	1890.		1891.		1892.	
	Average number employed.	Average number employed.	Average number of days worked.	Average number employed.	Average number of days worked.	Average number employed.	Average number of days worked.
Clay	2,592	2,179	218	2,346	181	2,797	239
Daviess	455	280	231	359	217	403	224
Fountain	41	48	260	252	40	30	315
Gibson	7	.....	.....	.....	.....	.....	.....
Greene	296	250	218	154	300	335	227
Knox	22	.....	.....	.....	.....	28	138
Parke	591	558	254	510	255	639	228
Perry	109	100	250	95	190	88	227
Pike	340	235	170	230	198½	160	163
Spencer	29	39	261	46	204	13	310
Sullivan	556	588	181	544	130½	522	242
Vanderburg	318	454	262	338	228½	282	262
Vermilion	276	307	244	380	147	545	164
Vigo	629	280	161	487	244	491	217
Warrick	85	131	222	161	199	171	141
The State	6,448	5,489	220	5,879	190	6,436	225

Statistics of labor employed in Indiana coal mines—Continued.

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average number of days worked.	Average number employed.	Average number of days worked.	Average number employed.	Average number of days worked.	Average number employed.	Average number of days worked.
Clay	2,976	196	3,114	131	3,319	195	3,290	171
Daviess	553	213	350	116	258	129	440	176
Fountain	18	150	75	160	.....	.....	122	240
Gibson	.....	.....	36	143	.....	.....	42	181
Greene	391	203	576	141	646	180	659	157
Knox	37	183	64	153	69	140	63	155
Parke	1,091	202	1,065	135	1,225	166	1,138	116
Perry	100	198	93	168	80	148	83	174
Pike	365	211	348	148	392	191	384	162
Spencer	29	170	40	170	61	129	50	157
Sullivan	460	221½	885	152	607	185	724	186
Vanderburg	357	250	330	215	281	233	293	222
Vermilion	507	158	710	165	572	245	657	214
Vigo	579	217	740	196	869	187	674	116
Warrick	136	129	147	199	146	186	187	175
The State	7,644	201	8,603	149	8,530	189	8,806	163

INDIAN TERRITORY.

Total product in 1896, 1,366,646 short tons; spot value, $1,918,115.

The output of coal in the Indian Territory during 1896 exceeded that of any previous year, being 155,461 short tons, or 12.8 per cent, more than in 1895, and 114,536 short tons, or 9 per cent, more than in 1893, when the largest previous output was recorded. The value of the product in 1896, while more than that of 1895 by about $180,000, was less than that of either 1892 or 1893. There has been a steady decline in the value per ton from $1.79 in 1893 to $1.40 in 1896.

During 1896 some of the principal operators were engaged in litigation regarding certain mining rights. A decision in the case was rendered in October by Chief Justice Springer which is interesting and important. The effect of the decision will probably be to stimulate the coal-mining business in the Territory. The case involved the title and ownership to a large coal mine located near Hartshorne, operated and claimed by the Choctaw, Oklahoma and Gulf Railway Company. The amount in litigation approximated half a million dollars, and the principle involved in the case affects property in the Territory valued at millions of dollars. The main point in controversy was the proper construction to be placed upon that provision of the constitution of the Choctaw Nation which provides that any citizen of the Choctaw Nation

who discovers any mine of coal shall have the exclusive right and privilege to work the same so long as he may choose, 1 mile in any direction from his works or improvements, provided he does not interfere with the rights of a former settler. The Choctaw Railway Company, which was successful in the court below, contended that this section gave to the discoverer the right to mine all veins of coal within a radius of 1 mile from the works in every direction. Appellants contended that the discoverer only took the particular vein upon which he made his discovery.

Chief Justice Springer held that the contention of the Choctaw Railway Company was sound, and that the discoverer took all veins of coal within a mile radius from his works in every direction, and showed conclusively that this was not only the accepted construction of the Choctaw Nation itself, but the only one which could be adopted without producing endless litigation and confusion.

The first production of coal reported from the Indian Territory was made in 1885, in which year the total output was 500,000 short tons. It increased with each succeeding year until 1893, when it reached 1,252,110 tons, a gain of 150 per cent in eight years. In 1894 the operatives in the Territory took part in the great strike which paralyzed the industry for several months, and the product fell off 22 per cent to 969,606 short tons. Production returned to about its normal proportions in 1895, but without a proportionate increase in value.

The following table exhibits the details of production during the past six years:

Coal product of the Indian Territory for six years.

Distribution.	1891.	1892.	1893.
	Short tons.	*Short tons.*	*Short tons.*
Loaded at mines for shipment	1,026,932	1,156,603	1,197,468
Sold to local trade and used by employees	9,405	10,840	9,234
Used at mines for steam and heat	22,163	18,089	21,663
Made into coke	32,532	7,189	23,745
Total	1,091,032	1,192,721	1,252,110
Total value	$1,897,037	$2,043,479	$2,235,209
Average number of employees	2,891	3,257	3,446
Average number of days worked	222	211	171

Coal product of the Indian Territory for six years—Continued.

Distribution.	1894.	1895.	1896.
	Short tons.	*Short tons.*	*Short tons.*
Loaded at mines for shipment	923, 581	1, 173, 399	1, 295, 742
Sold to local trade and used by employees	4, 632	3, 070	12, 648
Used at mines for steam and heat	30, 878	21, 935	45, 560
Made into coke	10, 515	12, 781	12, 696
Total	969, 606	1, 211, 185	1, 366, 646
Total value	$1, 541, 293	$1, 737, 254	$1, 918, 115
Average number of employees	3, 101	3, 212	3, 549
Average number of days worked	157	164	170

Since 1885 the annual production has been as follows:

Product of coal in the Indian Territory from 1885 to 1896, inclusive.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1885	500, 000				
1886	534, 580	$855, 328	$1. 60		
1887	685, 911	1, 286, 692	1. 88		
1888	761, 986	1, 432, 072	1. 89		
1889	752, 832	1, 323, 807	1. 76		1, 862
1890	869, 229	1, 579, 188	1. 82	238	2, 571
1891	1, 091, 032	1, 897, 037	1. 71	222	2, 891
1892	1, 192, 721	2, 043, 479	1. 71	211	3, 257
1893	1, 252, 110	2, 235, 209	1. 79	171	3, 446
1894	969, 606	1, 541, 293	1. 59	157	3, 101
1895	1, 211, 185	1, 737, 254	1. 43	164	3, 212
1896	1, 366, 646	1, 918, 115	1. 40	170	3, 549

IOWA.

Total product in 1896, 3,954,028 short tons; spot value, $4,628,022.

Notwithstanding a decrease in production of over 200,000 short tons in 1896 as compared with 1895, Iowa continues to be the premier State in coal mining west of the Mississippi River, but drops from sixth to seventh place among all coal-producing States.

The value of the product in 1896 shows a loss of about $254,000 as compared with the preceding year. The general tendency toward lower prices for the past few years is shown in a steady decline in the value per ton since 1892. This is exhibited in the table of prices on a subsequent page.

Coal product of Iowa in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Appanoose	45	553,253	22,709	12,476	588,438	$737,907	$1.25	141	2,323
Boone	12	247,828	18,274	2,320	268,422	447,760	1.67	191	977
Greene	4	3,000	4,197	.....	7,197	13,010	1.81	125	46
Jasper	5	150,000	5,573	134	155,707	196,477	1.26	242	278
Jefferson	2	400	1,440	.....	1,840	2,335	1.27	176	11
Keokuk	12	249,124	11,750	5,520	266,394	277,769	1.04	167	563
Mahaska	14	979,674	26,837	10,112	1,016,623	1,134,022	1.12	208	2,144
Marion	13	181,615	9,874	2,279	193,768	195,628	1.01	200	471
Monroe	7	541,080	7,743	11,159	559,982	570,879	1.02	216	1,037
Polk	17	347,197	125,258	12,905	485,360	680,684	1.40	242	959
Taylor	3	12,189	1,843	30	14,062	26,638	1.89	236	38
Van Buren	4	7,800	1,990	106	9,896	13,582	1.37	193	31
Wapello	9	206,969	50,892	3,649	261,510	291,746	1.12	183	541
Warren	5	197	5,899	20	6,116	9,145	1.50	165	20
Wayne	2	39,750	6,000	565	46,315	61,835	1.31	126	155
Webster	20	104,493	16,693	2,696	123,882	163,673	1.32	173	444
Dallas, Guthrie, and Story	3	6,298	3,848	416	10,562	19,012	1.80	198	28
Small mines	.....	.....	140,000	.....	140,000	140,000	.....	.....	.....
Total	177	3,630,867	460,820	64,387	4,156,074	4,982,102	1.20	189	10,066

Coal product of Iowa in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Appanoose	43	511,791	21,395	11,492	544,678	$683,360	$1.26	158	1,768
Boone	16	270,304	30,061	16,391	316,756	472,725	1.49	183	953
Dallas, Greene	5	979	7,517	1,128	9,624	17,433	1.81	152	61
Jasper	5	160,000	4,040	70	164,110	174,595	1.06	258	254
Jefferson	2	.....	1,317	.....	1,317	1,535	1.17	96	7
Keokuk	10	195,558	13,137	5,779	214,474	218,586	1.02	172	551
Mahaska	17	974,751	52,459	20,031	1,047,241	1,127,974	1.08	191	2,121
Marion	11	84,073	5,068	3,862	*a* 93,023	91,295	.98	146	305
Monroe	8	415,903	6,781	10,836	433,520	437,490	1.01	188	840
Polk	20	385,136	140,660	13,255	*b* 546,051	696,682	1.28	180	1,556
Story	2	.....	9,101	.....	9,101	17,162	1.89	124	54
Taylor	3	7,000	1,400	.....	8,400	14,800	1.76	157	30
Van Buren	4	4,800	3,576	20	8,396	10,519	1.25	210	22
Wapello	9	191,750	31,140	4,187	227,077	225,950	1.00	171	463
Warren	7	3,426	9,298	100	12,824	18,608	1.45	143	53
Wayne	2	38,429	3,713	590	42,732	54,407	1.27	153	182
Webster	18	116,899	13,780	4,025	134,704	189,901	1.40	190	452
Small mines	.....	.....	140,000	.....	140,000	175,000	.....	.....	.....
Total	182	3,360,799	494,443	91,766	3,954,028	4,628,022	1.17	178	9,672

a Includes 20 short tons made into coke. *b* Includes 7,000 short tons made into coke.

The State is divided into three inspection districts, known, respectively, as the first or southern, the second or northeastern, and the third or northwestern. The following table shows the annual production according to districts since 1883:

Total production of coal in Iowa, by districts, from 1883 to 1896, inclusive.

District.	1883.	1884.	1885.	1886.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
First	1,231,444	1,165,803	1,294,971	1,416,165
Second	1,654,267	1,583,468	1,379,799	1,890,784
Third	1,571,829	1,621,295	1,337,805	1,008,830
Total	4,457,540	4,370,566	4,012,575	4,315,779

District.	1887.	1888.	1889.	1890.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
First	1,598,062	1,712,443	1,497,685	1,536,978
Second	1,989,095	2,211,274	1,720,727	1,626,193
Third	886,671	1,028,723	876,946	718,568
Small mines	.....	.....	.....	140,000
Total	4,473,828	4,952,440	4,095,358	4,021,739

District.	1891.	1892.	1893.	1894.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
First	1,229,512	1,398,793	1,505,205	1,654,112
Second	1,814,910	1,666,224	1,734,666	1,417,542
Third	641,073	713,474	592,358	755,599
Small mines	140,000	140,000	140,000	140,000
Total	3,825,495	3,918,491	3,972,229	3,967,253

District.	1895.	1896.	Increase in 1896.	Decrease in 1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
First	1,681,927	1,371,967	.....	309,960
Second	1,438,724	1,425,825	.....	12,899
Third	895,423	1,016,236	120,813	.....
Small mines	140,000	140,000	.....	.....
Total	4,156,074	3,954,028	.....	*a* 202,046

a Net decrease.

The counties comprised in each district and the product of each county since 1883 are shown in the following table:

Product of coal in the first inspection district of Iowa from 1883 to 1896, inclusive.

County.	1883.	1884.	1885.	1886.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Appanoose	144, 364	178, 064	275, 404	168, 000
Adams	4, 358	4, 459	4, 364	10, 731
Davis	590	1, 358	37, 694	1, 120
Jefferson	43, 553	9, 153	1, 250	1, 213
Lucas	546, 360	460, 017	492, 750	594, 450
Marion	101, 903	108, 735	112, 012	158, 697
Monroe	104, 647	110, 238	113, 699	131, 824
Page	838	1, 130	2, 037	1, 736
Taylor	105	142	691	9, 615
Van Buren	1, 880	1, 991	1, 336	9, 003
Wapello	266, 360	269, 607	210, 461	265, 564
Warren	14, 367	15, 374	14, 364	26, 132
Wayne	2, 119	5, 541	28, 909	38, 080
Total	1, 231, 444	1, 165, 803	1, 294, 971	1, 416, 165

County.	1887.	1888.	1889.	1890.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Appanoose	179, 593	235, 495	285, 194	284, 560
Adams	22, 233	21, 075	13, 457	(*a*)
Cass	.....	.....	280	(*a*)
Davis	2, 016	2, 016	3, 825	(*a*)
Jefferson	11, 645	10, 514	8, 123	351, 600
Lucas	529, 758	408, 765	339, 229	
Marion	238, 218	258, 330	145, 180	153, 506
Monroe	205, 525	261, 964	258, 401	324, 031
Montgomery	.....	.....	1, 040	(*a*)
Page	1, 993	3, 842	2, 768	(*a*)
Taylor	13, 642	8, 962	9, 736	(*a*)
Van Buren	29, 491	29, 075	39, 258	47, 464
Wapello	304, 722	426, 042	359, 199	341, 932
Warren	27, 772	19, 155	14, 515	8, 470
Wayne	31, 454	27, 208	17, 480	25, 415
Total	1, 598, 062	1, 712, 443	1, 497, 685	*b* 1, 536, 978

a Included in product of small mines. *b* Exclusive of product of small mines.

Product of coal in the first inspection district of Iowa from 1883 to 1896, inclusive—Cont'd.

County.	1891.	1892.	1893.	1894.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Appanoose	409,725	411,984	489,920	667,271
Adams	(*a*)	(*a*)	(*a*)	(*a*)
Cass	(*a*)	(*a*)	(*a*)	(*a*)
Davis	(*a*)	(*a*)	(*a*)	(*a*)
Jefferson, Lucas	800	1,000	482	1,127
Marion	165,867	134,400	111,145	108,695
Monroe	393,227	507,106	570,905	505,164
Montgomery	(*a*)	(*a*)	(*a*)	(*a*)
Page	(*a*)	(*a*)	(*a*)	(*a*)
Taylor	10,500	15,204	10,990	14,780
Van Buren	36,166	28,946	22,867	23,619
Wapello	165,827	231,472	230,460	278,583
Warren	2,000	3,600	3,000	12,649
Wayne	45,000	62,078	65,436	42,224
Total	*b* 1,229,512	*b* 1,398,793	*b* 1,505,205	*b* 1,654,112

County.	1895.	1896.	Increase.	Decrease.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Appanoose	588,438	544,678	.....	43,760
Adams	(*a*)	(*a*)	.....	.....
Cass	(*a*)	(*a*)	.....	.....
Davis	(*a*)	(*a*)	.....	.....
Jefferson, Lucas	1,840	1,317	.....	523
Marion	193,768	93,023	.....	100,745
Monroe	559,982	433,520	.....	126,462
Montgomery	(*a*)	(*a*)	.....	.....
Page	(*a*)	(*a*)	.....	.....
Taylor	14,062	8,400	.....	5,662
Van Buren	9,896	8,396	.....	1,500
Wapello	261,510	227,077	.....	34,433
Warren	6,116	12,824	6,708	.....
Wayne	46,315	42,732	.....	3,583
Total	*b* 1,681,927	*b* 1,371,967	.....	*c* 309,960

a Included in product of small mines. *b* Exclusive of product of small mines. *c* Net decrease.

Product of coal in the second inspection district of Iowa from 1883 to 1896.

County.	1883.	1884.	1885.	1886.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Mahaska	1,038,673	1,044,640	854,319	953,525
Keokuk	560,045	482,652	417,554	610,741
Jasper	51,389	51,896	101,276	320,358
Scott	4,160	4,280	6,650	3,360
Marshall	.....	.....	.....	448
Hardin	.....	.....	.....	2,240
Muscatine	.....	.....	.....	112
Total	1,654,267	1,583,468	1,379,799	1,890,784

County.	1887.	1888.	1889.	1890.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Mahaska	1,148,614	936,299	1,056,477	1,103,831
Keokuk	670,888	607,002	455,162	349,318
Jasper	159,083	308,200	199,152	173,044
Scott	9,670	10,170	9,446	(*b*)
Marshall	224	.....	.....	.....
Hardin	504	1,120	490	(*b*)
Muscatine	112	.....	.....	.....
Total	1,989,096	*b* 2,211,274	1,720,727	*c* 1,626,193

County.	1891.	1892.	1893.	1894.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Mahaska	1,231,405	1,141,131	1,419,930	1,152,988
Keokuk	316,303	361,233	152,097	142,750
Jasper	267,202	163,860	162,639	121,804
Scott	(*b*)	(*b*)	(*b*)	(*b*)
Hardin	(*b*)	(*b*)	(*b*)	(*b*)
Total	*c* 1,814,910	*c* 1,666,224	*c* 1,734,666	*c* 1,417,542

County.	1895.	1896.	Increase.	Decrease.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Mahaska	1,016,623	1,047,241	30,618	.....
Keokuk	266,394	214,474	.....	51,920
Jasper	155,707	164,110	8,403	.....
Scott	(*b*)	(*b*)	.....	.....
Hardin	(*b*)	(*b*)	.....	.....
Total	*c* 1,438,724	*c* 1,425,825	.....	*d* 12,899

a Includes 348,483 tons nut coal not included in county distribution.
b Included in product of small mines. *c* Exclusive of product of small mines. *d* Net decrease.

Product of coal in the third inspection district of Iowa from 1883 to 1896.

County.	1883.	1884.	1885.	1886.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Boone	523,019	529,842	513,174	330,366
Dallas	42,793	41,647	36,944	24,624
Greene	99,513	107,886	100,337	131,643
Guthrie	.....	5,809	5,148	19,257
Hamilton	2,238	2,103	1,028	3,710
Polk	625,879	694,312	518,442	378,520
Webster	278,387	239,696	162,732	120,710
Story	.....	.....	.....	.....
Total	1,571,829	1,621,295	1,337,805	1,008,830

County.	1887.	1888.	1889.	1890.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Boone	187,116	156,959	174,392	153,229
Dallas	45,270	54,457	67,055	33,466
Greene	118,601	122,127	51,438	45,192
Guthrie	20,502	20,922	12,275	(*a*)
Hamilton	7,469	7,257	.....	.....
Polk	341,705	336,749	434,047	367,852
Webster	163,768	178,881	137,739	118,829
Story	2,240	2,240	.....	.....
Total	886,671	*b* 1,028,723	876,946	*c* 718,568

County.	1891.	1892.	1893.	1894.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Boone	151,659	139,820	172,070	241,522
Dallas	48,710	26,550	13,461	10,201
Greene	53,215	43,360	18,000	5,220
Guthrie	(*a*)	(*a*)	(*a*)	(*a*)
Hamilton	.....	.....	.....	.....
Polk	309,467	388,590	271,731	395,647
Webster	78,022	115,154	117,096	103,009
Story	.....	.....	.....	.....
Total	*b* 641,073	*b* 713,474	*b* 592,358	*b* 755,599

a Included in product of small mines.
b Includes 149,131 tons nut coal not included in county distribution.
c Exclusive of product of small mines.

Product of coal in the third inspection district of Iowa from 1883 to 1896—Continued.

County.	1895.	1896.	Increase.	Decrease.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Boone	268, 422	316, 756	48, 334	.....
Dallas	6, 061	9, 624	.....	3, 634
Greene	7, 197			
Guthrie	1, 600	.....	.....	1, 600
Hamilton	.....	.....	.....	.....
Polk	485, 360	546, 051	60, 691	.....
Webster	123, 882	134, 704	10, 822	.....
Story	2, 901	9, 101	6, 200	.....
Total	*b* 895, 423	*b* 1, 016, 236	*c* 120, 813	.....

a Included in product of small mines. *b* Exclusive of product of small mines. *c* Net increase.

The product in some of the earlier years in the history of coal mining has already been referred to. Below is given in tabular form the output in all the years for which figures are obtainable, with the value and average price per ton when known, and the statistics of labor employed during the past eight years.

Product of coal in Iowa from 1860 to 1896, inclusive.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1860	48, 263	$92, 180	$1. 91	.....	.....
1865	69, 574	.....	.....	.....	.....
1866	99, 320	.....	.....	.....	.....
1868	241, 453	.....	.....	.....	.....
1870	283, 467	.....	.....	.....	.....
1875	1, 231, 547	2, 500, 140	2. 03	.....	.....
1880	1, 461, 166	2, 507, 453	1. 72	.....	.....
1882	3, 920, 000	.....	.....	.....	.....
1883	4, 457, 540	.....	.....	.....	.....
1884	4, 370, 566	.....	.....	.....	.....
1885	4, 012, 575	.....	.....	.....	.....
1886	4, 315, 779	5, 391, 151	1. 25	.....	.....
1887	4, 473, 828	5, 991, 735	1. 34	.....	.....
1888	4, 952, 440	6, 438, 172	1. 30	.....	.....
1889	4, 095, 358	5, 426, 509	1. 33	.....	9, 247
1890	4, 021, 739	4, 995, 739	1. 24	213	8, 130
1891	3, 812, 495	4, 807, 999	1. 27	224	8, 124
1892	3, 918, 491	5, 175, 060	1. 32	236	8, 170
1893	3, 972, 229	5, 110, 460	1. 30	204	8, 863
1894	3, 967, 253	4, 997, 939	1. 26	170	9, 995
1895	4, 156, 074	4, 982, 102	1. 20	189	10, 066
1896	3, 954, 028	4, 628, 022	1. 17	178	9, 672

It will be seen from the above table that the greatest range in the average price per ton during the past eleven years has been 17 cents; the highest price being $1.34, in 1887, and the lowest $1.17, in 1896.

In the preceding tables the product for a series of years, by counties, has been given. In the following tables will be found the average price per ton for a period of eight years, and the statistics of labor and working time in counties producing 10,000 tons or over:

Average prices for Iowa coal since 1889, in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Appanoose	$1.32	$1.38	$1.39	$1.51	$1.51	$1.30	$1.25	$1.26
Boone	1.86	1.82	1.86	1.80	1.87	1.60	1.67	1.49
Dallas	1.66	1.70	1.60	1.71	1.82	1.60	.....	.....
Greene	1.74	1.63	1.40	1.76	2.00	2.00	.....	.....
Jasper	1.42	1.11	1.44	1.28	1.28	1.75	1.26	1.06
Keokuk	1.25	1.31	1.32	1.28	1.21	1.14	1.04	1.02
Lucas	1.23	1.25	.....	.....	.....	.....	.....	.....
Mahaska	1.16	1.06	1.06	1.15	1.11	1.18	1.12	1.08
Marion	1.28	1.26	1.16	1.17	1.21	1.05	1.01	.98
Monroe	1.16	1.21	1.21	1.26	1.12	1.09	1.02	1.01
Polk	1.59	1.49	1.50	1.57	1.73	1.50	1.40	1.28
Taylor	2.07	.....	2.15	2.00	2.02	1.85	1.89	.....
Van Buren	1.39	1.29	1.29	1.32	1.36	1.37	1.37	.....
Wapello	1.13	1.10	1.24	1.29	1.27	1.09	1.12	1.00
Warren	.....	.....	.....	.....	.....	.....	.....	1.45
Wayne	1.47	1.25	1.52	1.49	1.47	1.50	1.31	1.27
Webster	1.63	1.54	1.71	1.61	1.67	1.64	1.32	1.40
The State	1.33	1.24	1.27	1.32	1.30	1.26	1.20	1.17

Statistics of labor employed and working time at Iowa coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Appanoose	1,080	165	1,419	207	1,213	184
Boone	465	191	484	196	534	189
Dallas	130	207	140	210	89	242
Greene	121	209	120	185	120	214
Jasper	335	246	416	256	426	274
Keokuk	1,018	184	795	204	610	285
Lucas	324	298	.....	.....	.....	.....
Mahaska	1,673	258	1,815	263	1,818	238
Marion	269	265	394	222	267	244

Statistics of labor employed and working time at Iowa coal mines—Continued.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Monroe	735	197	806	203	1,112	233
Polk	700	243	779	239	938	268
Taylor	.....	.....	35	241	54	223
Van Buren	108	280	85	207	92	226
Wapello	773	159	421	214	445	260
Wayne	60	180	130	205	140	232
Webster	307	182	273	182	302	247
The State	8,130	213	8,124	224	8,170	236

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Appanoose	1,793	151	2,254	153	2,323	141	1,768	158
Boone	577	208	842	169	977	191	953	183
Dallas	55	159	43	172	.....	.....	.....	.....
Greene	60	150	19	213	.....	.....	.....	.....
Jasper	284	253	177	204	278	242	254	258
Keokuk	528	155	551	128	563	167	551	172
Lucas	.....	.....	.....	.....	.....	.....	.....	.....
Mahaska	2,209	258	2,396	199	2,144	208	2,121	191
Marion	292	193	329	121	471	200	305	146
Monroe	1,103	214	1,212	172	1,037	216	840	188
Polk	697	211	944	184	959	242	1,556	180
Taylor	29	228	52	212	38	236	.....	.....
Van Buren	69	178	78	174	31	193	.....	.....
Wapello	603	174	541	167	541	183	463	171
Warren	.....	.....	.....	.....	.....	.....	53	143
Wayne	155	205	140	121	155	126	182	153
Webster	391	194	378	155	444	173	452	190
The State	8,863	204	9,995	170	10,066	189	9,672	178

KANSAS.

Total product in 1896, 2,884,801 short tons; spot value, $3,295,032.

Kansas participated in the double declining tendency of coal production during 1896. The amount of the product was not so much less

than in 1895, aggregating 2,884,801 short tons against 2,926,870 short tons, a loss of only a little more than 42,000 tons, but the value dropped $186,949 and was less in 1896 than in any year since 1890, when the output was about 625,000 tons less than in 1896. There have been three years (1892, 1894, and 1895) in which the product was more than in 1896; the value exceeded that of 1896 in every year since 1889 except 1890. The value per ton has declined steady from $1.31½ in 1892, to $1.27 in 1893; $1.23 in 1894; $1.20 in 1895, and $1.15 in 1896, this last being the lowest figure ever reported.

The following tables show the details of production in 1895 and 1896, by counties:

Coal product of Kansas in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Cherokee	26	880,018	28,375	10,439	112	918,944	$1,122,785	$1.22	155	1,982
Crawford	28	1,316,237	20,252	18,125	.....	1,354,614	1,378,996	1.02	161	3,098
Franklin	7	3,223	13,801	23	.....	17,047	31,404	1.84	192	54
Leavenworth	3	158,760	70,343	29,682	275	259,060	385,475	1.49	182	1,019
Linn	4	9,389	4,616	46	.....	14,051	15,492	1.10	115	71
Osage	35	219,975	20,782	827	.....	241,584	423,364	1.75	145	1,231
Atchison, Coffey, and Labette	3	.....	1,570	.....	.....	1,570	4,465	2.84	61	27
Small mines	.....	.....	120,000	.....	.....	120,000	120,000	1.00	.....	.....
Total	106	2,587,602	279,739	59,142	387	2,926,870	3,481,981	1.20	159	7,482

Coal product of Kansas in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Cherokee	22	958,720	10,737	14,460	1,215	985,132	$1,206,022	$1.23	179	1,969
Crawford	23	1,237,254	12,287	21,893	.....	1,271,434	1,229,691	.97	144	2,966
Franklin	6	2,000	10,811	50	.....	12,861	23,092	1.80	165	59
Leavenworth	3	187,594	70,169	26,937	.....	284,700	368,825	1.30	242	1,054
Linn	4	11,771	2,763	.....	.....	14,534	14,176	.97	113	54
Osage	35	165,440	24,947	561	.....	190,948	324,250	1.65	141	992
Atchison, Labette	3	.....	5,192	.....	.....	5,192	8,976	1.73	248	33
Small mines	.....	.....	120,000	.....	.....	120,000	120,000	1.00	.....	.....
Total	96	2,562,779	256,906	63,901	1,215	2,884,801	3,295,032	1.15	168	7,127

The following table shows in condensed form the statistics of coal production in Kansas since 1880. It will be noted that the years 1893, 1895, and 1896 were the only exceptions to a continual annual increase in the product.

Coal product of Kansas since 1880.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of men employed.
1880	550, 000	.....	.....	.....	.....
1881	750, 000	.....	.....	.....	.....
1882	750, 000	.....	.....	.....	.....
1883	900, 000	.....	.....	.....	.....
1884	1, 100, 000	.....	.....	.....	.....
1885	1, 212, 057	$1, 485, 002	$1. 23	.....	.....
1886	1, 400, 000	1, 680, 000	1. 20	.....	.....
1887	1, 596, 879	2, 235, 631	1. 40	.....	.....
1888	1, 850, 000	2, 775, 000	1. 50	.....	.....
1889	2, 221, 043	3, 296, 888	1. 48	.....	5, 956
1890	2, 259, 922	2, 947, 517	1. 30	210	4, 523
1891	2, 716, 705	3, 557, 305	1. 31	222	6, 201
1892	3, 007, 276	3, 955, 595	1. 31½	208	6, 559
1893	2, 652, 546	3, 375, 740	1. 27	147	7, 310
1894	3, 388, 251	4, 178, 998	1. 23	164	7, 339
1895	2, 926, 870	3, 481, 981	1. 20	159	7, 482
1896	2, 884, 801	3, 295, 032	1. 15	168	7, 127

In the following table is shown the total product of the State since 1885, by counties, with the increases and decreases during 1896 as compared with 1895:

Coal product of Kansas since 1885, by counties.

[Short tons.]

County.	1885.	1886.	1887.	1888.	1889.
Atchison	.....	.....	.....	.....	.....
Cherokee	371, 930	375, 000	385, 262	450, 000	549, 873
Coffey	.....	.....	.....	.....	18, 272
Crawford	221, 741	250, 000	298, 049	425, 000	827, 159
Franklin	14, 518	15, 000	18, 080	25, 000	37, 771
Labette	.....	.....	.....	.....	2, 541
Leavenworth	120, 561	160, 000	195, 480	210, 000	245, 616
Linn	5, 556	8, 900	12, 400	17, 500	25, 345
Osage	370, 552	380, 000	393, 608	415, 000	446, 018
Small mines	107, 199	211, 100	294, 000	307, 500	68, 448
Total	1, 212, 057	1, 400, 000	1, 596, 879	1, 850, 000	2, 221, 043

Coal product of Kansas since 1885, by counties—Continued.

[Short tons.]

County.	1890.	1891.	1892.	1893.	1894.
Atchison	.....	.....	.....	.....	3,500
Cherokee	724,861	832,289	825,531	697,521	948,142
Coffey	12,200	1,218	3,664	1,720	475
Crawford	900,464	997,759	1,309,246	1,195,868	1,554,253
Franklin	9,045	10,277	11,150	11,768	17,418
Labette	4,000	800	800	800	440
Leavenworth	319,866	380,142	330,166	309,237	395,967
Linn	10,474	38,934	43,913	46,464	25,867
Osage	179,012	355,286	372,806	279,168	322,189
Small mines	100,000	100,000	110,000	110,000	120,000
Total	2,259,922	2,716,705	3,007,276	2,652,546	3,388,251

County.	1895.	1896.	Increase.	Decrease.
Atchison	1,200	4,592	3,392	.....
Cherokee	918,944	985,132	66,188	.....
Coffey	120	.....	.....	120
Crawford	1,354,614	1,271,434	.....	83,180
Franklin	17,047	12,861	.....	4,186
Labette	250	600	350	.....
Leavenworth	259,060	284,700	25,640	.....
Linn	14,051	14,534	483	.....
Osage	241,584	190,948	.....	50,636
Small mines	120,000	120,000	.....	.....
Total	2,926,870	2,884,801	.....	*a* 42,069

a Net decrease.

In the preceding table the output by counties has been shown. The following tables indicate the tendency of prices for such years as they have been obtained, and the statistics of labor employed, together with the average working time:

Average prices for Kansas coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Cherokee	$1.20	$1.22	$1.19	$1.22	$1.15	$1.13	$1.22	$1.23
Crawford	1.20	1.24	1.09	1.08	1.10	1.07	1.02	.97
Franklin	2.18	2.00	1.90	1.85	1.84	1.88	1.84	1.80
Leavenworth	1.69	1.60	1.40	1.60	1.55	1.49	1.49	1.30
Linn	1.32	1.34	1.23	1.27	1.22	1.20	1.10	.97
Osage	2.03	1.35	2.04	2.04	1.85	1.89	1.45	1.65
The State	1.48	1.30	1.31	1.31½	1.27	1.23	1.20	1.15

Statistics of labor employed and working time at Kansas coal mines.

County.	1890.		1891.		1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Cherokee	1,413	186	1,609	180	1,777	183	1,978	106
Crawford	1,447	198	1,785	202	2,234	213	2,883	163
Franklin	47	224	48	207	57	180	57	162
Leavenworth	745	273	1,073	245	1,020	247	1,145	208
Linn	60	164	94	236	115	237	136	194
Osage	804	209	1,581	270	1,312	202	1,100	145
The State	4,523	210	6,201	222	6,559	208	7,310	147

County.	1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Cherokee	1,834	143	1,982	155	1,969	179
Crawford	2,723	167	3,098	161	2,966	144
Franklin	87	147	54	192	59	165
Leavenworth	1,406	197	1,019	182	1,054	242
Linn	132	91	71	115	54	113
Osage	1,129	159	1,231	145	992	141
The State	7,339	164	7,482	159	7,127	168

It is the opinion of Mr. Bennett Brown, State mine inspector, that there are good reasons for believing that coal mining in Kansas will increase with comparative rapidity during the coming years. He thinks that the quantity within the Coal Measures area is much greater than has been usually estimated by those interested in such matters. The records of the various deep wells drilled by those prospecting for oil and gas show that in many places coal of considerable quantity was passed through, which might often be mined were there a sufficient demand for it. The State is full of thinner seams of good coal which can not now be mined on account of the low price of coal. But should the price advance only from 1 to 2 cents per bushel many of them now untouched could be successfully operated. There is, therefore, little ground for apprehension regarding the exhaustion of the Kansas coal mines within a few centuries or much hope for a material advance in price.

Many inquiries have been made of the State survey regarding the

probabilities of deep borings reaching coal in the west-central portions of the State. There are not sufficient data upon which to base predictions that will be of any special value. In general, it may be said that the lower Coal Measures strata maintain their thickness westward much better than had previously been supposed by geologists in general. The Cherokee shales maintain almost their full thickness to as far west as Neodesha and Fredonia, with considerable quantities of coal, as is shown by the 27-inch vein at Cherry Vale, and this indicates that possibly they and other formations may continue westward for 100 or 200 miles more. There are no authentic records of deep wells farther west than Fredonia. Could a few wells be drilled about Wichita, Hutchinson, and to the north which would pass almost to the base of the Coal Measures they would throw much light upon the general stratigraphy of the deeply buried formations, and, whether they passed through coal or not, would be a great help in the intelligent prediction of the probable conditions of the presence or absence of coal in any considerable quantities. It is earnestly hoped that in the future accurate records of all deep wells within the State will be permanently preserved. At present little encouragement can be given to the hope that coal in paying quantities could be reached in those localities by shafting.

In Kansas, as in several other States, the system of employing convicts in coal mines is in operation, but is vigorously opposed. The State owns its own mines, located at Lansing, in Leavenworth County. The coal is used to supply the State eleemosynary institutions, the surplus after that being sold to the highest bidder. The highest bid made in 1896 was $1.10, which was 5 cents lower than the average for all sizes mined in the State during the year. Operators claim they can not compete with the convict-mined coal and demand some change which will protect the free miners from this competition.

In reviewing the coal-mining industry in Colorado mention was made of the Atchison, Topeka and Santa Fe Railroad having leased its mines in that State to the Colorado Fuel and Iron Company. The railroad company has also leased its mines in Kansas, and has retired from the coal-mining business. Mr. C. J. Devlin, of Topeka, who has been the manager of the railroad company's coal properties for a number of years, became the lessee under the arrangement of all the Kansas mines, as the Colorado Fuel and Iron Company did of the mines in Colorado.

KENTUCKY.

Total product in 1896, 3,333,478 short tons; spot value, $2,684,306.

The statistics of coal production in Kentucky during 1896, as in 1894 and 1895, were collected by Mr. C. J. Norwood, late chief inspector of mines, who, in connection with similar work for the State, acted as special agent for the Survey. In transmitting the result of his investigation in 1896 Mr. Norwood says that "general depression and increased competition" run monotonously through the story. There was a sharp

decline in selling value as well as a decrease in output. The smaller output was chiefly due to losses in cannel-coal production, and this occurred principally in the northeastern district, most largely attributable to the suspension of one mine in Carter County (due to business complications) and the winding up of the Johnson County mines. Mr. Norwood divides the State into three districts, (1) the northeastern, (2) the southeastern, and (3) the western.

1. Loss of product in the northeastern district he attributes to the lessened output of cannel coal. The invasion of certain Kentucky markets hitherto served in part by Carter and Lawrence counties mines by West Virginia coal and, to a small extent, by certain Laurel County (Kentucky) coal also cut down the output of this district. A small rate war occurred between Kentucky roads serving central Kentucky points on the one side and the Chesapeake and Ohio on the other, and while this helped the Carter County tonnage (the Chesapeake and Ohio using Carter County mines to meet southeastern Kentucky mines) it reduced the Lawrence County tonnage. Of course, prices were cut all round.

2. In the southeastern district increase of development and absence of strikes resulted in increase of production. The output was the largest known, but prices declined. Aside from increase of competition in a dull year, Tennessee's convict-mined coal was an important factor in the hammering down of prices. The mines of the Jellico district (nearly all of which, producing "Jellico" coal, are in Kentucky) and those on the Cincinnati Southern Railroad look southward for their principal markets, especially for their steam coal. The convict-mined coal not only made closer competition but created new competing points, and not only southward but in Kentucky. It has been contended that the Tennessee State mines did not produce sufficient coal to cause all the trouble that has been charged to them. Mr. Norwood avers it is not necessary that a mine's output shall be large in order to unsettle prices. It is stated that Tennessee's convict-mined steam coal has been placed at 45 cents, whereas 85 cents means lowest price for Jellico steam. The entrance of Tennessee as a competitor in the coal markets with its "convict coal" is one of the astonishing things of present times. Kentuckians propose to keep the coal out of this State if possible. After a brief campaign Kentucky completely eliminated convict mining from among the possibilities in the State. It is inhibited by the new constitution.

3. Too many mines, increased competition, overproduction at some points at the expense of others, uncommonly mild weather, and decline in demand for pea and slack, caused loss of tonnage and fall in price in the western district. The situation in this district just now is far from satisfactory. Machine mining is growing, and Mr. Norwood looks for practically all of the commercial coal—certainly by far the larger part of it—to be mined by machines at an early day. It seems now as

if a contest between machine mines and pick mines is imminent, with a possibility of a subsequent fight between machine and machine, unless some sort of an association of interests is effected, whereby production and prices may be kept within reasonable limits. Many of the pick mines have already reduced mining rates, and in some instances coal was sold in 1896 at prices far below cost of production.

Of course, the general business depression affected all districts. All things being considered, however (keeping in mind that Kentucky is still deficient in manufacturing plants), it seems that the bituminous mines held their own fairly well as to tonnage; and, since the markets generally were dull, perhaps the decline in selling value was no greater than might reasonably have been expected.

In the following tables will be found the statistics of coal production in Kentucky during 1895 and 1896, by counties, with the distribution of the output for consumption:

Coal product of Kentucky in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bell	5	76,132	1,982	936	324	79,374	$116,773	$1.47	137	275
Carter	8	94,976	5,618	1,435	.....	102,029	116,391	1.14	162	328
Daviess	2	4,211	8,576	111	.....	12,898	6,877	.53	126	29
Hancock	3	30,377	103	89	.....	30,569	27,536	.90	106	8[illegible]
Henderson	6	53,075	23,134	2,904	.....	79,113	70,797	.89	155	277
Hopkins	11	709,573	22,152	16,497	40,214	788,436	541,489	.69	170	1,366
Johnson	3	10,561	.....	118	.....	10,679	25,928	2.43	242	50
Laurel	16	231,044	914	1,680	.....	233,638	210,393	.90	100	1,000
Lee	3	42,363	399	551	.....	43,313	45,122	1.04	158	141
Muhlenberg	9	258,924	3,732	4,697	.....	267,353	197,735	.74	114	583
Ohio	9	376,504	4,553	5,846	.....	386,903	270,731	.70	160	724
Union	5	86,760	10,864	2,692	300	100,616	88,632	.88	169	224
Webster	3	44,819	4,321	756	.....	49,896	37,862	.76	166	81
Butler, Christian, and McLean	7	64,247	3,179	1,068	.....	68,494	71,906	1.05	139	220
Greenup, Boyd, and Lawrence	6	222,502	1,155	4,102	.....	227,759	180,233	.79	233	435
Knox and Whitley	16	630,445	5,461	5,131	.....	641,037	611,081	.95	158	1,606
Pulaski and Rockcastle	8	76,097	7,885	1,681	.....	85,663	83,261	.97	127	378
Small mines	.....	.....	150,000	.....	.....	150,000	187,500	1.25	.....	.....
Total	120	3,012,610	254,028	50,294	40,838	3,357,770	2,890,247	.86	153	7,799

Coal product of Kentucky in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bell	8	69,094	3,412	757	16,271	89,534	$130,026	$1.45	175	331
Boyd	2	118,439	1,583	1,000	.....	121,022	96,818	.80	249	232
Carter	6	135,440	280	346	.....	136,066	115,354	.85	221	360
Hancock	3	16,802	800	240	.....	17,842	27,536	1.54	178	99
Henderson	6	92,417	23,742	3,381	.....	119,540	92,159	.77	132	265
Hopkins	12	710,759	24,610	15,833	25,980	777,182	520,189	.67	191	1,292
Johnson	2	6,762	.....	.....	.....	6,762	18,596	2.75	238	64
Knox	5	211,176	1,874	3,990	.....	217,040	145,916	.67	247	436
Laurel	13	285,724	1,331	1,439	.....	288,494	234,865	.81	142	826
Lee	3	9,697	100	50	.....	9,847	9,847	1.00	58	156
Muhlenberg	8	247,331	4,819	4,118	.....	256,268	178,272	.70	129	569
Ohio	8	353,867	6,158	8,069	.....	368,094	226,008	.61	163	721
Pulaski	5	71,414	289	834	.....	72,537	71,875	.99	118	270
Union	6	88,312	9,595	2,687	3,528	104,122	86,687	.83	166	245
Webster	4	39,273	10,034	1,231	.....	50,538	37,108	.73	140	108
Whitley	11	420,296	4,150	4,534	.....	428,980	401,066	.93	145	1,196
Breathitt, Greenup, Lawrence	3	46,307	477	3,950	.....	50,734	41,605	.82	125	153
Butler, Christian	3	34,216	5,562	1,790	.....	41,568	43,046	1.04	150	161
Daviess, McLean	4	23,029	3,081	1,198	.....	27,308	19,833	.73	136	65
Small mines	.....	.....	150,000	.....	.....	150,000	187,500	.....	.....	.....
Total	112	2,980,355	251,897	55,447	45,779	3,333,478	2,684,306	.78	165	7,549

The following table exhibits the annual product of the State since 1873:

Annual coal product of Kentucky since 1873.

Year.	Short tons.	Year.	Short tons.
1873	300,000	1885	1,600,000
1874	360,000	1886	1,550,000
1875	500,000	1887	1,933,185
1876	650,000	1888	2,570,000
1877	850,000	1889	2,399,755
1878	900,000	1890	2,701,496
1879	1,000,000	1891	2,916,069
1880	1,000,000	1892	3,025,313
1881	1,100,000	1893	3,007,179
1882	1,300,000	1894	3,111,192
1883	1,650,000	1895	3,357,770
1884	1,550,000	1896	3,333,478

Since 1889 the product, by counties, has been as follows:

Coal product of Kentucky since 1889, by counties.

County.	1889.	1890.	1891.	1892.	1893.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bell	20,095	.....	15,693	7,971	43,671
Boyd	163,124	*a* 191,600	179,350	194,470	162,706
Butler	6,489	*b* 44,931	12,871	18,951	22,719
Carter	172,776	179,379	145,937	139,351	105,844
Christian	27,281	.....	34,060	47,895	34,560
Daviess	30,870	.....	6,711	8,064	7,546
Greenup	632	.....	.....	.....	1,964
Hancock	21,588	.....	16,815	13,393	5,000
Henderson	65,682	*c* 126,640	124,021	80,661	103,639
Hopkins	555,119	604,307	680,386	730,879	713,809
Johnson	32,347	21,222	21,522	24,543	6,205
Knox	48,703	90,000	100,000	106,031	161,986
Laurel	280,451	291,178	308,242	241,129	193,622
Lawrence	79,787	.....	80,848	97,000	95,232
Lee	.....	.....	.....	.....	.....
McLean	35,177	.....	25,000	.....	.....
Muhlenberg	206,855	240,983	260,315	277,865	290,270
Ohio	246,253	267,736	322,411	310,289	312,658
Pulaski	84,363	.....	15,810	10,990	52,897
Rockcastle	1,432	.....	.....	9,774	9,010
Union	56,556	67,763	86,678	127,225	158,194
Webster	32,729	*d* 133,216	33,883	38,207	37,999
Whitley	184,874	262,541	265,516	340,615	337,648
Small mines	46,572	180,000	180,000	200,000	150,000
Total	2,399,755	2,701,496	2,916,069	3,025,313	3,007,179

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bell	63,022	79,374	89,534	10,160	.....
Boyd	111,659	170,443	121,022	.....	49,421
Breathitt	.....	.....	2,406	2,406	.....
Butler	19,982	24,501	28,444	3,943	.....
Carter	85,266	102,029	136,066	34,037	.....
Christian	38,836	22,159	13,124	.....	9,035
Daviess	10,353	12,898	3,232	.....	9,666
Greenup	1,573	1,403	854	.....	549
Hancock	35,571	30,569	17,842	.....	12,727
Henderson	80,074	79,113	119,540	40,427	.....
Hopkins	811,759	788,436	777,182	.....	11,254
Johnson	16,902	10,679	6,762	.....	3,917
Knox	72,858	185,734	217,040	31,306	.....
Laurel	261,177	233,638	288,494	54,856	.....
Lawrence	86,497	55,913	47,474	.....	8,439

a Includes Pulaski.
b Includes Christian, Crittenden, and Daviess.
c Includes Hancock and McLean.
d Includes Lawrence.

Coal product of Kentucky since 1889, by counties—Continued.

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Lee	49,527	43,313	9,847	.....	33,466
McLean	15,354	21,834	24,076	2,242	.....
Muhlenberg	269,580	267,353	256,268	.....	11,085
Ohio	348,937	386,903	368,094	.....	18,809
Pulaski	51,665	81,188	72,537	.....	8,651
Rockcastle	800	4,475	.....	.....	4,475
Union	134,585	100,616	104,122	3,506	.....
Webster	41,934	49,896	50,538	642	.....
Whitley	349,282	455,303	428,980	.....	26,323
Small mines	153,999	150,000	150,000	.....	.....
Total	3,111,192	3,357,770	3,333,478	.....	*a* 24,292

a Net decrease.

The following tables exhibit the average price per ton received for coal at the mines in counties producing 10,000 tons or over, the number of employees, and the average number of days worked. It will be noticed that the average for the State shows a drop from 93 cents in 1891 to 78 cents in 1896:

Average prices for Kentucky coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Bell	$1.40	.....	$1.25	$1.50	$0.87	$1.27	$1.47	$1.45
Boyd	1.10	$0.84	.81	.74	.82	.80	.84	.80
Butler	1.24	.....	1.00	2.00	1.25	1.25	1.12	.94
Carter	1.14	1.10	1.04	1.29	1.24	1.37	1.14	.85
Christian	1.26	.86	1.16	.95	.97	1.25	1.18	1.25
Daviess	.....	.....	.....	.....	.....	.....	.53	.....
Hancock	1.58	.....	1.84	2.50	2.50	1.00	.90	1.54
Henderson	1.26	.89	.92	.86	.85	.88	.89	.77
Hopkins	.78	.76	.73	.70	.66	.75	.69	.67
Johnson	1.67	2.13	2.28	2.37	2.64	2.40	2.43	.....
Knox	.84	.77	1.00	.79	.85	.80	.79	.67
Laurel	.90	.95	1.00	.94	.89	.80	.90	.81
Lawrence	1.34	1.25	1.00	1.15	1.38	.98	.60	.78
Lee	.....	.....	.....	.....	.....	1.17	1.04	.....
Muhlenberg	.87	.80	.84	.89	.75	.76	.74	.70
Ohio	.81	.78	.79	.83	.78	.70	.70	.61
Pulaski	1.30	1.00	1.39	1.20	1.06	1.00	.97	.99
Union	1.13	1.08	1.26	1.01	.95	.87	.88	.83
Webster	.80	.78	.88	.86	.74	.66	.76	.73
Whitley	1.10	1.09	1.19	1.05	1.03	1.01	1.02	.93
The State	.99	.92	.93	.92	.86	.86	.86	.78

Statistics of labor employed and working time at Kentucky coal mines.

County.	1890.		1891.		1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Bell	.....	.....	75	130	30	136	194	177
Boyd	.....	.....	300	287	300	285	275	225
Butler	.....	.....	45	200	65	192	45	224
Carter	459	237	437	227½	375	276	476	222
Christian	.....	.....	125	187	135	210	143	182
Daviess	.....	.....	.....	.....	.....	.....	.....	.....
Hancock	.....	.....	100	80	100	275	25	150
Henderson	.....	.....	231	249	150	231	194	185
Hopkins	1,104	231	1,203	244	1,292	228	1,264	232
Johnson	110	267	153	280	157	291	27	281
Knox	200	240	215	200	225	185	275	240
Laurel	680	225	798	233	775	177	654	223
Lawrence	.....	.....	300	289	325	295	380	244
Lee	.....	.....	.....	.....	.....	.....	.....	.....
Muhlenberg	495	213	586	215	555	219	597	173
Ohio	520	236	625	225	818	169	590	170
Pulaski	.....	.....	74	170	45	135	108	180
Union	131	189	289	161	313	191	332	181
Webster	.....	.....	67	226	64	194	52	215
Whitley	625	204	680	190	890	216	850	163
The State	5,259	219	6,355	225	6,724	217	6,581	202

Statistics of labor employed and working time at Kentucky coal mines—Continued.

County.	1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Bell	192	208	275	137	331	175
Boyd	287	183	306	253	232	249
Butler	64	195	82	155	86	199
Carter	516	110	328	162	360	221
Christian	88	194	77	142	75	94
Daviess	.....	.....	29	126	.....	.....
Hancock	111	129	82	106	99	178
Henderson	215	164	277	155	265	132
Hopkins	1,535	182	1,366	170	1,292	191
Johnson	98	284	50	242	.....	.....
Knox	255	113	388	159	436	247
Laurel	927	108	1,000	100	826	142
Lawrence	226	194	99	213	115	130
Lee	152	246	141	158	.....	.....
Muhlenberg	642	105	583	114	569	129
Ohio	673	147	724	160	721	163
Pulaski	339	90	317	138	270	118
Union	260	168	224	169	245	166
Webster	89	98	81	166	108	140
Whitley	1,287	125	1,218	158	1,196	145
The State	8,083	145	7,799	153	7,549	165

MARYLAND.

Total product in 1896, 4,143,936 short tons; spot value, $3,299,928.

Maryland's output of coal in 1896 shows an increase over the preceding year of 228,351 short tons, or 5.8 per cent over that of 1895, with an increase in value of $139,336. The increased production in 1896 advances Maryland from eighth to sixth place among the coal producers, and with the exception of Illinois makes the Appalachian field the home of the six leading States. This is the first year in which the coal output of Maryland has exceeded 4,000,000 short tons, and is in consequence the most important year in her history. It has been claimed that the Georges Creek field was becoming exhausted, but in opposition to this it is recently reported that the Borden Mining Company has discovered a large amount of valuable coal, as yet undeveloped, on the company's lands in Garrett County and close to the Allegany County line, near Borden Pit. There is also a large amount of coal on the lands of the Consolidation Coal Company in the

same vicinity. It is said there is as much coal on these lands as has already been taken out and mined from the Georges Creek coal region. From this it would appear that the early exhaustion of the Maryland mines is highly improbable.

During 1896 the Consolidation Coal Company, one of the largest operators in the Maryland field, began experimenting with coal barges, to be towed by steam colliers from Locust Point, Baltimore, to coastwise destinations. The use of these barges will be watched with deep interest by shippers and dealers in coal generally. It is expected to solve the important question of moving coal at the least possible expense, and to secure at the same time the reliability of steam. Coal can be moved by sailing vessels at very low rates sometimes, but in this age of spot demand sailing vessels often fail to move with the necessary promptness. Large and constant consumers of coal do not like to keep a great supply on hand; it takes up too much room and ties up a great deal of money. They prefer to have it delivered in convenient lots just as they want it, and deal with those who can furnish it in that way.

The new barges are built on the lines of a ship, in order to make them ride and handle easily in a sea. Each has four masts, and can spread sufficient canvas to take care of herself should she break away from her consort at sea. The living accommodations for the crew are good, and even should the towline part during a gale the men would be completely safe, navigating the barge under her own canvas. Each barge will carry 1,500 tons of coal, which is also the capacity of the steamers *Frostburg* and *Charles F. Mayer*. Hereafter when each steamer leaves she will carry out a double cargo—1,500 tons in her hold and towing another 1,500 tons in the barge astern. The last 1,500 tons is thus moved at comparatively little additional expense, as the tow will delay the steamer only eight hours between Baltimore and Boston, and requires but little additional use of fuel. Should the barge plan measure up to expectations the Consolidation Company will probably give out contracts for several other barges next winter, and will be followed by other companies engaged in moving coal.

Coal mining in Maryland is confined to two counties, Allegany and Garrett, the former being by far the most important. Of the product in 1896 Garrett County produced 88,681 short tons, a little more than 2 per cent of the total.

The following table shows the statistics of production in Maryland since 1889. The figures are reduced to short tons for the sake of uniformity throughout the report.

Coal product of Maryland since 1889.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
1889	2,885,336	44,217	10,162	2,939,715	$2,517,474	$0.86	.....	3,702
1890	3,296,393	52,621	8,799	3,357,813	2,899,572	.86	244	3,842
1891	3,771,584	36,959	11,696	3,820,239	3,082,515	.80	244	3,891
1892	3,385,384	30,955	3,623	3,419,962	3,063,580	.89	225	3,886
1893	3,676,137	26,833	13,071	3,716,041	3,267,317	.88	240	3,935
1894	3,435,600	51,750	14,078	3,501,428	2,687,270	.77	215	3,974
1895	3,840,991	59,950	14,644	3,915,585	3,160,592	.81	248	3,912
1896	4,068,558	53,046	22,332	4,143,936	3,299,928	.80	204	4,039

The following table shows the annual output of coal in Maryland since 1883:

Product of coal in Maryland from 1883 to 1896.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of men employed.
1883	2,476,075	.....	.....	.....	.....
1884	2,765,617	.....	.....	.....	.....
1885	2,833,337	.....	.....	.....	.....
1886	2,517,577	$2,391,698	$0.95	.....	.....
1887	3,278,023	3,114,122	.95	.....	.....
1888	3,479,470	3,293,070	.95	.....	.....
1889	2,939,715	2,517,474	.86	.....	3,702
1890	3,357,813	2,899,572	.86	244	2,842
1891	3,820,239	3,082,515	.80	244	3,891
1892	3,419,962	3,063,580	.89	225	3,886
1893	3,716,041	3,267,317	.88	240	3,935
1894	3,501,428	2,687,270	.77	215	3,974
1895	3,915,585	3,160,592	.81	248	3,912
1896	4,143,936	3,299,928	.80	204	4,039

The following tables, showing the shipments from the various mines in Maryland since 1883 and the total shipments from the Cumberland field (including the West Virginia mines in the field) since 1842, are obtained from the official reports of the Cumberland coal trade. The Maryland mining laws compel the use of the long ton as a basis of measurement, and the quantities in these tables are so expressed.

Shipments of coal from Maryland mines from 1883 to 1896.

[Long tons.]

Company.	1883.	1884.	1885.	1886.
Consolidation Coal Co	456, 238	689, 212	710, 064	675, 652
New Central Coal Co	210, 850	210, 140	203, 814	149, 561
Georges Creek Coal and Iron Co.	257, 490	266, 042	257, 343	265, 942
Maryland Union Coal Co	137, 105	117, 180	98, 095	116, 771
Borden Mining Co	151, 665	162, 057	179, 537	137, 747
Maryland Coal Co	235, 854	295, 736	365, 319	288, 742
American Coal Co	190, 055	194, 330	220, 339	211, 305
Potomac Coal Co	139, 723	169, 463	196, 280	156, 757
Hampshire and Baltimore Coal Co	194, 534	36, 416	.....	.....
Atlantic and Georges Creek Coal Co. (Pekin mine)	69, 000	75, 467	64, 938	7, 321
Swanton Mining Co	34, 905	28, 620	52, 862	42, 688
Blæn Avon Coal Co	81, 721	100, 961	69, 192	65, 830
Piedmont Coal and Iron Co	4, 619	1, 250	32	1, 678
Union Mining Co	5, 024	5, 310	5, 641	6, 824
National Coal Co	38, 998	42, 680	48, 307	62, 637
Davis and Elkins mine	.....	74, 437	58, 002	58, 382
James Ryan	.....	.....	.....	.....
George M. Hansel	.....	.....	.....	.....
Total	2, 210, 781	2, 469, 301	2, 529, 765	2, 247, 837

Shipments of coal from Maryland mines from 1883 to 1896—Continued.

[Long tons.]

Company.	1887.	1888.	1889.	1890.
Consolidation Coal Co	936, 799	1, 023, 349	871, 463	956, 031
New Central Coal Co	181, 906	169, 484	118, 885	218, 169
Georges Creek Coal and Iron Co.	394, 012	437, 992	311, 258	351, 310
Maryland Union Coal Co	148, 523	106, 620	.....	.....
Borden Mining Co	192, 636	212, 520	206, 549	290, 055
Maryland Coal Co	316, 518	340, 866	268, 438	366, 839
American Coal Co	259, 632	287, 058	297, 537	386, 731
Potomac Coal Co	209, 793	208, 777	205, 212	217, 232
Atlantic and Georges Creek Coal Co. (Pekin mine)	.....	6, 375	3, 884	752
Swanton Mining Co	61, 610	58, 383	40, 748	41, 401
Blæn Avon Coal Co	11, 934	.....	.....	.....
Union Mining Co	7, 500	6, 396	3, 734	17, 933
National Coal Co	117, 775	76, 592	72, 571	60, 206
Davis and Elkins mine	82, 667	98, 443	18, 089	.....
James Ryan	3, 608	.....	.....	.....
George M. Hansel	1, 989	3, 559	113	.....
Barton and Georges Creek Valley Co	.....	69, 857	123, 429	175, 838
Enterprise mine	.....	399	288	11
Franklin Consolidated Coal Co	.....	.....	71, 837	66, 644
Big Vein Coal Co	.....	.....	21, 310	52, 917
Piedmont-Cumberland Coal Co	.....	.....	2, 493	29, 003
Anthony Mining Co	.....	.....	.....	115
Total	2, 926, 902	3, 106, 670	2, 637, 838	3, 231, 187

Company.	1891.	1892.	1893.	1894.
Consolidation Coal Co	910, 977	912, 787	907, 559	892, 502
New Central Coal Co	206, 813	201, 428	223, 504	151, 002
Georges Creek Coal and Iron Co.	356, 927	297, 632	345, 791	364, 668
Borden Mining Co	300, 268	253, 629	367, 725	265, 548
Maryland Coal Co	406, 464	280, 946	356, 820	351, 542
American Coal Co	449, 631	384, 681	443, 963	453, 680
Potomac Coal Co	184, 706	137, 738	121, 258	108, 977
Swanton Mining Co	33, 029	5, 162	.....	2, 465
Union Mining Co	179, 232	176, 996	205, 210	173, 548
Barton and Georges Creek Valley Co	201, 124	201, 365	193, 545	165, 886
Franklin Consolidated Coal Co.[a]	76, 593	72, 117	57, 598	64, 766

[a] Succeeded by Davis Coal and Coke Co. in 1894.

Shipments of coal from Maryland mines from 1883 to 1896—Continued.

[Long tons.]

Company.	1891.	1892.	1893.	1894.
Big Vein Coal Co	62, 832	66, 683	63, 940	47, 023
Piedmont-Cumberland Coal Co	42, 439	14, 564	17, 869	6, 483
Anthony Mining Co	9, 725	10, 665	11, 228	17, 617
Atlantic and Georges Creek Coal Co	.....	.....	.....	.....
Midland Mining Co	.....	.....	.....	.....
Total	3, 420, 760	3, 016, 393	3, 316, 010	3, 065, 707

Company.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Consolidation Coal Co	923, 655	1, 151, 816	228, 161	.....
New Central Coal Co	201, 726	188, 453	.....	13, 273
Georges Creek Coal and Iron Co	458, 245	525, 131	66, 886	.....
Borden Mining Co	244, 878	167, 712	.....	77, 166
Maryland Coal Co	449, 234	359, 625	.....	89, 609
American Coal Co	524, 079	461, 215	.....	62, 864
Potomac Coal Co	123, 708	69, 416	.....	54, 292
Swanton Mining Co	.....	4, 605	4, 605	.....
Union Mining Co	184, 916	276, 466	91, 550	.....
Barton and Georges Creek Valley Co	190, 826	232, 846	42, 020	.....
Davis Coal and Coke Co	50, 781	108, 656	57, 875	.....
Big Vein Coal Co	36, 397	70, 305	33, 908	.....
Piedmont-Cumberland Coal Co	9, 537	8, 268	.....	1, 269
Anthony Mining Co	10, 062	.....	.....	10, 062
Atlantic and Georges Creek Coal Co	4, 714	37, 750	33, 036	.....
Midland Mining Co	240	.....	.....	240
Total	3, 412, 998	3, 662, 264	*a* 249, 266	.....

a Net increase.

Total shipments from the Cumberland coal field in

Year.	Frostburg region.						
	Cumberland and Pennsylvania R. R.				Cumberland Coal and Iron Company's railroad.		
	By Baltimore and Ohio R. R.	By Chesapeake and Ohio Canal.	By Pennsylvania R. R.	Total.	By Baltimore and Ohio R. R.	By Chesapeake and Ohio Canal.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
1842	757	.....	.....	757	951	.....	951
1843	3,661	.....	.....	3,661	6,421	.....	6,421
1844	5,156	.....	.....	5,156	9,734	.....	9,734
1845	13,738	.....	.....	13,738	10,915	.....	10,915
1846	11,240	.....	.....	11,240	18,555	.....	18,555
1847	20,615	.....	.....	20,615	32,325	.....	32,325
1848	36,571	.....	.....	36,571	43,000	.....	43,000
1849	63,676	.....	.....	63,676	78,773	.....	78,773
1850	73,783	3,167	.....	76,950	119,023	875	119,898
1851	70,893	51,438	.....	122,331	103,808	31,540	135,348
1852	128,534	46,357	.....	174,891	139,925	19,362	159,287
1853	150,381	84,060	.....	234,441	155,278	70,535	225,813
1854	148,953	63,731	.....	212,684	173,580	92,114	265,694
1855	93,691	77,095	.....	170,786	97,710	100,691	198,401
1856	86,994	80,387	.....	167,381	121,945	105,149	227,094
1857	80,743	55,174	.....	135,917	88,573	54,000	142,573
1858	48,018	166,712	.....	214,730	66,009	87,539	153,548
1859	48,415	211,639	.....	260,054	72,423	86,203	158,626
1860	70,669	232,278	.....	302,947	80,500	63,600	144,100
1861	23,878	68,303	.....	92,181	25,983	29,296	55,279
1862	71,745	75,206	.....	146,951	41,096	23,478	64,574
1863	117,796	173,269	.....	291,065	111,087	43,523	154,610
1864	287,126	194,120	.....	481,246	67,676	64,522	132,198
1865	384,297	285,295	.....	669,592	104,651	57,907	162,558
1866	592,938	291,019	.....	883,957	52,251	52,159	104,410
1867	623,031	385,249	.....	1,008,280	40,106	72,904	113,010
1868	659,115	424,406	.....	1,083,521	100,345	57,919	158,264
1869	1,016,777	573,243	.....	1,590,020	130,017	78,908	208,925
					2,092,660	1,192,224	3,284,884
					Eckhart Branch R. R.		
1870	909,511	520,196	.....	1,429,707	114,404	83,941	198,345
1871	1,247,279	656,085	.....	1,903,364	69,864	194,254	264,118
1872	1,283,956	612,537	22,021	1,918,514	26,586	203,666	230,252
1873	1,509,570	641,220	114,589	2,265,379	89,765	137,582	227,347
1874	1,295,804	631,882	67,671	1,995,357	113,670	135,182	248,852
1875	1,095,880	715,673	160,213	1,971,766	52,505	164,165	216,670
1876	939,262	443,435	131,866	1,514,563	15,285	189,005	204,290
1877	755,278	473,646	170,884	1,399,808	63,181	111,350	174,531
1878	823,801	486,038	145,864	1,455,703	99,455	123,166	222,621
1879	933,240	397,009	154,264	1,484,513	141,907	104,238	246,145
1880	1,055,491	471,800	213,446	1,740,737	197,525	131,325	328,850
1881	1,113,263	270,156	153,501	1,536,920	271,570	151,526	423,096
1882	576,701	115,344	91,574	783,619	199,183	76,140	275,323
1883	851,985	302,678	217,065	1,371,728	197,235	141,390	338,625
1884	1,193,780	150,471	199,138	1,543,389	289,884	124,718	414,602
1885	1,091,904	171,460	206,227	1,469,591	289,407	117,829	407,236
1886	1,131,949	115,531	141,520	1,389,000	243,321	113,791	357,112
1887	1,584,114	132,177	176,241	1,892,532	332,798	125,305	458,103
1888	1,660,406	155,216	193,046	2,008,668	374,888	95,191	470,079
1889	1,430,381	26,886	177,152	1,634,419	368,497	26,407	394,904
1890	1,511,418	.....	291,704	1,803,122	522,334	.....	522,334
1891	1,628,574	9,070	289,232	1,926,876	463,142	39,294	502,436
1892	1,426,994	93,705	214,011	1,734,710	349,207	170,116	519,323
1893	1,332,634	135,409	360,807	1,828,850	341,321	201,947	543,268
1894	1,068,739	95,523	372,205	1,536,467	436,216	208,914	645,130
1895	1,193,834	101,076	255,133	1,550,043	464,407	212,534	676,941
1896	1,344,402	169,195	163,471	1,677,068	610,418	195,279	805,697
Total	36,923,341	11,635,566	4,682,845	53,241,752	6,737,975	3,578,155	10,316,230

a Includes 118,680 tons used on line of Cumberland and Pennsylvania Railroad and its branches Company in locomotives, rolling mills, etc.

Maryland and West Virginia from 1842 to 1896.

Frostburg region.				Piedmont region.		Total.			
Georges Creek and Cumberland R. R.									
By Chesapeake and Ohio Canal.	By Pennsylvania R. R.	Local and Baltimore and Ohio.	Total.	Georges Creek R. R.	Hampshire R. R. by Baltimore and Ohio R. R.	Baltimore and Ohio R. R. and local.	Chesapeake and Ohio Canal.	Pennsylvania R. R.	Aggregate.
Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
.....	.....	.....	.....	.....	.....	1, 708	.....	.....	1, 708
.....	.....	.....	.....	.....	.....	10, 082	.....	.....	10, 082
.....	.....	.....	.....	.....	.....	14, 890	.....	.....	14, 890
.....	.....	.....	.....	.....	.....	24, 653	.....	.....	24, 653
.....	.....	.....	.....	.....	.....	29, 795	.....	.....	29, 795
.....	.....	.....	.....	.....	.....	52, 940	.....	.....	52, 940
.....	.....	.....	.....	.....	.....	79, 571	.....	.....	79, 571
.....	.....	.....	.....	.....	.....	142, 449	.....	.....	142, 449
.....	.....	.....	.....	.....	.....	192, 806	4, 042	.....	196, 848
.....	.....	.....	.....	.....	.....	174, 701	82, 978	.....	257, 679
.....	.....	.....	.....	.....	.....	268, 459	65, 719	.....	334, 178
.....	.....	.....	.....	73, 725	.....	376, 219	157, 760	.....	533, 979
.....	.....	.....	.....	181, 303	.....	503, 836	155, 845	.....	659, 681
.....	.....	.....	.....	227, 245	65, 570	478, 486	183, 786	.....	662, 272
.....	.....	.....	.....	269, 210	42, 765	502, 330	204, 120	.....	706, 450
.....	.....	.....	.....	252, 368	51, 628	465, 912	116, 574	.....	582, 486
.....	.....	.....	.....	218, 318	63, 060	395, 405	254, 251	.....	649, 656
.....	.....	.....	.....	257, 740	47, 934	426, 512	297, 842	.....	724, 354
.....	.....	.....	.....	289, 298	52, 564	493, 031	295, 878	.....	788, 909
.....	.....	.....	.....	85, 554	36, 660	172, 075	97, 599	.....	269, 674
.....	.....	.....	.....	69, 482	36, 627	218, 950	98, 684	.....	317, 634
.....	.....	.....	.....	266, 430	36, 240	531, 553	216, 792	.....	748, 345
.....	.....	.....	.....	.....	44, 552	399, 354	258, 642	.....	657, 996
.....	.....	.....	.....	.....	71, 345	560, 293	343, 202	.....	903, 495
.....	.....	.....	.....	.....	90, 964	736, 153	343, 178	.....	1, 079, 331
.....	.....	.....	.....	.....	72, 532	735, 669	458, 153	.....	1, 193, 822
.....	.....	.....	.....	.....	88, 658	848, 118	482, 325	.....	1, 330, 443
.....	.....	.....	.....	.....	83, 724	1, 230, 518	652, 151	.....	1, 882, 669
				2, 190, 673					
				Empire and West Virginia mines.					
.....	.....	.....	.....	28, 035	60, 988	1, 112, 938	604, 137	.....	1, 717, 075
.....	.....	.....	.....	81, 218	96, 453	1, 494, 814	850, 339	.....	2, 345, 153
.....	.....	.....	.....	85, 441	121, 364	1, 517, 347	816, 103	22, 021	2, 355, 471
.....	.....	.....	.....	77, 582	103, 793	1, 780, 710	778, 802	114, 589	2, 674, 101
.....	.....	.....	.....	57, 492	109, 194	1, 576, 160	767, 064	67, 671	2, 410, 895
.....	.....	.....	.....	63, 537	90, 800	1, 302, 237	879, 838	160, 698	2, 342, 773
.....	.....	.....	.....	108, 723	7, 505	1, 070, 775	632, 440	131, 866	1, 835, 081
.....	.....	.....	.....	.....	.....	818, 459	584, 996	170, 884	1, 574, 339
.....	.....	.....	.....	.....	998	924, 254	609, 204	145, 864	1, 679, 322
.....	.....	.....	.....	.....	51	1, 075, 198	501, 247	154, 264	1, 730, 709
.....	.....	.....	.....	66, 573	.....	1, 319, 589	603, 125	213, 446	2, 136, 160
83, 136	125, 097	4, 947	213, 180	88, 722	.....	1, 478, 502	504, 818	278, 598	2, 261, 918
78, 298	93, 861	31, 436	203, 595	277, 929	.....	1, 085, 249	269, 782	185, 435	1, 540, 466
215, 767	202, 223	77, 829	495, 819	338, 001	.....	1, 444, 766	680, 119	419, 288	2, 544, 173
69, 765	156, 959	283, 336	510, 060	466, 928	.....	2, 233, 928	344, 954	356, 097	2, 934, 979
79, 455	214, 518	291, 685	585, 658	403, 489	.....	2, 076, 485	368, 744	420, 745	2, 865, 974
53, 480	98, 371	348, 196	500, 047	346, 308	.....	2, 069, 774	282, 802	239, 891	2, 592, 467
4, 863	153, 230	418, 057	576, 150	449, 011	.....	2, 724, 347	262, 345	389, 104	3, 375, 796
112	286, 787	341, 024	627, 923	564, 397	.....	2, 669, 216	286, 700	715, 151	3, 671, 067
.....	365, 029	243, 487	608, 516	576, 047	.....	2, 357, 585	57, 459	798, 842	3, 213, 886
.....	677, 593	228, 138	905, 731	774, 904	.....	2, 723, 341	.....	1, 282, 748	4, 006, 091
.....	763, 845	229, 266	993, 111	959, 673	.....	2, 855, 225	51, 121	1, 474, 087	4, 380, 433
.....	568, 003	236, 314	804, 317	971, 214	.....	2, 557, 177	266, 901	1, 205, 486	4, 029, 564
.....	741, 954	201, 938	943, 892	1, 031, 797	.....	2, 423, 159	338, 107	1, 586, 541	4, 347, 807
.....	773, 074	111, 036	884, 110	900, 399	.....	2, 084, 265	304, 437	1, 577, 404	3, 966, 106
125	1, 031, 015	110, 258	1, 141, 398	1, 157, 803	.....	2, 418, 554	314, 551	1, 793, 080	4, 526, 185
.....	995, 443	75, 400	1, 070, 843	1, 307, 822	.....	a 2, 807, 161	364, 474	1, 689, 795	4, 861, 430
585, 001	7, 247, 002	3, 232, 347	11.064,350	11, 183, 045	1, 475, 969	60, 069, 348	17, 094, 130	15, 593, 595	92, 757, 073

and at Cumberland and Piedmont; also 368,097 tons used by the Baltimore and Ohio Railroad

MICHIGAN.

Total product in 1896, 92,882 short tons; spot value, $150,631.

While the output of coal in Michigan in 1896 did not reach the figure attained in 1895, it was more than in any other year since 1882. The decrease in 1896 from 1895 is attributable to the prevailing unsatisfactory trade conditions. It is to be noted, however, that the average value per ton obtained in 1896 was 2 cents more than in 1895.

The production by counties in 1896 was as follows:

Coal product of Michigan in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Bay	2	6,000	676	760	7,436	$13,302	$1.79	100	42
Eaton	2	360	1,255	30	1,645	2,160	1.31	151	11
Jackson	3	44,023	200	1,095	45,318	81,350	1.80	199	120
Saginaw	2	3,175	3,840	300	7,315	12,728	1.80	91	67
Huron, Shiawassee	2	29,592	576	1,000	31,168	41,091	1.32	181	80
Total	11	83,150	6,547	3,185	92,882	150,631	1.62	157	320

The following tables show the details of production in Michigan for the past five years and the total output since 1877:

Coal product of Michigan for five years.

Year.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
1892	27,200	45,180	5,610	77,990	$121,314	$1.56	230	195
1893	27,787	16,367	1,825	45,979	82,462	1.79	154	162
1894	60,817	7,055	2,150	70,022	103,049	1.47	224	223
1895	80,403	27,019	4,900	112,322	180,016	1.60	186	320
1896	83,150	6,547	3,185	92,882	150,631	1.62	157	320

Coal product of Michigan from 1877 to 1896.

Year.	Short tons.	Year.	Short tons.
Previous to 1877	350,000	1887	71,461
1877	69,197	1888	81,407
1878	85,322	1889	67,431
1879	82,015	1890	74,977
1880	129,053	1891	80,307
1881	130,130	1892	77,990
1882	135,339	1893	45,979
1883	71,296	1894	70,022
1884	36,712	1895	112,322
1885	45,178	1896	92,882
1886	60,434		

MISSOURI.

Total product in 1896, 2,331,542 short tons; spot value, $2,518,194.

Missouri's coal-mining business in 1896 was in keeping with that of the other important producers east and west of the Mississippi River. The production does not show a very marked decrease, being only 40,851 tons, or less than 2 per cent, below that of 1895, but the value indicates a loss of $133,428, the value per ton declining from $1.12 in 1895 to $1.08 in 1896. As in nearly all the coal-producing States, there has been a steady decline in price since 1893, the total decline being 15 cents, or 12½ per cent, in three years.

Coal production in Missouri has for several years been an excellent indicator of local industrial conditions. This is true also of the neighboring States, Iowa and Kansas. The markets are somewhat restricted on account of the abundant Illinois coals on the east, the Territory coals on the south, and the Rocky Mountain fuels on the west. The mines are developed up to the needs of the country fed by them, and coal mining reflects the general trade and climatic conditions with remarkable accuracy.

The following tables exhibit the details of production in Missouri in 1895 and 1896:

Coal product of Missouri in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Adair	2	22,950	88	.....	23,038	$28,598	$1.24	153	62
Audrain	2	26,346	11,310	730	38,386	55,501	1.45	238	72
Barton	3	50,735	224	441	51,400	56,277	1.09	172	150
Bates	11	349,852	2,389	2,500	354,741	324,301	.91	168	683
Boone	3	8,000	7,120	60	15,180	19,408	1.28	202	57
Caldwell	2	11,975	3,959	1,046	16,980	23,600	1.39	243	115
Callaway	8	2,000	17,165	4	19,169	28,936	1.51	205	73
Henry	10	51,077	4,069	282	55,428	80,609	1.45	115	173
Lafayette	26	243,412	16,764	3,751	263,927	369,866	1.40	147	1,015
Linn	5	86,584	11,774	677	99,035	151,576	1.53	234	282
Livingston	2	.....	623	.....	623	1,102	1.77	137	9
Macon	9	494,178	3,254	8,838	506,270	469,123	.93	152	1,346
Morgan	2	920	750	50	1,720	2,455	1.43	91	12
Randolph	10	207,482	16,605	4,010	228,097	241,310	1.06	187	602
Ray	8	127,077	4,072	2,532	133,681	192,409	1.44	132	559
Vernon	9	293,830	1,748	7,505	303,083	258,914	.85	149	542
Cooper, Grundy, Jackson, Johnson, Moniteau, Montgomery, Putnam, Ralls, Saline, and St. Clair	12	128,034	9,176	4,425	141,635	207,627	1.46	172	547
Small mines	.....	.....	120,000	.....	120,000	140,000	.....	.....	.....
Total	124	2,104,452	231,090	36,851	2,372,393	2,651,612	1.12	163	6,299

Coal product of Missouri in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Bates	10	438,580	6,775	7,080	452,435	$393,472	$0.87	189	662
Callaway	13	2,608	38,083	18	40,709	55,708	1.37	165	102
Henry	15	27,771	7,440	294	35,505	50,448	1.42	144	195
Jackson	2	23,000	3,100	1,860	27,960	41,856	1.60	123	115
Lafayette	25	241,451	14,361	2,365	258,177	344,523	1.33	157	927
Linn	5	55,435	8,159	910	64,504	97,895	1.52	153	286
Livingston	2	.....	706	.....	706	1,438	2.04	134	7
Macon	7	448,951	2,576	8,251	459,778	413,680	.90	169	1,218
Putnam	3	83,132	1,551	3,057	87,740	95,976	1.09	168	330
Randolph	10	236,631	16,196	2,886	255,713	279,322	1.09	185	622
Ray	10	119,845	6,430	3,081	129,356	177,639	1.37	142	536
Vernon	10	232,475	2,871	7,270	242,616	210,978	.87	146	437
Adair and Audrain	3	46,709	618	268	47,595	57,979	1.22	217	118
Barton and Boone	4	24,324	4,111	47	28,482	32,763	1.08	144	118
Caldwell and Grundy	2	44,089	8,538	3,775	56,402	95,284	1.69	250	240
Johnson and Moniteau	2	.....	350	100	450	675	1.50	107	4
Montgomery and Morgan	2	11,622	684	.....	12,306	14,422	1.17	151	39
Ralls, Saline, and St. Clair	3	10,628	480	.....	11,108	14,136	1.27	200	26
Small mines	.....	.....	120,000	.....	120,000	140,000	.....	.....	.....
Total	128	2,047,251	243,029	41,262	2,331,542	2,518,194	1.08	168	5,982

The annual production since 1873 has been as follows:

Coal product of Missouri since 1873.

Year.	Short tons.	Year.	Short tons.
1873	784,000	1885	3,080,000
1874	789,680	1886	1,800,000
1875	840,000	1887	3,209,916
1876	1,008,000	1888	3,909,967
1877	1,008,000	1889	2,557,823
1878	1,008,000	1890	2,735,221
1879	1,008,000	1891	2,674,606
1880	1,680,000	1892	2,773,949
1881	1,960,000	1893	2,897,442
1882	2,240,000	1894	2,245,039
1883	2,520,000	1895	2,372,393
1884	2,800,000	1896	2,331,542

The following table contains the statistics of production, by counties, since 1889, with the increases and decreases in 1896 as compared with 1895.

Coal product of Missouri since 1889, by counties.

[Short tons.]

County.	1889.	1890.	1891.	1892.	1893.
Adair	18,592	16,000	10,940	11,138	20,893
Audrain	26,194	20,261	8,772	23,012	37,986
Barton	61,167	28,500	85,002	50,561	42,360
Bates	755,989	751,702	628,580	572,730	409,819
Boone	31,405	17,000	16,340	15,636	11,650
Caldwell	13,594	21,599	51,065	30,806	18,102
Callaway	16,053	5,331	22,458	21,710	24,266
Clay	.....	.....	.....	.....	12,724
Cooper	996	.....	.....	1,720	1,632
Grundy	23,401	24,000	30,000	27,300	37,633
Henry	180,118	109,768	102,866	89,769	100,415
Jasper	720	.....	.....	.....	604
Johnson	12,841	5,950	4,500	5,680	11,009
Lafayette	348,670	347,688	277,393	324,848	339,668
Linn	6,992	1,300	26,994	40,622	93,207
Macon	446,396	540,061	592,105	668,146	688,479
Moniteau	.....	.....	.....	.....	520
Montgomery	12,300	13,584	16,129	16,689	12,000
Morgan	2,000	650	220	48	.....
Putnam	83,774	108,514	122,666	137,058	139,582
Randolph	221,463	269,372	274,520	149,608	214,490
Ray	220,530	278,118	213,539	235,298	220,418
St. Clair	6,880	5,050	2,500	6,500	336
Vernon	39,420	13,385	48,017	155,070	309,649
Other counties and small mines	28,328	157,388	140,000	150,000	150,000
Total	2,557,823	2,735,221	2,674,606	2,773,949	2,897,442

Coal product of Missouri since 1889, by counties—Continued.

[Short tons.]

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Adair	10,150	23,038	25,738	2,700	.....
Audrain	14,921	38,386	21,857	.....	16,529
Barton	139,977	51,400	13,731	.....	37,669
Bates	279,706	354,741	452,435	97,694	.....
Boone	18,160	15,180	14,751	.....	429
Caldwell	26,304	16,980	21,800	4,820	.....
Callaway	18,687	19,169	40,709	21,540	.....
Chariton	100	.....	.....	.....	.....
Cooper	2,243	225	.....	.....	225
Grundy	.....	29,340	34,602	5,262	.....
Henry	158,409	55,428	35,505	.....	19,923
Jackson	6,000	21,300	27,960	6,660	.....
Johnson	6,498	250	200	.....	50
Lafayette	203,423	263,927	258,177	.....	5,750
Linn	77,272	99,035	64,504	.....	34,531
Livingston	.....	623	706	83	.....
Macon	489,579	506,270	459,778	.....	46,492
Moniteau	364	425	250	.....	175
Montgomery	8,871	10,881	12,106	1,225	.....
Morgan	745	1,720	200	.....	1,520
Putnam	116,655	69,044	87,740	18,696	.....
Ralls	.....	9,800	10,628	828	.....
Randolph	201,397	228,097	255,713	27,616	.....
Ray	100,686	133,681	129,356	.....	4,325
Saline	.....	150	400	250	.....
St. Clair	679	220	80	.....	140
Vernon	244,213	303,083	242,616	.....	60,467
Other counties and small mines	120,000	120,000	120,000	.....	.....
Total	2,245,039	2,372,393	2,331,542	.....	*a* 40,851

a Net decrease.

The following tables are worthy of attention, as showing the tendency of prices during a series of years and the statistics of labor employed at Missouri coal mines during the same period.

Average prices for Missouri coal since 1889, in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Adair	$1.66	$1.70	$1.75	$1.75	$1.49	$1.48	$1.24	$1.15
Audrain	1.47	1.61	1.57	1.50	1.40	1.50	1.45	1.30
Barton	1.35	1.06	1.22	1.29	1.12	1.06	1.09	1.00
Bates	1.14	1.02	1.04	1.00	1.01	1.04	.91	.87
Boone	1.54	1.50	1.50	1.53	1.62	1.55	1.28	1.29
Caldwell	1.97	1.98	2.15	2.20	1.98	1.76	1.39	1.52
Callaway	1.79	1.50	1.42	1.56	1.54	1.60	1.51	1.37
Grundy	2.05	2.05	2.05	2.05	2.05	.....	1.95	1.80
Henry	1.55	1.48	1.33	1.41	1.45	1.13	1.45	1.42
Jackson	.....	.....	.....	.....	.....	.....	.....	1.60
Lafayette	1.60	1.55	1.55	1.60	1.52	1.68	1.40	1.33
Linn	1.88	.....	1.19	1.56	1.62	1.59	1.53	1.52
Macon	1.23	1.11	1.02	1.04	1.06	.96	.93	.90
Montgomery	1.42	1.35	1.35	1.36	1.35	1.25	1.25	1.15
Putnam	1.34	1.31	1.31	1.37	1.36	1.21	1.22	1.09
Randolph	1.29	1.14	1.06	1.07	1.10	1.09	1.06	1.09
Ray	1.57	1.52	1.62	1.54	1.51	1.44	1.44	1.37
Vernon	1.18	1.20	1.04	1.02	1.01	.99	.85	.87
The State	1.36	1.24	1.23	1.23	1.23	1.17	1.12	1.08

Statistics of labor employed and working time at Missouri coal mines.

County.	1890.		1891.		1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Adair	48	280	40	300	40	300	81	188
Audrain	70	205	33	180	60	224	101	184
Barton	90	231	263	221	149	179	207	116
Bates	1,315	215	1,077	235	663	207	771	162
Boone	46	290	53	257	38	273	32	203
Caldwell	77	294	194	230	158	244	74	223
Callaway	11	218	90	230	97	243	127	218
Grundy	50	200	90	297	140	275	130	300
Henry	311	207	286	218	246	219	279	225
Lafayette	1,056	217	850	206	949	233	1,148	226
Linn	.....	.....	90	240	135	249	290	233
Macon	1,027	259	1,198	228	1,489	252	1,833	232
Montgomery	33	200	37	260	40	195	48	200
Putnam	355	234	430	196	393	242	460	236
Randolph	635	229	535	249	371	227	523	191
Ray	687	241	753	178	694	206	636	196
Vernon	44	118	139	131	186	166	537	126
The State	5,971	229	6,199	218	5,893	230	7,375	206

Statistics of labor employed and working time at Missouri coal mines—Continued.

County.	1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Adair	28	226	62	153	58	214
Audrain	59	186	72	238	60	220
Barton	412	195	150	172	50	80
Bates	919	83	683	168	662	189
Boone	50	200	57	202	68	191
Caldwell	115	228	115	243	100	250
Callaway	81	156	73	205	102	165
Grundy	.....	.....	105	222	140	250
Henry	327	156	173	115	195	144
Jackson	.....	.....	.....	.....	115	123
Lafayette	1,305	119	1,015	147	927	157
Linn	264	233	282	234	286	153
Macon	1,387	183	1,346	152	1,218	169
Montgomery	35	156	25	150	38	150
Putnam	486	146	301	148	330	168
Randolph	566	144	602	187	622	185
Ray	690	78	559	132	536	142
Vernon	666	90	542	149	437	146
The State	7,523	138	6,299	163	5,982	168

MONTANA.

Total product in 1896, 1,543,445 short tons; spot value, $2,279,672.

The annual coal product of Montana has shown an uninterrupted increase each year since 1887, and the output in 1895 showed a phenomenal gain of over 62 per cent, or 576,798 short tons, over that of 1894. The value increased from $1,887,390 to $2,850,906, a gain of $963,516, or a little more than 50 per cent. The increase in production in 1896 was only 39,252 short tons, and this was accompanied by a sharp decline in value, the actual loss amounting to $571,234, more than 60 per cent of the total decrease in the value of the bituminous product in the United States. The value per ton declined from $1.89 in 1895 to $1.47 in 1896. The value per ton in 1892 was $2.36, indicating a decline of 89 cents, or about 35 per cent, in four years.

There was a decrease in the number of mines worked from 26 in 1894 to 22 in 1895 and 21 in 1896, showing a tendency, noticed in some other States, toward greater production at the larger mines and the closing of smaller operations. The number of employees increased from 2,184 in 1895 to 2,335 in 1896, and the average working time from 223 to 234 days.

Coal product of Montana in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Carbon	2	176,843	4,300	3,000	.....	184,143	$388,924	$2.11	194	309
Cascade	5	650,027	8,050	15,800	40,000	713,877	1,238,035	1.72	235	1,341
Choteau	5	.....	3,725	.....	.....	3,725	8,050	2.16	92	30
Dawson	2	.....	600	.....	.....	600	1,650	2.75	120	4
Gallatin	3	95,992	793	1,613	.....	98,398	204,122	2.07	245	235
Park	3	482,000	1,450	50	19,700	503,200	1,099,075	2.01	197	260
Lewis and Clarke and Meagher	2	.....	250	.....	.....	250	1,050	4.02	70	5
Total	22	1,404,862	19,168	20,463	59,700	1,504,193	2,850,906	1.89	223	2,184

Coal product of Montana in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Cascade	3	978,110	5,000	14,400	103,788	1,101,298	$1,473,532	$1.34	247	1,505
Choteau	8	.....	4,825	226	.....	5,051	18,915	3.74	82	44
Gallatin	3	106,960	1,500	.....	.....	108,460	214,535	1.98	180	306
Meagher and Park	5	250	13,320	50	79,632	93,252	148,235	1.59	275	168
Carbon and Lewis and Clarke	2	229,553	2,831	3,000	.....	235,384	424,455	1.80	224	312
Total	21	1,314,873	27,476	17,676	183,420	1,543,445	2,279,672	1.47	234	2,335

The following table shows the total output of coal in Montana since 1883 and the value of the product in the last seven years:

Coal product of Montana since 1883.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1883	19,795	.....	1890	517,477	$1,252,492
1884	80,376	.....	1891	541,861	1,228,630
1885	86,440	.....	1892	564,648	1,330,847
1886	49,846	.....	1893	892,309	1,772,116
1887	10,202	.....	1894	927,395	1,887,390
1888	41,467	.....	1895	1,504,193	2,850,906
1889	363,301	.....	1896	1,543,445	2,279,672

The development of the Montana coal fields on a commercial scale dates from 1889. Previous to that year the largest output was in 1885, when the product was 86,440 short tons. During 1893 extensive improvements were made at the Sandcoulee mines, in Cascade County. Mining machines were introduced, and the output of the county was increased over 100 per cent—from 242,120 short tons in 1892 to 516,460 short tons in 1893. The increase in this county in 1894 was more than three times the total increase in the State, the gain in Cascade County being in part offset by a decrease of over 90,000 tons, or about 30 per cent, in Park County. Cascade County showed a gain of about 75,000 tons in 1895; Park County increased its output by 288,947 short tons, or over 130 per cent, and Carbon County appeared for the first time as a coal producer, with an output of 184,143 short tons. In 1896 Cascade County increased its production by 387,421 tons, or 54 per cent; Carbon County increased its output by 51,185 tons, or 28 per cent, and Gallatin County increased a little over 10,000 tons. These were offset in part by a decrease of 410,068 tons in Park County.

The following tables show the product and value, by counties, since 1889, and the average price per ton and the statistics of labor and working time in the important producing counties:

Product and value of Montana coal since 1889, by counties.

County.	1889.		1890.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Cascade	166,480	$339,226	200,435	$406,748
Choteau	820	2,160	800	2,000
Custer	3,470	9,129	10,228	26,417
Dawson	733	1,900	450	1,350
Fergus	460	1,380	1,260	5,740
Gallatin	43,838	104,377	51,452	119,084
Lewis and Clarke	50	200	115	283
Missoula	150	450	.....	.....
Park	147,300	421,950	252,737	690,870
Total	363,301	880,773	517,477	1,252,492

Product and value of Montana coal since 1889, by counties—Continued.

County.	1891.		1892.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Cascade	198,107	$396,219	242,120	$484,320
Choteau	478	1,723	1,574	6,338
Dawson	250	625	335	1,000
Fergus	250	1,400	400	2,100
Gallatin	56,981	135,893	61,198	152,496
Lewis and Clarke	.....	.....	.....	.....
Meagher	50	200	30	120
Park	285,745	692,570	258,991	684,473
Total	541,861	1,228,630	564,648	1,330,847

County.	1893.		1894.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Cascade	516,460	$907,640	638,960	$1,238,001
Choteau	5,295	20,953	2,892	11,089
Dawson	440	1,320	545	1,635
Fergus	200	1,200	325	1,625
Gallatin	63,163	148,021	69,257	168,431
Granite	.....	.....	600	600
Lewis and Clarke	125	666	60	300
Meagher	100	500	503	2,315
Park	306,526	691,816	214,253	463,394
Total	892,309	1,772,116	927,395	1,887,390

County.	1895.		1896.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Carbon	184,143	$388,924	235,328	$424,205
Cascade	713,877	1,238,035	1,101,298	1,473,532
Choteau	3,725	8,050	5,051	18,915
Dawson	600	1,650	.....	.....
Gallatin	98,398	204,122	108,460	214,535
Lewis and Clarke	50	250	56	250
Meagher	200	800	120	360
Park	503,200	1,009,075	93,132	147,875
Total	1,504,193	2,850,906	1,543,445	2,279,672

Product and value of Montana coal since 1889, by counties—Continued.

County.	Increase, 1896.		Decrease, 1896.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Carbon	51,185	$35,281	.....	.....
Cascade	387,421	235,497	.....	.....
Choteau	1,326	10,865	.....	.....
Dawson	.....	.....	600	$1,650
Gallatin	10,062	10,413	.....	.....
Lewis and Clarke	6	.....	.....	.....
Meagher	.....	.....	80	440
Park	.....	.....	410,068	861,200
Total	*a* 39,252	.....	.....	*b* 571,234

a Net increase. *b* Net decrease.

Average prices for Montana coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Carbon	.....	.....	.....	.....	.....	.....	$2.11	$1.80
Cascade	$2.04	$2.03	$2.00	$2.00	$1.76	$1.94	1.72	1.34
Gallatin	2.38	2.31	2.38	2.50	2.34	2.43	2.07	1.98
Park	2.86	2.73	2.43	2.64	2.31	2.16	2.01	1.58
The State	2.42	2.42	2.27	2.36	1.99	2.04	1.89	1.47

Statistics of labor employed and working time at Montana coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Cascade	379	.....	401	.....	426	275
Gallatin	120	.....	139	.....	146	298
Park	705	.....	562	.....	565	241
The State	1,251	.....	1,119	.....	1,158	258

Statistics of labor employed and working time at Montana coal mines—Continued.

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Carbon	.....	.....	.....	.....	309	194	310	225
Cascade	634	247	1,165	184	1,341	235	1,505	247
Gallatin	151	278	153	265	235	245	306	180
Park	568	240	408	198	260	197	164	280
The State	1,401	242	1,782	192	2,184	223	2,335	234

NEBRASKA.

The southwestern corner of Nebraska contains a portion of the Western coal field, but the veins of coal being on the edge of the field are pinched to thin seams, varying from 6 to 22 inches. Some coal has been taken out for local consumption, but with the development of the fields of Iowa, Kansas, and Missouri, more favored both as to quality and conditions for economical mining, and with the operators of these mines seeking a market for their surplus product, such little work as has been done on Nebraska coal deposits has been practically abandoned. A small amount (3,560 short tons) was mined in Dixon County in 1896, all of which was consumed locally.

NEVADA.

During 1894 a small amount of coal (150 short tons) was mined in Esmeralda County, Nevada, by Mr. William Groezinger, of Columbus. It was sold to the Columbus Borax Works at $2.50 per ton.

Mr. Groezinger writes that a coal field of considerable extent has been discovered about 20 miles from Candelaria. He states there are twelve different veins, varying in thickness from 4 to 12 feet, of semi-bituminous coal, some of which will make coke. The outcrops are badly weathered and decomposed, but the quality improves at greater depth. At present all the silver mines in the vicinity are shut down, and there is no demand for the fuel. With a return to prosperity for the silver-mining industry, attention will be given to any properties promising an adequate and cheap supply of fuel.

Coal is also reported in the vicinity of Carlin, in Elko County, and a company of Nevada citizens has been organized, under the name of the Humboldt Coal Company, to exploit the deposits. No output has been obtained up to date.

NEW MEXICO.

Total product in 1896, 622,626 short tons; spot value, $930,381.

The output of coal from New Mexico mines in 1896 was 98,028 short tons, or about 16 per cent less than in 1895, with a proportionate decrease in value of $142,139. There was no decline in the average value per ton as compared with 1895, but since 1891 there has been a drop of 19 cents, or 11 per cent, and a drop of 30 cents, or 20 per cent, since 1889.

The first report of coal production in New Mexico was contained in the inaugural volume of Mineral Resources, covering the calendar year 1882. No output was reported by the Tenth United States Census, 1880, and while it is probable that some coal was taken out by ranchmen and miners for their own use prior to 1882, there had been no development on a commercial scale until that year. The product reported for 1882 was 157,092 short tons. With the exception of 1886 it increased annually until 1888, when it reached a total of 626,665 short tons. The product decreased in the next two years, falling to 375,777 short tons in 1890, but recovered its normal proportions in 1892 and 1893. In 1894 the output was about 10 per cent less than in 1893. It increased again in 1895 to 720,654 short tons, a gain of 123,458 short tons, or a little more than 20 per cent, and exceeding by more than 50,000 tons the product of any previous year. The product in 1896 was, with the exception of 1894, the smallest in five years.

The statistics of production in the Territory during 1895 and 1896 are shown in the following tables:

Coal product of New Mexico in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bernalillo	5	304,989	1,463	2,224	.....	308,676	$440,750	$1.43	183	549
Colfax	3	180,773	3,863	2,466	.....	187,102	224,218	1.20	154	332
Lincoln	3	.....	3,125	.....	.....	3,125	12,337	3.95	149	7
Rio Arriba	2	27,250	1,500	3,250	.....	32,000	49,000	1.53	284	40
San Juan, Santa Fe	9	182,622	3,094	3,352	683	189,751	346,215	1.83	218	455
Total	22	695,634	13,045	11,292	683	720,654	1,072,520	1.49	190	1,383

Coal product of New Mexico in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Bernalillo	7	267,400	1,530	2,207	.....	271,137	$404,145	$1.50	164	588
Colfax, Lincoln	2	179,475	2,400	75	.....	181,950	223,101	1.23	180	379
Rio Arriba	2	7,200	.....	1,000	.....	8,200	10,370	1.26	264	14
San Juan, Santa Fe	5	153,244	2,747	4,164	1,184	161,339	292,765	1.82	170	578
Total	16	607,319	6,677	7,446	1,184	622,626	930,381	1.49	172	1,559

The following table shows the annual output of the Territory since 1882, with the value of the product since 1885. It is probable, however, that the values given for years prior to 1889 are too high. They were estimated on a basis of $3 per ton, which was evidently excessive:

Coal product of New Mexico since 1882.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1882	157,092	.....	1890	375,777	$504,390
1883	211,347	.....	1891	462,328	779,018
1884	220,557	.....	1892	661,330	1,074,251
1885	306,202	$918,606	1893	665,094	979,044
1886	271,285	813,855	1894	597,196	935,857
1887	508,034	1,524,102	1895	720,654	1,072,520
1888	626,665	1,879,995	1896	622,626	930,381
1889	486,943	872,628			

In the following table the product since 1882 is shown by counties, together with the increase and decrease in 1896 as compared with 1895. Decreases were general in 1896. Each county shows a loss from 590 tons in Lincoln to 37,539 tons in Bernalillo County:

Coal product of New Mexico since 1882, by counties.

[Short tons.]

County.	1882.	1883.	1884.	1885.	1886.
Bernalillo	33,373	42,000	62,802	97,755	106,530
Colfax	91,798	112,089	102,513	135,833	87,708
Rio Arriba	12,000	17,240	11,203	14,958	7,000
Santa Fe	3,600	3,000	3,000	1,000	1,000
Socorro	16,321	37,018	41,039	56,656	69,047
Total	157,092	211,347	220,557	306,202	271,285

Coal product of New Mexico since 1882, by counties—Continued.

[Short tons.]

County.	1887.	1888.	1889.	1890.	1891.
Bernalillo	275,952	300,000	233,059	181,647	76,515
Colfax	154,875	227,427	151,464	151,400	295,089
Lincoln	.....	.....	1,255	1,175	1,000
Rio Arriba	11,000	12,000	13,650	12,175	7,350
Santa Fe	7,500	25,200	34,870	22,770	16,500
Socorro	58,707	62,038	52,205	.....	65,574
Other counties	.....	.....	440	6,610	300
Total	508,034	626,665	486,943	375,777	462,328

County.	1892.	1893.	1894.	1895.	1896.	Decrease 1896.
Bernalillo	248,911	278,691	270,413	308,676	271,137	37,539
Colfax	297,911	249,783	114,985	187,102	179,415	7,687
Lincoln	3,145	1,962	2,655	3,125	2,535	590
Rio Arriba	20,600	15,500	*a* 21,020	32,000	8,200	23,800
Santa Fe	36,780	118,892	187,923	*b* 189,751	*b* 161,339	28,412
Socorro	53,783	.....	.....	.....	.....	.....
Other counties	200	266	200	.....	.....	.....
Total	661,330	665,094	597,196	720,654	622,626	98,028

a Including Union County. *b* Including San Juan County.

The average price per ton and the statistics of labor and average working time in the more important counties for a series of years are shown in the following table:

Average prices for New Mexico coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Bernalillo	$1.70	$1.14	$1.47	$1.45	$1.42	$1.44	$1.43	$1.50
Colfax	1.33	1.31	1.35	1.33	1.31	1.25	1.20	1.18
Rio Arriba	1.82	1.72	1.95	1.50	1.30	1.25	1.53	.....
Santa Fe	2.14	2.29	2.13	2.63	2.13	1.96	1.83	1.82
Socorro	3.29	.....	3.22	3.43	.....	.....	.....	.....
Territory	1.79	1.34	1.68	1.62	1.47	1.57	1.49	1.49

Statistics of labor employed and working time at New Mexico coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Bernalillo	375	.....	187	.....	449	179
Colfax	360	.....	384	.....	370	261
Rio Arriba	20	.....	20	.....	35	270
Santa Fe	55	.....	36	.....	30	267
Socorro	.....	.....	175	.....	180	253
Territory	827	.....	806	.....	1,083	223

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Bernalillo	370	196	460	192	549	183	588	164
Colfax	272	248	136	111	332	154	375	180
Rio Arriba	25	250	25	300	40	284	.....	.....
Santa Fe	328	257	343	193	455	218	576	170
Territory	1,011	229	985	182	1,383	190	1,559	172

NORTH CAROLINA.

Total product in 1896, 7,813 short tons; spot value, $11,720.

The disastrous explosion of gas at the Cumnock mines in December 1895, had the effect of reducing the output of the State in 1896 more than two-thirds. The losses incurred by this explosion and the subsequent suits for damages by the heirs of those killed and by the injured miners and laborers forced the mining company into the hands of a receiver. The disaster occurred just after the completion of large and expensive improvements, and the money thus invested was a total loss.

The history of coal mining in the State dates from 1889. The Egypt mines were opened in December of that year, and yielded 192 tons. Since that time the product annually has been as follows:

Coal product of North Carolina since 1889.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1889	192	$451	1893	17,000	$25,500
1890	10,262	17,864	1894	16,900	29,675
1891	20,355	39,635	1895	24,900	41,350
1892	6,679	9,599	1896	7,813	11,720

Coal product of North Carolina for six years.

Year.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
1891	1	18,780	600	975	20,335	$39,635	$1.93	254	80
1892	1	6,679	.....	.....	6,679	9,599	1.44	160	90
1893	1	15,000	.....	2,000	17,000	25,500	1.50	80	70
1894	1	13,500	1,000	2,400	16,900	29,675	1.76	145	95
1895	3	23,400	600	900	24,900	41,350	1.66	226	61
1896	1	5,356	295	2,162	7,813	11,720	1.50	220	18

NORTH DAKOTA.

Total product in 1896, 78,050 short tons; spot value, $84,908.

Two new mines were opened in North Dakota in 1896 and the output at the older mines increased, so that the State's total shows an increase of more than 100 per cent over that of 1895. This increase was in all probability largely due to legislative enactment compelling State institutions to obtain their supply of fuel from North Dakota mines.

The details of production in 1895 and 1896 are shown in the following table:

Coal product of North Dakota in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons	*Short tons*	*Short tons*				
McLean and Morton	4	13,720	617	14,337	$16,896	$1.18	110	40
Stark	4	21,660	3,000	24,660	24,750	1.00	202	22
Total	8	35,380	3,617	38,997	41,646	1.07	143	62

Coal product of North Dakota in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by em ployees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Morton	4	24,477	408	45	24,930	$25,608	$1.03	166	57
Stark	4	34,000	4,525	375	38,900	41,275	1.06	162	50
McLean and Ward	2	12,970	1,250	.....	14,220	18,025	1.27	173	34
Total	10	71,447	6,183	420	78,050	84,908	1.09	166	141

Coal product of North Dakota since 1884.

Year.	Short tons.	Year.	Short tons.
1884	35,000	1891	30,000
1885	25,000	1892	40,725
1886	25,955	1893	49,630
1887	21,470	1894	42,015
1888	34,000	1895	38,997
1889	28,907	1896	78,050
1890	30,000		

OHIO.

Total product in 1896, 12,875,202 short tons; spot value, $10,253,461.

The coal product of Ohio in 1896 was 480,604 short tons, or 3.6 per cent less than that of 1895. The value fell off in proportion, there being no change in the average price per ton. This decrease in Ohio's product, coupled with an increase of nearly 1,500,000 tons in West Virginia's output, gives the latter State prior rank in the list of coal-producing States; and Ohio, for the first time in her history, drops below third place. The margin by which West Virginia supplants Ohio is a very narrow one, the difference in their respective productions being but 1,000 tons, and each State produced over 12,875,000 tons. The percentage of difference was less than .008.

As stated above, there was no further decline in the price of coal in Ohio. It was about as low as it could get in 1895, and this was 15 cents, or 16 per cent, less than it was in 1892, since which year there has been no reaction from a persisting reduction in price.

The ever-vexing wage question continued to harass operators during the year. Ohio's coal mines are to a large extent made to suffer from the close proximity of and competition with the Pittsburg (Pennsylvania) and Kanawha River (West Virginia) coals. To meet this competition operators claim it is impossible to pay the rates of wages demanded by the miners, and the latter demand increases, or at least no reductions. These divergent opinions, it was expected, would produce a strike of considerable proportions in the latter part of 1896, but it was avoided at that time.

PRODUCTION BY COUNTIES.

There are four counties in the State whose annual product has exceeded 1,000,000 tons for the past five years, and their average annual product has exceeded 1,500,000 tons each during that time. These counties are Athens, Hocking, Jackson, and Perry. Their combined product in 1896 was 6,165,407 short tons, half of the total output in the State, excluding the small mines. Of these four counties, three,

Athens, Hocking, and Perry, comprise what is known as the Hocking Valley region. Their aggregate output was about 4,500,000 tons in 1896, a decrease of about 200,000 tons from 1895. Perry County increased its production 10,628 short tons and supersedes Jackson as the premier county in coal production. The other three counties lost ground in 1896, Athens County by 35,085 tons; Hocking by 172,517 tons, and Jackson by 376,158 tons. In addition to these four there were six counties whose output in 1896 exceeded 500,000 tons. They were in order, (1) Stark, (2) Guernsey, (3) Belmont, (4) Jefferson, (5) Tuscarawas, and (6) Columbiana.

The statistics of production in 1895 and 1896, by counties, are shown in the following tables:

Coal product of Ohio in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Athens	27	1,367,250	9,211	27,824	28,941	1,433,226	$979,041	$0.68	155	2,556
Belmont	31	680,140	161,291	5,212	.....	846,643	611,789	.72	197	1,202
Carroll	8	256,375	1,224	3,280	.....	260,879	191,962	.74	148	482
Columbiana	21	574,525	38,537	4,592	.....	617,654	481,890	.78	228	1,204
Coshocton	11	193,992	13,478	150	.....	207,620	171,896	.82	175	395
Guernsey	17	866,673	15,280	4,628	.....	886,581	513,837	.58	194	1,218
Harrison	2	2,100	1,372	.....	.....	3,472	2,981	.86	197	15
Hocking	19	1,566,747	2,800	7,800	10,638	1,587,985	1,053,203	.66	198	2,501
Jackson	47	1,883,556	90,738	30,290	800	2,005,384	1,798,665	.90	184	4,061
Jefferson	44	773,535	107,715	2,832	1,240	885,322	615,856	.70	136	1,989
Lawrence	8	55,230	32,052	1,220	.....	88,502	81,098	.92	184	284
Mahoning	15	15,742	25,887	853	.....	42,482	54,290	1.28	145	186
Medina	6	251,054	5,537	7,580	.....	264,171	281,274	1.06	209	489
Meigs	13	82,638	99,091	2,347	.....	184,076	172,409	.94	151	612
Muskingum	19	91,458	12,198	204	.....	103,860	86,339	.83	194	279
Perry	53	1,661,748	29,059	21,137	.....	1,711,944	1,323,181	.77	169	2,732
Portage	3	82,609	2,135	1,832	.....	86,576	114,627	1.32	183	263
Stark	27	730,040	23,623	25,070	1,000	779,733	798,528	1.02	149	2,074
Summit	3	20,286	5,320	.....	.....	25,606	36,064	1.41	178	95
Trumbull	2	11,601	4,200	.....	.....	15,801	20,683	1.31	242	38
Tuscarawas	27	619,412	34,416	3,266	.....	657,094	466,342	.71	180	1,354
Vinton	2	17,585	420	.....	.....	18,005	14,894	.83	226	38
Washington	2	.....	3,489	.....	.....	3,489	3,057	.88	167	16
Wayne	5	104,890	3,751	2,160	.....	110,801	121,151	1.09	174	392
Gallia and Morgan	3	24,500	4,400	.....	.....	28,900	23,420	.80	191	69
Small mines	.....	.....	500,000	.....	.....	500,000	600,000	1.20	.....	.....
Total	415	11,933,686	1,227,224	152,277	42,619	13,355,806	10,618,477	.79	176	24,644

Coal product of Ohio in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Athens	27	1,316,361	21,833	37,295	22,652	1,398.141	$969,466	$0.69	163	2,705
Belmont	38	759,149	157,758	2,169	.....	919,076	639,770	.70	152	1,701
Carroll	9	259,116	28,836	1,165	.....	289,117	219,016	.76	172	729
Columbiana	25	485,047	44,716	4,934	.....	534,697	436,425	.82	181	1,460
Coshocton	12	346,901	11,803	675	.....	359,379	281,811	.78	202	557
Guernsey	15	935,795	11,899	7,763	.....	955,457	624,107	.65	193	1,357
Hocking	18	1,379,245	13,400	22,823	.....	1,415,468	956,906	.68	131	2,431
Jackson	37	1,552,296	54,100	22,830	.....	1,629,226	1,446,929	.89	145	3,972
Jefferson	34	587,385	93,622	2,962	3,943	687,912	526,828	.79	138	1,499
Lawrence	9	40,763	10,784	50	.....	51,597	41,610	.81	125	171
Mahoning	15	8,417	15,946	330	.....	24,693	29,027	1.18	106	153
Medina	6	183,492	4,934	5,678	.....	194,104	194,075	1.00	181	431
Meigs	12	177,197	78,275	3,914	.....	259,386	216,969	.84	176	587
Morgan	2	16,294	.....	.....	.....	16,294	11,877	.73	141	77
Muskingum	14	110,850	1,383	100	.....	112,333	80,632	.72	193	216
Perry	52	1,664,943	37,479	20,150	.....	1,722,572	1,221,231	.71	161	3,091
Portage	4	44,655	1,940	1,782	.....	48.377	64,218	1.33	118	301
Stark	28	909,985	20,453	32,180	.....	962,618	1,043,067	1.08	206	2,127
Summit	3	18,471	4,999	.....	.....	23,470	37,897	1.61	197	92
Trumbull	3	1,562	718	.....	.....	2,280	3,820	1.68	61	26
Tuscarawas	29	586,807	51,218	3,062	.....	641,087	500,880	.78	148	1,412
Vinton	5	37,669	1,470	300	.....	39,439	36,871	.93	128	182
Washington	3	.....	3,320	.....	.....	3,320	3,320	1.00	107	18
Wayne	4	50,198	3,860	1,380	.....	55,438	46,969	.85	151	119
Gallia, Harrison	2	2,080	2,504	.....	.....	4,584	3,737	.82	110	34
Noble, Scioto	2	19,597	4,360	1,180	.....	25,137	15,003	.60	228	52
Small mines	.....	.....	500,000	.....	.....	500,000	600,000	.....	.....	.....
Total	408	11,494,275	1,181,610	172,722	26,595	12,875,202	10,253,461	.79	161	25,500

The following table shows the annual output of the State since 1884, by counties:

Coal product of Ohio since 1884, by counties.

[Short tons.]

County.	1884.	1885.	1886.	1887.	1888.
Athens	627,944	823,139	899,046	1,083,543	1,336,698
Belmont	643,129	744,446	573,779	721,767	1,108,106
Carroll	102,531	150,695	216,630	293,328	355,097
Columbiana	469,708	462,733	336,063	516,057	466,191
Coshocton	56,562	99,609	52,934	124,791	167,903
Gallia	20,372	16,383	17,424	15,365	16,722
Guernsey	375,427	297,267	433,800	553,613	383,728
Harrison	.....	.....	5,509	4,032	2,865
Hocking	372,694	656,441	741,571	853,063	1,086,538
Holmes	12,052	11,459	12,670	10,526	8,121
Jackson	831,720	791,608	856,740	1,134,705	1,088,761
Jefferson	316,777	271,329	275,666	293,875	243,178
Lawrence	176,412	145,916	166,933	143,559	137,806
Mahoning	241,599	275,944	313,040	272,349	231,035
Medina	77,160	152,721	252,411	225,487	198,452
Meigs	248,436	234,756	192,263	185,205	242,483
Morgan	7,636	5,536	4,370	4,100	.....
Muskingum	84,398	86,846	96,601	171,928	211,861
Noble	.....	.....	3,342	6,320	6,200
Perry	1,379,100	1,259,592	1,607,666	1,870,840	1,736,805
Portage	65,647	77,071	70,339	65,163	70,923
Scioto	3,650	2,440	.....	.....	.....
Stark	513,225	391,418	593,422	784,164	793,227
Summit	253,148	145,134	82,225	95,815	112,024
Trumbull	257,683	264,517	188,531	167,989	157,826
Tuscarawas	317,141	285,545	267,666	506,466	546,117
Vinton	69,740	77,127	60,013	89,727	108,695
Washington	5,600	5,000	5,500	1,880	2,432
Wayne	120,571	81,507	109,057	105,150	91,157
Total	7,640,062	7,816,179	8,435,211	10,300,807	10,910,951

Coal product of Ohio since 1884, by counties—Continued.

[Short tons.]

County.	1889.	1890.	1891.	1892.	1893.
Athens	1,224,186	1,205,455	1,482,294	1,400,865	1,597,685
Belmont	641,862	774,110	819,236	1,037,700	974,043
Carroll	351,782	328,967	313,543	367,055	261,327
Columbiana	596,824	567,595	621,726	520,755	467,314
Coshocton	166,599	177,700	189,469	228,727	244,605
Gallia	23,208	16,512	17,493	19,000	11,393
Guernsey	362,168	413,739	390,418	455,997	412,395
Harrison	33,724	8,600	3,960	3,220	2,640
Hocking	845,049	1,319,427	1,515,719	1,786,803	1,637,052
Jackson	926,874	970,878	1,475,939	1,833,910	1,826,572
Jefferson	271,830	491,172	697,193	932,477	1,077,779
Lawrence	102,656	77,004	76,235	71,376	36,512
Mahoning	240,563	256,319	200,734	205,105	173,704
Medina	136,061	139,742	160,184	101,440	153,100
Meigs	220,277	255,365	282,094	266,044	228,534
Morgan	8,060	.....	.....	12,000	10,000
Muskingum	214,005	229,719	160,154	177,488	205,966
Noble	38,400	6,850	3,800	300	.....
Perry	1,565,786	1,921,417	1,785,626	1,452,979	1,438,123
Portage	78,117	70,666	69,058	76,398	89,431
Stark	851,994	836,449	917,995	856,607	926,200
Summit	50,726	112,997	140,079	147,847	28,989
Trumbull	108,120	47,714	83,950	30,187	15,681
Tuscarawas	683,505	589,875	736,297	777,215	698,527
Vinton	102,040	80,716	98,166	83,113	72,976
Washington	18,045	5,990	5,950	44,720	646
Wayne	84,178	38,528	21,371	73,599	62,452
Small mines	.....	550,000	600,000	600,000	600,000
Total	9,976,787	11,494,506	12,868,683	13,562,927	13,253,646

Coal product of Ohio since 1884, by counties—Continued.

[Short tons.]

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Athens	1,508,900	1,433,226	1,398,141	.....	35,085
Belmont	906,284	846,643	919,076	72,433	.....
Carroll	263,293	260,879	289,117	28,238	.....
Columbiana	558,280	617,654	534,697	.....	82,957
Coshocton	166,427	207,620	359,379	151,759	.....
Gallia	12,894	12,900	2,080	.....	10,820
Guernsey	891,859	886,581	955,457	68,876	.....
Harrison	1,701	3,472	2,504	.....	968
Hocking	1,520,868	1,587,985	1,415,468	.....	172,517
Jackson	1,511,950	2,005,384	1,629,226	.....	376,158
Jefferson	851,200	885,322	687,912	.....	197,410
Lawrence	57,179	88,502	51,597	.....	36,905
Mahoning	42,748	42,482	24,693	.....	17,789
Medina	110,787	264,171	194,104	.....	70,067
Meigs	170,593	184,076	259,386	75,310	.....
Morgan	8,236	16,000	16,294	294	.....
Muskingum	109,334	103,860	112,333	8,473	.....
Noble and Scioto	.....	.....	25,137	25,137	.....
Perry	1,599,025	1,711,944	1,722,572	10,628	.....
Portage	90,094	86,576	48,377	.....	38,199
Stark	452,950	779,733	962,618	182,885	.....
Summit	14,510	25,606	23,470	.....	2,136
Trumbull	2,278	15,801	2,280	.....	13,521
Tuscarawas	485,024	657,094	641,087	.....	16,007
Vinton	43,400	18,005	39,439	21,434	.....
Washington	.....	3,489	3,320	.....	169
Wayne	30,042	110,801	55,438	.....	55,363
Small mines	500,000	500,000	500,000	.....	.....
Total	11,909,856	13,355,806	12,875,202	.....	*a* 480,604

a Net decrease.

Records of the total production of coal in Ohio extend only as far back as 1872, since which time the annual output has been as follows:

Annual coal product of Ohio since 1872.

Year.	Short tons.	Year.	Short tons.
1872	5,315,294	1885	7,816,179
1873	4,550,028	1886	8,435,211
1874	3,267,585	1887	10,300,708
1875	4,864,259	1888	10,910,951
1876	3,500,000	1889	9,976,787
1877	5,250,000	1890	11,494,506
1878	5,500,000	1891	12,868,683
1879	6,000,000	1892	13,562,927
1880	7,000,000	1893	13,253,646
1881	8,225,000	1894	11,909,856
1882	9,450,000	1895	13,355,806
1883	8,229,429	1896	12,875,202
1884	7,640,062		

Taken in connection with the preceding tables of production, the following tables, exhibiting the average prices and the statistics of labor for a series of years, will be found of interest:

Average prices paid for Ohio coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Athens	$0.81	$0.83	$0.85	$0.85	$0.83	$0.74	$0.68	$0.69
Belmont	.87	.78	.84	.84	.81	.71	.72	.70
Carroll	.74	.85	.81	.83	.87	.78	.74	.76
Columbiana	.79	.91	.96	.90	.88	.77	.78	.82
Coshocton	.98	.90	1.00	1.01	1.00	.91	.83	.78
Gallia	1.04	.90	.92	.92	.91	.85	.80	.....
Guernsey	.87	.68	.79	.72	.71	.63	.58	.65
Hocking	.80	.81	.81	.85	.82	.77	.66	.68
Jackson	1.03	1.00	1.06	.99	1.06	.97	.90	.89
Jefferson	1.00	.83	.85	.92	.79	.71	.70	.79
Lawrence	1.04	1.08	1.04	1.06	.94	1.03	.92	.81
Mahoning	1.12	1.20	1.25	1.41	1.44	1.40	1.28	1.18
Medina	1.16	1.20	1.16	1.23	1.25	1.13	1.06	1.00
Meigs	1.02	1.24	.96	1.13	1.10	1.05	.94	.84
Morgan	.....	.....	.....	.....	.....	.....	.80	.73
Muskingum	.99	.86	.82	.91	.83	.89	.83	.72
Noble	.....	.....	.....	.....	.....	.....	.....	.58
Perry	.84	.85	.84	.85	.85	.78	.77	.71

Average prices paid for Ohio coal since 1889 in counties producing 10,000 tons or over—Continued.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Portage	$1.27	$1.59	$1.52	$1.52	$1.55	$1.52	$1.32	$1.33
Stark	1.26	1.30	1.25	1.22	1.24	1.19	1.02	1.08
Summit	1.83	1.50	1.38	1.43	1.73	1.67	1.41	1.61
Trumbull	1.64	1.20	1.41	1.54	1.54	1.87	1.31	.....
Tuscarawas	.80	.85	.79	.85	.84	.66	.71	.78
Vinton	1.03	1.07	1.05	1.02	.97	.94	.83	.93
Wayne	1.23	1.07	1.15	1.30	1.27	1.22	1.09	.85
The State	.94	.94	.94	.94	.92	.83	.79	.79

Statistics of labor employed and working time at Ohio coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Athens	2,122	198	2,702	193	2,536	193
Belmont	1,401	201	1,276	238½	1,713	224
Carroll	642	188	589	200	595	214
Columbiana	987	219	1,031	251	932	223
Coshocton	327	237	284	265	386	229
Gallia	33	205	35	218	38	220
Guernsey	788	225	810	188	800	229
Hocking	1,625	240	1,674	241	2,099	216
Jackson	2,654	180	3,097	189	3,347	214
Jefferson	944	203	1,237	235	1,544	208
Lawrence	242	198	232	223	247	263
Mahoning	537	220	525	233½	484	206
Medina	310	219	314	221	175	255
Meigs	616	202	623	190	636	190
Muskingum	366	250	338	213	356	192
Perry	2,977	188	3,284	170	2,380	187
Portage	155	236	149	225	204	207
Stark	1,930	182	1,952	190	1,776	199
Summit	389	173	376	194	406	221
Trumbull	102	243	176	226	86	205
Tuscarawas	1,082	196	1,161	232	1,300	224
Vinton	186	241	197	206	197	198
Wayne	87	178	65	200	196	166
The State	20,576	201	22,182	206	22,576	212

Statistics of labor employed and working time at Ohio coal mines—Continued.

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Athens	3,203	162	3,445	124	2,556	155	2,705	163
Belmont	1,684	199	1,947	157	1,302	197	1,701	152
Carroll	652	166	466	133	482	148	729	172
Columbiana	964	210	1,417	161	1,204	228	1,460	181
Coshocton	398	233	451	168	395	175	557	202
Gallia	36	176	40	160	9	200	.....	.....
Guernsey	993	176	1,880	165	1,218	194	1,357	193
Hocking	2,072	193	2,549	122	2,501	198	2,431	131
Jackson	3,188	201	3,803	142	4,061	184	3,972	145
Jefferson	2,033	194	2,093	153	1,989	136	1,499	138
Lawrence	142	143	198	134	284	184	171	125
Mahoning	419	196	206	138	186	145	153	106
Medina	349	228	351	150	489	209	431	181
Meigs	601	142	584	146	612	151	587	176
Morgan	.....	.....	.....	.....	60	190	77	141
Muskingum	388	214	458	112	279	194	216	193
Noble	.....	.....	.....	.....	.....	.....	41	220
Perry	2,585	178	3,597	139	2,732	169	3,091	161
Portage	252	217	249	182	263	183	301	118
Stark	2,105	161	2,250	81	2,074	149	2,127	206
Summit	90	256	80	126	95	178	92	197
Trumbull	53	128	14	76	38	242	.....	.....
Tuscarawas	1,329	234	646	120	1,354	180	1,412	148
Vinton	179	200	155	115	38	226	182	128
Wayne	168	167	184	83	392	174	119	151
The State	23,931	188	27,105	136	24,644	176	25,500	161

OREGON.

Total production in 1896, 101,721 short tons; spot value, $294,564.

In Mineral Resources for 1895 it was stated that the opening up of some new mines during that year would materially increase the product in 1896. The prediction was verified by a gain of 28,036 short tons, or 38 per cent, in tonnage over 1895, and the winning of the largest output ever recorded. The value increased $46,663, or 19 per cent, Oregon following the example of the other States in lower prices. The average price per ton declined from $3.36 in 1895 to $2.90 in 1896.

The following tables show the statistics of production for the past five years and the total output since 1885:

Coal product in Oregon since 1892.

Distribution.	1892.	1893.	1894.	1895.	1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Loaded at the mines for shipment	31,760	37,835	45,068	68,108	88,116
Sold to local trade and used by employees	2,353	3,594	2,171	5,294	12,951
Used at mines for steam and heat	548	254	282	283	654
Total product	34,661	41,683	47,521	73,685	101,721
Total value	$148,546	$164,500	$183,914	$247,901	$294,564
Total number of employees	90	110	88	414	254
Average number of days worked	120	192	243	*a* 69	191

a The apparently large number of men employed and small average working time are due to the large force of men employed in developing the Beaver Hill mine, which was producing coal for shipment during only twenty days in 1895. The average time made at the Newport mines was over two hundred days per man.

Coal product of Oregon from 1885 to 1896.

Year.	Short tons.	Year.	Short tons.
1885	50,000	1891	51,826
1886	45,000	1892	34,661
1887	31,696	1893	41,683
1888	75,000	1894	47,521
1889	64,359	1895	73,685
1890	61,514	1896	101,721

Mr. J. S. Diller, of the United States Geological Survey, has made a reconnoissance of the geology of the coal fields of Oregon, and his report will be found in Part I of the Seventeenth Annual Report of the Survey.

PENNSYLVANIA.

Total product in 1896, 92,771,013 long tons, or 103,903,534 short tons; spot value, $117,116,900. Anthracite: Total product, 48,523,287 long tons, or 54,346,081 short tons; spot value, $81,748,651. Bituminous: 44,247,726 long tons, or 49,557,453 short tons; spot value, $35,368,249.

The total amount of coal produced in Pennsylvania in 1895 was 96,621,933 long tons, or 108,216,565 short tons, valued at $117,999,629, indicating in 1896 a decrease of 3,850,920 long tons, or 4,313,031 short tons and a loss in value of $882,729.

The decrease in tonnage was largely in anthracite, the production of which in 1895 was 51,785,122 long tons, or 57,999,337 short tons, 3,261,835 long tons, or 3,653,256 short tons, more than in 1896. The production of bituminous coal in 1895 was 44,836,811 long tons, or 50,217,228 short tons, which was 589,085 long tons, or 659,775 short tons, more than the output of 1896.

It will be seen by this that 85 per cent of the decrease in 1896 was in the production of anthracite. When we consider the decrease in value, however, a different aspect is presented. With 85 per cent of the decrease in product, anthracite is responsible for only 32 per cent of the loss in value. The decrease in bituminous production was 15 per cent of the total loss in output, with 68 per cent of the total loss in value. With a decreased output of 3,261,835, or 6 per cent, long tons in 1896, the value fell off only $270,621, or a little more than 0.3 per cent. Excluding the small amount of slack coal used at the mines, upon which no value is placed, the average price per long ton realized in 1896 was $1.85 against $1.72 in 1895. This was not due to any improved condition of the markets, but to the determination of the anthracite producers to put an end to ruinous competition and maintain prices at a profitable figure. This is discussed more fully in treating the anthracite product in subsequent pages.

Bituminous production in Pennsylvania shows a decrease of 659,775 short tons in product and of $612,108 in value. It is probable that the production of Pennsylvania bituminous coal would have shown an increase in tonnage and a comparatively large decrease in value but for the fact that the principal manufacturers of coke in the Connellsville region determined to follow the example of anthracite producers and maintain prices. This action resulted in a decrease of over 2,700,000 short tons of Connellsville coke, representing a restriction of over 4,000,000 tons in the coal output.

Pennsylvania, as is well known, is by far the most important of the coal-producing States. It is so preeminently ahead of every other producing State, having in the combined product of anthracite and bituminous coal in 1896 more than five times the output of Illinois, which ranks second, that comparisons are only of interest when drawn with reference to the ratio of Pennsylvania's output to that of the total in the United States or of the combined product of the other States. It is not possible to carry such comparisons back to an earlier date than 1880, owing to incomplete statistics in a number of the States. During 1880 the total output of coal in the United States was 63,822,830 long tons, or 71,481,569 short tons, of which Pennsylvania produced 42,437,242 long tons, or 47,529,711 short tons, or practically two-thirds of the total.

The product of Pennsylvania coal has always exceeded 50 per cent of the total product of the United States, the lowest percentage being 52, in 1884 and 1888. The average percentage for the seventeen years

from 1880 to 1896, inclusive, was 55. In the following table is shown the total product of Pennsylvania and the United States since 1880, with the percentage of the total produced by Pennsylvania in each year:

Product of Pennsylvania coal compared with total United States since 1880.

Year.	Total United States.	Pennsylvania.	Per cent of Pennsylvania to total.
	Short tons.	*Short tons.*	
1880	71, 481, 569	46, 529, 711	65
1881	85, 881, 030	54, 320, 018	63
1882	103, 285, 789	57, 254, 507	55
1883	115, 212, 125	62, 488, 190	54
1884	119, 735, 051	62, 404, 488	52
1885	110, 957, 522	62, 137, 271	56
1886	112, 743, 403	62, 857, 210	56
1887	129, 975, 557	70, 372, 857	54
1888	148, 659, 402	77, 719, 624	52
1889	141, 229, 514	81, 719, 059	58
1890	157, 788, 657	88, 770, 814	56
1891	168, 566, 668	93, 453, 921	55
1892	179, 329, 071	99, 167, 080	55
1893	182, 352, 774	98, 038, 267	54
1894	170, 741, 526	91, 833, 584	54
1895	193, 117, 530	108, 216, 565	56
1896	191, 986, 357	103, 903, 534	54
Total	2, 383, 043, 545	1, 321, 186, 700	55

PENNSYLVANIA ANTHRACITE.[1]

The year 1896 was marked by a very considerable falling off in the production of anthracite coal as compared with the year 1895, a result naturally to be expected as the abnormally large production of 1895 was far beyond any reasonable consumptive demand, with the result that the stocks of coal at the close of that year were unusually heavy. This left quite an amount of the 1895 production to be disposed of during the early part of 1896. and this of itself would have resulted in a lessening of the 1896 output, but add to this condition the dull times and stagnant markets, and there were all the reasons necessary for the decreased production; in fact, in view of the above-mentioned conditions, the product of 48,523,287 tons seems large, as the year 1895 was the only one in which it was exceeded.

While the product of 1896 was less than that of the preceding year,

[1] By William W. Ruley, chief of Bureau Anthracite Coal Statistics.

the prices obtained for coal were considerably higher, andt he wholesale losses noted for 1895 were fortunately not repeated.

Further comment on the question of prices will be found at the end of this section.

It has been customary to give in the report for each year a description of the anthracite coal fields, and the same plan is followed in this report.

Below is given a tabular arrangement of the fields and their divisions:

Geological field or basin.	*Local district.*	*Trade region.*
Northern	Carbondale	Wyoming.
	Scranton	
	Pittston	
	Wilkesbarre	
	Plymouth	
	Kingston	
Eastern middle	Green Mountain	Lehigh.
	Black Creek	
	Hazleton	
	Beaver Meadow	
Southern	Panther Creek	Schuylkill.
	East Schuylkill	
	West Schuylkill	
	Lorberry	
	Lykens Valley	
Western middle	East Mahanoy	
	West Mahanoy	
	Shamokin	

The above territory is reached by eleven so-called initial railroads, as follows:

Philadelphia and Reading Railway Company.
Lehigh Valley Railroad Company.
Central Railroad Company of New Jersey.
Delaware, Lackawanna and Western Railroad Company.
Delaware and Hudson Canal Company's Railroad.
Pennsylvania Railroad Company.
Erie and Wyoming Valley Railroad Company.
New York, Lake Erie and Western Railroad Company.
New York, Ontario and Western Railroad Company.
Delaware, Susquehanna and Schuylkill Railroad Company.
New York, Susquehanna and Western Railroad Company.

The above-named fields comprise an area of something over 480 square miles and are located in the eastern middle part of the State, in the counties of Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, Schuylkill, and Susquehanna, and are classed under three general divisions, viz, Wyoming, Lehigh, and Schuylkill regions. Geologically they are divided into fields or basins, which are again subdivided into districts.

The Bernice basin in Sullivan County was formerly classed as the Western-Northern field, but it is now not considered strictly anthracite. It is therefore omitted from the tabular arrangement of the fields shown above, and its product is no longer included in the anthracite product.

The railroads noted after the table of regions are known as initial anthracite roads, and on them and their branches originates all the coal from the several regions. In the body of this report is given a table showing the total annual shipments over these roads from the beginning of the industry down to and including 1896, divided among the three divisions—Wyoming, Lehigh, and Schuylkill.

The total product of anthracite in 1896 was 48,523,287 long tons. Of this amount 43,177,485 tons were shipped to market, 1,010,975 tons sold at or about the mines to local trade, and 4,334,827 tons used for steam and heat at mines. The last item consists largely of culm and dirt and more or less unmarketable coal, and is not as valuable as that shipped. For this reason it is not included in making up the value of coal at mines.

In the following table is shown the total product, together with its average value at the mines, number of persons employed, etc., in 1896 as compared with 1895:

Total product of anthracite coal in 1895 and 1896.

Year.	Total product.	Value at mines.	Average price per ton.	Number of persons employed.	Number of days worked.
	Long tons.				
1895	51,785,122	$82,019,272	$1.72	142,917	196
1896	48,523,287	81,748,651	1.85	148,991	174

The following tables give the details by counties as to total product, shipment, local trade, and colliery consumption, for the years 1895 and 1896:

Anthracite product in 1895.

County.	Total product.	Shipments.	Local trade.	Used at mines.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Susquehanna	435,904	398,210	10,000	27,694
Lackawanna	12,664,913	11,514,406	392,041	758,466
Luzerne	19,239,498	17,272,082	450,963	1,516,453
Carbon	1,470,595	1,294,124	20,400	156,071
Schuylkill	11,941,242	10,656,366	130,650	1,154,226
Columbia	546,990	471,774	11,125	64,091
Northumberland	4,773,124	4,335,328	90,419	347,377
Dauphin	712,856	569,187	68,548	75,121
Total	51,785,122	46,511,477	1,174,146	4,099,499

Anthracite product in 1896.

County.	Total product.	Shipments.	Local trade.	Used at mines.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Susquehanna	429,506	383,719	7,787	38,000
Lackawanna	12,450,297	11,476,552	252,026	721,719
Luzerne	17,803,196	15,592,297	361,595	1,489,304
Carbon	1,504,582	1,322,431	29,118	153,033
Schuylkill	10,902,343	9,421,684	194,010	1,286,649
Columbia	659,849	553,593	13,021	93,235
Northumberland	4,083,136	3,549,337	119,290	414,509
Dauphin	690,378	517,872	34,128	138,378
Total	48,523,287	43,177,485	1,010,975	4,334,827

In the above table will be seen the variations in the product of the several counties for the two years, and comparisons can be made of the relations borne by the shipments, coal sold to local trade, etc., to the total product for the years.

It should be remembered, however, as stated in another part of this report, that the figures representing coal "Used at mines" are in many cases approximate, and, although for all practical purposes correct, they are not absolutely accurate in all cases.

Below is given a table showing the shipments of coal from the three trade regions from 1820 to 1896, inclusive:

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1896.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Percent.	Long tons.	Percent.	Long tons.	Percent.	Long tons.
1820	.....	.....	365	.....	.....	.....	365
1821	.....	.....	1,073	.....	.....	.....	1,073
1822	1,480	39.79	2,240	60.21	.....	.....	3,720
1823	1,128	16.23	5,823	83.77	.....	.....	6,951
1824	1,567	14.10	9,541	85.90	.....	.....	11,108
1825	6,500	18.60	28,393	81.40	.....	.....	34,893
1826	16,767	34.90	31,280	65.10	.....	.....	48,047
1827	31,360	49.44	32,074	50.56	.....	.....	63,434
1828	47,284	61.00	30,232	39.00	.....	.....	77,516
1829	79,973	71.35	25,110	22.40	7,000	6.25	112,083
1830	89,984	51.50	41,750	23.90	43,000	24.60	174,734
1831	81,854	46.29	40,966	23.17	54,000	30.54	176,820
1832	209,271	57.61	70,000	19.27	84,000	23.12	363,271
1833	252,971	51.87	123,001	25.22	111,777	22.91	487,749

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1896—Continued.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Percent.	Long tons.	Percent.	Long tons.	Percent.	Long tons.
1834....	226, 692	60. 19	106, 244	28. 21	43, 700	11. 60	376, 636
1835....	339, 508	60. 54	131, 250	23. 41	90, 000	16. 05	560, 758
1836....	432, 045	63. 16	148, 211	21. 66	103, 861	15. 18	684, 117
1837....	530, 152	60. 98	223, 902	25. 75	115, 387	13. 27	869, 441
1838....	446, 875	60. 49	213, 615	28. 92	78, 207	10. 59	738, 697
1839....	475, 077	58. 05	221, 025	27. 01	122, 300	14. 94	818, 402
1840....	490, 596	56. 75	225, 313	26. 07	148, 470	17. 18	864, 379
1841....	624, 466	65. 07	143, 037	14. 90	192, 270	20. 03	959, 773
1842....	583, 273	52. 62	272, 540	24. 59	252, 599	22. 79	1, 108, 412
1843....	710, 200	56. 21	267, 793	21. 19	285, 605	22. 60	1, 263, 598
1844....	887, 937	54. 45	377, 002	23. 12	365, 911	22. 43	1, 630, 850
1845....	1, 131, 724	56. 22	429, 453	21. 33	451, 836	22. 45	2, 013, 013
1846....	1, 308, 500	55. 82	517, 116	22. 07	518, 389	22. 11	2, 344, 005
1847....	1, 665, 735	57. 79	633, 507	21. 98	583, 067	20. 23	2, 882, 309
1848....	1, 733, 721	56. 12	670, 321	21. 70	685, 196	22. 18	3, 089, 238
1849....	1, 728, 500	53. 30	781, 556	24. 10	732, 910	22. 60	3, 242, 966
1850....	1, 840, 620	54. 80	690, 456	20. 56	827, 823	24. 64	3, 358, 899
1851....	2, 328, 525	52. 34	964, 224	21. 68	1, 156, 167	25. 98	4, 448, 916
1852....	2, 636, 835	52. 81	1, 072, 136	21. 47	1, 284, 500	25. 72	4, 993, 471
1853....	2, 665, 110	51. 30	1, 054, 309	20. 29	1, 475, 732	28. 41	5, 195, 151
1854....	3, 191, 670	53. 14	1, 207, 186	20. 13	1, 603, 478	26. 73	6, 002, 334
1855....	3, 552, 943	53. 77	1, 284, 113	19. 43	1, 771, 511	26. 80	6, 608, 567
1856....	3, 603, 029	52. 91	1, 351, 970	19. 52	1, 972, 581	28. 47	6, 927, 580
1857....	3, 373, 797	50. 77	1, 318, 541	19. 84	1, 952, 603	29. 39	6, 644, 941
1858....	3, 273, 245	47. 86	1, 380, 030	20. 18	2, 186, 094	31. 96	6, 839, 369
1859....	3, 448, 708	44. 16	1, 628, 311	20. 86	2, 731, 236	34. 98	7, 808, 255
1860....	3, 749, 632	44. 04	1, 821, 674	21. 40	2, 941, 817	34. 56	8, 513, 123
1861....	3, 160, 747	39. 74	1, 738, 377	21. 85	3, 055, 140	38. 41	7, 954, 264
1862....	3, 372, 583	42. 86	1, 351, 054	17. 17	3, 145, 770	39. 97	7, 869, 407
1863....	3, 911, 683	40. 90	1, 894, 713	19. 80	3, 759, 610	39. 30	9, 566, 006
1864....	4, 161, 970	40. 89	2, 054, 669	20. 19	3, 960, 836	38. 92	10, 177, 475
1865....	4, 356, 959	45. 14	2, 040, 913	21. 14	3, 254, 519	33. 72	9, 652, 391
1866....	5, 787, 902	45. 56	2, 179, 364	17. 15	4, 736, 616	37. 29	12, 703, 882
1867....	5, 161, 671	39. 74	2, 502, 054	19. 27	5, 325, 000	40. 99	12, 988, 725
1868....	5, 330, 737	38. 52	2, 502, 582	18. 13	5, 968, 146	43. 25	13, 801, 465
1869....	5, 775, 138	41. 66	1, 949, 673	14. 06	6, 141, 369	44. 28	13, 866, 180
1870....	4, 968, 157	30. 70	3, 239, 374	20. 02	7, 974, 660	49. 28	16, 182, 191
1871....	6, 552, 772	41. 74	2, 235, 707	14. 24	6, 911, 242	44. 02	15, 699, 721
1872....	6, 694, 890	34. 03	3, 873, 339	19. 70	9, 101, 549	46. 27	19, 669, 778
1873....	7, 212, 601	33. 97	3, 705, 596	17. 46	10, 309, 755	48. 57	21, 227, 952

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1896—Continued.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.
1874....	6,866,877	34.09	3,773,836	18.73	9,504,408	47.18	20,145,121
1875....	6,281,712	31.87	2,834,605	14.38	10,596,155	53.75	19,712,472
1876....	6,221,934	33.63	3,854,919	20.84	8,424,158	45.53	18,501,011
1877....	8,195,042	39.35	4,332,760	20.80	8,300,377	39.85	20,828,179
1878....	6,282,226	35.68	3,237,449	18.40	8,085,587	45.92	17,605,262
1879....	8,960,829	34.28	4,595,567	17.58	12,586,293	48.14	26,142,689
1880....	7,554,742	32.23	4,463,221	19.05	11,419,279	48.72	23,437,242
1881....	9,253,958	32.46	5,294,676	18.58	13,951,383	48.96	28,500,017
1882....	9,459,288	32.48	5,689,437	19.54	13,971,371	47.98	29,120,096
1883....	10,074,726	31.69	6,113,809	19.23	15,604,492	49.08	31,793,027
1884....	9,478,314	30.85	5,562,226	18.11	*a*15,677,753	51.04	30,718,293
1885....	9,488,426	30.01	5,898,634	18.65	*a*16,236,470	51.34	31,623,530
1886....	9,381,407	29.19	5,723,129	17.89	*a*17,031,826	52.82	32,136,362
1887....	10,609,028	30.63	4,347,061	12.55	*a*19,684,929	56.82	34,641,018
1888....	10,654,116	27.93	5,639,236	14.78	*a*21,852,366	57.29	38,145,718
1889....	10,486,185	29.28	6,294,073	17.57	*a*19,036,835	53.15	35,817,093
1890....	10,867,822	29.68	6,329,658	17.28	*a*19,417,979	53.04	36,615,459
1891....	12,741,258	31.50	6,381,838	15.78	21,325,240	52.72	40,448,336
1892....	12,626,784	30.14	6,451,076	15.40	22,815,480	54.46	41,893,340
1893....	12,357,444	28.68	6,892,352	15.99	23,839,741	55.33	43,089,537
1894....	12,035,005	29.08	6,705,434	16.20	22,650,761	54.72	41,391,200
1895....	14,269,932	30.68	7,298,124	15.69	24,943,421	53.63	46,511,477
1896....	13,097,571	30.34	6,490,441	15.03	23,589,473	54.63	43,177,485
Total.	341,491,690	34.30	175,047,659	17.58	479,162,996	48.12	995,702,345

a Includes Loyalsock field.

In the following pages is given a directory of the anthracite mines in Pennsylvania, with names of operators, post-office addresses, etc.

Directory of anthracite coal mines in Pennsylvania.

NORTHERN COAL FIELD.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
15	Erie	Carbondale	1	Carbondale Twp	Lackawanna	D. and H. C. Co. R. R.	Glenwood	Hillside Coal and Iron Co.	Scranton.
16	Glenwood	do	1	do	do	do	do	do	Do.
17	Keystone	do	1	do	do	do	Archbald	do	Do.
21	Raymond	do	1	Blakely Twp	do	do	do	Raymond Coal Co	Do.
23	Pierce	do	1	do	do	D., L. and W. R. R.	Winton	Pierce Coal Co., Limited	Winton.
18	Edgerton	do	1	do	do	Erie R. R	Jermyn	Edgerton Coal Co., Limited	Jermyn.
25	Sterrick Creek	do	1	do	do	do	Winton	Sterrick Creek Coal Co	Peckville.
36	Johnson No. 1	do	1	do	do	N. Y., S. and W. R. R.	Dickson	Johnson Coal Co	Scranton.
35	Johnson No. 2	do	1	do	do	do	do	do	Do.
28	Marshwood	do	1	do	do	Erie R. R	Peckville	Moosic Mountain Coal Co.	Marshwood.
43	Murray	do	1	Dunmore Twp	do	D., L. and W. R. R.	Scranton	Murray, Carney & Co	Dunmore.
5	Northwest	do	1	Fell Twp	do	Erie R. R	Carbondale	Northwest Coal Co	Scranton.
27	White	do	1	Blakely Twp	do	N. Y., S. and W. R. R.	Winton	Winton Coal Co., Limited	Do.
24	Mount Jessup	do	1	do	do	D., L. and W. R. R. and N. Y., O. and W. R. R.	do	Mount Jessup Coal Co., Limited.	Peckville.
33	Olyphant	do	1	do	do	D. and H. C. Co. R. R.	Olyphant	D. & H. Canal Co	Providence.
34	Eddy Creek	do	1	do	do	do	do	do	Do.
29	Grassy Island	do	1	do	do	do	do	do	Do.
20	White Oak	do	1	do	do	do	Archbald	do	Do.
19	Jermyn Shaft	do	1	Carbondale Twp	do	do	Jermyn	do	Do.
11	Coal Brook	do	1	do	do	do	Carbondale	do	Do.
12	No. 1 Shaft	do	1	do	do	do	do	do	Do.
13	No. 3 Shaft	do	1	do	do	do	do	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
	Russell B	Carbondale	1	Fell Twp	Lackawanna	N. Y., O. and W. R. R	Carbondale	Russell B. Coal Co	Scranton.
	Nay Aug	do	2	Dunmore Twp	do	L. V. R. R	Dunmore	Nay Aug Coal Co	Do.
10	Racket Brook	do	1	Carbondale Twp	do	D. and H. C. Co. R. R	Carbondale	D. & H. Canal Co	Providence.
14	Powderly	do	1	do	do	do	do	do	Do.
3	Clinton	do	1	Fell Twp	do	Erie R. R	Forrest City	do	Do.
26	Dolph	do	1	Blakely Twp	do	L. V. R. R	Jessup	Dolph Coal Co., Limited	Scranton.
32	Lackawanna	do	1	do	do	N. Y., O. and W. R. R	Olyphant	Lackawanna Coal Co., Lim.	Do.
31	Ontario	do	1	do	do	do	Peckville	N. Y. and Scranton Coal Co.	Peckville.
2	Forest City	do	1	Forest City	Susquehanna	Erie R. R	Forest City	Hillside Coal and Iron Co	Scranton.
1	Clifford	do	1	do	do	do	do	do	Do.
	West Ridge	do	1	do	Lackawanna	N. Y., O. and W. R. R	West Ridge	West Ridge Coal Co	Do.
	Riverside	do	1	Archbald	do	do	Winton	Riverside Coal Co	Do.
69	Archbald	Scranton	2	Lackawanna Twp	do	D., L. and W. R. R	Scranton	D., L. and W. R. R. Co	Do.
63	Bellevue	do	2	do	do	do	Bellevue	do	Do.
60	Brisbin	do	2	3d ward, Scranton	do	do	Scranton	do	Do.
59	Cayuga	do	2	do	do	do	do	do	Do.
68	Continental	do	2	Lackawanna Twp	do	do	do	do	Do.
64	Dodge	do	2	do	do	do	Bellevue	do	Do.
67	Hampton	do	2	do	do	do	Scranton	do	Do.
71	Holden	do	2	do	do	do	Taylorville	do	Do.
65	Hyde Park	do	2	5th ward, Scranton	do	do	Scranton	do	Do.
62	Oxford	do	2	do	do	do	do	do	Do.
73	Pyne	do	2	Lackawanna Twp	do	do	Taylorville	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
70	Sloan	Scranton	2	Lackawanna Twp	Lackawanna	D., L. and W. R. R	Scranton	D., L. and W. R. R. Co	Scranton.
44	Storrs	do	2	Blakely Twp	do	do	Priceville	do	Do.
72	Taylor	do	2	Lackawanna Twp	do	do	Taylorville	do	Do.
61	Diamond No. 1	do	2	21st ward, Scranton	do	do	Scranton	do	Do.
	Diamond No. 2	do	2	do	do	do	do	do	Do.
	Tripp Shaft	do	2	do	do	do	do	do	Do.
38	Dunmore No. 1	do	1	Dunmore Twp	do	E. and W. V. R. R	Dunmore	Pennsylvania Coal Co	Dunmore
41	Dunmore No. 5	do	2	do	do	do	do	do	Do.
	Bunker Hill	do	2	do	do	do	do	do	Do.
50	Blue Ridge	do	1	do	do	N. Y., O. and. W. R. R.	Peckville	Blue Ridge Coal Co	Peckville.
	Austin	do	2	Old Forge Twp	do	L. V. R. R	Lackawanna	Austin Coal Co	Scranton.
40	Gypsy Grove No. 3	do	1	Dunmore Twp	do	E. and W. V. R. R	Dunmore	Pennsylvania Coal Co	Dunmore.
	Gypsy Grove No. 4	do	1	do	do	do	do	do	Do.
52	Pine Brook	do	2	7th ward, Scranton	do	D., L. and W. R. R	Scranton	Lackawanna I. and C. Co	Scranton.
53	Capouse	do	2	21st ward, Scranton	do	do	do	do	Do.
76	Greenwood No. 1	do	2	Lackawanna Twp	do	N. Y., S. and W. R. R.	Peckville	Greenwood Coal Co., Lim	Do.
77	Greenwood No. 2	do	2	do	do	do	Minooka	do	Do.
80	Jermyn Nos. 1 and 2	do	2	Old Forge Twp	do	L. V. R. R	Taylorville	Jermyn & Co	Do.
37	Pancoast	do	1	Blakely Twp	do	D., L. and W. R. R	Dickson City	Pancoast Coal Co	Do.
56	Providence	do	2	2d ward, Scranton	do	do	Green Ridge	Providence Coal Co., Lim	Do.
79	Sibley	do	2	Old Forge Twp	do	L. V. R. R	Lackawanna	Elliott, McClure & Co	Do.
42	Spencer	do	2	Dunmore Twp	do	do	Dunmore	A. D. and F. M. Spencer	Dunmore.
74	Meadow Brook	do	2	20th ward, Scranton	do	D., L. and W. R. R	Taylorville	William Connell & Co	Scranton.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
75	National	Scranton	2	20th ward, Scranton	Lackawanna	D., L. and W. R. R	Taylorville	William Connell & Co	Sranton.
	Stafford	do	2	Lackawanna Twp	do	do	do	do	Do.
49	Manville *a*	do	2	13th ward, Scranton	do	D. and H. C. Co. R. R	Green Ridge	D. and H. Canal Co	Providence.
46	Leggitts Creek	do	1	1st ward, Scranton	do	do	Providence	do	Do.
45	Marvine	do	1	do	do	do	do	do	Do.
48	Von Storch	do	2	2d ward, Scranton	do	do	do	do	Do.
47	Dickson	do	2	do	do	do	Green Ridge	do	Do.
50	Green Ridge	do	2	Dunmore Twp	do	Erie R. R	do	O. S. Johnson	Scranton.
	Richmond, Nos. 3, 4	do	1	Scranton Twp	do	N. Y., O. and W. R. R.	Providence	Elk Hill Coal and Iron Co	Do.
57	Mount Pleasant	do	2	14th ward, Scranton	do	D., L. and W. R. R	Scranton	Wm. T. Smith	Do.
81	William A	Pittston	2	Old Forge Twp	do	L. V. R. R	Lackawanna	Connell Coal Co	Do.
	Lawrence	do	2	do	do	do	do	do	Do.
88	Katy-Did	do	3	do	do	E. and W. V. R. R	Moosic	Robertson & Co	Moosic.
87	Central No. 13	do	3	do	do	do	Pleasant Valley	Pennsylvania Coal Co	Dunmore.
	Law Shaft	do	3	Pittston Twp	do	do	do	do	Do.
86	Old Forge	do	2	Old Forge Twp	do	do	Lackawanna	do	Do.
109	Ewen Breaker	do	3	Jenkins Twp	Luzerne	do	Pittston	do	Do.
	Shaft No. 4	do	3	do	do	do	do	do	Do.
110	Breaker No. 6	do	3	do	do	do	Port Blanchard	do	Do.
	Breaker No. 8	do	3	Hughestownboro	do	do	Pittston	do	Do.
99	Breaker No. 10	do	3	do	do	do	do	do	Do.

a Operated jointly with Delaware, Lackawanna and Western Railroad Company.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
111	Breaker No. 14	Pittston	3	Jenkins Twp	Luzerne	E. and W. V. R. R.	Port Blanchard	Pennsylvania Coal Co	Dunmore.
100	Barnum	do	3	Marcy Twp	do	do	Pittston Junction	do	Do.
112	Laflin	do	3	Jenkins Twp	do	C. R. R. of New Jersey and L. V. R. R.	Laflin	Laflin Coal Co	Wilkesbarre.
91	Avoca	do	3	Pittston Twp	do	L. V. R. R.	Avoca	Avoca Coal Co., Limited	Avoca.
90	Langcliffe	do	3	Pittston	do	do	do	Langcliffe Coal Co	Do.
101	Twin	do	3	do	do	do	Pittston	Newton Coal Mining Co	Pittston.
	Ravine	do	3	do	do	do	do	do	Do.
102	Seneca	do	3	do	do	do	do	do	Do.
98	Mosier	do	3	Marcy Twp	do	do	do	do	Do.
108	Hunt	do	3	Kingston Twp	do	D., L. and W. R. R.	Wyoming	Wyoming C. and L. Co	Scranton.
83	Hallstead	do	3	Marcy Twp	do	do	Duryea	D., L. and W. R. R. Co	Do.
95	Butler	do	3	Pittston Twp	do	L. V. R. R.	Pittston	Butler Mine Co., Limited	Pittston.
106	Schooley	do	3	Exeter Twp	do	do	West Pittston	do	Do.
84	Columbia	do	3	Marcy Twp	do	D., L. and W. R. R. and L. V. R. R.	Duryea	Old Forge C. Mng. Co	Do.
85	Phœnix	do	3	do	do	do	do	do	Do.
82	Babylon	do	3	do	do	L. V. R. R.	Coxton	Babylon Coal Co	Scranton.
89	Consolidated	do	3	Pittston Twp	do	E. and W. V. R. R.	Moosic	Hillside Coal and Iron Co	Do.
103	Clear Spring	do	3	West Pittston	do	D., L. and W. R. R.	West Pittston	Clear Spring Coal Co	Pittston.
	Louise	do	3	do	do	L. V. R. R.	do	Raub Coal Co	Do.
94	Elmwood	do	3	Pittston Twp	do	do	Avoca	Florence Coal Co., Limited	Dupont.
96	Abbott No. 2	do	3	do	do	C. R. R. of New Jersey	Pittston	Abbott Coal Co	Pittston.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
113	Ridgewood	Pittston	3	Plains Twp	Luzerne	N. Y., S. and W. R. R.	Mill Creek	Keystone Coal Co	Wilkesbarre.
104	Stevens	do	3	Exeter Twp	do	L. V. R. R	Exeter	Stevens Coal Co	Scranton.
107	Mount Lookout	do	3	do	do	D., L. and W. R. R. and L. V. R. R.	do	Mount Lookout Coal Co	Do.
	Morning Star	do	3	do	do	L. V. R. R	Wyoming	J. A. Hutchins	Wyoming.
105	Exeter	do	3	do	do	do	West Pittston	Lehigh Valley Coal Co	Wilkesbarre.
92	Heidelberg No. 1	do	3	Pittston Twp	do	do	do	do	Do.
93	Heidelberg No. 2	do	3	do	do	do	do	do	Do.
133	Diamond No. 1	Wilkesbarre	4	Wilkesbarre	do	C. R. R. of New Jersey.	Ashley	L. and W. Coal Co	Do.
132	Hollenback No. 2	do	4	do	do	do	Wilkesbarre	do	Do.
134	Empire No. 4	do	4	do	do	do	Ashley	do	Do.
137	S. Wilkesbarre No. 5.	do	4	do	do	do	S. Wilkesbarre	do	Do.
135	Stanton No. 7	do	4	do	do	do	Ashley	do	Do.
138	New Jersey No. 8	do	4	Hanover Twp	do	do	do	do	Do.
139	Sugar Notch No. 9	do	4	do	do	do	Sugar Notch	do	Do.
	Maxwell No. 20	do	4	do	do	do	do	do	Do.
143	Wanamie No. 18	do	4	Newport Twp	do	do	Wanamie	do	Do.
142	Alden	do	4	do	do	do	Alden	Alden Coal Co	Alden.
148	Melville	do	4	do	do	do	Lee	Melville Coal Co	Wilkesbarre.
130	Red Ash No. 1	do	4	Wilkesbarre Twp	do	do	Ashley	Red Ash Coal Co	Do.
131	Red Ash No. 2	do	4	do	do	do	do	do	Do.
144	Colliery No. 1	do	4	Hanover Twp	do	P. R. R	Nanticoke	Susquehanna Coal Co	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
145	Colliery No. 2	Wilkesbarre	4	Hanover Twp	Luzerne	P. R. R.	Nanticoke	Susquehanna Coal Co	Wilkesbarre.
146	Colliery No. 5	do	4	do	do	do	do	do	Do.
147	Colliery No. 6	do	4	Newport Twp	do	do	Glen Lyon	do	Do.
117	Bennett	do	3	Plains Twp	do	C. R. R. of New Jersey	Mill Creek	Thomas Waddell & Co	Pittston.
141	Warrior Run	do	4	Hanover Twp	do	L. V. R. R	Warrior Run	A. J. Davis & Co	Wilkesbarre.
149	West End No. 1	do	4	Conyngham Twp	do	P. R. R	Mocanaqua	West End Coal Co	Shickshinny.
140	Hadleigh	do	4	Hanover Twp	do	C. R. R. of New Jersey	Sugar Notch	Crescent Coal Co	Wilkesbarre.
118	Abbott	do	3	Plains Twp	do	L. V. R. R	Miners Mills	Lehigh Valley Coal Co	Do.
129	Hillman Vein	do	4	Wilkesbarre Twp	do	do	Wilkesbarre	Hillman Vein Coal Co	Do.
136	Franklin	do	4	do	do	do	Ashley	Lehigh Valley Coal Co	Do.
120	Henry	do	3	Plains Twp	do	do	Port Bowkley	do	Do.
122	Prospect	do	3	do	do	do	do	do	Do.
123	Dorrance	do	3	Wilkesbarre Twp	do	do	do	do	Do.
121	Wyoming	do	3	Plains Twp	do	do	do	do	Do.
116	Algonquin	do	3	do	do	N. Y., S. and W. R. R.	Miners Mills	Algonquin Coal Co	Do.
125	Laurel Run	do	3	do	do	do	Parsons	Laurel Run Coal Co	Do.
126	Baltimore Slope	do	4	Wilkesbarre Twp	do	D. and H. C. C R. R	do	D. and H. Canal Co	Providence.
	Bal. Red Ash No. 2	do	4	do	do	do	do	do	Do.
127	Baltimore Tunnel	do	4	do	do	do	Wilkesbarre	do	Do.
128	Conyngham	do	4	do	do	do	do	do	Do.
114	Delaware	do	3	Plains Twp	do	do	Mill Creek	do	Do.
168	Lance No. 11	Plymouth	4	Plymouth	do	C. R. R. of New Jersey	Plymouth	L. and W. Coal Co	Do.
169	Nottingham No. 15	do	4	do	do	do	do	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
170	Reynolds No. 16	Plymouth	4	Plymouth	Luzerne	C. R. R. of New Jersey	Plymouth	L. and W. Coal Co	Providence.
172	Avondale	do	4	Plymouth Twp	do	D., L. and W. R. R	Avondale	D., L. and W. R. R. Co	Scranton.
	Auchincloss	do	4	do	do	do	do	do	Do.
	Bliss	do	4	do	do	do	do	do	Do.
160	Woodward	do	4	do	do	do	Kingston	do	Do.
166	Dodson	do	4	do	do	do	Plymouth	John C. Haddock	Wilkesbarre.
155	East Boston	do	3	Kingston	do	D., L. and W. R. R., P. R. R., and L. V. R. R.	Kingston	W. G. Payne & Co	Kingston.
171	Parrish	do	4	Plymouth	do	C. R. R. of New Jersey	Plymouth	Parrish Coal Co	Plymouth.
	Buttonwood	do	4	do	do	do	do	do	Do.
173	Colliery No. 3	do	4	West Nanticoke	do	D., L. and W. R. R	West Nanticoke	Susquehanna Coal Co	Wilkesbarre.
	Salem	do	4	Shickshinny	do	do	Shickshinny	Cadwallader Coal Co	Shickshinny.
161	Boston	do	4	Plymouth Twp	do	D. and H. C. Co. R. R	Plymouth	D. and H. Canal Co	Providence.
162	Plymouth No. 2	do	4	do	do	do	do	do	Do.
163	Plymouth No. 3	do	4	do	do	do	do	do	Do.
164	Plymouth No. 4	do	4	do	do	do	do	do	Do.
165	Plymouth No. 5	do	4	do	do	do	do	do	Do.
159	Pettebone	Kingston	3	Kingston	do	D., L. and W. R. R	do	D., L. and W. R. R. Co	Do.
156	Kingston No. 1	do	3	Kingston Twp	do	do	do	Kingston Coal Co	Kingston.
158	Kingston No. 2	do	3	Plymouth	do	do	do	do	Do.
	Kingston No. 3	do	3	do	do	do	do	do	Do.
157	Kingston No. 4	do	3	Kingston Twp	do	do	do	do	Do.
167	Gaylord	do	4	Plymouth Twp	do	do	do	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

NORTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
152	Harry E	Kingston	3	Kingston Twp	Luzerne	D., L. and W. R. R	Bennett	Simpson & Watkins	Wilkesbarre.
151	Forty Fort	do	3	do	do	D., L. and W. R. R. and L. V. R. R.	Maltby	do	Do.
154	Black Diamond	do	3	do	do	do	Kingston	John C. Haddock	Do.
153	Mill Hollow	do	3	do	do	do	Bennett	Thomas Waddell	Pittston.
150	Maltby	do	3	do	do	do	Maltby	Lehigh Valley Coal Co	Wilkesbarre.

EASTERN MIDDLE COAL FIELD.

175	Upper Lehigh No. 2.	Green Mountain.	5	Butler Twp	Luzerne	C. R. R. of New Jersey	Upper Lehigh	Upper Lehigh Coal Co	Upper Lehigh.
176	Upper Lehigh No. 4.	do	5	do	do	do	do	do	Do.
191	Milnesville	Black Creek	5	Hazle Twp	do	L. V. R. R	Hazleton	A. S. Van Wickle & Co	Milnesville.
188	Lattimer No. 1	do	5	do	do	do	do	Calvin Pardee & Co	Hazleton.
189	Lattimer No. 2								
190	Lattimer No. 3								
192	Hollywood	do	5	do	do	do	do	do	Do.
177	Sandy Run	do	5	Foster Twp	do	C. R. R. of New Jersey	Sandy Run	M. S. Kemmerer & Co	Sandy Run.
178	Highland No. 1	do	5	do	do	L. V. R. R	Highland	G. B. Markle & Co	Jeddo.
179	Highland, Nos. 2, 5	do	5	do	do	do	do	do	Do.
184	Jeddo No. 3	do	5	Hazle Twp	do	do	Jeddo	do	Do.
185	Jeddo No. 4	do	5	do	do	do	do	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

EASTERN MIDDLE COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
195	Derringer	Black Creek	5	Black Creek Twp	Luzerne	D., S. and S. R. R.	Derringer	Cross Creek Coal Co	Drifton.
180	Drifton No. 1	do	5	Foster Twp	do	do	Drifton	do	Do.
181	Drifton No. 2	do	5	do	do	do	do	do	Do.
	Drifton No. 3	do	5	Hazle Twp	do	do	do	do	Do.
183	Eckley No. 5	do	5	Foster Twp	do	do	Eckley	do	Do.
182	Eckley No. 10	do	5	do	do	do	do	do	Do.
196	Gowen	do	5	Black Creek Twp	do	do	Gowen	do	Do.
194	Tomhicken	do	5	Sugar Loaf Twp	do	do	Tomhicken	do	Do.
	Oneida, Nos. 1, 2, and 3.	do	6	North Union	Schuylkill	do	Oneida	do	Do.
197	Hazlebrook	Hazleton	5	Foster Twp	Luzerne	L. V. R. R.	Hazlebrook	J. S. Wentz & Co	Mauch Chunk
208	Harwood	do	5	Hazle Twp	do	D., S. and S. R. R.	Hazleton	Calvin Pardee & Co	Harwood Mines.
198	Stockton	do	5	do	do	do	Stockton	Cross Creek Coal Co	Drifton.
207	Cranberry	do	5	do	do	L. V. R. R.	Hazleton	A. Pardee & Co	Hazleton.
205	Hazleton, Nos. 1,2	do	5	Hazleton	do	do	do	Lehigh Valley Coal Co	Do.
204	Hazleton, Nos. 3,5	do	5	do	do	do	do	do	Do.
206	Hazleton No. 6	do	5	do	do	do	do	do	Do.
217	Beaver Brook	Beaver Meadow.	5	do	do	L. V. R. R. and C. R. R. of New Jersey.	Audenried	C. M. Dodson & Co	Audenried.
211	Beaver Meadow	do	5	Banks Twp	Carbon	D., S. and S. R. R. and L. V. R. R.	Beaver Meadow	Cross Creek Coal Co	Drifton.
218	Honeybrook No. 2	do	5	do	do	C. R. R. of New Jersey.	Treskow	L. and W. Coal Co	Wilkesbarre.

Directory of anthracite coal mines in Pennsylvania—Continued.

EASTERN MIDDLE COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
219	Honeybrook No. 4.	Beaver Meadow.	6	Klein Twp	Schuylkill	C. R. R. of New Jersey	Audenried	L. and W. Coal Co	Wilkesbarre.
220	Honeybrook No. 5.	do	6	do	do	do	do	do	Do.
221	Silver Brook No. 1.	do	6	do	do	L. V. R. R	Silver Brook	Silver Brook Coal Co	Mauch Chunk.
	Silver Brook No. 2.	do	6	do	do	do	do	do	Do.
212	Coleraine	do	5	Banks Twp	Carbon	do	Beaver Meadow	A. S. Van Wickle & Co	Milnesville.
210	Evans	do	5	do	do	do	do	Evans Mining Co	Beaver Meadow.
216	Spring Brook	do	5	do	do	do	Audenried	Lehigh Valley Coal Co	Wilkesbarre.
213	Spring Mount No. 1.	do	5	Jeanesville	do	do	Jeanesville	do	Do.
214	Spring Mount No. 4.	do	5	do	Luzerne	do	do	do	Do.

WESTERN MIDDLE COAL FIELD.

235	Ellangowan	East Mahanoy	6	Mahanoy Twp	Schuylkill	P. and R. R. R	St. Nicholas	P. and R. Coal and Iron Co.	Pottsville.
230	Elmwood	do	6	do	do	do	Mahanoy City	do	Do.
236	Knickerbocker	do	6	do	do	do	Yatesville	do	Do.
229	Mahanoy City	do	6	Mahanoy City	do	do	Mahanoy City	do	Do.
228	North Mahanoy	do	6	Mahanoy Twp	do	do	do	do	Do.
227	Schuylkill	do	6	do	do	do	do	do	Do.
233	Suffolk	do	6	do	do	do	St. Nicholas	do	Do.
232	St. Nicholas	do	6	do	do	do	do	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
231	Tunnel Ridge	East Mahanoy	6	Mahanoy Twp	Schuylkill	P. and R. R. R	Mahanoy City	P. and R. Coal and Iron Co	Pottsville.
330	Middle Lehigh	do	7	do	do	L. V. R. R	New Boston	Mill Creek Coal Co	New Boston.
223	Buck Mountain	do	6	do	do	do	Buck Mountain	do	Do.
331	Morea	do	8	do	do	P. R. R. and L. V. R. R.	Morea	Dodson Coal Co	Morea Colliery.
222	Park No. 2	do	6	do	do	L. V. R. R	Park Place	Lentz, Lilly & Co	Park Place.
226	Springdale	do	6	do	do	do	do	do	Do.
224	Primrose	do	6	do	do	do	Mahanoy City	Lehigh Valley Coal Co	Wilkesbarre.
234	Maple Hill	do	6	do	do	P. and R. R. R	St. Nicholas	P. and R. Coal and Iron Co.	Pottsville.
284	Alaska	West Mahanoy	7	Mount Carmel Twp.	Northum'l'd	do	Alaska	do	Do.
283	Locust Gap	do	7	do	do	do	Locust Gap	do	Do.
282	Locust Spring	do	7	do	do	do	do	do	Do.
279	Merriam	do	7	do	do	do	Locust Summit	do	Do.
280	Monitor	do	7	do	do	do	Locust Gap	do	Do.
281	Reliance	do	7	do	do	do	Mount Carmel	do	Do.
276	Mount Carmel	do	7	do	do	P. and R. R. R., N. C. R. R., and L. V. R. R.	do	Thomas M. Righter & Co	Do.
274	Columbus No. 1	do	7	N. Conyngham Twp	Columbia	L. V. R. R	do	Lehigh Valley Coal Co	Wilkesbarre.
271	Centralia	do	7	do	do	do	Centralia	do	Do.
272	Logan	do	7	do	do	do	do	do	Do.
273	Morris Ridge	do	7	do	do	do	Mount Carmel	Morris Ridge Coal Co	Shamokin.
268	North Ashland	do	7	do	do	P. and R. R. R	Continental	P. and R. Coal and Iron Co.	Pottsville.
278	Potts	do	7	do	do	do	Locust Dale	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
267	Bast	West Mahanoy	7	Butler Twp	Schuylkill	P. and R. R. R	Ashland	P. and R. Coal and Iron Co.	Pottsville.
247	Bear Ridge	do	6	West Mahanoy Twp.	do	do	Mahanoy Plane	do	Do.
238	Boston Run	do	6	Mahanoy Twp	do	do	St. Nicholas	do	Do.
237	Bear Run	do	6	do	do	do	do	do	Do.
241	Gilberton	do	6	West Mahanoy Twp.	do	do	Gilberton	do	Do.
260	Girard Mammoth	do	6	do	do	do	Raven Run	do	Do.
263	Girard	do	6	Butler Twp	do	do	Girardville	do	Do.
262	Hammond	do	6	do	do	do	Conner	do	Do.
248	Indian Ridge	do	6	West Mahanoy Twp.	do	do	Shenandoah	do	Do.
252	Kohinoor	do	6	do	do	do	do	do	Do.
277	Keystone	do	7	Butler Twp	do	do	Locust Dale	do	Do.
249	Shenandoah City	do	6	West Mahanoy Twp.	do	do	Shenandoah	do	Do.
266	Tunnel	do	7	Butler Twp	do	do	Ashland	do	Do.
250	Turkey Run	do	6	West Mahanoy Twp.	do	do	Shenandoah	do	Do.
251	West Shenandoah	do	6	do	do	do	do	do	Do.
265	Preston No. 3	do	7	Butler Twp	do	do	Girardville	do	Do.
269	Big Mine Run	do	7	do	do	do	Ashland	Lehigh Valley Coal Co	Ashland.
253	Cambridge	do	6	West Mahanoy Twp.	do	do	Shenandoah	Cambridge Coal Co	Shenandoah.
242	Draper	do	6	do	do	do	Gilberton	P. and R. Coal and Iron Co.	Pottsville.
239	Furnace	do	6	do	do	do	do	Furnace Coal Co	Gilberton.
254	Kehley Run	do	6	do	do	do	Shenandoah	Thomas Coal Co	Philadelphia.
245	Lawrence	do	6	do	do	do	Mahanoy Plane	Lawrence Coal Co	Pottsville.
255	William Penn	do	6	do	do	P. R. R.	Shaft	William Penn Coal Co	Shaft.

Directory of anthracite coal mines in Pennsylvania—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
258	Packer No. 2	West Mahanoy	6	West Mahanoy Twp.	Schuylkill	L. V. R. R.	Lost Creek	Lehigh Valley Coal Co.	Wilkesbarre.
256	Packer No. 3	do	6	do	do	do	Shenandoah	do	Do.
257	Packer No. 4	do	6	do	do	do	do	do	Do.
259	Packer No. 5	do	6	Butler Twp.	do	do	Girardville	do	Do.
305	Bear Valley	Shamokin	7	Coal Twp.	Northum'd	P. and R. R. R	Shamokin	P. and R. Coal and Iron Co.	Pottsville.
293	Buck Ridge	do	7	do	do	do	Greenback	do	Do.
304	Burnside	do	7	do	do	do	Shamokin	do	Do.
299	Henry Clay	do	7	do	do	do	do	do	Do.
306	North Franklin	do	7	Zerbe Twp	do	do	Treverton	do	Do.
297	Cameron	do	7	Coal Twp.	do	N. C. Rwy	Shamokin	Mineral R. R. & Mining Co.	Wilkesbarre.
296	Luke Fidler	do	7	do	do	do	do	do	Do.
290	Hickory Ridge	do	7	do	do	do	Lancaster Switch	Union Coal Co.	Shamokin.
291	Hickory Swamp	do	7	do	do	do	do	do	Do.
286	Pennsylvania	do	7	Mount Carmel Twp.	do	do	Mount Carmel	do	Do.
	Richards	do	7	do	do	do	do	do	Do.
287	Enterprise	do	7	Coal Twp.	do	P. and R. R. R.	Excelsior	Enterprise Coal Co.	Scranton.
288	Excelsior	do	7	do	do	do	do	Excelsior Coal Co.	Excelsior.
289	Corbin	do	7	do	do	do	do	do	Do.
292	Colbert	do	7	do	do	N. C. Rwy.	Lancaster Switch	Shipman Coal Co.	Shamokin.
302	Neilson	do	7	do	do	P.& R.R.R.and P.R.R	Shamokin	J. Langdon & Co.	Elmira, N. Y.
	Natalie	do	7	do	do	do	do	Natalie Anthracite Coal Co.	Mount Carmel.
275	Midvalley	do	7	Mount Carmel Twp.	do	L. V. R. R.	Mount Carmel	Midvalley Coal Co.	Wilburton.

Directory of anthracite coal mines in Pennsylvania—**Continued.**

SOUTHERN COAL FIELD.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
307	Colliery No. 1	Panther Creek	5	Packer Twp	Carbon	C. R. R. of New Jersey	Nesquehoning	Lehigh C. and N. Co	Lansford.
308	Colliery No. 4	do	5	do	do	do	Lansford	do	Do.
309	Colliery No. 5	do	5	do	do	do	do	do	Do.
	Colliery No. 6	do	5	do	do	do	do	do	Do.
311	Colliery No. 8	do	8	Rahn Twp	Schuylkill	do	Coaldale	do	Do.
310	Colliery No. 9	do	5	Packer Twp	Carbon	do	do	do	Do.
313	Colliery No. 10	do	8	Rahn Twp	Schuylkill	do	Tamaqua	do	Do.
314	Colliery No. 11	do	8	do	do	do	do	do	Do.
312	Colliery No. 12	do	8	do	do	do	Coaldale	do	Do.
315	Colliery No. 13	do	8	do	do	do	Tamaqua	do	Do.
337	Beechwood	E. Schuylkill	8	Newcastle Twp	do	P. and R. R. R.	Pottsville	P. and R. Coal and Iron Co.	Pottsville.
327	Eagle	do	8	East Norwegian Twp	do	do	St. Clair	do	Do.
324	Eagle Hill	do	8	Blythe Twp	do	do	Cumbola	do	Do.
316	East Lehigh	do	8	Tamaqua	do	do	Tamaqua	Mitchell & Shepp	Tamaqua.
336	Flowery Field	do	8	Newcastle Twp	do	do	St. Clair	Geo. U. Sturdevant	St. Clair.
321	Kaska William	do	8	Blythe Twp	do	do	Middleport	T. M. Dodson Coal Co	S. Bethlehem.
	Palmer Vein	do	8	do	do	do	do	P. F. Kelly	Lansford.
325	Pine Forest	do	8	East Norwegian Twp	do	do	Mill Creek	P. and R. Coal and Iron Co.	Pottsville.
322	Silver Creek	do	8	Blythe Twp	do	do	Patterson	do	Do.
326	Mount Hope	do	8	East Norwegian Twp	do	do	St. Clair	G. B. Linderman & Co	S. Bethlehem.
338	York Farm	do	8	do	do	do	do	Lehigh Valley Coal Co	Wilkesbarre.
344	Glendower	W. Schuylkill	8	Foster Twp	do	do	Glen Carbon	P. and R. Coal and Iron Co.	Pottsville.
350	Otto	do	8	Reilly Twp	do	do	Branch Dale	do	Do.

Directory of anthracite coal mines in Pennsylvania—Continued.

SOUTHERN COAL FIELD—Continued.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
342	Thomaston	W. Schuylkill.	8	Cass Twp	Schuylkill	P. and R. R. R	Heckscherville	P. and R. Coal and Iron Co.	Pottsville.
349	Phœnix Park	do	8	do	do	do	Llewellyn	do	Do.
343	Richardson	do	8	Foster Twp	do	do	Glen Carbon	do	Do.
339	Ellsworth	do	8	Newcastle Twp	do	do	Broad Mountain	Davis Bros	Broad Mountain.
	Albright	do	8	Cass Twp	do	do	Llewellyn	Albright Coal Co	Pottsville.
	Stoddart	do	8	do	do	do	Gilberton	Stoddart Coal Co	Gilberton.
345	Oak Hill	do	8	do	do	do	Minersville	Leisenring & Co	Minersville.
352	Blackwood	do	8	do	do	L. V. R. R	Blackwood	Lehigh Valley Coal Co	Wilkesbarre.
354	East Franklin	do	8	Tremont Twp	do	P. and R. R. R	Tremont	P. and R. Coal and Iron Co.	Pottsville.
353	Middle Creek	Lykens Valley	8	Frailey Twp	do	do	Swatara Switch	do	Do.
359	West Brookside	do	8	Porter Twp	do	do	Brookside	do	Do.
355	Lincoln	do	8	Tremont Twp	do	do	Lorberry Junc	do	Do.
	North Brookside	do	8	Porter Twp	do	do	Good Spring	do	Do.
358	Good Spring	do	8	do	do	do	do	do	Do.
360	Williamstown	do	7	Wiconisco Twp	Dauphin	N. C. Rwy	Williamstown	Summit Branch Railroad Co	Wilkesbarre.
361	Short Mountain	do	7	do	do	do	Lykens	Lykens Valley Coal Co	Do.

General offices of corporations named in foregoing directory.

Pennsylvania Coal Company, No. 1 Broadway, New York.
Lehigh and Wilkesbarre Coal Company, No. 143 Liberty street, New York.
Delaware, Lackawanna and Western Railroad Company, No. 26 Exchange place, New York.
Delaware and Hudson Canal Company, No. 21 Cortlandt street, New York.
Coxe Bros. & Co., No. 143 Liberty street, New York.
Philadelphia and Reading Coal and Iron Company, Reading Terminal, Philadelphia.
Lehigh Valley Coal Company, No. 228 South Third street, Philadelphia.
Lehigh Coal and Navigation Company, No. 226 South Third street, Philadelphia.
Hillside Coal and Iron Company, No. 21 Cortlandt street, New York.
New York, Susquehanna and Western Railroad Company, No. 26 Cortlandt street, New York.
Susquehanna Coal Company, Broad Street Station, Philadelphia.
Lykens Valley Coal Company, Broad Street Station, Philadelphia.
Mineral Railroad and Mining Company, Broad Street Station, Philadelphia.
Summit Branch Railroad Company, Broad Street Station, Philadelphia.
Union Coal Company, Erie, Pa.
New York, Ontario and Western Railroad Company, 56 Beaver street, New York.
Delaware, Susquehanna and Schuylkill Railroad Company, 143 Liberty street, New York.

In the 1895 report comment was made on the very unsatisfactory condition of the anthracite industry, and brief references were made to the losses sustained by some of the companies on the business for that year. It was plainly apparent at the close of 1895 that unless some change occurred for the better most if not all the anthracite companies would be greatly embarrassed within a short time. It is satisfactory to note that during 1896 the anthracite business was conducted much more conservatively, and that the apparent disposition to squander valuable resources was succeeded by an attempt to obtain a fair return for the product. Generally speaking, the prices obtained for coal more nearly approached a fair return for the labor expended and the capital invested, and it is earnestly hoped and believed by those interested in the industry that the return of good times will result in placing this very important business on a sound basis, with consequent good to the labor and capital directly interested, and indirectly to the whole community.

It may be opportune to mention at this time the difficulty presented by the labor question in the anthracite regions, viz, the overplus of miners and laborers. Thus, in the tables in the beginning of this report it will be noted that although the product fell off over 3,000,000 tons in 1896 as compared with 1895, the total number of employees increased 6,000. It will be seen at once that these men must have worked shorter time. This was the fact, and although wages, measured by day's work, were higher in 1896, it is questionable whether the miners individually were benefited to any great extent. It is evident, of course, that there are too many men for the amount of work to be done, but a remedy for the difficulty does not easily present itself. While there is any likelihood of work the miners will not leave the vicinity of the

mines, and the companies try so to apportion the work as to give all a chance, with the result that there is not enough work for any.

With a very much larger output this trouble would no doubt adjust itself; but that condition is not in sight in the near future. In the meantime it is a question whether it would not be better for the companies to give their old employees measurably steady employment and drop from the rolls all such as could not be thus provided for, allowing them to seek work elsewhere.

Necrological.—It has been the custom in these reports to record the deaths of notable persons connected with the anthracite coal trade. During 1896 two prominent characters passed away. Thomas Hodgson, general sales agent of the Pennsylvania Coal Company, died in the city of New York on Saturday, November 28. Mr. Hodgson was born in Roxbury, Somerset County, Pennsylvania, March 3, 1840, so that he was only in the fifty-seventh year of his age when he died. He had been in the employ of the Pennsylvania Coal Company from the time he was 18 years of age, advancing from a clerkship in one of its retail yards at that time to the charge of eight retail yards of the company. In 1875 he was made western sales agent at Buffalo, and in 1895 was appointed general sales agent at New York. He was a man of bright spirits and sterling integrity, and was genuinely popular among all with whom he came in contact.

Charles Parrish, of Wilkesbarre, one of the best known coal operators in the Wyoming Valley, died suddenly of apoplexy at the Hotel Stenton, Philadelphia. Mr. Parrish was president of the Parrish Coal Company, of Plymouth, a director of the Lehigh and Wilkesbarre Coal Company, a director of the Central Railroad of New Jersey, and president of the Hazard Wire Rope Works. He was also senior member of the firm of Parrish, Phillips & Co., wholesale coal merchants, of New York and Philadelphia. Mr. Parrish won the gratitude of all persons interested in the anthracite trade by the active assistance given Franklin B. Gowen in ridding the coal regions of the band of Molly Maguires twenty years ago.

On January 30, 1897, George B. Roberts, president of the Pennsylvania Railroad Company, died at his residence near Philadelphia. Mr. Roberts was born in Montgomery County, Pennsylvania, January 15, 1833, so that he was 64 years old at the time of his death. He began his career in the employ of the Pennsylvania Company as a rodman in the construction department. He was then 18 years of age, having received a civil engineering education at the Rensselaer Polytechnic Institute, at Troy, N. Y. He steadily rose in his profession until, in 1862, he was appointed assistant to the president, J. Edgar Thomson, and seven years later was elected fourth vice-president. Subsequently he became first vice-president, and in May, 1890, succeeded to the presidency, made vacant by the death of Col. Thomas A. Scott. One of the results of Mr. Roberts's tenure of office was the thorough discipline instilled throughout the service. The uniform courtesy shown by Pennsylvania

Railroad employees to the patrons of the road is largely due to Mr. Roberts's influence and instructions. Under his administration the Pennsylvania Railroad grew to be the largest single railroad system in existence.

PENNSYLVANIA BITUMINOUS COAL.

Total product in 1896, 49,557,453 short tons; spot value, $35,368,249.

Compared with 1895, the bituminous coal product of Pennsylvania in 1895 shows a decrease of 659,775 short tons in amount, and of $612,108 in value. There was a decline from 72 to 71 cents in the average value per ton. This is only a slight decline when the sharp falling off in some of the other large coal-producing States is concerned. The comparatively small decline in value may be attributed to the fact that during 1895 the H. C. Frick Coke Company, by the purchase of the property of the McClure Coke Company, the Frick Company's greatest competitor, and one or two smaller concerns, became almost dictator in regard to Connellsville coke. As a result of these acquisitions by the Frick Company, the price of Connellsville furnace coke advanced from $1 @ $1.60 in 1895 to $1.75 @ $2 in 1896, with proportionate advances in foundry and crushed coke. Other coke regions were naturally benefited to some extent, and with the advance in coke a higher value was placed upon the coal used in its manufacture. In the more important coal-producing counties where coke making (unless using Connellsville coal) is not an important industry, there were pronounced losses in value. None of Washington County's coal was reported as made into coke; the price fell from 66 to 59 cents. The product of the county exceeded 4,000,000 tons. Less than 10,000 tons of Allegheny's 7,856,867 tons was made into coke; the value per ton declined from 74 to 70 cents. Clearfield County coal (product in 1896, 4,812,017 short tons, of which less than 4 per cent was coked) declined from 67 to 66 cents. Jefferson County shipped 3,783,065 short tons and coked 688,615 tons; the value per ton declined from 65 to 60 cents. Fayette County was chief among the coke makers, the value of the coal per ton being the same in 1896 as in 1895. Westmoreland County, the second in coke production and first in coal output, shows a gain from 77 to 80 cents in price. Cambria County is the notable exception to the rule, the price advancing from 67 to 81 cents. This is due partly to the fact that much of the coal reported as shipped is afterward coked at a distance from the mines, and partly to the fact that a large portion of the product is used at the iron furnaces of the concerns mining the coal, and the placing of a value on this item is an arbitrary matter.

The records of bituminous production in Pennsylvania for the earlier years of the industry are very incomplete. In fact, from 1840 to 1872 the only record extant is that of the shipments over some of the railroads, from a few of the districts, and these bear very little relation to the total product (see Mineral Resources, 1883–84, p. 84). For instance,

the statement for 1873 shows the total shipments to have been about 4,600,000 long tons, whereas the total production for that year, the first for which any statistics were obtained, was 11,695,383 long tons. From 1873 to 1882 the product has been estimated in round numbers, the output in the latter year being about double that of 1873, approximately 22,000,000 long tons or 24,640,000 short tons. During the next decade the output increased each year, nearly doubling in 1892 the yield in 1882. In 1893 the output fell off 2,623,852 short tons, or between 5 and 6 per cent as compared with 1892. The first half of 1893 was favorable in the bituminous regions of Pennsylvania and operations were active; but later, when the unfavorable conditions of trade manifested themselves, production fell off and prices declined so severely that all of the benefits of the earlier months were overcome and the average price for the year was 4 cents lower than in 1892. The unfavorable conditions were still more pronounced in 1894, and this, added to the disastrous effects of the long strike in the spring and summer of the year, caused a diminution of over 4,000,000 tons, or about 10 per cent in the tonnage, while the value declined about 16 per cent. The average price per ton fell off from 80 cents in 1893 to 74 cents in 1894. Stimulated by the reaction in the iron industry during 1895, the production of bituminous coal in Pennsylvania received a remarkable impetus, and the largest output in the history of the State was obtained. The activity in the iron business, however, was due principally to the exceedingly low prices at which it was being offered and not to any healthy recovery from the depressed condition of the previous two or three years. During the temporary improvement, or boom, in the iron industry of 1895 the prices of that commodity advanced somewhat, but this improvement in prices was not long lived, nor did its influence extend materially to its sister industry—coal mining—for, while the product increased something more than 25 per cent over the product of 1894, the value increased but 21 per cent and the average price declined from 74 cents in 1894 to 72 cents in 1895. As heretofore explained, while some counties, chiefly the coke producers, show an increase in the average value per ton, the general average declined to 71 cents in 1896.

PRODUCTION BY COUNTIES.

Seven counties in Pennsylvania produced coal in excess of 4,000,000 short tons in 1896. They were, in order, Westmoreland, 8,559,076 tons; Fayette, 8,076,200 tons; Allegheny, 7,856,867 tons; Clearfield, 4,812,017 tons; Cambria, 4,649,819 tons; Jefferson, 4,508,077 tons; Washington, 4,039,976 tons. No other county had a product exceeding 1,000,000 tons, though two, Tioga and Elk, yielded over 800,000 tons each, and one, Somerset, approximated within 13,000 tons of the latter figure. Of the seven most important counties, Fayette and Westmoreland comprise what is known as the Connellsville coking-coal region. The decrease in the production of Connellsville coke, previously discussed,[1]

[1] See also chapter on coke for 1896.

is reflected in a decrease of 1,589,169 short tons in the output of Fayette County as compared with 1895, and a decrease of 1,047,078 short tons in the output of Westmoreland County. In the subsequent tables it is shown that the amount of coal made into coke in Fayette County in 1896 was about 2,400,000 tons less than in 1895, while in Westmoreland County the decrease was about 1,000,000 tons. These were made up, in part, by an increase of about 850,000 tons in the shipments reported from Fayette County and of nearly 300,000 tons in Westmoreland County. Allegheny County shows an increase in product of 1,240,893 short tons, Clearfield County lost 403,510 tons, Cambria gained 360,562 tons, Jefferson, 259,748 tons, and Washington, 462,716 tons.

In the following tables are shown the details of production by counties in 1895 and 1896, the total output of the State since 1873, and the production by counties each year since 1886, with the increase or decrease in each county during 1896 as compared with 1895:

Bituminous coal product of Pennsylvania in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Allegheny	83	6,436,646	133,878	45,450	.....	6,615,974	$4,885,184	$0.74	176	13,094
Armstrong	13	630,709	5,148	6,952	.....	642,809	450,669	.70	233	1,128
Beaver	7	175,523	8,061	512	.....	184,096	142,494	.77	227	325
Bedford	10	296,346	69,305	2,337	50,000	417,988	264,417	.63	200	658
Blair	5	317,002	8,050	5,505	43,600	374,157	264,147	.71	248	650
Butler	12	217,720	13,484	1,900	.....	233,104	160,696	.69	166	511
Cambria	70	3,510,150	538,564	26,832	213,711	4,289,257	2,854,352	.67	222	6,270
Center	14	256,522	16,901	224	.....	273,647	173,625	.63	161	579
Clarion	13	379,434	9,527	889	.....	389,850	254,014	.65	230	665
Clearfield	95	5,001,788	25,488	33,212	155,039	5,215,527	3,474,065	.67	190	8,604
Elk	4	635,841	3,201	3,101	.....	642,143	733,473	1.14	247	1,024
Fayette	50	1,580,644	91,275	158,343	7,827,107	9,665,369	6,439,717	.67	256	7,745
Huntingdon	10	309,609	11,634	6,527	.....	327,770	249,528	.76	230	606
Indiana	12	495,704	6,345	346	10,680	513,075	329,336	.64	181	672
Jefferson	22	3,753,076	14,802	22,279	458,172	4,248,329	2,770,568	.65	201	5,637
Lawrence	7	267,748	1,518	513	.....	269,779	211,241	.78	233	568
Lycoming	2	81,000	2,200	850	.....	84,050	100,900	1.20	277	165
Mercer	12	513,280	9,382	12,380	.....	535,042	396,027	.74	190	1,173
Somerset	24	504,611	10,105	2,145	7,894	524,755	310,542	.59	248	682
Tioga	9	776,601	16,843	6,671	976	801,091	927,479	1.16	173	2,128
Washington	44	3,537,496	14,798	20,877	4,089	3,577,260	2,373,490	.66	175	6,432
Westmoreland	67	5,293,154	122,441	110,236	4,080,323	9,606,154	7,440,685	.77	203	11,455
Bradford, Clinton, McKean	3	184,849	853	300	.....	186,002	173,708	.77	206	359
Small mines	.....	.....	600,000	.....	.....	600,000	600,000	.....	.....	.....
Total	588	35,164,453	1,732,803	468,381	12,851,591	50,217,228	35,980,357	.72	206	71,130

Bituminous coal product of Pennsylvania in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Allegheny	82	7,521,145	255,068	71,129	9,525	7,856,867	$5,504,199	$0.70	188	13,733
Armstrong	13	596,288	12,925	5,719	.....	614,932	446,643	.73	185	1,116
Beaver	7	118,067	9,183	40	.....	127,290	109,516	.86	157	288
Bedford	12	152,804	24,209	1,772	58,629	237,414	171,218	.72	135	709
Blair	4	319,274	14,746	3,867	23,100	360,987	252,867	.70	257	644
Butler	11	214,931	13,911	1,494	.....	230,336	163,328	.71	200	477
Cambria	68	4,171,254	193,609	38,450	246,506	4,649,819	3,747,177	.81	213	7,345
Center	10	251,028	404	233	.....	251,665	178,871	.71	201	476
Clarion	16	357,558	12,847	1,344	.....	371,749	235,380	.63	202	718
Clearfield	91	4,581,983	26,495	25,924	177,615	4,812,017	3,207,510	.66	190	8,681
Elk	6	800,704	3,909	3,273	.....	807,886	607,509	.75	229	1,441
Fayette	55	2,439,550	68,459	133,475	5,434,716	8,076,200	5,394,481	.67	221	8,481
Huntingdon	12	323,903	9,698	5,996	.....	339,597	236,134	.69	197	678
Indiana	13	382,300	1,570	680	34,092	418,642	285,906	.68	173	836
Jefferson	15	3,783,065	19,508	16,889	688,615	4,508,077	2,683,519	.60	230	4,859
Lawrence	5	173,072	25,256	338	.....	198,666	167,298	.84	208	409
Lycoming	2	78,730	4,000	500	.....	83,230	101,680	1.22	236	168
Mercer	11	547,729	17,444	13,896	.....	579,069	421,496	.73	217	1,158
Somerset	19	766,676	4,876	1,868	13,630	787,050	486,362	.62	222	908
Tioga	8	806,352	12,756	5,547	1,032	825,687	950,099	1.15	203	1,910
Washington	43	3,826,217	188,010	25,749	.....	4,039,976	2,383,177	.59	185	6,506
Westmoreland	63	5,272,408	41,874	145,741	3,099,053	8,559,076	6,810,995	.80	224	10,719
Bradford, Clinton, McKean	3	211,517	9,404	300	.....	221,221	222,784	1.01	239	365
Small mines	.....	.....	600,000	.....	.....	600,000	600,000	.....	.....	.....
Total	569	37,696,555	1,570,161	504,224	9,786,513	49,557,453	35,368,249	.71	206	72,625

The following table shows the total product since 1873:

Product of bituminous coal in Pennsylvania since 1873.

Year.	Short tons.	Year.	Short tons.
1873	13,098,829	1885	26,000,000
1874	12,320,000	1886	27,094,501
1875	11,760,000	1887	31,516,856
1876	12,880,000	1888	33,796,727
1877	14,000,000	1889	36,174,089
1878	15,120,000	1890	42,302,173
1879	16,240,000	1891	42,788,490
1880	21,280,000	1892	46,694,576
1881	22,400,000	1893	44,070,724
1882	24,640,000	1894	39,912,463
1883	26,880,000	1895	50,217,228
1884	28,000,000	1896	49,557,453

The production by counties was not reliably ascertained prior to 1886. The results obtained by the bureau of industrial statistics of the State for 1882, 1884, and 1885 were published in the earlier volumes of Mineral Resources, but owing to the failure of a number of mines to report their production the statistics were very incomplete, the total for 1885, for instance, being more than 5,000,000 tons short of the actual product. Since 1886 the product by counties has been as follows:

Bituminous coal product of Pennsylvania since 1886, by counties.

[Short tons.]

County.	1886.	1887.	1888.	1889.
Allegheny	4,202,086	4,680,924	5,575,505	4,717,431
Armstrong	210,856	235,221	226,093	289,218
Beaver	208,820	197,863	63,900	93,461
Bedford	173,372	311,452	248,159	257,455
Blair	305,695	287,367	314,013	215,410
Bradford	206,998	167,416	163,851	129,141
Butler	162,306	161,764	194,715	288,591
Cambria	1,222,028	1,421,980	1,540,460	1,751,664
Cameron	3,200	3,000	700	2,300
Center	313,383	508,255	382,770	395,127
Clarion	429,544	593,758	535,192	596,589
Clearfield	3,753,986	5,180,311	5,398,981	5,224,506
Clinton	.....	.....	32,000	106,000
Elk	526,036	609,757	555,960	614,113
Fayette	4,494,613	4,540,322	5,208,993	5,897,254
Greene	5,600	3,002	5,323	53,714
Huntingdon	313,581	265,479	281,823	280,133
Indiana	103,615	207,597	157,285	153,698
Jefferson	1,023,186	1,693,492	2,275,349	2,896,487
Lawrence	101,154	125,361	106,921	143,410
McKean	617	9,214	10,443	11,500
Mercer	537,712	539,721	487,122	575,751
Somerset	349,926	416,240	370,228	442,027
Tioga	1,384,800	1,328,963	1,106,146	1,036,175
Venango	2,500	2,296	2,000	6,911
Washington	1,612,407	1,751,615	1,793,022	2,364,901
Westmoreland	5,446,480	6,074,486	6,519,773	7,631,124
Small mines	.....	200,000	240,000	(*a*)
Total	27,094,501	31,516,856	33,796,727	36,174,089
Net increase	.....	4,422,355	2,279,871	2,377,362

a Included in county distribution.

Bituminous coal product of Pennsylvania since 1886, by counties—Continued.

[Short tons.]

County.	1890.	1891.	1892.	1893.
Allegheny	4,894,372	5,640,669	6,399,199	6,663,095
Armstrong	380,554	484,000	583,519	561,039
Beaver	139,117	129,961	140,835	150,095
Bedford	445,192	389,257	552,461	501,507
Blair	298,196	237,626	259,224	177,902
Bradford	126,687	68,697	57,708	42,739
Butler	167,578	211,647	145,729	156,016
Cambria	2,790,954	2,932,973	3,086,554	3,282,467
Center	452,114	526,753	496,521	458,056
Clarion	512,387	479,887	569,333	551,158
Clearfield	6,651,587	7,143,382	6,876,785	6,148,758
Clinton	159,000	130,802	98,242	94,582
Elk	1,121,534	973,600	731,575	634,165
Fayette	6,413,081	5,782,573	7,260,044	6,261,146
Huntingdon	322,630	269,021	333,855	303,547
Indiana	357,580	456,077	514,463	380,666
Jefferson	2,850,799	3,160,614	3,706,329	3,885,196
Lawrence	140,528	164,669	216,561	196,736
Lycoming	.....	.....	20,515	53,192
McKean	(*a*)	15,345	21,282	19,169
Mercer	524,319	526,220	420,145	499,651
Somerset	522,796	480,194	509,610	532,688
Tioga	903,997	1,010,872	999,784	962,248
Washington	2,836,667	2,606,158	2,903,235	3,315,146
Westmoreland	8,290,504	7,967,493	8,791,068	7,439,760
Small mines	1,000,000	1,000,000	1,000,000	800,000
Total	42,302,173	42,788,490	46,694,576	44,070,724
Net increase	6,128,084	486,317	3,906,086	*b* 2,623,852

a Included in product of small mines.
b Net decrease.

Bituminous coal product of Pennsylvania since 1886, by counties—Continued.

[Short tons.]

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Allegheny	6,354,559	6,615,974	7,856,867	1,240,893	.....
Armstrong	580,030	642,809	614,932	.....	27,877
Beaver	103,765	184,096	127,290	.....	56,806
Bedford	313,095	417,988	237,414	.....	180,574
Blair	256,157	374,157	360,987	.....	13,170
Bradford	28,027	52,711	53,519	808	.....
Butler	137,593	233,104	230,336	.....	2,768
Cambria	2,978,927	4,289,257	4,649,819	360,562	.....
Center	307,806	273,647	251,665	.....	21,982
Clarion	401,004	389,850	371,749	.....	18,101
Clearfield	4,148,464	5,215,527	4,812,017	.....	403,510
Clinton	100,000	95,291	134,569	39,278	.....
Elk	399,023	642,143	807,886	165,743	.....
Fayette	6,440,989	9,665,369	8,076,200	.....	1,589,169
Forest	123	.....	.....	.....	.....
Huntingdon	200,032	327,770	339,597	11,827	.....
Indiana	398,548	513,075	418,642	.....	94,433
Jefferson	3,248,154	4,248,329	4,508,077	259,748	.....
Lawrence	132,422	269,779	198,666	.....	71,113
Lycoming	80,160	84,050	83,230	.....	820
McKean	19,844	38,000	33,133	.....	4,867
Mercer	331,594	535,042	579,069	44,027	.....
Somerset	418,195	524,755	787,050	262,295	.....
Tioga	704,560	801,091	825,687	24,596	.....
Washington	3,461,428	3,577,260	4,039,976	462,716	.....
Westmoreland	7,767,964	9,606,154	8,559,076	.....	1,047,078
Small mines	600,000	600,000	600,000	.....	.....
Total	39,912,463	50,217,228	49,557,453	2,872,493	3,532,268
Net increase	*a*4,158,261	10,304,765	*a*659,775	.....	*a*659,775

a Net decrease.

In the following tables will be found a statement of the average prices which obtained in the different counties since 1889, and the statistics of labor and working time since 1890:

Average prices for Pennsylvania coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Allegheny	$0.85	$0.93	$1.03	$0.91	$0.82	$0.88	$0.74	$0.70
Armstrong	.73	.72	.76	.76	.76	.72	.70	.73
Beaver	1.18	1.05	1.00	1.01	.98	.91	.77	.86
Bedford	.80	.80	.86	.82	.74	.69	.63	.72
Blair	.98	.81	.87	.85	.77	.75	.71	.70
Bradford	1.33	1.28	1.34	1.42	1.30	1.53	1.25	1.30
Butler	.97	.87	.89	.93	.81	.76	.69	.71
Cambria	.77	.83	.80	.82	.79	.73	.67	.81
Center	.79	.79	.75	.79	.75	.68	.63	.71
Clarion	.72	.75	.75	.75	.72	.70	.65	.63
Clearfield	.84	.85	.84	.81	.80	.72	.67	.66
Clinton	.....	.78	1.15	1.01	.76	.81½	.75	.88
Elk	.81	.84	.83	.83	.79	.86	1.14	.75
Fayette	.63	.77	.82	.77	.73	.69	.67	.67
Huntingdon	.75	.77	.78	.75	.75	.74	.76	.69
Indiana	.71	.82	.76	.77	.77	.70	.64	.68
Jefferson	.73	.85	.88	.81	.74	.71	.65	.60
Lawrence	1.05	1.02	1.02	1.02	1.03	.92	.78	.84
Lycoming	.....	.....	.....	1.12	1.22	1.23	1.20	1.22
McKean	.....	.....	1.05	1.10	1.10	.95	.95	1.05
Mercer	.89	.85	.90	.88	.89	.82	.74	.73
Somerset	.70	.65	.71	.66	.63	.63	.59	.62
Tioga	1.22	1.10	1.14	1.44	1.21	1.36	1.16	1.15
Washington	.66	.93	.87	.87	.78	.62	.66	.59
Westmoreland	.74	.80	.87	.81	.82	.77	.77	.80
The State	.77	.84	.87	.84	.80	.74	.72	.71

Statistics of labor employed and working time at Pennsylvania coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Allegheny	9,036	198	11,194	199	11,223	225
Armstrong	661	251	805	230	964	246
Beaver	205	251	228	201½	323	210
Bedford	662	288	605	230	975	265
Blair	595	284	503	249	848	203
Bradford	292	196	169	228	122	206
Butler	314	237	342	240	358	169
Cambria	4,140	361	4,284	258	4,913	228
Center	623	230	823	200	767	181
Clarion	938	237	895	221	985	235
Clearfield	9,324	336	10,067	227	10,225	212
Clinton	200	265	181	291	175	175
Elk	1,181	255	1,622	229	1,265	230
Fayette	6,503	247	7,545	216½	7,952	239
Huntingdon	611	237	595	246	560	244
Indiana	668	245	561	227	656	191
Jefferson	3,971	245	4,172	237	4,567	232
Lawrence	307	232	327	236	368	250
Lycoming	.....	.....	.....	.....	60	252
McKean	.....	.....	42	230	28	304
Mercer	1,023	231	972	241	876	181
Somerset	646	225	531	266	577	238
Tioga	2,019	192	1,980	241	2,249	223
Washington	4,644	227	4,135	222	4,895	202
Westmoreland	12,080	228	11,083	221	10,724	234
The State	61,333	232	63,661	223	66,655	223

Statistics of labor employed and working time at Pennsylvania coal mines—Continued.

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Allegheny	14,328	161	14,107	154	13,094	176	13,733	188
Armstrong	1,080	214	1,153	168	1,128	233	1,116	185
Beaver	318	215	312	148	325	227	288	157
Bedford	806	185	855	144	658	200	709	135
Blair	632	166	730	142	650	248	644	257
Bradford	83	167	90	134	109	299	115	259
Butler	276	208	497	111	511	166	477	200
Cambria	6,073	199	6,230	165	6,270	222	7,345	213
Center	743	193	855	111	579	161	476	201
Clarion	1,224	231	926	201	665	230	718	202
Clearfield	10,455	186	9,654	134	8,604	190	8,681	190
Clinton	175	163	190	153	175	140	180	222
Elk	1,244	195	1,107	147	1,024	247	1,441	229
Fayette	6,780	195	8,847	198	7,745	256	8,481	221
Huntingdon	487	182	478	133	606	230	678	197
Indiana	605	186	724	164	672	181	836	173
Jefferson	5,537	210	5,184	164	5,637	201	4,859	230
Lawrence	430	218	490	165	568	233	409	208
Lycoming	117	279	166	231	165	277	168	236
McKean	19	285	50	200	75	225	70	250
Mercer	981	187	1,014	121	1,173	190	1,158	217
Somerset	695	214	731	150	682	248	908	222
Tioga	2,425	214	2,213	149	2,128	173	1,910	203
Washington	6,058	184	6,889	159	6,432	175	6,506	185
Westmoreland	10,270	205	11,517	202	11,455	203	10,719	224
The State	71,931	190	75,010	165	71,130	206	72,625	206

TENNESSEE.

Total product in 1896, 2,663,106 short tons; spot value, $2,281,295.

The coal production of Tennessee in 1896 exhibits an increase of 127,462 short tons over the output of 1895, notwithstanding unfavorable trade conditions and continued decline in prices. The value of the product in 1896 was less than that of 1895 by $67,737, the average value per ton declining from 93 to 86 cents.

Operators claim that for three or four years coal mining in Tennessee has been carried on at a loss, especially in the Coal Creek and Jellico

regions. It is certainly true that prices have declined sharply since 1892. The average for the State in that year, as shown in a subsequent table, was $1.13. In 1893 it dropped to $1.08, to 97 cents in 1894, to 93 cents in 1895, and to 86 cents in 1896. Attempts have been made to maintain prices by cooperation on the part of operators, but they have not been successful, mainly because of a disinclination on the part of some large interests to give up independent action. Convict-mined coal also continues a thorn in the flesh of those interested. Operators claim that the coal produced at the State mines where convict labor is employed is sold in competitive markets at prices lower than it costs to mine coal by free labor. Prior to the purchase by the State of the coal lands in Morgan County, when convicts were leased to coal mining companies under contract, complaint was made by the miners of the inability to meet the convict competition, and complaint was also made of the degradation forced upon free labor by association with the convicts. Still further cause of complaint was that in dull times, when orders were slack, free labor was made idle, while the convicts were compelled to perform their tasks. There can be little doubt that, so far as the miners are directly concerned and the well-being of the convicts, the present arrangement is better than the old, and it is to be hoped that conditions will so adjust themselves as to remove any just causes for complaint that may now exist.

The following tables exhibit the details of production in Tennessee in 1895 and 1896, by counties:

Coal product of Tennessee in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Anderson	9	422,551	4,508	2,709	1,600	431,368	$391,674	$0.91	248	1,118
Campbell	9	309,168	12,129	1,518	17,580	340,395	350,907	1.03	174	1,128
Claiborne	4	140,952	50	1,200	37,461	179,663	147,871	.82	179	284
Hamilton	3	115,856	1,824	1,704	54,922	174,306	146,055	.84	220	335
Marion	4	253,635	1,691	1,224	112,413	368,963	376,837	1.02	249	581
Morgan	6	60,842	673	.....	.....	61,515	52,869	.86	134	209
Rhea	2	3,936	9,405	3,360	93,116	109,817	76,838	.70	240	165
Scott	3	114,817	7,287	3,155	15,597	140,856	153,967	1.09	193	331
Grundy, Putnam, Roane, and White	4	386,299	9,856	10,607	317,499	724,261	647,514	.89	283	969
Small mines	.....	.....	4,500	.....	.....	4,500	4,500	.....	.....	.....
Total	44	1,808,056	51,923	25,477	650,188	2,535,644	2,349,032	.93	224	5,120

Coal product of Tennessee in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Anderson	6	452,360	339	3,811	.....	456,510	$366,141	$0.80	230	1,015
Campbell	12	360,838	15,414	585	7,500	384,337	374,911	.98	164	1,718
Claiborne	4	153,477	200	1,850	48,399	203,926	161,104	.79	220	368
Hamilton	3	96,689	2,205	1,384	63,532	163,810	139,067	.85	183	517
Marion	3	187,940	2,572	936	103,447	294,895	261,895	.89	223	628
Morgan	6	217,112	836	.....	.....	217,948	134,771	.62	265	509
Rhea	2	4,946	839	4,780	81,050	91,615	59,549	.65	186	270
Scott	4	154,715	12,295	2,288	19,178	188,476	180,480	.96	178	453
Cumberland, Grundy, Putnam	3	218,393	220	15,608	107,447	341,668	324,416	.95	271	496
Roane, White	2	144,068	4,332	9,101	157,920	315,421	274,461	.87	263	557
Small mines	.....	.....	4,500	.....	.....	4,500	4,500	.....	.....	.....
Total	45	1,990,538	43,752	40,343	588,473	2,663,106	2,281,295	.86	211	6,531

Considering the increases and decreases in 1896, by counties, it will be seen that the principal increase was in Morgan County, which increase was due to the larger production at the State mines. The most important decreases were in Grundy and Marion counties, the former losing 115,738 tons, or more than 25 per cent; the latter, 74,068 tons, or about 20 per cent.

In the following table is shown the total production, by counties, since 1889, with the increase and decrease in each county during 1896, as compared with the preceding year.

Coal product of Tennessee since 1889, by counties.

[Short tons.]

County.	1889.	1890.	1891.	1892.	1893.
Anderson	457,069	582,403	587,558	409,970	311,777
Campbell	123,103	126,367	159,937	289,605	262,503
Claiborne	(*a*)	(*a*)	73,738	137,219	181,530
Franklin	(*b*)	1,500	1,400	1,400	1,200
Grundy	400,107	349,467	398,936	358,023	294,013
Hamilton	241,067	277,896	243,298	105,283	155,523
Marion	203,923	213,202	271,809	241,974	211,594
Morgan	68,229	143,518	125,287	34,970	78,190
Rhea	149,194	211,465	213,649	133,424	96,531
Roane	*c* 174,551	70,452	112,308	102,588	39,554
Scott	108,027	136,365	142,943	183,230	157,980
White	(*b*)	52,650	78,315	90,378	107,863
Other counties and small mines	419	4,300	4,500	4,000	4,000
Total	1,925,689	2,169,585	2,413,678	2,092,064	1,902,258
Net increase	.....	243,896	244,093	*d* 321,614	*d* 189,806

County.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Anderson	544,222	431,368	456,510	25,142	.....
Campbell	183,288	340,395	384,337	43,942	.....
Claiborne	167,153	179,663	203,926	24,263	.....
Cumberland	.....	.....	120	120	.....
Franklin	3,000	.....	.....	.....	.....
Grundy	365,989	446,386	330,648	.....	115,738
Hamilton	156,301	174,306	163,810	.....	10,496
Marion	184,597	368,963	294,895	.....	74,068
Morgan	64,601	61,515	217,948	156,433	.....
Putnam	659	8,075	10,900	2,825	.....
Rhea	124,115	109,817	91,615	.....	18,202
Roane	118,887	129,744	169,255	39,511	.....
Scott	149,413	140,856	188,476	47,620	.....
White	114,154	140,056	146,166	6,110	.....
Other counties and small mines	4,500	4,500	4,500	.....	.....
Total	2,180,879	2,535,644	2,663,106	345,966	218,504
Net increase	278,621	354,765	127,462	127,462	.....

a Developing.
b Included in Roane County.
c Includes Franklin and White counties.
d Net decrease.

In connection with the foregoing table the following statements of the average prices ruling in the important producing counties since 1889 and the statistics of labor and working time for the past seven years should be considered:

Average prices for Tennessee coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Anderson	$1.16	$1.17	$1.15	$1.11	$1.02	$0.97	$0.91	$0.80
Campbell	1.15	1.22	1.27	1.19	1.25	1.05	1.03	.98
Claiborne	.....	.....	1.19	1.04	.90	.94	.82	.79
Grundy	.99	.94	.89	1.11	1.04	.80	.90	.95
Hamilton	1.30	1.15	1.12	1.11	1.02	.90	.84	.85
Marion	1.13	1.06	1.11	1.08	.98	1.14	1.02	.89
Morgan	1.34	1.10	1.09	1.36	1.07	.98	.86	.62
Putnam	.....	.....	.....	.....	.....	.....	.....	.92
Rhea	1.10	1.00	1.00	1.00	.89	1.01	.70	.65
Roane	.....	.....	1.15	1.05	1.46	1.00	.80	.75
Scott	1.34	1.29	1.25	1.24	1.40	1.09	1.09	.96
White	.....	.....	1.31	1.25	1.03	1.03	.95	1.03
The State	1.21	1.10	1.10½	1.13	1.08	.97	.93	.86

Statistics of labor employed and working time at Tennessee coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Anderson	1,325	291	1,350	242	1,072	218
Campbell	251	212	451	145	732	213
Claiborne	.....	.....	165	172	276	207
Grundy	880	310	515	311	800	309
Hamilton	500	285	475	213	365	192
Marion	523	226	615	220	375	286
Morgan	363	258	363	250	156	148
Rhea	450	200	350	250	175	307
Roane	.....	.....	210	277	207	282
Scott	475	241	347	182	448	243
White	.....	.....	246	228	300	232
The State	5,082	263	5,097	230	4,926	240

Statistics of labor employed and working time at Tennessee coal mines—Continued.

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Anderson	665	247	1,217	256	1,118	248	1,015	230
Campbell	936	175	698	140	1,128	174	1,718	164
Claiborne	280	142	277	169	284	179	368	220
Grundy	548	247	904	238	424	312	475	272
Hamilton	670	260	441	218	335	220	517	183
Marion	480	262	522	183	581	249	628	223
Morgan	272	224	373	145	209	134	509	265
Putnam	.....	.....	.....	.....	.....	.....	20	250
Rhea	245	295	209	253	165	240	270	186
Roane	160	203	210	307	200	225	200	286
Scott	414	222	366	194	331	193	453	178
White	300	307	300	196	325	283	357	250
The State	4,976	232	5,542	210	5,120	224	6,531	211

The annual output of the State since 1873 has been as follows:

Coal product of Tennessee from 1873 to 1896.

Year.	Short tons.	Year.	Short tons.
1873	350,000	1885	1,440,957
1874	350,000	1886	1,714,290
1875	360,000	1887	1,900,000
1876	550,000	1888	1,967,297
1877	450,000	1889	1,925,689
1878	375,000	1890	2,169,585
1879	450,000	1891	2,413,678
1880	641,042	1892	2,092,064
1881	750,000	1893	1,902,258
1882	850,000	1894	2,180,879
1883	1,000,000	1895	2,535,644
1884	1,200,000	1896	2,663,106

TEXAS.

Total product in 1896, 544,015 short tons; spot value, $896,251.

Coal production in Texas passed the half-million-ton mark for the first time, the increased production in 1896 being due chiefly to the more extended development of the lignite fields in the eastern central portion of the State, particularly in Milam and Robertson counties. The increased production of lignite coal was attended with much lower prices, the total value of the product in 1896 being less than in 1895 by $16,887.

The counties from which bituminous coal is produced are Erath Palo Pinto, Parker, Maverick, Montague, and Webb. All of these reported production of coal in 1896 except Maverick. The total product of bituminous coal was 376,076 short tons. Lignite was produced in Bastrop, Medina, Milam, Robertson, Nacogdoches, and Shelby counties. The total amount of lignite mined in 1896 was 167,939 short tons, valued at $148,379.

The following table shows the statistics of coal production in the State since 1889:

Coal product of Texas since 1889.

Distribution.	1889.	1890.	1891.	1892.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Loaded at mines for shipment	120,602	180,800	169,300	241,005
Sold to local trade and used by employees	6,552	1,840	900	4,460
Used at mines for steam and heat	1,062	1,800	1,900	225
Total	128,216	184,440	172,100	245,690
Total value	$340,617	$465,900	$412,300	$569,333

Distribution.	1893.	1894.	1895.	1896.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Loaded at mines for shipment	300,064	417,281	475,157	522,177
Sold to local trade and used by employees	462	2,412	7,705	12,846
Used at mines for steam and heat	1,680	1,155	2,097	8,992
Total	302,206	420,848	484,959	544,015
Total value	$688,407	$976,458	$913,138	$896,251

The statistics of the production in 1895 and 1896 in somewhat greater detail are shown in the following tables:

Coal product of Texas in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Milam	6	97,492	2,185	.....	99,677	$87,366	$0.88	213	146
Coleman, Earth, Medina, Montague, Parker, Palo Pinto, Robertson, and Webb	8	377,665	5,520	2,097	385,282	825,772	2.14	167	1,496
Total	14	475,157	7,705	2,097	484,959	913,138	1.88	171	1,642

Coal product of Texas in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*				
Bituminous:									
Erath, Montague, Palo Pinto, Parker	4	296,363	3,876	3,702	303,941	$613,596	$2.02	191	1,173
Webb	2	68,995	.....	3,140	72,135	134,276	1.86	255	350
Lignite:									
Bastrop, Medina, Milam, Robertson	7	145,219	8,550	2,100	155,869	132,339	.85	177	320
Nacogdoches, Shelby	3	11,600	420	50	12,070	16,040	1.33	58	110
Total	16	522,177	12,846	8,992	544,015	896,251	1.65	187	1,953

UTAH.

Total product in 1896, 418,627 short tons; spot value, $500,547.

Utah's output of coal in 1896 was 53,209 short tons less than in 1895, and nearly 13,000 tons less than in 1894. The decrease in product was due in the main to the depressed condition of the silver-mining industry. Prices have declined steadily since 1891. In that year the average price realized was $1.80; in 1896 it was $1.20, a drop of exactly 33⅓ per cent in five years. The prices per ton in the intervening years were: In 1892, $1.56; in 1893, $1.48; in 1894, $1.40, and in 1895, $1.31.

The production by counties in 1895 and 1896, with the distribution of the product for consumption, is shown in the following tables:

Coal product of Utah in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Carbon	5	329,486	4,212	3,000	63,027	399,725	$503,529	$1.26	214	522
Iron	2	.....	350	10	.....	360	900	2.50	81	5
Sanpete	2	5,100	13,125	652	.....	18,877	39,334	2.09	138	46
Summit	5	41,873	7,410	3,591	.....	52,874	73,586	1.39	180	97
Total	14	376,459	25,097	7,253	63,027	471,836	617,349	1.31	203	670

Coal product of Utah in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Carbon	5	294,057	3,545	3,350	61,707	362,659	$428,398	$1.18	215	548
Iron	2	.....	316	16	.....	332	733	2.21	52	7
Sanpete	2	2,023	.....	12	.....	2,035	4,279	2.10	95	15
Summit.....	3	44,146	5,015	4,033	.....	53,194	66,408	1.25	165	102
Utah and Uinta.....	3	112	295	.....	.....	407	729	1.79	77	7
Total ...	15	340,338	9,171	7,411	61,707	418,627	500,547	1.20	202	679

Mr. J. M. Goodwin, in the Inter-Mountain Mining Review, says that Utah is supplied with Coal Measures to as great an extent as any other State, and yet only a small portion of her fields has been developed. Certainly the coal fields extend over a much greater area than those of any of the Eastern States. Much of the Wasatch Mountain region has immense veins of bituminous coal of most excellent quality, while the various hydrocarbons, in forms found nowhere else, are the surprise of the world, because of characteristics and apparent values as yet undetermined, and of which further notice in this article is unnecessary. The Uinta, the Book, and other mountain ranges also have vast deposits of coal.

As yet no real anthracite has been discovered in Utah, but several small finds approaching anthracite and cannel coals have been made, and it is hoped that both these varieties of coal will eventually be developed. Only one working mine supplies coking coal.

Some of the largest and probably best deposits of coal in the State are located so far from railway transportation as to be useless at present. The building of a railway line from Salt Lake City to Los Angeles will tap some of these coal lands, and create great industries in mining and shipping coal to the Pacific Ocean.

The Pleasant Valley Coal Company is, and for years has been, the largest producer of coal in the State. Its mines are thoroughly equipped for economical working. At Winter Quarters, near Scofield, in Carbon County, its mines have been operated for many years; hence the cuttings are very extensive. On one mine the tunnel has been extended over a mile, reaching clear through the ridge in which it is located. The mule, so long used to take in cars and bring out coal, has given way to an electric locomotive, and the mine now has a capacity of 1,000 tons of coal per day. This vein is 11 feet thick, with a very slight dip—just enough to aid in mining above the tracks. The ground has been opened for 2,000 feet on each side of the main tunnel.

On the opposite side of the gulch extends the same vein, which has been opened to a large extent. Its equipment includes two electric hoists for taking cars and hoisting coal, made necessary because of faults which changed the levels. Both mines have such faults or "jumps," but in such uniform and large sections as to give no serious trouble in operating. This mine, comparatively new, has a capacity of 800 tons of coal per day.

The same company operates a vein 6 to 10 feet thick at Castle Gate, where electric power is transmitted for operating the several hoists, crushers, etc. All the screenings or slack from this mine are run into the coke ovens and converted into fuel for smelting ores.

There are no records of the amount of coal produced in Utah prior to 1885. Since that time the annual output has been as follows:

Coal product of Utah since 1885.

Year.	Short tons.	Year.	Short tons.
1885	213, 120	1891	371, 045
1886	200, 000	1892	361, 013
1887	180, 021	1893	413, 205
1888	258, 961	1894	431, 550
1889	236, 651	1895	471, 836
1890	318, 159	1896	418, 627

VIRGINIA.

Total product in 1896, 1,254,723 short tons; spot value, $848,851.

Virginia's coal product in 1896 was 113,601 short tons less than in the preceding year. The decrease was all in Tazewell County. In fact the loss in Tazewell County was more than the total decrease in the State by 73,323 short tons, the difference being made up by increased production in Wise County and from the Richmond basin. The Richmond coal being nearer to points of consumption than the other fields, has the advantage in freights, and consequently the product brings a higher price at the mines. The output from this region was 95,670 short tons in 1896 against 57,782 tons in 1895, an increase of 37,888 short tons, or nearly 40 per cent. This increase in product, attended with a slight advance in price, is reflected in an increase in the average value per ton for the State from 63 cents in 1895 to 68 cents in 1896.

The first coal mined systematically in the United States was from the Richmond basin. As early as 1822 the amount of coal mined here was 48,214 long tons. In 1833, 142,587 long tons were produced. From 1833 to 1869 there is a blank in the records. In the latter year the product was 61,803 long tons, or 69,219 short tons. The Tenth United States Census reported an output of 43,079 short tons for the fiscal

year ending June 30, 1880. All of the above figures represent the output of the State obtained from the Richmond basin. The output during 1880, 1881, and 1882 was estimated at 100,000 long tons, or 112,000 short tons, in each year, but this is an "estimate" merely. The development in the Pocahontas Flat Top coal field began in the fall of 1881, but owing to the wet season of 1882 and the lack of transportation facilities until the New River division of the Norfolk and Western Railroad was completed, in 1883, the first carload of coal was not shipped until the latter year. From 1883 the production of this field has grown to enormous proportions, the output in 1894 (including McDowell and Mercer counties, W. Va., and Tazewell and Wise counties, Va.) reaching 5,389,756 short tons. The unusually large production of the Flat Top field in this year was due to the great strike which involved nearly all of the bituminous coal fields east of the Rocky Mountains except the Flat Top, where the mines were pushed to their utmost capacity to supply the extra demand thus created. In 1895 the Flat Top region had its own strike, and the output from the field was only 4,381,591 short tons, more than 1,000,000 tons less than in 1894. In 1896 the Flat Top region produced 4,865,720 short tons, an increase over 1895 of 484,129 short tons. Four-fifths of the product in 1894 was from the districts north of the Bluestone River, in West Virginia, but the output from Virginia alone was 1,158,437 short tons. In 1895 West Virginia's portion was less than three-fourths of the decreased total, while Virginia's quota increased to 1,298,862 short tons. In 1896 West Virginia contributed 78.5 per cent of the total, Virginia's portion being more than 100,000 tons less than it was in 1894.

The details of production in Virginia in the past two years, by counties, are shown in the following tables:

Coal product of Virginia in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Montgomery	5	269	1,032	.....	.....	1,301	$2,394	$1.84	87	14
Pulaski	2	4,304	6,075	.....	.....	10,379	14,378	1.38	146	32
Tazewell	2	660,645	3,469	4,480	293,675	962,269	588,730	.61	305	1,077
Wise	11	320,243	4,382	924	11,044	336,593	192,713	.57	190	582
Chesterfield, Henrico	2	38,739	215	16,934	1,894	57,782	71,658	1.24	90	453
Total	22	1,024,200	15,173	22,338	306,613	1,368,324	869,873	.63	225	2,158

Coal product of Virginia in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Montgomery	8	951	6,832	48	.....	7,831	$15,858	$2.03	147	40
Pulaski	3	8,175	95	.....	.....	8,270	9,335	1.13	115	45
Tazewell	2	519,538	4,540	7,056	254,211	785,345	484,178	.62	270	1,029
Wise	13	229,825	29,186	2,988	95,608	357,607	217,519	.61	186	595
Chesterfield, Henrico	3	65,553	298	28,448	1,371	95,670	121,961	1.27	121	801
Total	29	824,042	40,951	38,540	351,190	1,254,723	848,851	.68	198	2,510

The total production of coal in Virginia since 1880 has been as follows:

Coal product of Virginia since 1880.

Year.	Short tons.	Year.	Short tons.
1880	112,000	1889	865,786
1881	112,000	1890	784,011
1882	112,000	1891	736,399
1883	252,000	1892	675,205
1884	336,000	1893	820,339
1885	567,000	1894	1,229,083
1886	684,951	1895	1,368,324
1887	825,263	1896	1,254,723
1888	1,073,000		

WASHINGTON.

Total product in 1896, 1,195,504 short tons; spot value, $2,396,078.

The discovery of coal in what is now the most important producing region of the Pacific States was made in 1852. The first mine was opened on Bellingham Bay in 1854. The coal from this mine was sent to San Francisco, and was the only coal shipped out of the Territory (now State) of Washington until 1870, when exportation commenced at Seattle from the Seattle, Renton, and Talbot mines in the vicinity. In 1874 the product from the Seattle mines was 50,000 tons; from July 1, 1878, to July 1, 1879, the product was 155,900 tons. In the year ended December 31, 1879, the product was 137,207 short tons. The Renton mine, opened in 1874, produced, in 1875 and 1876, 50,000 short tons. The Talbot mine, opened in 1875, produced, in 1879, 18,000 short tons of coal. Records of the operations of Washington coal mines are incomplete, and entirely wanting from 1879 to 1884. The mining during this time was confined to King and Pierce counties. During the fiscal year

ended June 30, 1885, the total product of the Territory is given at 380,250 short tons, of which King County is credited with 204,480 short tons and Pierce County with 175,770 short tons.

Coal mining in Washington received a sudden impetus in 1887 and 1888, practically reaching the limit of profitable production in the latter year, for in only two years since has the product of 1888 been exceeded. The product in 1887 was more than 75 per cent larger than in 1886, and that of 1888 more than 55 per cent larger than in 1887. The product in both 1890 and 1893 exceeded that of 1888 by about 50,000 tons, but these were the only years when it did so. The output has not fallen below 1,000,000 tons since it passed that figure in 1888. An increase of about 85,000 tons is shown in the product of 1895 over 1894, but it did not reach the tonnage of four previous years, 1888, 1890, 1892, and 1893.

The product in 1896 was 4,094 short tons more than in 1895, but the general tendency toward lower prices throughout the country was exhibited even in this remote region, and the value of the product in 1896 was $181,880 less than for the slightly smaller output the preceding year. The average value per ton decreased from $2.31 in 1893 and 1894 to $2.16 in 1895 and $2 in 1896.

It is the general opinion of those familiar with the conditions on the Pacific Coast that the coal mining industry of Washington is still in its infancy. Coal is said to occur in more than half of the 34 counties in the State. Recent developments of what is claimed to be anthracite coal near Index are reported, and are expected to add greatly to the industry. Several new mines of bituminous coal were opened in 1896 and will probably largely increase the tonnage in 1897. One of the new mines located on Carbon River, 6 miles southeast of the present Carbon Hill mine, promises to be, it is claimed, the largest operation in the State. A tunnel 600 feet long has been driven and two others have been started. Eight veins of coal, ranging from 4 to 15 feet in width have been opened. San Francisco is looked to for a market.

The following tables will show the details of production in 1895 and 1896:

Coal product of Washington in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
King	10	400,326	12,940	22,705	.....	435,971	$1,078,897	$2.47	218	1,045
Kittitas	2	270,673	2,545	8,316	.....	281,534	485,520	1.72	182	877
Pierce	4	412,243	654	11,396	12,736	437,029	928,802	2.13	268	773
Skagit	2	9,610	50	429	10,237	20,326	47,446	2.33	301	73
Thurston, Whatcom	4	16,016	131	403	.....	16,550	37,293	2.25	280	72
Total	22	1,108,868	16,320	43,249	22,973	1,191,410	2,577,958	2.16	224	2,840

Coal product of Washington in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Cowlitz	2	1,045	84	134	.....	1,263	$2,825	$2.23	97	12
King	11	443,589	10,773	27,348	.....	481,710	1,027,209	2.13	208	1,101
Kittitas	2	256,618	2,660	6,675	.....	265,953	501,166	1.88	198	662
Pierce	4	386,978	1,973	9,650	20,967	419,568	776,201	1.85	252	740
Skagit, Whatcom	2	7,254	1,232	806	17,718	27,010	88,677	3.28	298	107
Total.	21	1,095,484	16,722	44,613	38,685	1,195,504	2,396,078	2.00	221	2,622

The annual product since 1885 has been as follows:

Product of coal in Washington since 1885.

Year.	Total product.	Total value.	Average price per ton.	Average number of employees.	Average number of days worked.
	Short tons.				
1885	380,250	.....	.....	.....	.....
1886	423,525	$952,931	$2.25	.....	.....
1887	772,601	1,699,746	2.19	1,571	.....
1888	1,215,750	3,647,250	3.00	.....	.....
1889	1,030,578	2,393,238	2.32	2,657	.....
1890	1,263,689	3,426,590	2.71	2,006	270
1891	1,056,249	2,437,270	2.31	2,447	211
1892	1,213,427	2,763,547	2.28	2,564	247
1893	1,264,877	2,920,876	2.31	2,757	241
1894	1,106,470	2,578,441	2.31	2,662	207
1895	1,191,410	2,577,958	2.16	2,840	224
1896	1,195,504	2,396,078	2.00	2,622	221

The total output of the State since 1887, by counties, with the increases and decreases in 1896, as compared with 1895, is shown in the following table:

Product of coal in Washington since 1887, by counties.

[Short tons.]

County.	1887.	1888.	1889.	1890.	1891.	1892.
King	339,961	546,535	415,779	517,492	429,778	508,467
Kittitas	104,782	220,000	294,701	445,311	348,018	285,088
Okanogan	.....	.....	.....	.....	.....	.....
Pierce	229,785	276,956	273,618	285,886	271,053	364,294
Skagit	.....	.....	.....	.....	1,400	4,703
Thurston	15,295	42,000	46,480	15,000	.....	22,119
Whatcom	.....	.....	.....	.....	6,000	28,756
Not specified	82,778	130,259	.....	.....	.....	.....
Total	772,601	1,215,750	1,030,578	1,263,689	1,056,249	1,213,427

County.	1893.	1894.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Cowlitz	.....	.....	.....	1,263	1,263	.....
King	577,731	422,676	435,971	481,710	45,739	.....
Kittitas	253,467	232,580	281,534	265,953	.....	15,581
Okanogan	.....	50	.....	.....	.....	.....
Pierce	408,074	406,831	437,029	419,568	.....	17,461
Skagit	2,905	7,537	20,326	18,548	.....	1,778
Thurston	.....	26,880	16,550	.....	.....	.....
Whatcom	22,700	9,916		8,462	.....	8,088
Total	1,264,877	1,106,470	1,191,410	1,195,504	*a* 4,094	.....

a Net increase.

In the following tables are shown the average prices ruling in each county since 1889, and the statistics of labor employed and average working time since 1890:

Average prices for Washington coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
King	$2.55	$2.61	$2.35	$2.42	$2.22	$2.62	$2.47	$2.13
Kittitas	2.64	2.76	2.22	2.11	2.71	2.11	1.72	1.88
Pierce	2.11½	2.85½	2.33½	2.26	2.25	2.15	2.13	1.85
Skagit	.....	.....	.....	.....	.....	.....	2.33	3.71
Thurston	1.79	2.00	.....	2.01	.....	2.28	2.25	.....
Whatcom	.....	.....	3.00	2.68	2.40	2.23		
The State	2.32	2.71	2.31	2.28	2.31	2.33	2.16	2.00

Statistics of labor employed and working time at Washington coal mines.

County.	1890.		1891.		1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
King	1,098	292	1,285	226	1,296	265	1,256	272
Kittitas	489	259	501	148	500	178	672	162
Pierce	589	257	601	236	626	269	756	260
Thurston	30	240	.....	.....	42	223	.....	.....
Whatcom	.....	.....	30	150	70	305	56	291
The State	2,206	270	2,447	211	2,564	247	2,757	241

County.	1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
King	919	244	1,045	218	1,101	208
Kittitas	809	125	877	182	662	198
Pierce	818	237	773	268	740	252
Skagit	.....	.....	73	301	75	312
Thurston	38	245	72	280	.....	.....
Whatcom	43	328				
The State	2,662	207	2,840	224	2,622	221

WEST VIRGINIA.

Total product in 1896, 12,876,296 short tons; spot value, $8,336,685.

West Virginia recovered from her decreased output in 1895 with an increase in 1896 of 1,488,335 short tons, and reached the highest figure yet attained. More than this, the increased output in 1896 puts West Virginia third in the rank of coal-producing States—her product in 1896 being about 1,000 tons more than Ohio, which State is thus supplanted. West Virginia, more than any other State, benefited by the advanced price of Connellsville coke in 1896, more than half a million tons of the increase in 1896 being in the coal made into coke. All of the important coke-producing counties figured in this increase except Marion. The amount of coal made into coke in Fayette County increased from 546,458 tons to 611,365 tons; in McDowell County from 717,197 tons to 1,002,427 tons; in Mercer County from 134,394 tons to 262,034 tons, and in Tucker County from 186,609 tons to 275,676 tons. In spite of this favorable condition the tendency of prices was downward, there

being a decline in the average price from 68 cents in 1895 to 65 cents in 1896. The details of production in the last two years are as follows:

Coal product of West Virginia in 1895, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Barbour	2	12,746	560	.....	.....	13,306	$10,686	$0.80	222	20
Brooke	3	64,039	10,652	150	.....	74,841	54,167	.72	212	126
Fayette	50	2,628,666	73,300	16,401	546,458	3,264,825	2,355,492	.72	201	5,537
Harrison	10	263,164	2,269	318	26,942	292,693	196,149	.67	212	513
Kanawha	26	1,070,300	32,582	5,468	26,448	1,134,798	894,310	.79	161	2,738
Marion	11	916,407	10,717	13,531	316,908	1,257,563	805,801	.64	238	1,812
Marshall	4	177,992	15,695	390	.....	194,077	130,661	.67	232	336
Mason	6	78,903	40,086	1,777	.....	120,766	102,988	.85	167	367
McDowell	29	1,657,802	13,797	6,569	717,197	2,395,365	1,393,428	.55	199	3,955
Mercer	8	547,118	3,860	1,992	134,394	687,364	387,578	.56	169	1,148
Mineral	6	667,536	7,777	297	.....	675,610	424,643	.63	229	656
Monongalia	2	42,949	668	668	23,225	67,510	51,941	.77	200	135
Ohio	9	67,921	101,448	465	.....	169,834	128,380	.76	227	221
Preston	4	60,716	954	583	44,800	107,053	70,000	.65	225	208
Putnam	4	120,332	150	.....	.....	120,482	114,394	.95	112	438
Taylor	3	81,303	794	49	11,106	93,252	51,512	.55	159	180
Tucker	5	258,387	3,058	1,937	186,609	449,991	305,962	.68	188	488
Wayne	3	3,833	.....	.....	.....	3,833	7,755	2.02	82	26
Grant, Logan, Mingo, Raleigh, and Randolph	5	138,142	1,656	.....	.....	139,798	99,728	.71	173	255
Small mines	.....	.....	125,000	.....	.....	125,000	125,000	.....	.....	.....
Total	190	8,858,256	445,023	50,595	2,034,087	11,387,961	7,710,575	.68	195	19,159

Coal product of West Virginia in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Barbour	2	22,915	1,149	.....	.....	24,064	$16,018	$0.67	250	42
Brooke	3	32,085	11,239	100	.....	43,424	31,488	.73	151	105
Fayette	52	2,879,275	29,764	13,168	611,365	3,533,572	2,403,457	.68	185	5,947
Grant	2	8,548	172	.....	.....	8,720	13,080	1.50	160	31
Harrison	8	212,932	8,673	600	9,482	231,687	134,181	.58	201	467
Kanawha	28	1,058,766	27,542	6,133	24,442	1,116,883	791,468	.71	175	2,314
Marion	11	1,201,265	8,724	12,841	289,073	1,511,903	863,766	.57	248	1,899
Marshall	4	169,107	11,352	1,151	.....	181,610	122,526	.67	224	254
Mason	3	55,875	42,373	1,888	.....	100,136	82,964	.83	228	249
McDowell	28	1,863,060	11,169	7,030	1,002,427	2,883,686	1,702,742	.60	221	3,557
Mercer	7	667,195	6,181	3,672	262,034	939,082	556,146	.59	202	1,110
Mineral	4	549,476	2,995	4,115	.....	556,586	378,138	.68	188	644
Mingo	7	209,546	2,047	.....	.....	211,593	137,099	.65	199	350
Monongalia	2	35,902	224	101	7,070	43,297	19,374	.45	128	74
Ohio	8	81,045	35,640	783	16,057	133,525	93,822	.70	180	204
Preston	3	7,729	95,363	2,323	34,344	139,759	83,554	.60	266	180
Putnam	4	185,528	300	125	.....	185,953	192,557	1.04	201	384
Taylor	4	122,647	707	.....	.....	123,354	63,157	.51	83	310
Tucker	6	407,768	2,919	2,063	275,676	688,426	452,257	.66	234	812
Raleigh, Wayne	3	67,389	2,908	302	23,437	94,036	73,891	.78	185	145
Small mines	.....	.....	125,000	.....	.....	125,000	125,000	.....	.....	.....
Total	189	9,838,053	426,441	56,395	2,555,407	12,876,296	8,336,685	.65	201	19,078

In the following table will be found the total product of the State, by counties, since 1886, with the increases and decreases in 1896 as compared with 1895:

Coal product of West Virginia from 1886 to 1896, by counties.

[Short tons.]

County.	1886.	1887.	1888.	1889.	1890.
Brooke	22,880	40,366	11,568	31,119	36,794
Fayette	1,413,778	1,252,457	1,977,030	1,450,780	1,591,298
Harrison	234,597	154,220	109,515	174,115	144,403
Kanawha	876,785	1,126,839	863,600	1,218,236	1,421,116
McDowell	.....	.....	.....	586,529	956,222
Marion	172,379	365,844	363,974	282,467	455,728
Marshall	251,333	92,368	47,702	47,706	123,669
Mason	150,878	140,968	72.410	185,030	145,314
Mercer	328,733	575,885	969,395	921,741	1,005,870
Mineral	361,312	478,636	456,361	493,464	573,684
Monongalia	.....	.....	.....	74,031	31,360
Ohio	(*a*)	131,936	140,019	143,170	103,586
Preston	170,721	276,224	231,540	129,932	178,439
Putnam	(*b*)	53,200	145,440	218,752	205,178
Taylor	(*c*)	168,000	55,729	83,012	76,618
Tucker	22,400	24,707	62,517	173,492	245,378
Other counties and small mines	.....	.....	.....	18,304	100,000
Total	4,005,796	4,881,620	5,498,800	6,231,880	7,394,654

County.	1891.	1892.	1893.	1894.
Barbour	.....	.....	.....	9,720
Brooke	33,950	26,521	32,900	44,995
Fayette	2,307,421	2,455,400	2,652,860	2,566,612
Grant	.....	.....	.....	6,563
Harrison	150,522	221,726	193,632	255,634
Kanawha	1,324,788	1,317,621	1,446,252	1,084,359
Logan	.....	.....	.....	11,611
McDowell	1,267,136	1,696,975	2,166,478	3,158,369
Marion	1,000,047	919,704	1,062,334	1,399,898
Marshall	193,703	118,974	158,997	156,320
Mason	159,990	159,644	153,633	140,802
Mercer	1,172,910	1,191,952	995,428	1,072,950
Mineral	693,574	582,402	653,025	563,270
Monongalia	31,000	48,900	38,600	79,558

a Included in product of Marshall County.
b Included in product of Mason County.
c Included in product of Harrison County.

Coal product of West Virginia from 1886 to 1896, by counties—Continued.

[Short tons.]

County.	1891.	1892.	1893.	1894.
Ohio	90,600	120,323	80,610	102,910
Preston	140,399	98,006	82,672	40,854
Putnam	94,230	89,886	209,881	220,138
Raleigh	.....	95,824	92,330	84,359
Randolph	.....	.....	.....	16,203
Taylor	101,661	115,145	78,640	102,682
Tucker	358,734	359,752	476,372	363,950
Wayne	.....	.....	.....	21,000
Other counties and small mines	100,000	120,000	133,934	125,000
Total	9,220,665	9,738,755	10,708,578	11,627,757

County.	1895.	1896.	Increase in 1896.	Decrease in 1896.
Barbour	13,306	24,064	10,758	.....
Brooke	74,841	43,424	.....	31,417
Fayette	3,264,825	3,533,572	268,747	.....
Grant	392	8,720	8,328	.....
Harrison	292,693	231,687	.....	61,006
Kanawha	1,134,798	1,116,883	.....	17,915
Logan	24,648	.....	.....	24,648
McDowell	2,395,365	2,883,686	488,321	.....
Marion	1,257,563	1,511,903	254,340	.....
Marshall	194,077	181,610	.....	12,467
Mason	120,766	100,136	.....	20,630
Mercer	687,364	939,082	251,718	.....
Mineral	675,610	556,586	.....	119,024
Mingo	26,370	211,593	185,223	.....
Monongalia	67,510	43,297	.....	24,213
Ohio	169,834	133,525	.....	36,309
Preston	107,053	139,759	32,706	.....
Putnam	120,482	185,953	65,471	.....
Raleigh	88,188	92,136	3,948	.....
Randolph	200	.....	.....	200
Taylor	93,252	123,354	30,102	.....
Tucker	449,991	688,426	238,435	.....
Wayne	3,833	1,900	.....	1,933
Other counties and small mines	125,000	125,000	.....	.....
Total	11,387,961	12,876,296	*a* 1,488,335	.....

a Net increase.

The annual output since 1873 has been as follows:

Coal product of West Virginia since 1873.

Year.	Short tons.	Year.	Short tons.
1873	672,000	1885	3,369,062
1874	1,120,000	1886	4,005,796
1875	1,120,000	1887	4,881,620
1876	896,000	1888	5,498,800
1877	1,120,000	1889	6,231,880
1878	1,120,000	1890	7,394,654
1879	1,400,000	1891	9,220,665
1880	1,568,000	1892	9,738,755
1881	1,680,000	1893	10,708,578
1882	2,240,000	1894	11,627,757
1883	2,335,833	1895	11,387,961
1884	3,360,000	1896	12,876,296

The decrease in 1895 was the first break in a series of fifteen years. In each year since 1881 until the close of 1894 the product of West Virginia has shown an uninterrupted gain, the total increase in fourteen years amounting to 10,059,757 short tons, an average of 718,554 short tons. The decrease in 1895 brings the total increase since 1881 down to 9,819,961 short tons, and the average for fifteen years down to 654,664 short tons, while the increased product in 1896 makes the total increase in sixteen years 11,308,296 short tons—a yearly average increase of 706,769 tons, as shown in the following table:

Annual increase in the coal product of West Virginia since 1880.

Year.	Short tons.	Year.	Short tons.
1881 over 1880	112,000	1894 over 1893	919,179
1882 over 1881	560,000	Total increase in fourteen years	10,059,757
1883 over 1882	95,833	Decrease in 1895	239,796
1884 over 1883	1,024,167	Total increase in fifteen years	9,819,961
1885 over 1884	9,062	1896 over 1895	1,488,335
1886 over 1885	636,734	Total increase in sixteen years	11,308,296
1887 over 1886	875,824	Average annual increase	706,769
1888 over 1887	617,180		
1889 over 1888	733,080		
1890 over 1889	1,162,774		
1891 over 1890	1,826,011		
1892 over 1891	518,090		
1893 over 1892	969,823		

Uniformly with the discussion of the product of other States the following tables are given, showing the average price per ton and the statistics of labor employed and working time for a series of years:

Average prices for West Virginia coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Barbour	.....	.....	.....	.....	.....	.....	$0.80	$0.67
Brooke	$0.73	$0.77½	$0.82½	$0.94	$0.88	$0.77	.72	.73
Fayette	.90	.90	.85	.84	.80	.72	.72	.68
Harrison	.66	.70	.72	.77	.67	.71	.67	.58
Kanawha	.96	.96	.97	.92	.86	.87	.79	.71
Logan	.....	.....	.....	.....	.....	.64½	.60	.....
Marion	.71	.69	.70	.74	.70	.86	.64	.57
Marshall	.75	.81½	.80	.79	.78	.72½	.67	.67
Mason	.91	.93	.90	.96	.93	.86	.85	.83
McDowell	.67½	.71	.67½	.73	.70	.67	.55	.60
Mercer	.64½	.75	.74	.76	.69	.71	.56	.59
Mineral	.80	.87½	.84	.77	.82	.77	.63	.68
Mingo	.....	.....	.....	.....	.....	.....	.....	.65
Monongalia	.72	.64	.65	.72	.72	.87	.77	.45
Ohio	.88½	.97	.78	.99	.82	.84	.76	.70
Preston	.66	.72	.64	.67	.69	.68	.65	.60
Putnam	1.12	.97	1.19	1.11	1.01	1.12	.95	1.04
Raleigh	.....	.....	.....	.89	1.00	.78½	.78½	.78
Randolph	.....	.....	.....	.....	1.00	.90	.....	.....
Taylor	.63½	.76	.60½	.61	.58	.62	.55	.51
Tucker	.69½	.76	.64½	.70	.71	.62	.68	.66
Wayne	.....	.....	.....	.....	.....	.76	.....	.....
The State	.82	.84	.80	.80	.77	.75	.68	.65

Statistics of labor employed and working time at West Virginia coal mines.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Barbour	.....	.....	.....	.....	.....	.....
Brooke	50	202	59	274	51	226
Fayette	2,824	225	3,823	245	4,102	252
Harrison	305	194	285	214	473	148
Kanawha	2,756	230	2,802	217	2,677	217
Marion	865	218	1,408	279	1,114	275
Marshall	175	265	190	257	210	199
Mason	480	229	311	236	338	215

Statistics of labor employed and working time at West Virginia coal mines—Continued.

County.	1890.		1891.		1892.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
McDowell	1,315	183	1,536	227	2,061	195
Mercer	1,465	217	1,510	244	1,621	211
Mineral	620	279	624	259½	500	244
Monongalia	55	260	50	260	72	308
Ohio	153	268	131	276	222	243
Preston	337	282	304	221	170	209
Putnam	375	194	526	143	483	180
Raleigh	.....	.....	.....	.....	120	167
Taylor	108	256	118	287	128	282
Tucker	353	309	550	306	525	306
The State	12,236	227	14,227	237	14,867	228

County.	1893.		1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Barbour	.....	.....	.....	.....	20	222	42	250
Brooke	79	260	100	205	126	212	105	151
Fayette	4,487	224	4,594	164	5,537	201	5,947	185
Harrison	298	211	439	178	513	212	467	201
Kanawha	2,306	276	2,706	155	2,738	161	2,314	175
Logan	.....	.....	150	70	65	160	.....	.....
Marion	1,536	203	1,479	274	1,812	238	1,899	248
Marshall	245	194	220	177	336	232	254	224
Mason	376	194	391	177	367	167	249	228
McDowell	3,375	185	3,891	207	3,955	199	3,557	221
Mercer	1,281	209	1,274	211	1,148	169	1,110	202
Mineral	666	229	564	189	656	229	644	188
Mingo	.....	.....	.....	.....	.....	.....	350	199
Monongalia	60	225	164	181	135	200	74	128
Ohio	135	221	249	166	221	227	204	180
Preston	200	140	105	152	208	225	180	266
Putnam	520	204	530	158	438	112	384	201
Raleigh	145	165	142	146	133	166	137	186
Randolph	8	100	120	93	.....	.....	.....	.....
Taylor	105	260	158	204	180	159	310	83
Tucker	675	267	390	179	488	188	812	234
Wayne	.....	.....	35	210	.....	.....	.....	.....
The State	16,524	219	17,824	186	19,159	195	19,078	201

WYOMING.

Total product in 1896, 2,229,624 short tons; spot value, $2,904,185.

The coal product of Wyoming in 1895 was 2,246,911 short tons, valued at $2,977,901, indicating a decrease in 1896 of 13,727 short tons in amount and of $59,676 in value. The product has declined steadily since 1892, when the output was 2,503,839. The details of production in 1895 and 1896 are shown in the following tables:

Coal product of Wyoming in 1895, by counties

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Carbon	4	331,940	2,466	16,098	.....	350,504	$438,501	$1.25	164	534
Converse	2	50,000	13,060	2,030	.....	65,090	108,675	1.67	245	149
Crook	2	8,000	1,650	.....	.....	9,650	14,700	1.52	275	14
Johnson	3	.....	4,658	100	.....	4,758	11,338	2.38	137	21
Sheridan	3	72,524	2,965	.....	.....	75,489	81,785	1.08	257	125
Sweetwater	5	1,119,945	3,057	35,123	.....	1,158,125	1,471,139	1.27	158	1,769
Uinta	3	209,749	3,069	4,825	13,041	230,684	320,846	1.39	187	384
Fremont and Weston	3	314,779	4,703	22,889	10,240	352,611	530,917	1.51	264	453
Total	25	2,106,937	35,628	81,065	23,281	2,246,911	2,977,901	1.33	184	3,449

Coal product of Wyoming in 1896, by counties.

County.	Number of mines.	Loaded at mines for shipment.	Sold to local trade and used by employees.	Used at mines for steam and heat.	Made into coke.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
		Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Carbon	7	343,247	8,925	11,085	.....	363,257	$467,187	$1.29	169	561
Sheridan	4	49,792	1,500	.....	.....	51,292	53,381	1.04	210	69
Sweetwater	8	1,019,219	1,955	25,868	.....	1,047,042	1,275,344	1.22	189	1,339
Uinta	3	306,655	2,998	3,780	.....	313,433	425,565	1.36	221	432
Converse, Crook, Fremont, Johnson, Weston	6	383,555	2,489	27,518	41,038	454,600	682,708	1.50	278	548
Total	28	2,102,468	17,867	68,251	41,038	2,229,624	2,904,185	1.30	209	2,949

In the following table is shown the total output in the State, by counties, since 1868, and the value of the total product since 1885:

Total product of coal in Wyoming, by counties.

[Short tons.]

Year.	Carbon County.	Sweetwater County.	Uinta County.	Weston County.
1868	6,560	365	.....	.....
1869	30,482	16,933	1,967	.....
1870	54,915	20,945	29,435	.....
1871	31,748	40,566	75,014	.....
1872	59,237	34,677	127,831	.....
1873	61,164	44,700	153,836	.....
1874	55,880	58,476	104,705	.....
1875	61,750	104,664	134,394	.....
1876	69,060	134,952	130,538	.....
1877	74,343	146,494	122,016	.....
1878	62,418	154,282	116,500	.....
1879	75,424	193,252	132,315	.....
1880	100,433	244,460	182,918	.....
1881	156,820	270,425	200,936	.....
1882	200,123	287,510	211,276	.....
1883	248,380	304,495	190,163	.....
1884	319,883	318,197	219,351	.....
1885	226,863	328,601	234,657	.....
1886	214,233	359,234	255,888	.....
1887	288,358	465,444	361,423	.....
1888	338,947	732,327	369,333	.....
1889	199,276	857,213	309,218	.....
1890	305,969	978,827	350,278	200,024
1891	432,180	1,202,017	332,327	326,155
1892	499,787	1,265,441	330,104	344,300
1893	395,059	1,337,206	292,374	310,906
1894	436,350	1,389,895	116,512	341,822
1895	350,504	1,158,125	230,684	348,611
1896	363,257	1,047,042	313,433	371,528

Total product of coal in Wyoming, by counties—Continued.

[Short tons.]

Year.	Converse County.	Other counties.	Total.	Value.
1868			6,925	
1869			49,382	
1870			105,295	
1871			147,328	
1872			221,745	
1873			259,700	
1874			219,061	
1875			300,808	
1876			334,550	
1877			342,853	
1878			333,200	
1879			400,991	
1880			527,811	
1881			628,181	
1882		8,855	707,764	
1883		36,651	779,689	
1884		45,189	902,620	
1885		17,207	807,328	$2,421,984
1886			829,355	2,488,065
1887		55,093	1,170,318	3,510,954
1888	29,933	11,000	1,481,540	4,444,620
1889	17,393	5,847	1,388,276	1,748,617
1890	25,748	9,520	1,870,366	3,183,669
1891	27,897	7,265	2,327,841	3,555,275
1892	45,907	18,300	2,503,839	3,168,776
1893	56,320	47,446	2,439,311	3,290,904
1894	74,000	58,884	2,417,463	3,170,392
1895	65,090	93,897	2,246,911	2,977,901
1896	78,000	56,364	2,229,624	2,904,185

The following tables show the average prices per ton which have obtained in the more important counties since 1889, and the statistics of labor engaged in the production for seven years:

Average price for Wyoming coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Carbon	$0.98	$1.75	$1.50	$1.11	$1.53	$1.26	$1.25	$1.29
Converse	1.78	1.74	1.77	1.63	1.58	1.50	1.67	1.50
Sheridan	1.50	1.50	1.00	.....	1.67	1.53	1.08	1.04
Sweetwater	1.20	1.70	1.48	1.16	1.14	1.23	1.27	1.22
Uinta	1.56	1.78	1.71	1.56	1.74	1.61	1.39	1.36
Weston	.....	1.45	1.50	1.50	1.50	1.50	1.51	1.50
The State	1.26	1.70	1.53	1.27	1.35	1.31	1.33	1.30

Statistics of labor employed and working time at Wyoming coal mines.

County.	1890.		1891.		1892.		1893.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Carbon	714	.....	609	.....	505	241	622	164
Converse	30	.....	85	.....	105	210	110	201
Sheridan	.....	.....	.....	.....	.....	.....	48	241
Sweetwater	1,672	.....	1,754	.....	1,643	198	1,729	179
Uinta	422	.....	548	.....	462	243	439	201
Weston	416	.....	402	.....	400	297	400	250
The State	3,272	.....	3,411	.....	3,133	225	3,378	189

County.	1894.		1895.		1896.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Carbon	539	179	534	164	561	169
Converse	140	229	149	245	90	300
Sheridan	90	269	125	257	69	210
Sweetwater	1,622	182	1,769	158	1,339	189
Uinta	245	108	384	187	432	221
Weston	377	261	445	264	440	280
The State	3,032	190	3,449	184	2,949	209

INDEX.

Page.

Abrasive materials, summary 9
Africa, copper 220-222
railroads 138
Alabama, coal 463
iron ore 36
manganese 299
steel 36
Alaska, auriferous conglomerate 181
coal 469
Algeria, iron ore 105
Algiers, copper 220
Aluminum, alloys of 283
paper by R. L. Packard on 281
plating 283
soldering 282
summary 6
American Pig Iron Storage Warrant Company, stocks in yards of 54
American-Russia sheet iron, prices 87
Anaconda Copper Mining Company, report 203
Analyses, ferromanganese 297
iron ores 28-32, 46
manganese 299, 301-304, 311-315, 319-323
Anthracite coal. (*See* Coal.)
Antimony, paper by Edward W. Parker on 343
summary 6
Argentina, copper 219
Arizona, copper 205
Arkansas, coal 469
manganese ores 293
Arndt, John S., notes on coal trade of Philadelphia, Pa., by 428
Asbestos, summary 11
Asia, copper 220-222
railroads 138
Asphaltum, summary 11
Atlantic copper mine, cost and profits at 202
Australasia, railroads 138
Australia, copper 220-222
gold-bearing pudding stones 182
Austria, copper 219
zinc 274
Austria-Hungary, coal 118, 417
coal and coke imports 119
iron and steel 116
iron-ore 117
pig-iron imports and exports 119
pig iron production 119
steel 120
Bar iron, hammered, Philadelphia prices, 1794 to 1844 82

Page.

Barringer, D. M., quoted on iron-ore occurrence in New Mexico 47
Bartow County, Ga., manganese ores 305
Barytes 11
Bauxite 285
Baxter, G. P., quoted on atomic weight of cobalt 342
Becker, George F., paper on the Witwatersrand banket, Africa, with notes on other gold-bearing pudding stones 153
Belgium, coal 113, 417
iron and steel 112
Bessemer iron-ore pool 35
Bessemer pig iron 51
Bessemer steel, first United States manufacture of 58
France 108
Great Britain 95
production 59
Spain 126
Sweden 123
United States and Great Britain compared 66
Bessemer steel rails, production and prices 62, 85
Great Britain 96
Bilboa district, Spain, iron ore 125
Birkinbine, John, paper on iron ores by 23
paper on manganese ores by 291
Bituminous coal. (*See* Coal.)
Blatchley, W. S., quoted on Indiana coal area 507
Bolivia, copper 219
Booth, Garrett & Blair, analyses of New Mexico iron ores by 48
Boston & Montana Copper Co., report 204
Boston, Mass., coal trade 426
Borax, summary 10
Brazil, manganese ores 313
Brewer, Wm. M., quoted on coal and iron resources of Alabama 463
quoted on manganese ores in Georgia 306
Bromine, summary 10
Buffalo, N. Y., coal trade 432
California, auriferous conglomerate in Siskiyou County 181
coal 472
copper 205
manganese 300
Calumet & Hecla Mining Co., report 198
Canada, coal 134, 420
copper 219
iron and steel 133

Page.
Canada, lead 262
manganese 311
nickel 330
pig iron 134
Canadian Copper Company nickel mines. 331
Cape Copper Company, operations in 1896. 235
Cape of Good Hope, copper production 220
Carne, Jos. E., quoted on discovery of cinnabar in New South Wales 290
Cement, summary 8
Charcoal pig iron, Philadelphia prices, 1799 to 1849 79
Chemical materials, summary 9
Chibas, E. J., quoted on manganese ores in Cuba and United States of Colombia 312, 315
Chicago, Ill., coal trade 439
Chile, copper 219
manganese 313
Chrome iron ore, summary 10
Cincinnati, Ohio, coal trade 451
Clarke, W. B., quoted on gold-bearing pudding stones in Australia 182
Clays, summary 8
Cleveland, Ohio, coal trade 435
Coal, Alabama 463
Alaska 469
Arkansas 469
Austria and Hungary 118, 119, 417
Belgium 113, 417
California 472
Canada 134, 420
Colorado 473
exports 411, 413
France 106, 416
freights 450
Georgia 481
Germany 100, 416
Great Britain 92, 415
Illinois 483
imports 154, 411
increases and decreases of production in 1895, by States 374
India 420
Indiana 506
Indian Territory 513
Iowa 515
Italy 128, 421
Kansas 524
Kentucky 529
machine mining 461
Maryland 536
Michigan 544
Missouri 545
Montana 551
Nebraska 556
Nevada 556
New Mexico 557
New South Wales 419
New Zealand 419
North Carolina 560
North Dakota 561
Ohio 562
Oregon 570
other countries 135
paper by E. W. Parker on 351

Page.
Coal, Pennsylvania (anthracite) 359, 571, 573
Pennsylvania (bituminous) 360, 597
percentage of production of United States 418
prices at mines 378
prices at points of consumption 379–410
prices at principal cities 422–459
production 353, 354, 358
Queensland 419
Russia 131, 418
Spain 125, 421
summary 7
Sweden 121, 421
tariff duties on 411
Tennessee 606
Texas 611
Utah 613
value of production by States 368–373
Victoria 420
Virginia 615
Washington 617
West Virginia 621
world's product 136, 414
Wyoming 629
Coal fields of United States 352
production 353, 354
Coal mines, men employed 360, 375–377
Coal trade review 422
Boston, Mass 426
Buffalo, N. Y 432
Chicago, Ill 439
Cincinnati, Ohio 451
Cleveland, Ohio 435
Milwaukee, Wis 446
Mobile, Ala 456
New York City 423
Norfolk, Va 457
Philadelphia, Pa 428
St. Louis, Mo 454
San Francisco, Cal 458
Seattle, Wash 460
Toledo, Ohio 437
Cobalt 329
Cobalt oxide, imports 336
summary 11
Coeur d'Alene district, lead 252
Coke, summary 8
Coke imports, Austria-Hungary 119
Italy 129
Colorado, coal 473
iron-ore 38, 45
manganese 301
mine explosion 473
Copper, American product 193
Anaconda Copper Mining Company, report 203–204
Arizona 205
Boston & Montana Company, report. 204
California 205
Calumet & Hecla Mining Company, report 198
consumption of leading European countries 233
exports 195, 212–213
France 228
Franklin mines 201

Page.
Copper, Germany 230
Great Britain 223, 227
imports 206–209
imports into Great Britain and France from United States 224–227
Kearsarge mine 201
Lake Superior mines 196–197, 215–216
leading foreign producers 234
leading mines 186–187
markets for 215
Montana 203
Osceola mine 201
paper by Charles Kirchhoff on 185
prices 215, 218
product, by States 189–191
product of foreign mines 194, 195
Quincy mine 199
Rio Tinto Company, Spain 234
Russia 232
source of imports 211
summary 6
supply for the United States 192
Tamarack mine 199
trade conditions 185
world's production, by countries 219–222
Copper Cliff nickel mine, Canada, operations at 331
Corundum and emery, summary 9
Cox, James, report on coal trade of St. Louis, Mo 454
Cox, S. H., quoted on auriferous conglomerates in New Zealand 183
Crucible steel, first United States manufacture of 58
production 59, 61
production in Sweden 123
Crude steel 58
Cuba, manganese ores 312
Cuban iron ore, shipments to United States 75
Curtis, J. S., quoted on theories of gold deposition in Witwatersrand banket 169
Cushman, A. T., quoted on atomic weight of nickel 342
Cut nails 72
Daintree, Richard, quoted on auriferous conglomerates in Australia 182
Danner, A. C., report on coal trade of Mobile, Ala 456
Dawson, Sir William, quoted on gold-bearing pudding stones in Nova Scotia 178
De Launay, quoted on composition of Witwatersrand banket 165, 172
Devereux, W. B., quoted on iron ores in Colorado 45
quoted on gold-bearing pudding stones in South Dakota 180
Diller, J. S., quoted on auriferous conglomerate in California 181
Dominion Mineral Company nickel mines 332
Drury Mining Company nickel mines 332
Dunn, R. L., quoted on auriferous conglomerate in California 181

Page.
Elba, iron-ore 127
English copper trade 223
Europe, copper consumption 233
copper production 219–222
railroads in 137
Evans nickel mine, Canada, operations at 331
Exports, coal 413
coal from Canada 134
coal from France 107
coal from Italy 129
coal from Russia 133
coal from Spain 125
copper 195–196, 212, 214
copper from France 229
copper from Germany 232
copper from Great Britain 227
iron ore from Belgium 113
iron ore from Bilboa district, Spain 125
iron ore from Canada 133
iron ore from France 105
iron ore from Great Britain 92
iron ore from Italy 128
iron ore from Sweden 121
iron and steel 74
iron and steel from Belgium 116
iron and steel from France 111
iron and steel from Germany 103
iron and steel from Great Britain 97
iron and steel from Russia 133
lead 244
lead from England 259
lead from France 258
lead from Germany 261
manganese ores from Cuba 312
manganese ores from Spain 321–322
pig iron from Spain 126
pig iron from Austria-Hungary 119
pig iron from Belgium 115
pig iron from Canada 134
pig iron from France 108
pig iron from Germany 102
pig iron from Great Britain 97
pig iron from Italy 130
pig iron and finished iron and steel 122
steel from France 110
zinc 270–271
Feldspar, summary 11
Ferromanganese 297
imports 56
production 52
Ferrosilicon, imports 56
Fleitmann, Theodore, process for rolling nickel plate 338
Flint, summary 11
Fluorspar, summary 10
Foster, Le Neve, quoted on composition of Witwatersrand banket 166
France, Bessemer and open-hearth steel 108
coal exports 107
coal imports 106
coal production 106, 416
copper consumption 229
copper exports 229
copper imports 228
copper trade 228

Page.
France, gold-bearing pudding stones 178
iron and steel exports 111
iron and steel imports 111
iron-ore exports 105
iron ore imports 104
iron-ore production 104
lead exports 258
lead imports 258
lead production 258
manganese production 317
miscellaneous steel production 109
pig-iron exports 108
pig-iron imports 108
pig-iron production 107
steel exports 110
steel imports 110
steel-rails 110
France and Spain, zinc 274
Franklin copper mine, report of 201
Franklinite ore mines, New Jersey, ownership of 266
Franklinite residuum 25
Fuels, pig-iron production by 52-53
summary 7
Fuller's earth, summary 11
Gap nickel mine, Pennsylvania, operations of 329
Gellivare, Sweden, iron-ore district 131
Georgia, coal 481
manganese ores 293, 305
Germany, copper consumption of 230
coal production 100, 416
copper exports 232
copper imports 231
copper production 219, 231
copper trade 230
iron and steel exports 103
iron and steel industry 98
iron-ore production 99
lead exports 261
lead imports 261
lead production 261
manganese production 316
pig-iron exports 102
pig-iron imports 102
pig-iron production 101
steel production 103
steel-rail production 103
Germany and Luxemburg, pig-iron 57
Gogebic iron range 27
analyses of ores 28
Gold-bearing pudding stones, Australia 182
France 178
New Zealand 183
Gold deposition of Witwatersrand, South Africa 156
Gold distribution of Witwatersrand banket 168
Gold production, Witwatersrand banket 154
Gold and silver 141
production, by States 141, 147
production since 1792 150-151
rank of producing States 148
summary 6
Great Britain, Bessemer steel production 95

Page.
Great Britain, Bessemer steel ingot and rail production compared with that of United States 66
Bessemer steel-rail production 96
coal exports 93
coal imports 94
coal production 92, 93, 415
copper imports and exports 223
iron and steel exports, all kinds 97
iron and steel imports 98
iron ore exports 92
iron-ore imports 91
iron-ore production 91
lead consumption 261
lead imports 260
lead production 258
manganese ores 317
manganese production 318
open-hearth steel production 95
open-hearth steel rail production compared with that of United States 67
pig-iron exports 97
pig-iron production 57, 90, 94
steel production 67, 96
zinc production 274
Grindstones, summary 9
Gypsum, summary 9
Hammond, John Hays, quoted on auriferous region of Matabeleland and Mashonaland 157
Harrison, J. W., report on coal trade of San Francisco, Cal 458
Hartt, C. F., quoted on gold-bearing pudding stones in Nova Scotia 178
Head, Jeremiah, quoted on manganese ores in Canada 311
quoted on manganese ore deposits of northern Spain 322
Hills, R. C., quoted on manganese in Colorado 301
Hungary, copper 219
Hybinette, N. V., patented nickel refining process 334
Illinois, Bessemer steel rail production 63
Bessemer steel-ingot production 60
coal 483
wire-nail production 73
zinc 264
Illinois Steel Company, ore-handling machinery 43
Imports, aluminum 284
antimony 345
coal 411
coal into Canada 143
coal into France 106
coal into Great Britain 94
coal into Russia 133
coal into Spain 125
coal and coke into Austria-Hungary 119
coal and coke into Italy 129
cobalt oxide 336
copper 206-209
copper into France 228
copper into Great Britain 224-225

Page.
Imports, copper into Great Britain and France from United States ... 226-227
copper into Liverpool, Swansea, and London ... 225-226
lead ... 242, 247
lead into France ... 258
lead into Germany ... 261
iron ore ... 75
iron ore, amount and value 1896 ... 44
iron ore into France ... 104
iron ore into Great Britain ... 91
iron ore into Italy ... 128
iron and steel ... 73
iron and steel into Belgium ... 116
iron and steel into France ... 111
iron and steel into Great Britain ... 98
iron and steel into Russia ... 133
iron and steel, foreign value of ... 74
manganese ... 296
nickel ... 337
pig iron ... 55
pig iron into Austria-Hungary ... 119
pig iron into Belgium ... 114
pig iron into Canada ... 134
pig iron into France ... 108
pig iron into Germany ... 102
pig iron and iron into Sweden ... 122
pig iron into Italy ... 129
spiegeleisen, ferromanganese and ferrosilicon ... 56
steel into France ... 110
tin plates ... 72
zinc ... 267-269
India, manganese ... 325
coal ... 420
Indiana, coal ... 506
wire-nails ... 73
Indian Territory, coal ... 513
Infusorial earth, summary ... 9
Iowa, coal ... 515
Iron and steel and allied industries in all countries, paper by James M. Swank on ... 51
authorities quoted ... 139
Iron and steel, Austria and Hungary ... 116
Belgium ... 112, 116
Canada ... 133
exports ... 74
exports from France ... 111
exports from Germany ... 103
exports from Great Britain ... 97
exports from Sweden ... 122
France ... 104
Germany ... 98
imports ... 73, 74
imports into Belgium ... 116
imports into France ... 111
imports into Great Britain ... 98
Italy ... 127
Russia ... 130
Spain ... 124
summary ... 5
Sweden ... 120
value of imports and exports in Canada ... 135
vessels built of ... 78

Page.
Iron and steel rails, imports into Sweden ... 122
miles in use, 1880 to 1895 ... 77
Iron ores, Algeria ... 105
Austria-Hungary ... 117
Belgium ... 112
Bilboa district, Spain ... 125
Canada ... 133
Cuban shipments to United States ... 75
exports from Belgium ... 113
exports from Bilboa district, Spain ... 125
exports from Canada ... 133
exports from France ... 104
exports from Great Britain ... 92
exports from Italy ... 128
exports from Sweden ... 121
France ... 104
Germany and Luxemburg ... 99
Great Britain ... 91
imports ... 75
imports into Belgium ... 112
imports into France ... 104
imports into Great Britain ... 91
imports into Italy ... 128
Island of Elba ... 127
Italy ... 127
Lake Superior region ... 26, 34, 90
Michigan ... 26, 35
Minnesota ... 26
New Mexico, analyses ... 48-50
other countries ... 135
paper by John Birkinbine on ... 23
production ... 23, 25, 41
prominent mines in United States ... 38, 39
Rocky Mountain region ... 45
Russia ... 131
Spain ... 124
stocks at lower lake ports ... 43
stocks on hand in various States, 1895 and 1896 ... 42
Sweden ... 120
valuation ... 40
various States ... 35
Wisconsin ... 26
world's production, by countries ... 136
Iron rails, production ... 62, 71
Iron, rolled, production ... 69
Italy, coal and coke imports ... 129
coal exports ... 129
coal production of ... 128, 421
copper production ... 219
iron and steel ... 127
iron-ore exports ... 128
iron-ore imports ... 128
iron-ore production ... 127
manganese, production of ... 317
pig-iron exports ... 130
pig-iron imports ... 129
pig-iron production ... 129
steel production ... 130
Japan, copper production ... 220
manganese ore production ... 325
Kansas, coal ... 524
lead ... 251
zinc ... 264
Kearsarge copper mine, report of ... 201

Page.
Kennedy, Hugh, report on White Pine (Colo.) iron ore ... 46
Kentucky, coal ... 529
iron-ore industry ... 38
labor at mines ... 534
Kirchhoff, Charles, paper on copper by ... 185
paper on lead by ... 237
paper on zinc by ... 263
Knight, W. C., quoted on gold-bearing pudding stones of Wyoming ... 180
Koch, Dr. A., quoted on composition of Witwatersrand banket ... 165
Krause, P. R., quoted on distribution of gold in Witwatersrand banket ... 169
Labor in coal mines ... 375-377
Lake Superior copper, prices, by months 215-216
Lake Superior copper mines, production ... 196-198
Lake Superior iron ores, analyses ... 28-32
prices at lower lake ports ... 33
royalties paid ... 33
shipments ... 90
values, how fixed ... 34
Lake Superior and Ishpeming Railroad, effect on iron production ... 35
Lake Superior region, iron ores ... 26
manganiferous iron-ore production ... 308
Lamb, William, report on coal trade of Norfolk, Va ... 457
Langson, William J., report on coal trade, Milwaukee, Wis ... 446
Lead, Coeur d'Alene district ... 252
British consumption of ... 261
Canada ... 262
consumption of ... 241
domestic producers ... 251
exports ... 244
France ... 258
Germany ... 261
Great Britain ... 258
imports and exports ... 242
imports ... 248
Kansas ... 251
Missouri ... 251
paper by Charles Kirchhoff on ... 237
prices at New York, by months ... 253-255
Rocky Mountain region ... 252
sources of American ores of ... 240
Spain ... 257
summary ... 6
world's production, by countries ... 256-257
Lewis, Henry, quoted on marine origin of Witwatersrand banket ... 160
Lindgren, Waldemar, quoted on gold-bearing pudding stones in South Dakota ... 180
Luxemburg, iron ore ... 99
pig iron ... 101
McCalley, Henry, quoted on manganese in Alabama ... 299
McGuire, J. C., quoted on aluminum soldering ... 282
McKay, Alexander, quoted on auriferous conglomerates in New Zealand ... 183
Machines, coal mined by ... 461

Page.
Magnesite, summary ... 11
Manganese, Alabama ... 299
domestic product and imports compared ... 297
imports ... 296
Manganese ores, analyses of ... 299, 311, 312, 319-323
Brazil ... 313
California ... 300
Canada ... 311
Chile ... 313
Colorado ... 301
Cuba ... 312
exports from Cuba ... 312
exports from Spain ... 321, 322
Georgia ... 305
Germany ... 316, 317
Great Britain ... 317
India ... 325
Italy ... 318
Japan ... 325
New South Wales ... 326
New Zealand ... 327
occurrence of ... 298
paper by John Birkinbine on ... 291
Pennsylvania ... 310
prices, how fixed ... 298
production ... 293, 296
production and value ... 292, 317
Queensland ... 326
South Australia ... 327
South Carolina ... 310
Spain ... 318
summary ... 7
Sweden ... 325
Tennessee ... 310
Turkey ... 325
United States of Colombia ... 313
United States of Colombia, analyses ... 314, 315
Vermont ... 310
Virginia ... 310
world's production, by countries ... 299, 327
Manganiferous iron ores ... 293
Lake Superior region ... 300
Manganiferous silver ores, Montana ... 308
production of ... 295
Manganiferous zinc ores, production ... 295
production of New Jersey ... 309
Manhes, Peter, nickel concentration patents ... 334
Marbeau, Henri, patent on nickel alloy ... 339
Marquette iron range ... 27
iron-ore analyses ... 29-30
Maryland, coal ... 536
iron-ore industry ... 38
Mashonaland, auriferous region of ... 157
Matabeleland, auriferous region of ... 157
Menominee iron range, production ... 27
iron-ore analyses ... 31
Mesabi iron range, production ... 27, 36
iron-ore analyses ... 31, 32
Metals, summary ... 5
Metallic paint, summary ... 10
Metallic products of the United States in 1896 ... 12
Mexico, copper ... 219

Page.
Mica, summary 11
Michigan, coal 544
iron ores 26
iron-ore industry 35
Millstones, summary 9
Milwaukee, Wis., coal trade 446
Mine La Motte, Missouri, nickel in lead ore 329
Mineral products of the United States, 1880 to 1895 14-21
Mineral waters, summary 11
Minnesota, iron ores 26
iron-ore industry 35
Missouri, coal 545
iron ore 38
lead 251
nickel and cobalt 329
zinc 264
Mobile, Ala., coal trade 456
Molengraaff, G. A. F., quoted on schistose rocks of the Transvaal 158
Mond, Ludwig, nickel-refining process 334
Montana, coal 551
copper 186, 203
manganiferous silver ores 309
Murray, Charles B., report on coal trade of Cincinnati, Ohio 453
Murray nickel mine, Canada 332
Nails (cut), production 72
wholesale prices 82
Nails (wire), prices 86
production 73
Natural gas, summary 8
Nebraska, coal 556
Nevada, coal 556
nickel 329
New England, production of wire nails 73
Newfoundland, copper 219
New Jersey, iron-ore industry 37
manganiferous zinc ores 309
New Mexico, coal 557
iron ores 47, 48, 50
New South Wales, cinnabar, analysis of 290
coal 419
copper 220
manganese-ore 326
quicksilver 290
Newton, Henry, quoted on gold-bearing pudding stones in South Dakota 180
New York and New Jersey, production of wire nails 73
New York City, coal trade 423
New York, iron-ore industry 37
prices of tin plate 88
New Zealand, auriferous conglomerates 183
coal 419
manganese-ore 327
Nickel, alloys 342
Canada 330
coinage in 338
cost of 339
forged alloys of 342
imports 337
investigations into metallurgy of 341
magnetic compass 341
magnets made from 341

Page.
Nickel, malleable 341
manufacture 333
mining in Canada 333
Missouri 329
Nevada 329
North Carolina 329
Oregon 330
Pennsylvania 329
prices 340
production 335
refining processes 334
rolled plate 338
summary 7
uses 338
wire 338
Nickel Mountain, Oregon, deposits in 330
Nickel and cobalt, paper by Joseph Wharton on 329
sources of 329
Nonmetallic products of the United States, 1896 12-13
Norfolk, Va., coal trade 457
North America, copper 219-222
railroads 138
North Carolina, coal 560
manganese ores 309
nickel 329
North Dakota, coal 561
Norway, copper 219
Nova Scotia, gold-bearing pudding stones 178
Ocher, summary 10
Ohio, coal 562
production of Bessemer steel ingots 60
production of wire nails 73
Oilstones, summary 7
Open-hearth steel production, France 108
Great Britain 95
Spain 126
Sweden 123
Open-hearth steel ingots, United States production 59
comparative production in United States and Great Britain 67
Oregon, coal 570
nickel 330
Osceola copper mine, report 201
Packard, R. L., paper on aluminum by 281
Parker, Edward W., paper on antimony by 343
paper on coal by 351
Paulding County, Ga., manganese ores in 307
Pennsylvania, Bessemer-steel production 60
anthracite coal producers in 579-595
Bessemer steel rail production 63
coal, anthracite 571
coal, bituminous 597
coal fields 573
coal production and value 575-576
coal shipments 576-578
crucible-steel production 61
iron-ore industry 37
manganese ore production 310
nickel 329
open-hearth steel production 60
wire nails 73

Page.
Peru, copper 219
Petroleum, summary 8
Philadelphia, Pa., coal freight rates from 431
coal trade 428
prices of charcoal pig iron at 79
Phillips, J. A., quoted on gold-bearing pudding stones in France 178
Phosphate rock, summary 9
Picard, Theodore, quoted on gold-bearing pudding stones in France 178
Pig iron, American and British prices 81
Austria-Hungary 119
Belgium 114
Belgium 115
Bessemer production 52
British production compared with that of the United States 90
Canada 134
consumption 56
exports from Austria-Hungary 119
France 108
France 107
Germany 102
Germany and Luxemburg 101
Great Britain 94
Great Britain 97
imports 55
imports into Austria-Hungary 119
imports into Belgium 114
imports into Canada 134
imports into France 108
imports into Germany 102
imports into Italy 129
imports into Sweden 122
in warrant yards 54
Italy 129
Italy 130
other countries 135
prices 79, 80
principal countries 57
production by fuels 52, 53
Russia 132
Spain 126
Sweden 122
United States 51, 90
unsold, stocks of 54
value of 78
world's production of 58, 137
Pigments, summary 10
Platinum 349
summary 7
Poland, production of zinc, 1883 to 1896 274
Poole, H. S., quoted on gold-bearing pudding stones in Nova Scotia 178
Precious stones, summary 11
Preston, Elwyn G., notes on coal trade of Boston, Mass 426
Pre-Tertiary gold-bearing pudding stones 177
France 178
Nova Scotia 178
United States 179
Prices, American and British pig iron 81
American-Russia sheet iron 87
antimony 346–348
Bessemer steel rails 85
coal at Buffalo 435

Page.
Prices, coal at Cincinnati, Ohio 454
coal at Cleveland, Ohio 437
coal at Milwaukee, Wis 449
coal at mines, by States 378
coal at New York 424
coal at Philadelphia, Pa 429
coal at points of consumption 379–410
coal at St. Louis, Mo 456
coal at San Francisco, Cal 459
copper 215, 218
cut nails, wholesale 82
foreign tin plate 87
hammered bar iron at Philadelphia 82
lead at New York 253–255
manganese ores, how fixed 298
nickel 340
old range Lake Superior iron ores at lower lake ports 33
pig iron 79
rolled iron and steel 84
Russia sheet iron 83
tin plate at New York 88
utensils 89
wire nails 86
zinc at New York 272–274
Prussia, manganese 317
Pyrites, summary 10
Queensland, coal 419
manganese ores 326
Quicksilver 287
New South Wales 290
summary 6
Quincy copper mine, report of 199
production 200
Railroads, mileage in United States 76–77
mileage of the world, by countries 137
Rails, decline in imports of 65
iron production 71
iron and steel, miles in use 77
largest production of 65
production and consumption 62, 64–65
Rhine district and Belgium, zinc 274
Richards, T. W., quoted on atomic weights of nickel and cobalt 342
Rio Tinto Company (Spain) copper production 234
Robinson, T. W., analyses of New Mexico iron ores by 50
Rocky Mountain region, lead 252
iron ores 45
Rolled iron 69
Rolled iron and steel 70
prices 84
Royalties paid on Lake Superior iron ores 33
Russia, coal 131, 418
copper 232
copper, by districts 233
copper production 219
copper trade 232
imports and exports of coal, iron, and steel 133
iron and steel 130
iron ore 131
pig iron 132
sheet iron, prices 83

Page.
Russia, steel 132
steel rails 133
St. Louis, Mo., coal trade 454
Salt, summary 9
San Francisco, Cal., coal trade 458
Saward, F. E., quoted on coal trade of New York 423
Scott, F. A., notes on coal trade of Cleveland, Ohio 435
Seattle, Wash., coal trade 460
coal production 131
Sheet iron, American-Russia, prices 87
Sheet iron, Russia, prices 83
Sienna, summary 10
Silesia, zinc production 274, 279
Silver. (*See* Gold and silver.)
Silver, summary 6
Siskiyou County, California, auriferous conglomerate in 181
Smith, Denison B., report on coal trade of Toledo, Ohio, by 437
Soapstone, summary 11
South America, copper 219-222
railroads 138
South Australia, copper 220-222
manganese 326
South Carolina, manganese ores 310
South Dakota, gold-bearing pudding stones in 180
Spain, Bilboa district, iron-ore 125
Bessemer steel production 126
coal, imports and exports 125
coal production 125, 421
iron and steel 124
iron-ore production 124
lead production 257
manganese exports 321, 322
manganese production 318, 324
pig iron 126
steel 126-127
Spain and France, zinc 274
Spain and Portugal, copper 219
Spelter. (*See* Zinc.)
Spencer, Dr. J. W., quoted on manganese in Georgia 305
Spiegeleisen, imports 56
production 52
Spurr, J. E., quoted on auriferous conglomerate in Alaska 181
Steel, Alabama 36
Austria-Hungary 120
Belgium 115
Bessemer ingots and rails, comparative production in United States and Great Britain 66
Bessemer, production by States 60
Canada 135
crucible 61
crude 59
crude, production in United States and Great Britain 68
early manufacture in United States 58
exports from France 110
France 109
Germany 103
imports into France 110

Page.
Steel, open hearth, comparative production in United States and Great Britain 67
open hearth, production 60
Great Britain 96
Italy 130
production, all kinds 90
Russia 132
Spain 127
Sweden 124
world's production 68
world's production, by countries 137
Steel rails, Belgium 116
France 110
Germany 103
production and prices 85
Russia 133
Stobie nickel mine, Canada, operations at 331
Stone, summary 8
Street rails, production 64
Structural materials, summary 8
Sudbury, Canada, nickel mining in 330
Sulphur, summary 10
Summary 5
Sundheim, Carlos, quoted on manganese in Spain 319
Swank, James M., on iron and steel and allied industries in all countries 51
Sweden, copper 219
Bessemer steel ingots and castings, production 123
coal 121, 421
crucible and blister steel 123
iron and steel 120
iron ore 120
iron ore exports 121
manganese ore 324, 325
open-hearth steel ingots 123
pig-iron 122
pig iron and finished iron and steel exports 122
pig iron and iron and steel rails imports 122
steel 124
Taft, H. H., quoted on iron ores in Colorado 40
Tamarack copper mine, report 199
Tariff duties on coal, 1824 to 1896 411
Taylor, Charles L., report on White Pine, Colo., iron ore 46
Tennessee, coal 606
iron-ore industry 37
manganese 310
Texas, coal 611
Tharsis Copper Company, Spain, operations 235
Thurston, William, notes on coal trade of Buffalo, N. Y. 432
Tin plates, imports 72
prices at New York 87, 88
production 71
Tin utensils, prices 89
Toledo, Ohio, coal trade 437
Topley, W., quoted on theories of gold deposition in Witwatersrand banket 169
Transvaal, gold fields of 156

Page.
Transvaal, main reef series 158
Turkey, manganese ores 325
Umber, summary 10
United States of Colombia, manganese 313
Utah, coal 610
Venetian reds, summary 13
Venezuela, copper 219
Vermilion iron range 27
iron ore, analyses 32
Vermont, manganese 310
Victoria, coal 420
Virginia, coal 615
manganese 310
manganese ore 293
Vulcan coal mine explosion, Colorado 473
Washington, coal 617
Weeks, Jos. D., quoted on manganese 298, 300
West Virginia, coal 621
Wharton, Joseph, paper on nickel and cobalt 329
White Pine, Colo., iron ore analyses 46
Wilkinson, C. S., quoted on auriferous conglomerate in Australia 182
Wire nails, prices by months 86
production 73
Wisconsin, iron ores 26
iron-ore industry 37
Witwatersrand banket, composition of 165
distribution of gold in 168
gold product of 154
impregnation theory concerning 170
marine origin of 160
marine-placer theory 173

Page.
Witwatersrand banket, paper by George F. Becker on 153
precipitation theory 172
theories of deposition 169
Wood, Harrie, quoted on auriferous conglomerate in Australia 182
World's principal pig-iron producers 57
World's production, coal 414
iron ore, coal, pig iron, and steel, by countries 136
lead, by countries 256-257
manganese ores, by countries 327-328
pig iron 58
steel 68
World, railroads of, by countries 137
Wyoming, coal 629
gold-bearing pudding stones in 180
iron ore 47
Zinc, consumption in leading countries 279
consumption in United States 269
exports 270-271
foreign production, by countries 274
imports 267-269
mines and works in Silesia, number of persons employed in 280
paper by Charles Kirchhoff on 263
prices at New York 272-274
production 263-265, 275, 279
properties in Kansas and Missouri, development of 267
stocks 265
summary 6
Zinc white, summary 11

O