NINETEENTH ANNUAL REPORT

OF THE

UNITED STATES GEOLOGICAL SURVEY

TO THE

SECRETARY OF THE INTERIOR

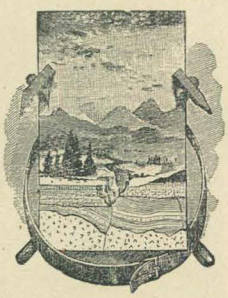
1897-98

CHARLES D. WALCOTT
DIRECTOR

IN SIX PARTS

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1897
METALLIC PRODUCTS, COAL, AND COKE

DAVID T. DAY, CHIEF OF DIVISION



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CONTENTS.

QUICKSILVER.

NICKEL AND COBALT.

ANTIMONY, BY EDWARD W. PARKER.

CHROMIC IRON ORE.

PLATINUM, BY DAVID T. DAY.

COAL, BY EDWARD W. PARKER.

COKE, BY EDWARD W. PARKER.

ILLUSTRATIONS.

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF MINERAL RESOURCES,
Washington, D. C., September 1, 1898.

SIR: I have the honor to transmit the fourteenth annual report on the mineral resources of the United States. It bears the title Mineral Resources of the United States, 1897. As usual, it carries the statistical record of the mineral developments of this country to the end of the calendar year concerned, in this case to December 31, 1897, and contains in addition much descriptive matter collected while the statistical canvas was being finished. Much of the matter has found prompt publication in accordance with the law providing for the printing of each chapter as soon as completed.

In accordance with your instructions, the report for the calendar year 1898 is in preparation.

Very respectfully, your obedient servant,

DAVID T. DAY,
Geologist in Charge.

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

MINERAL RESOURCES OF THE UNITED STATES, 1897.

DAVID T. DAY, *Chief of Division.*

INTRODUCTION.

The scope and arrangement of the subjects in this volume are practically the same as in the thirteen volumes of the series, Mineral Resources of the United States, which have preceded it. The object of the volume is to record the developments in the mineral industries of the United States since the last report. The reports should be consulted together. Every chapter treated in this report, with the exception of the compilation of existing information concerning the mineral resources of Hawaii, is a census of the industry as complete as possible with the means at disposal. The statistics of the production of gold and silver are, as usual, the work of the Director of the Mint, Treasury Department, and are accepted as official. The statistics of the imports and exports of minerals, which form an essential part of this volume, are obtained through the courtesy of the Chief of the Bureau of Statistics, Treasury Department.

The following brief statement gives in condensed form the principal statistical information in the two volumes which make up this report.

SUMMARY.

It will be noted that while the normal increase which we may expect in the total value of our mineral products is about $25,000,000 annually, the totals for the various years are markedly irregular. The total valuation for 1897 is $632,312,347, which is less than a normal increase, being only $8,575,621 greater than the mineral products of 1896, when the total value was $623,736,726. Nevertheless, this total for 1897 is the greatest in the history of the country, except that for 1892. It was reached owing to the remarkable increase over 1896 in the value of almost all of the important metallic products, especially pig iron, gold, copper, lead, and zinc. Copper and zinc reached their greatest production and value. Proportionately, aluminum made the largest increase, its product being more than three times that of 1896. The metallic products made a gain of $14,601,596 over 1896, while the nonmetallic

products fell off $6,025,975. The principal contributors to this decrease in value were petroleum and anthracite coal. On the other hand, bituminous coal, stone, natural gas, cement, and salt made notable advances in value.

METALS.

Iron and steel.—The year 1897 proved to be a record breaker in the production of pig iron, 9,652,680 long tons being produced, as compared with 8,623,127 tons in 1896, an increase of 1,029,553 tons, or 11.94 per cent; and 9,446,308 tons in 1895, an increase of 206,372 tons, or 2.18 per cent. While the quantity of pig iron made in 1897 exceeded that of any previous year, the value was $95,122,299, or $10,076,251 less than the somewhat smaller product of 1895, when the total value was $105,198,550. In 1896 the value of the product was $90,250,000. The average price per ton has steadily declined in the last three years—from $11.14 in 1895 to $10.47 in 1896, and $9.85 in 1897. Bessemer steel ingots increased from 3,919,906 long tons in 1896 to 5,475,315 tons in 1897, a gain of 1,555,409 tons, or 39.68 per cent. The production of open-hearth steel ingots and castings increased from 1,298,700 tons in 1896 to 1,631,843 tons in 1897, an increase of 333,143 tons, or 25.65 per cent. The value of all Bessemer steel in the form of rails and billets in 1897 was $77,050,000; that of open-hearth steel in the form of billets was $24,275,000.

Iron ores.—The value of the iron ores produced in the United States in 1897 was $18,953,221, as compared with $22,788,069 in 1896. Although there was this considerable decrease in the value of the iron-ore product, the quantity increased from 16,005,449 long tons in 1896 to 17,518,046 long tons in 1897. The average price per ton in 1896 was $1.42, as compared with $1.09 in 1897.

Gold.—The gold product continued to increase, and in 1897 was valued at $57,363,000, as compared with $53,088,000 in 1896.

Silver.—The coining value of the silver product in 1897 was $69,637,172, or a commercial value of $32,316,000. In 1896 the coining value of the silver product was $76,069,236, or a commercial value of $39,655,000. This is a decrease in 1897 of $6,432,064 in the coining value and of $7,339,000 in the commercial value.

Copper.—The copper industry continues to be in a flourishing condition. The product in 1897 was 491,638,000 pounds, or 245,819 tons, valued at $54,080,180, the greatest product ever obtained in the United States. In 1896 the product was 460,061,430 pounds, valued at $49,456,603. The average price per pound in 1896 was 10.5 cents; in 1897 it was 11 cents.

Lead.—The lead product also increased from 188,000 short tons in 1896 to 212,000 tons in 1897, which is the largest product ever attained in this country. The value also increased from $10,528,000 in 1896 to $14,885,728 in 1897.

Zinc.—This product also contributed to the general increase in the value of the metallic products of the United States in 1897. In 1896 the product was 81,499 short tons, valued at $6,519,920; in 1897 it was 99,980 tons, valued at $8,498,300.

Quicksilver.—The product declined from 30,765 flasks in 1896, worth $1,075,449, to 26,648 flasks in 1897, worth $993,445. The industry is confined practically to California. The Texas deposit is still undeveloped.

Aluminum.—The product of aluminum and the variety of its uses continue to increase. In 1896 the product was 1,300,000 pounds; in 1897 it increased over threefold, or to 4,000,000 pounds. The value increased from $520,000 in 1896 to $1,500,000 in 1897.

Nickel.—The product of the United States continues to be derived as a by-product, and, while small, showed a slight increase in 1897. In 1896 the product was 17,170 pounds, worth $4,464; in 1897 it was 23,707 pounds, valued at $7,823. The Canadian mines continue to furnish the principal supply.

Platinum.—The product was 150 ounces, worth $900, in 1897, as compared with 163 ounces in 1896, valued at $944.

Manganese ore.—The product of manganese increased slightly, or from 10,088 long tons in 1896, valued at $90,927, to 11,108 tons in 1897, worth $95,505.

Antimony.—The total amount of metallic antimony produced in 1897 was 756 short tons, having a value of $109,655, as compared with 601 short tons in 1896, worth $84,290. A large portion of the product was from foreign ores smelted in New Jersey. The amount of antimony ore, or stibnite, mined in the United States during the year was 489 short tons, valued at $8,864.

FUELS.

Coal.—The total product of coal in 1897 amounted to 178,769,344 long tons, equivalent to 200,221,665 short tons, as compared with 171,416,390 long tons, or 191,986,357 short tons in 1896. The production in 1897 was the largest ever attained, the product last year in short tons exceeding 200,000,000 for the first time in our history. The production of anthracite coal in Pennsylvania showed a decrease of 1,709,213 long tons as compared with 1896, and of 4,971,048 long tons as compared with the product of 1895, which was the year of maximum production for anthracite coal. It follows, therefore, that the entire increase in the total production of coal in 1897 was in the output of bituminous coal, which increased from 122,893,104 long tons, or 137,640,276 short tons, in 1896, to 131,955,270 long tons, or 147,789,902 short tons, in 1897. The increase in the bituminous product was, therefore, 9,062,074 long tons, or 10,149,626 short tons, and made a net increase in the total product of coal in 1897 of 7,352,954 long tons, or 8,235,308 short tons. The net increase in the value of the product in

1897 as compared with 1896 was $2,229,012, the difference being an increase of $4,848,537 in the value of the bituminous product and a decrease of $2,619,525 in the value of the anthracite product. The total value of the product obtained in 1897 was $198,869,178, against a total value in 1896 of $196,640,166. This was divided as follows: Anthracite value in 1897, $79,129,126; in 1896, $81,748,651; bituminous value in 1897, $119,740,052; in 1896, $114,891,515. The product of bituminous coal in all cases includes a small amount of anthracite coal produced in Colorado and New Mexico; also semianthracite mined in Arkansas and Virginia, the lignite coals of Colorado, North Dakota, California, Oregon, and Texas, and semibituminous, cannel, splint, and block coals.

A study of the conditions which affected the coal-mining industry in 1897 reveals the fact that the higher prices of anthracite coal which prevailed during the last two years, and which have been due to a cooperation among the producers for the purpose of restricting production and maintaining prices, have resulted in the adoption by large consumers of other kinds of fuel. Bituminous coal is, with the use of smoke-consuming furnaces, superseding anthracite coal for steam raising. Iron furnaces formerly using anthracite coal, or a mixture of anthracite coal and coke, are substituting coke or a mixture of bituminous coal and coke, and the use in kitchen ranges and household furnaces of prepared sizes of coke is increasing. The use of gas for domestic purposes, particularly in summer, is also increasing. Anthracite producers in 1897 were successful in maintaining prices, the average per ton for the year being $1.85, which was the same as that which obtained during 1896. The price of bituminous coal, on the other hand, was somewhat lower, and continues an uninterrupted succession of lower annual prices since 1887. The average price for all coals included in the bituminous product was 81 cents in 1897, against 83 cents in 1896 and $1.12 in 1887. In arriving at the average price of anthracite coal, only the marketed product is considered. The amount consumed at the collieries, which consists usually of culm or slack, an otherwise wasted product, is excluded from the value. The value of the bituminous coal includes all sizes, for, while the colliery consumption usually consists of slack coal, it has a market value.

Coke.—Stimulated by a year of exceptional activity in the iron and steel industries of the United States, the production of coke increased from 11,788,773 short tons in 1896 to 13,288,984 short tons in 1897. While this was an increase of a little over 1,500,000 tons as compared with 1896, it was about 45,000 tons less than the product in 1895, which was, in coke production as in the production of anthracite coal, the year of maximum output. The value of the coke product in 1897 was only $440,000 more than that of 1896, the proportionately higher value in the former year being due to higher prices set by the larger producers of Connellsville coke. Early in the year the large concerns in the

Connellsville region put the prices of their product at $2 per ton for furnace, $2.30 for foundry, and $2.35 for crushed, and maintained these prices throughout the year. The average price per ton realized for the entire coke product of 1896 was $1.837; in 1897 the average price per ton was $1.663.

Petroleum.—The product decreased slightly, from 60,960,361 barrels of 42 gallons each in 1896 to 60,568,081 barrels in 1897. The remarkable feature of the petroleum industry throughout the year was the break in prices, resulting in a decrease in the total value from $58,518,709 to $40,929,611, a loss of practically 30 per cent.

Natural gas.—The product of natural gas continued to decrease, but the higher prices set by producers for their product caused the total value in 1897 to show a slight increase over the total value in 1896, the figures for the two years being, respectively, $13,002,512 and $13,826,422.

STRUCTURAL MATERIALS.

Stone.—The total value of stone of all kinds increased from $31,346,171 in 1896 to $36,070,651 in 1897. The export of slate continued to be one of the leading features of the trade, notwithstanding the settlement of the strikes in the slate-quarrying region of Wales. The continued increased demand for the more highly finished products of the stone quarries remained a feature of the year.

Clays.—There was a slight decline in the general volume of the clay industry. In 1896 the value of the brick clays aggregated about $9,000,000 in the crude state, and that of other clays $800,000. In 1897 the brick clays were valued, in the crude state, at about $8,000,000, and all other clays at about $1,000,000. The total value of wares made from clay in 1897 was $60,911,641; in 1896 it was $62,528,963.

Cement.—Natural-rock cement continued to increase. In 1896 the product was 7,970,450 barrels (of 300 pounds each), worth $4,049,202; in 1897 it was 8,311,688 barrels, worth $3,862,392. It will be noted that in spite of the increased output the value declined slightly. The increase in the Portland-cement product was much more marked—from 1,543,023 barrels in 1896, worth $2,424,011, to 2,677,775 barrels, worth $4,315,891, in 1897. The number of Portland-cement works increased from 26 to 29.

ABRASIVE MATERIALS.

Millstones.—The value of the product in 1897 showed a slight increase over that of 1896, and although amounting altogether to only $25,932, was the largest value reported since 1889. The value of millstones produced in 1896 amounted to $22,567, indicating an increase in 1897 of $3,365. Millstones of domestic production are used chiefly for grinding paint ores, cement rock, and the coarser cereals. Their use in flouring mills has been superseded by the roller process.

Grindstones.—The product was the largest in any year since 1891, being valued at $368,058, an increase of $41,232 over the value of the product in 1896, and exceeding the value of grindstones produced in 1895 by over 75 per cent.

Corundum and emery.—The production of corundum and emery has shown very little change in the last three years, the quantity mined in 1897 amounting to 2,165 short tons, against 2,120 short tons in 1896 and 2,102 short tons in 1895. The value of the product in 1897 was $106,574, a decrease from 1896 of $6,672, and an increase compared with 1895 of $318.

Oilstones.—The value of this class of abrasives produced in the United States in 1897 was $149,970, against a value of $127,098 in 1896. The production is practically controlled by one concern.

Infusorial earth.—Including the product of tripoli from Virginia, the output of infusorial earth in 1897 was 3,833 short tons, valued at $22,835, against 3,846 short tons, valued at $26,792, in 1896.

Garnet.—Abrasive garnet produced in the United States in 1897 amounted to 2,554 short tons, valued at $80,853, a slight decrease in quantity and an increase in value as compared with 1896.

Pumice stone.—A commercial product of this material is reported for the first time in 1897, the total output amounting to 158 tons, which was shipped to Chicago for preparation for market.

CHEMICAL MATERIALS.

Phosphate rock.—The development of phosphate-rock mines in Tennessee was active during 1897, and the product from that State amounted to 128,723 long tons. Florida produced 552,342 long tons, and South Carolina 267,380 long tons of land rock and 90,900 long tons of river rock. The total product for the United States amounted to 1,039,345 long tons, an increase of nearly 100,000 tons over the product of 1896, but less than 1,000 tons in excess of the product in 1895. Prices continue to decline, the value of the product in 1897 being $2,673,202, against a value of $2,803,372 for the smaller product in 1896.

Gypsum.—The product of crude gypsum in 1897 amounted to 288,982 short tons, as compared with 224,254 short tons in 1896. The product in 1897 was the largest on record, and that in 1896 was the smallest in six years. Taking the value of the material in the condition in which it was first sold, the product in 1897 was worth $755,864, an increase of $182,520 over 1896, but less than the value in 1894 and in 1895.

Salt.—The production of salt in 1897 was phenominally large, amounting to 15,973,202 barrels of 280 pounds, as compared with 13,850,726 barrels in 1896. The value of the product increased $879,181—from $4,040,839 in 1896 to $4,920,020 in 1897. The average price per barrel received by producers, exclusive of the cost of package, in both years was 30 cents, a fraction over 10 cents for 100 pounds. An agreement

was effected among the producers in Michigan to uphold prices, with the result that the average for the State advanced from 22.7 cents in 1896 to 31.4 cents in 1897, but this was not sufficient to effect an increase in the average price for the entire salt product.

Bromine.—The industry continues in the hands of the sales syndicate, the product in 1897 being 487,149 pounds, with a value at the works of $129,094, a decrease from the product of 546,580 pounds, valued at $144,501, in 1896. This product includes the bromine in potassium bromide made directly.

Sulphur.—The product decreased in 1897, owing to the works in Louisiana being shut down the greater part of the year. The total output in 1897 was 2,275 short tons, only 43 per cent of the amount produced in 1896, when the product amounted to 5,260 short tons. The value declined from $87,200 in 1896 to $45,590 in 1897.

Pyrites.—The substitution of pyrites for sulphur in the manufacture of sulphuric acid is on the increase. The production of iron pyrites for acid manufacture in 1897 amounted to 143,201 long tons, against 115,483 tons in 1896, making the largest output ever recorded. The value advanced from $320,163 in 1896 to $391,541 in 1897.

Borax.—The product in 1897 amounted to 16,000,000 pounds, valued at $1,080,000, an increase from 13,508,000 pounds, worth $675,400 in 1896.

Fluorspar.—The product shows a decrease from 6,500 short tons, valued at $52,000 in 1896, to 5,062 short tons, valued at $37,159 in 1897.

PIGMENTS.

Metallic paint.—The product, exclusive of mortar colors, increased from 14,805 short tons, valued at $180,134 in 1896, to 16,699 short tons, valued at $187,694 in 1897. The production of mortar colors decreased from 9,660 in 1896 to 8,237 short tons in 1897.

Ocher, umber, and sienna.—The production of ocher decreased slightly, from 14,074 short tons in 1896 to 14,006 short tons in 1897. The value increased from $136,458 to $162,764. The production of umber increased from 165 to 480 short tons, and the production of sienna from 395 to 620 short tons, with proportionate increase in value.

Venetian red.—The production of 1897 was more than three times that of 1896, the phenominal increase being due to the bringing in of a large product from Illinois, which is reported as a source of supply for the first time in 1897.

Zinc white.—The use of zinc white as a base for white and color pigments is increasing, the production in 1897 amounting to 25,000 short tons, worth $1,750,000, an increase of 25 per cent over 1896. Prices remained steady.

Barytes.—The production in 1897 increased a little more than 50 per cent over that of 1896, amounting to 26,042 short tons, against 17,068

short tons the previous year. The value increased 25 per cent—from $46,513 to $58,295.

Cobalt oxide.—The product increased from 10,700 pounds, worth $15,301 in 1896 to 19,520 pounds, worth $31,232 in 1897.

MISCELLANEOUS.

Fuller's earth.—This product continues to come practically entirely from Florida, the beds in Georgia noted in the last report having not yet been developed. The product in 1897 was 17,113 short tons, valued at $112,272, as compared with 9,872 short tons in 1896, worth $59,360.

Precious stones.—The product increased 33.54 per cent, or from $97,850 in 1896 to $130,675 in 1897. The principal features of the year were the increased output of sapphires from Montana, the development of turquoise deposits in New Mexico, Arizona, California, and Nevada, and the finding of large quantities of gigantic quartz crystals at Mokelumne Hill, California. The importation of diamonds also increased markedly upon the reduction of the import duties.

Mica.—The amount of sheet mica produced in 1897 exceeded that of any year since 1885, aggregating 82,676 pounds. To this should be added 740 tons of scrap mica, ground for manufacture into lubricants, wall papers, boiler covering, etc. The value of the sheet mica produced in 1897 was $80,774, and that of the scrap mica $14,452, a total of $95,226. In 1896 the value of the scrap mica was $1,750 and of sheet mica $65,441, a total of $67,191.

Feldspar.—The product increased from 9,114 long tons in 1896, worth $35,200, to 11,175 tons in 1897, worth $43,100.

Flint.—This is chiefly quartz, ground for potters' use. The product increased from 11,124 long tons in 1896, valued at $24,226, to 11,952 tons in 1897, valued at $26,227.

Asphaltum.—The product in 1897 amounted to 75,945 short tons, valued at $664,632, against 80,503 short tons in 1896, worth $577,563. It will be noted by this that while the output in 1897 decreased 4,558 tons, the value not only showed a marked increase ($87,069), but reached the highest figure ever recorded.

Asbestos.—The product showed a slight increase, from 504 short tons in 1896, valued at $6,100, to 580 tons in 1897, valued at $6,450. The Canadian deposits continue to supply by far the larger part of this material used in the United States.

Magnesite.—This product comes entirely from California. It was 1,143 short tons in 1897, worth $13,671. In 1896 the product was 1,500 tons, worth $11,000.

Graphite.—The production during 1897 amounted to 1,254,402 pounds of crystalline and refined plumbago, and 1,108 short tons of amorphous graphite and graphitic coal. The value of these products was, respectively, $43,099 and $11,178. In 1896 the product of crystalline plum-

bago was 535,858 pounds, and of the amorphous variety 760 short tons. The total value of both these varieties in 1896 was $48,460.

Soapstone.—In 1897 the product was 21,923 short tons, worth $365,629, against 22,183 tons in 1896, valued at $354,065. The product of fibrous talc increased from 46,089 short tons in 1896, valued at $399,443, to 57,009 short tons in 1897, worth $396,936.

Mineral waters.—The quantity of mineral waters sold continued to decline, there being 23,255,911 gallons sold in 1897 and 25,795,312 gallons in 1896. Nevertheless, the value of the product increased from $4,136,192 in 1896 to $4,599,106 in 1897.

Limestone for iron flux.—This product gained slightly, or from 4,120,102 long tons in 1896, valued at $2,060,000, to 4,247,688 long tons in 1897, worth $2,124,000.

Bauxite.—The product increased slightly, from 18,364 long tons in 1896, worth $47,338, to 20,590 long tons in 1897, valued at $57,652.

Monazite.—The product of monazite, which came entirely from North Carolina, increased from 30,000 pounds in 1896 to 44,000 pounds in 1897, while the value increased from $1,500 in 1896 to $1,980 in 1897.

Metallic products of the United States in 1897.

Product.	Quantity.	Value.
Pig iron, value at Philadelphia..long tons..	9,652,680	$95,122,299
Silver, coining value.....troy ounces..	53,860,000	69,637,172
Gold, coining value.....do....	2,774,935	57,363,000
Copper, value at New York City..pounds..	491,638,000	54,080,180
Lead, value at New York City..short tons..	212,000	14,885,728
Zinc, value at New York City.....do....	99,980	8,498,300
Quicksilver, value at San Francisco..flasks..	26,648	993,445
Aluminum, value at Pittsburg....pounds..	4,000,000	1,500,000
Antimony, value at New York City, short tons.....	756	109,655
Nickel, value at Philadelphia.... pounds..	23,707	7,823
Platinum (crude), value at San Francisco, troy ounces.....	150	900
Total.....	.....	302,198,502

Nonmetallic products of the United States in 1897.

Product.	Quantity.	Value.
Bituminous coal ..... short tons..	147,789,902	$119,740,052
Pennsylvania anthracite..... long tons..	46,814,074	79,129,126
Building stone	.....	36,070,651
Petroleum..... barrels..	60,568,081	40,929,611
Natural gas	.....	13,826,422
Brick clay.....	.....	8,000,000
Clay, all other than brick..... long tons..	.....	1,000,000
Cement..... barrels..	10,989,463	8,178,283
Mineral waters ..... gallons sold..	23,255,911	4,599,106
Phosphate rock..... long tons..	1,039,345	2,673,202
Salt..... barrels..	15,973,202	4,920,020
Limestone for iron flux..... long tons..	4,247,688	2,124,000
Zinc white..... short tons..	25,000	1,750,000
Gypsum ..... do....	288,982	755,864
Borax..... pounds..	16,000,000	1,080,000
Mineral paints..... short tons..	60,913	795,793
Grindstones	.....	368,058
Fibrous talc..... short tons..	57,009	396,936
Asphaltum..... do....	75,945	664,632
Soapstone..... do....	21,923	365,629
Precious stones.....	.....	130,675
Pyrites..... long tons..	143,201	391,541
Corundum and emery..... short tons..	2,165	106,574
Oilstones, etc.....	.....	149,970
Garnet for abrasive purposes..short tons..	2,554	80,853
Mica (sheet)..... pounds..	82,676	80,774
Mica (scrap)..... short tons..	740	14,452
Barytes (crude) ..... long tons..	26,042	58,295
Bromine ..... pounds..	487,149	129,094
Fluorspar ..... short tons..	5,062	37,159
Feldspar ..... long tons..	11,175	43,100
Manganese ore ..... do....	11,108	95,505
Flint..... do....	11,952	26,227
Monazite..... pounds..	44,000	1,980
Graphite (crystalline)..... do....	1,254,402	43,099
Graphite (amorphous) ..... short tons..	1,108	11,178
Bauxite..... long tons..	20,590	57,652
Sulphur ..... short tons..	2,275	45,590
Fullers earth..... do....	17,113	112,272
Marls..... do....	60,000	30,000
Infusorial earth and tripoli ..... do....	3,833	22,835
Millstones.....	.....	25,932

Nonmetallic products of the United States in 1897—Continued.

Product.	Quantity.	Value.
Chromic iron ore ..... long tons..	None.	None.
Cobalt oxide ..... pounds..	19,520	31,232
Magnesite ..... short tons..	1,143	13,671
Asbestos ..... do....	580	6,450
Rutile ..... pounds..	100	350

Résumé of the mineral products of the United States in 1897.

Total value of nonmetallic mineral products	$329,113,845
Total value of metallic products	302,198,502
Estimated value of mineral products unspecified	1,000,000
Grand total	632,312,347

Mineral products of the United States

	Product.	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 (crude), value 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	Oilstones, etc. *a* ..... 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

a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

for the calendar years 1880 to 1896.

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

	Product.	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 (crude), value 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. *a*.....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

a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

the calendar years 1880 to 1896—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

	Product.	1888. Quantity.	1888. 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 (crude), value 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	1,679,202
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. *a* ..... 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	Manganese 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 nonmetallic 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

a Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

for the calendar years 1880 to 1896—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

	Product.	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 (crude), value 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	505,191
36	Corundum.....short tons..	1,771	181,300
37	Oilstones, etc.....	.....	146,730
38	Mica.....pounds..	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 1896—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, 345	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

Mineral products of the United States for the calendar years 1880 to 1896—Continued.

	Product.	1896.	
		Quantity.	Value.
	METALLIC.		
1	Pig iron, value at Philadelphia.....long tons..	8,623,127	$90,250,000
2	Silver, coining value.....troy ounces..	58,834,800	76,069,236
3	Gold, coining value.....do....	2,568,132	53,088,000
4	Copper, value at New York City.....pounds..	460,061,430	49,456,603
5	Lead, value at New York City.....short tons..	188,000	10,528,000
6	Zinc, value at New York City.....do....	81,499	6,519,920
7	Quicksilver, value at San Francisco.....flasks..	30,765	1,075,449
8	Aluminum, value at Pittsburg.....pounds..	1,300,000	520,000
9	Antimony, value at New York City....short tons..	601	84,290
10	Nickel, value at Philadelphia.....pounds..	17,170	4,464
11	Platinum (crude), value at San Francisco, troy ounces.....	163	944
12	Total value of metallic products.....	.....	287,596,906
	NONMETALLIC (spot values).		
13	Bituminous coal.....short tons..	137,640,276	114,891,515
14	Pennsylvania anthracite.....long tons..	48,523,287	81,748,651
15	Building stone.....	.....	31,346,171
16	Petroleum.....barrels..	60,960,361	58,518,709
17	Natural gas.....	.....	13,002,512
18	Brick clay.....	.....	9,000,000
19	Clay (all other than brick).....long tons..	360,000	800,000
20	Cement.....barrels..	9,513,473	6,473,213
21	Mineral waters.....gallons sold..	25,795,312	4,136,192
22	Phosphate rock.....long tons..	930,779	2,803,372
23	Salt.....barrels..	13,850,726	4,040,839
24	Limestone for iron flux.....long tons..	4,120,102	2,060,000
25	Zinc white.....short tons..	20,000	1,400,000
26	Gypsum.....do....	224,139	573,344
27	Borax.....pounds..	13,508,000	675,400
28	Mineral paints.....short tons..	48,032	530,455
29	Grindstones.....	.....	326,826
30	Fibrous talc.....short tons..	46,089	399,443
31	Asphaltum.....do....	80,503	577,563
32	Soapstone.....do....	22,183	354,065
33	Precious stones.....	.....	97,850
34	Pyrites.....long tons..	115,483	320,163
35	Corundum and emery.....short tons..	2,120	113,246
36	Oilstones, etc.....	.....	127,098
37	Mica (sheet).....	.....	65,441
38	Mica (scrap).....	.....	1,750
39	Barytes (crude).....long tons..	17,068	46,513
40	Bromine.....pounds..	546,580	144,501
41	Fluorspar.....short tons..	6,500	52,000
42	Feldspar.....long tons..	9,114	35,200
43	Manganese ore.....do....	10,088	90,927
44	Flint.....do....	11,124	24,226
45	Monazite.....pounds..	30,000	1,500
46	Graphite (crystalline).....do....	535,858	48,460
47	Graphite (amorphous).....short tons..	760	
48	Bauxite.....long tons..	18,364	47,338
49	Sulphur.....short tons..	5,260	87,200
50	Fuller's earth.....do....	9,872	59,360
51	Marls.....do....	60,000	30,000
52	Infusorial earth.....do....	3,846	26,792
53	Millstones.....	.....	22,567
54	Chromic iron ore.....long tons..	786	6,667
55	Cobalt oxide.....pounds..	10,700	15,301
56	Magnesite.....short tons..	1,500	11,000
57	Asbestos.....do....	504	6,100
58	Rutile.....pounds..	100	350
59	Total value of nonmetallic mineral products.....	.....	335,139,820
60	Total value of metallic products.....	.....	287,596,906
61	Estimated value of mineral products unspecified.....	.....	1,000,000
62	Grand total.....	.....	623,736,726

IRON ORES.

By JOHN BIRKINBINE.

PRODUCTION.

The year which ended December 31, 1897, was the banner year of pig-iron production in the United States. The output was also the largest ever reported by any country in one year. It is therefore natural to expect that the American iron-ore industry, which supplied raw material for the manufacture of pig iron, would also reach its maximum output in 1897. This was the case. The total for the whole country reached 17,518,046 long tons of iron ore, which is 1,221,380 long tons, or 7.49 per cent, more than the former maximum of 16,296,666 long tons in the year 1892.

During the year twenty-five States and Territories contributed to the total, one State—Vermont—joining the ranks of the producers with a small amount of manganiferous iron ore. While the production for the entire country showed a marked increase, all the States, with the exception of the southern group, of Alabama, Georgia, Tennessee, and Texas, and the States of Michigan and Minnesota in the Lake Superior region, produced less than in 1896. In Minnesota the improvement was most marked and showed an advance which nearly equaled the difference between the totals for the United States in 1896 and 1897, viz, 1,512,597 long tons.

The following table presents the total production of iron ore in the United States since the United States Geological Survey commenced the systematic collection of data in the year 1889:

Production of iron ore in the United States from 1889 to 1897.

Year.	Production.	Year.	Production.
	Long tons.		*Long tons.*
1889	14,518,041	1894	11,879,679
1890	16,036,043	1895	15,957,614
1891	14,591,178	1896	16,005,449
1892	16,296,666	1897	17,518,046
1893	11,587,629		

Placing the years in the order of production, they rank as follows: 1897, 1892, 1890, 1896, 1895, 1891, 1889, 1894, 1893. The mean production for the nine years was 14,932,261 long tons, which slightly exceeds the records of 1889 and 1891.

The tendency to use the richer ores and the facilities which make possible the delivery of these at points remote from the mines have in late years supplied a larger product of pig metal from a given weight of ore than formerly, and consequently the increased output of ore means more than the actual figures suggest.

The domestic iron ore produced in 1897 represents a volume of excavation equivalent to 40 acres, dug to an average depth of 100 feet. This does not include the barren earth or rock necessarily removed in exploitation.

Probably 30 per cent of the ore is won from open excavations, some of them covering many acres, and 70 per cent is taken from underground workings, some of which exceed 1,000 feet in depth, and extend long distances from slopes or shafts sunk into ore lenses or veins.

With continued low prices prevailing and many blast furnaces idle, the average production for the past three years, about 16,500,000 long tons, may be considered as representing the actual annual requirements of the country, subject to possible temporary decrease, but more liable to be permanently augmented as the population of the country increases and its development extends.

In examining the production of the different varieties of iron ore they have been classified as in previous years, viz, red hematite, brown hematite, magnetite, and carbonate, and it will be seen that the red hematite was the only class which showed an increase, advancing from 12,576,288 long tons in 1896 to 14,413,318 long tons in 1897, a gain of 1,837,030 long tons, or 14.61 per cent. This, the greatest output of this character of ore in any one year, is due to large deposits recently exploited, and also to the ores carrying, as a rule, higher percentages of iron than the other classes. Being rich and easily smelted, red hematites are preferred by many furnace managers.

The brown hematite output decreased from 2,126,212 long tons in 1896 to 1,961,954 long tons in 1897, a loss of 164,258 long tons, or 7.73 per cent, the greatest falling off being in the State of Virginia.

The total quantity of magnetite produced also declined from 1,211,526 long tons in 1896 to 1,059,479 long tons in 1897, a decrease of 152,047 long tons, or 12.55 per cent. Pennsylvania, New York, and Michigan each supplied less magnetite in 1897 than in 1896.

The total amount of carbonate mined in 1896 was 91,423 long tons as against 83,295 long tons in 1897, a loss of 8,128 tons, or 8.89 per cent, chiefly in the State of New York.

Michigan, which held first rank as the producer of red hematite ore, was closely followed by Minnesota. Virginia, as in previous years, was the largest producer of brown hematite, having almost double the

product of its nearest competitor, Alabama. Pennsylvania again heads the list of magnetite producers, easily outclassing New York, which was second. Ohio contributed over two-thirds of the total carbonate ore produced, Maryland ranking second. A comparison with the records of the different States in the reports of the Survey suggests remarkable changes in the production of ores by locality or according to class, and a résumé of the quantities of ore of the general classes recognized in the reports produced in the United States is of interest. Such a résumé is presented in the following statement, which shows the long tons of each class of ore produced in the years for which statistics were collected:

Production of iron ore in the United States, by classes.

[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
1897..	*14,413,818*	1,961,954	1,059,479	83,295	*17,518,046*

The reported product of concentrated iron ore during the year 1897 is 19,713 long tons. It is included in the totals given in the various tables.

In addition to the iron ore mined, residuum, obtained in the manufacture of zinc, was utilized to produce spiegeleisen during the year 1897 to the amount of 33,924 long tons, valued at $18,713, or 55 cents per ton.

The magnetite mined in the United States in 1897 represented an average of but about 6 per cent of the total domestic production, and for the past ten years the quantity of magnetic iron has been equivalent to about 12 per cent of the total annual output.

The developments in the Lake Superior and the Alabama-Tennessee regions have encouraged the mining of red hematite ores in greater proportions each year, the Lake Superior region supplying in 1897 nearly 70 per cent of the domestic iron ore product, most of which is of the red hematite character.

The growing industry of the Southern States relies almost exclusively upon local red and brown hematites, the former largely predominating.

The quantity of each variety of ore produced, by States, is set forth in the following table:

Production of different varieties of iron ore, by States, in the year 1897.

[Maxima in italic figures.]

State.	Red hematite.	Brown hematite.	Magnetite.	Carbonate.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Michigan	*6,041,597*	.....	45,866	.....	*6,087,463*
Minnesota	5,601,429	.....	.....	.....	5,601,429
Alabama	1,738,583	360,038	.....	.....	2,098,621
Pennsylvania	19,515	256,573	*441,556*	6,098	723,742
Virginia	13,570	*697,558*	.....	.....	711,128
Tennessee	260,550	343,947	.....	.....	604,497
Wisconsin	554,155	.....	.....	.....	554,155
New York	7,664	20,059	296,722	11,280	335,725
New Jersey	.....	.....	254,235	.....	254,235
Georgia and North Carolina	131,540	73,099	.....	.....	204,639
Colorado	21,500	165,814	.....	.....	187,314
Ohio	.....	.....	.....	*54,417*	54,417
Montana, Nevada, New Mexico, Utah, and Wyoming	10,151	8,705	21,100	.....	39,956
Connecticut, Vermont, and Massachusetts	.....	22,573	.....	.....	22,573
Texas	.....	13,588	.....	.....	13,588
Kentucky	12,464	.....	.....	.....	12,464
Maryland	.....	.....	.....	11,500	11,500
Missouri	600	.....	.....	.....	600
Total	14,413,318	1,961,954	1,059,479	83,295	17,518,046

The above figures will be supplemented later by remarks concerning the status of various States, considered in their order of prominence as producers of iron ore.

VALUE OF IRON ORE.

The total valuation at the mines of the 17,518,046 long tons of iron ore produced in the United States in the year 1897, was $18,953,221, or $1.08 per ton. This indicates a decided decline from the average price reported in 1896, $1.42 per ton, of 34 cents per ton, equivalent to 23.94 per cent. The lowest value of ore at the mine was in the State of Minnesota, where the average was 72 cents per ton, this low price being

influenced by the distances to be covered before reaching blast furnaces, and a diminished value due to the fact that the Mesabi ores (which comprise the greater portion of the product from that State) do not, on account of their physical characteristics, command as high prices as other Lake Superior ores of the same chemical composition. Minnesota was but slightly surpassed in value per ton by Alabama, whose comparatively lean ores were valued at 74 cents per ton at the mine. The highest value reported was in Colorado, where a large portion of the iron ores was used as flux in smelting the precious metals, and the higher wages paid increased the mining costs.

While there was augmented demand for iron ores in 1897 over 1896, the ores did not, in many instances, command a fair return upon the capital invested. This was emphasized in instances where mines were operated under lease and the royalty was reduced or the lease given up; and also by the Bessemer Ore Association in the early part of the year 1898 advancing the price of the Bessemer ores, other ores profiting proportionately by such increase.

The basis for the prices of Lake Superior ores for the present season (1898) has been fixed for the Bessemer ores of the Marquette, Menominee, and Gogebic ranges by the Bessemer Ore Association at an advance of 15 cents (5.66 per cent) per ton over the prices of 1897, the same ore (Norrie) being taken as a standard, and the basis price raised from $2.65 to $2.80 per ton.

The following table will show the total production and valuation of iron ore mined in the year 1897, by States, together with the average value per ton:

Quantity and value at the mines of iron ore produced in 1897.

States.	Production.	Valuation.	Value per ton.
	Long tons.		
Alabama	2,098,621	$1,546,543	$0.74
Colorado	187,314	485,009	2.59
Connecticut, Vermont, and Massachusetts	22,573	56,141	2.49
Georgia and North Carolina	204,639	166,704	.81
Kentucky	12,464	12,464	1.00
Maryland	11,500	23,000	2.00
Michigan	6,087,463	8,347,615	1.37
Minnesota	5,601,429	4,029,077	.72
Missouri	600	600	1.00
Montana, Nevada, New Mexico, Utah, and Wyoming	39,956	67,922	1.70
New Jersey	254,235	491,838	1.93
New York	335,725	642,838	1.91

Quantity and value at the mines of iron ore produced in 1897—Continued.

States.	Production.	Valuation.	Value per ton.
	Long tons.		
Ohio	54,417	$64,235	$1.18
Pennsylvania	723,742	851,079	1.18
Tennessee	604,497	479,485	.79
Texas	13,588	10,870	.80
Virginia	711,128	974,031	1.37
Wisconsin	554,155	703,770	1.27
Total	17,518,046	18,953,221	1.08

The values shown above represent what the ores mined in 1897 command at the mines—not necessarily the cost.

STOCKS OF IRON ORE.

Notwithstanding the greatly increased production of iron ore, the stocks of ore on hand reported show a decline from 3,405,302 long tons in 1896 to 3,098,287 long tons on December 31, 1897, a decrease of 307,015 long tons, or 9.02 per cent. Apparently the iron industry consumed during 1897 the amount of this reduction of stock. In addition to the iron ores and zinc residuum mentioned, there entered into the manufacture of pig iron in 1897 about half a million tons of mill cinder, "blue billy," resulting from roasting pyrites, and some basic silicates of iron produced in smelting copper ores.

The largest stocks of ore, as in former years, were held in the States of Michigan, Minnesota, and Wisconsin, which form the Lake Superior region. The amount of ore sent forward from this region by all-rail routes to points of consumption was relatively small, practically the entire output last year being carried by water to lower lake ports, and as during the latter part of the year lake transportation ceases on account of the ice, the ore accumulates in the stock piles at the mines to await the opening of the shipping season in the spring. These immense stock piles are prominent topographic features during the early part of the shipping season. On account of the ore being wet with mine water or snow during cold weather, the piles often require blasting, even in midsummer, before the ore may be loaded on cars. At many of the mines steam shovels are employed for the purpose of loading the ore on railroad cars from the stock piles. In the Southern States, where the mines are as a rule close to the furnaces, the ores being shipped as mined by rail, there are but small stocks of ore on hand at the mines.

The stocks of ore on hand at the mines December 31, 1897, are given by States in the following table:

Stocks of iron ore on hand December 31, 1897, by States.

State.	Long tons.
Alabama	26,000
Colorado	10,300
Connecticut, Massachusetts, and Vermont	3,233
Georgia and North Carolina	5,950
Kentucky	14,538
Maryland	7,500
Michigan	1,310,145
Minnesota	855,855
Missouri	73,611
Montana, Nevada, New Mexico, and Wyoming	23,740
New Jersey	72,350
New York	142,279
Ohio	48,510
Pennsylvania	44,531
Tennessee	34,161
Texas	10,000
Virginia	6,420
Wisconsin	409,164
Total	3,098,287

Having considered the United States in general, the different States will be taken up in detail.

IRON-ORE INDUSTRY IN VARIOUS STATES.

MICHIGAN.

This State continues to head the list of iron-ore producers of the country, with a total for 1897 of 6,087,463 long tons of ore, all classed as the red hematite variety, with the exception of 45,866 long tons of magnetite. The output in 1896 was 5,706,736 long tons. In 1897, therefore, there was an increase of 380,727 long tons, or 6.67 per cent.

The position which Michigan has held is illustrated by the following figures of production in this State and the total for the United States during each year since 1889:

Production of iron ore in Michigan since 1889.

Year.	Michigan.	United States.
	Long tons.	*Long tons.*
1889	5,856,169	14,518,041
1890	7,141,656	16,036,043
1891	6,127,001	14,591,178
1892	7,543,544	16,296,666
1893	4,668,324	11,587,629
1894	4,419,074	11,879,679
1895	5,812,444	15,957,614
1896	5,706,736	16,005,449
1897	6,087,463	17,518,046

It is evident from this statement that the unprecedented low prices at which Lake Superior ores have been sold, and the large supply furnished from Minnesota mines in competition with that from Michigan, have not prevented liberal outputs from the older ranges.[1] The prices and competition have demanded cheaper mining costs, better transportation facilities, and reduced royalties. In this connection the following is introduced to indicate how royalties are affected:

One of the companies mining large amounts of ore, and holding liberal areas of land, has heretofore operated with a schedule based upon royalties of nominally 30 cents per ton for non-Bessemer ores, 40 cents for Bessemer, and 50 cents for high-grade Bessemer. A readjustment of the low prices now prevailing throughout the iron industry is in prospect.

A sliding scale is adopted, providing for a royalty of 7 cents per ton, on the basis of $1.49 or less for a ton of ore delivered at Lake Erie ports; 8 cents a ton on ore selling at $1.50 to $1.59; 9 cents royalty on prices from $1.60 to $1.69; 10 cents on prices from $1.70 to $1.79; 11 cents on prices from $1.80 to $1.89; 12 cents on prices from $1.90 to $1.94; and so on, with 1 cent increase in royalty for each additional 5 cents increase in price from $1.90 per ton. This makes a 20-cent royalty on ore bringing from $2.30 to $2.34; 30 cents royalty on ore from $2.80 to $2.84, and 33 cents royalty on ore from $2.95 to $2.99.

MINNESOTA.

This State still holds second place, with a total of 5,601,429 long tons, an increase of 1,317,549 long tons, or 30.76 per cent over the product of 4,283,880 long tons in 1896.

All of this ore was of the red hematite variety. While the State

[1] Notes upon the Marquette Range appear on pages 54-58.

has been steadily advancing as a producer of iron ore, it is doubtful if it will win first place in 1898.

The marvelous strides taken by Minnesota will be evident from the following table:

Production of iron ore in Minnesota from 1889 to 1897.

Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*
1889	864,508	1894	2,968,463
1890	891,910	1895	3,866,453
1891	945,105	1896	4,283,880
1892	1,255,465	1897	5,601,429
1893	1,499,927		

Until 1884 this State did not produce any iron ore, but it has shown a decided advance every year since, reaching its maximum in 1897.

The totals show that Minnesota, which until fourteen years ago contributed no iron ore, has mined in the interval 23,681,148 long tons. To obtain this, towns and villages have been located, several hundred miles of railroad built and equipped, and extensive shipping docks constructed. Most of this work has been done in what was previously an unbroken wilderness.

ALABAMA.

Alabama maintained third place, with a production of 2,098,621 long tons in 1897, of which 1,738,583 long tons, or 82.84 per cent, consisted of red hematite, and 360,038 long tons, or 17.16 per cent, was brown hematite. The output of 1897 was 56,828 long tons, or 2.78 per cent greater than in 1896, when it was 2,041,793 long tons. A new discovery of brown hematite is reported in the Birmingham district, overlying the red hematite ore beds, and is said to be of large size and persistent.

The ores from Michigan, Minnesota, and Wisconsin find a market remote from the mines, but most of the ores extracted in Alabama are used locally. The production of this State therefore practically reflects the condition of its pig-iron industry.

For the years for which statistics have been collected the record of Alabama is:

Product of iron ore in Alabama from 1889 to 1897.

Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*
1889	1,570,319	1894	1,493,086
1890	1,897,815	1895	2,199,390
1891	1,986,830	1896	2,041,793
1892	2,312,071	1897	2,098,621
1893	1,742,410		

The amount mined in 1897 was greater than in any previous year except 1892 and 1895.

The project of constructing a large steel plant to operate upon basic iron, made from Alabama ores, has progressed so far as to encourage the expectation of its accomplishment, with the effect of considerably increasing the demands upon the iron-ore mines of the State. The ores mined in Alabama are all of non-Bessemer grade, and hence the product of the blast furnaces using these ores has been confined to foundry and mill irons. If the manufacture of basic steel upon a large scale proves successful, the market for Alabama metal will be greatly broadened. Considerable foundry iron from southern furnaces has been exported in the last two years, and has found a market in various European countries, and in Canada, Mexico, and Japan. It is probable that this outlet for manufactured metal will continue an important factor in the operation of American blast furnaces.

A statement of the character of the iron ore deposits of Alabama appears on pages 58–63.

PENNSYLVANIA.

This State produces all the four varieties of ore. The 1897 output of 723,742 long tons consisted of 441,556 long tons of magnetite, in which class it occupies first place, 256,573 long tons of brown hematite, 19,515 tons of red hematite, and 6,098 tons of carbonate ore. While the State showed a decline of 24,042 long tons, or 3.22 per cent, from the 747,784 long tons produced in 1896, it rose from fifth to fourth place, chiefly on account of a marked decline in the amount of ore mined in Virginia.

The greater portion of the output of Pennsylvania is supplied by one region, viz, the Cornwall Ore Hills, which in 1897 produced 419,468 long tons of magnetic ore; the small amount of carbonate mined comes from the western portion of the State, the red hematite is credited to the eastern central portion, and the brown hematite is won principally in the East Penn and Lehigh valleys and in the central section.

The State has large reserves of iron ore, but these are mostly of a grade which is now considered comparatively undesirable with rich Lake Superior ores delivered at blast furnaces at low cost. Some of these reserves may again be wrought if the exploitation is conducted on a liberal scale and the ores are brought to as high a standard of purity as is practicable. Taking the most favorable conditions, Lake Superior ores cost from 3 to 4 cents per unit of iron for transportation from the mines to the eastern Pennsylvania blast furnaces.

This does not include expense of mining or profit. It would therefore appear practicable to operate some of the Pennsylvania mines advantageously if the operations are carried forward with all possible economies and if local railroad rates permit the mines to obtain some advantage on account of the charge for long hauls of the Lake ores.

Compared with the former records of Pennsylvania, the figures for

1897 show a smaller production than any year in the past two decades, except 1893 and 1894.

Iron ore production in Pennsylvania from 1889 to 1897.

Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*
1889	1,560,234	1894	532,087
1890	1,361,622	1895	900,340
1891	1,272,928	1896	747,784
1892	1,084,047	1897	723,742
1893	697,985		

VIRGINIA.

Virginia occupied fifth place as a miner of iron ore. The 1897 product of the State was 711,128 long tons, a decrease of 148,338 tons, or 17.26 per cent, from the total of 859,466 tons in 1896. It was, however, the largest producer of brown hematite ore in the United States in 1897, the entire output of the State, with the exception of 13,570 long tons of red hematite ore, being of this variety.

The Virginia ores are of such chemical composition that the pig iron produced from them can not be used in the manufacture of steel by the Bessemer process, but some of the blast furnaces have produced metal for the manufacture of basic steel. The decrease in the iron-ore output of Virginia is directly traceable to the reduced production of pig iron in the State in 1897, for these blast furnaces depend upon local ores.

TENNESSEE.

The iron ore production of this State increased 69,013 long tons, or 12.89 per cent, over that of 1896, the 1897 output being 604,497 long tons, against 535,484 long tons in 1896.

Of this, 343,947 long tons was brown hematite, and considerable quantities of this class of ore have been supplied regularly to the blast furnaces in northern Alabama.

WISCONSIN.

The 554,155 tons of iron ore mined in this State in 1897 was all of the red hematite variety, being a decrease of 53,250 long tons, or 8.77 per cent, from the total of 607,405 tons in 1896. This was the only State in the Lake Superior region that showed a decline in output.

The red hematite ores are drawn from portions of the Gogebic and Menominee ranges of the Lake Superior region, and the Mineral Point district of eastern Wisconsin.

NEW YORK.

This was the only State except Pennsylvania which mined all four varieties of ore; it produced 296,722 long tons of magnetite, 20,059 tons of brown hematite, 11,280 tons of carbonate, and 7,664 tons of red hematite, making a total of 335,725 long tons, a decrease of 49,752 tons, or 12.91 per cent, from the product of 385,477 long tons in 1896. Like Pennsylvania this State has large reserves of ore, the magnetite being as a rule richer than those obtained in the former State, but the ore from the Lake Superior region has greatly restricted the market for New York magnetite, and in many instances has caused some of the mines to close down. The magnetite, as before stated, is not so much desired by blast furnace managers as red hematite of similar chemical composition. The carbonate and brown hematite are mostly utilized in the southeastern portion of the State in the manufacture of some special pig iron, for which there is limited but constant demand.

Large sums have been invested in the construction of a basic steel plant at Troy, with the purpose of using the highly phosphorous magnetites of the Lake Champlain district, and if this enterprise proves successful increased production from New York will be chronicled.

NEW JERSEY.

The product of 254,235 long tons in 1897 was all of the magnetite variety, and shows a decline of 10,764 tons, or 4.06 per cent, from that of 1896, which amounted to 264,999 tons. The increased depth and expense of mining, together with the competition of the Lake Superior and foreign ores, have combined to restrict the New Jersey production, and several prominent mines have closed down since the last report was issued. In fact, over one-third of the total for the State, 99,033 tons, was produced by one mine, the Richards.

Efforts to work mines of limited width and produce a small daily output will, unless the ore is of exceptionally good quality, prove unprofitable in the present state of the iron industry. By combination of interests, by working mines to their capacity, and by introducing economies, some of the New Jersey deposits now idle might again be made productive.

Several attempts to concentrate lean ores magnetically have been made on a liberal scale in central New Jersey, and large amounts of money have been invested in these enterprises. The output, however, of concentrated ore has so far been inconsiderable. One of the important concentrating plants was destroyed by fire and thus removed from the list.

GEORGIA AND NORTH CAROLINA.

Two varieties of ore were mined in 1897, viz, 131,540 tons of red hematite and 73,099 tons of brown hematite. The total, 204,639 tons, was an increase of 29,308 tons, or 16.72 per cent, over 1896. The magnetite mines of North Carolina were not worked in 1897.

COLORADO.

A decided reduction in the quantity of pig iron produced and the suspension of operations at some of the silver mines of Colorado are responsible for the small amount of iron ore mined during 1897—187,314 long tons as compared with 215,819 long tons in 1896, a decline of 28,505 tons or 13.21 per cent.

OTHER STATES.

Of the remaining States Ohio produced 54,417 long tons of carbonate ore, which was smelted in local furnaces. The output of the Western States of Montana, Nevada, New Mexico, Utah, and Wyoming was used as flux in the smelting of the precious metals. In Connecticut and Massachusetts brown hematites were employed in the production of charcoal pig iron. The amounts mined in Texas, Kentucky, Missouri, and Maryland were used in local furnaces.

PROMINENT IRON ORE PRODUCERS.

The year 1897 was the banner year for the larger operators; 73 mines or groups of mines produced 15,002,583 long tons of iron ore, or 205,515 long tons on the average. The combined output of these 73 plants was 85.64 per cent of the total production for the year. The largest average output, except in 1897, was in 1895, when 84.01 per cent of the total iron ore mined was obtained from 72 of the larger mines.

One of these 73 producers in 1897 contributed over 700,000 long tons; 1 between 600,000 and 700,000 long tons; 7 between 500,000 and 600,000 long tons; 5 between 400,000 and 500,000 tons; 2 between 300,000 and 400,000 tons; 8 between 200,000 and 300,000 tons; 20 between 100,000 and 200,000 tons, and 29 between 50,000 and 100,000 tons. Of these large mines 29 were located in Michigan, 17 in Minnesota, 8 in Alabama, 5 in Tennessee, 3 each in New Jersey, Virginia, and Wisconsin, 2 each in Pennsylvania and New York, and 1 in Georgia.

Of these mines 56 produced red hematite, with a total of 13,217,094 long tons. Six mines supplied 833,766 long tons of magnetite, 10 contributed 814,124 tons of brown hematite, and the remaining mine yielded a mixture of red hematite and magnetite. The average of the red hematite mines was 236,220 long tons each, of the magnetite 138,961 tons, and of the brown hematite 81,412 tons.

Forty-nine of the important producers are located in the Lake Superior region, divided as follows:

In the Mesabi Range	14
In the Marquette Range	12
In the Menominee Range	10
In the Gogebic Range	10
In the Vermilion Range	3
Total	49

The table following indicates by name the principle mines with their outputs in 1897, where the management did not object to such publication. The remaining 19 are grouped at the end of the statement. It is truly a remarkable list and one which can be duplicated in no other country.

Iron ore product by mines in the United States yielding 50,000 tons or more during 1897.

Name of mine.	State.		Product.
			Long tons.
Mountain Iron and Rathbun	Minnesota		773,538
Lone Jack and Missabe Mountain	do		601,072
Chandler	do		586,353
Fayal	do		565,600
Alice, Fossil, Muscado, Redding, Wares (group)	Alabama		565,395
Metropolitan Land and Iron Co.:			
Norrie	Michigan	222,088	
North Norrie	do	180,520	
East Norrie	do	158,578	
			561,186
Pittsburg and Lake Angeline	do		521,100
Mahoning	Minnesota		519,892
Minnesota Iron Co. (group)	do		502,738
Ishkooda and Spalding	Alabama		457,568
Biwabik	Minnesota		427,464
Cornwall	Pennsylvania		419,468
Lake Superior	Michigan		409,883
Cleveland Iron Mining Co.:			
Hard Ore	do	12,428	
Lake	do	392,206	
			404,634
Chapin	do		354,559
Genoa	Minnesota		316,318
Pewabic	Michigan		278,627
Pioneer	Minnesota		251,370
Penn Mining Co.	Michigan		232,479
Ludington	do		222,600
Queen Mining Co	do		216,072
Montreal	do		202,647
Hull	Minnesota		192,601
Sloss	Alabama		192,076
Pabst	Michigan		186,997
Negaunee	do		186,310
Adams	Minnesota		171,247
Brown Mining Co.	Tennessee		163,641

Iron ore product by mines in the United States, etc.—Continued.

Name of mine.	State.	Product.
		Long tons.
Auburn	Minnesota	145,545
Newport	Michigan	141,369
Champion	do	137,599
Salisbury	do	131,819
Lawrence	Tennessee	126,552
Republic and West Republic	Michigan	124,491
Port Henry Iron Ore Co., No. 21	New York	116,438
Irondale	Alabama	116,196
Lillie	Michigan	112,781
Aragon	do	112,000
Cambria	do	110,648
Richard	New Jersey	99,033
Commonwealth and Badger	Wisconsin	97,000
Crystal Falls	Michigan	95,210
Norman	Minnesota	91,666
Jackson	Michigan	88,700
Greeley	Alabama	86,546
Scotia	Pennsylvania	83,000
Embreville Iron Co., Limited	Tennessee	79,400
Atlantic	Wisconsin	75,303
Dolly Ann	Virginia	71,124
Tecumseh, including State Line and Baker.	Alabama	70,000
Sparta Iron Co	Minnesota	66,721
Ohio	do	52,957
Inman	Tennessee	52,709
Champion	Alabama	51,724
Total		13,019,966
19 mines not reported by names		1,982,617
Grand total		15,002,583

MINING METHODS.

Iron-ore deposits in the United States differ materially in character, and the geological and physical conditions of the several varieties generally recognized as magnetite, red hematite, brown hematite, and carbonate ores require methods of exploitation which vary greatly. The known character, the apparent dimensions, the general form, and the position of an iron-ore deposit, with reference to the surface and water, the physical structure or chemical composition of the material to be

extracted, the character of the earth or rock inclosing or occurring in the ore body, the stratification, dip, and strike, the simplicity or complexity of the ore body, the convenience of the deposit to an available market for its product, and the capital at command of those who attempt the exploitation, all influence the methods followed in mining iron ore.

While a detailed description of the various practices followed in specific localities and in different deposits will not be attempted, it has been considered advisable to offer some general data upon iron-ore mining as practiced in the United States, and to present illustrations of a few of the problems with which those engaged in the industry have to contend.

Where the ore body projects above or lies close to the surface, or where in a large apparently well defined deposit the cover can be stripped to advantage, the exploitation may be carried on by open-cut work, from which the ore is taken out either by train, as illustrated by Pls. II and IV, or after digging lifted by steam power applied to inclines or to vertical hoists, as shown on Pls. VI and VIII.

Where the body of ore is under considerable cover, if the roof is firm, or if the vein matter is comparatively narrow and dips at steep angles from the horizon, it is removed through shafts, either vertical or inclined, and through tunnels or adits. In a number of instances open-cut work has, after reaching a considerable depth, been supplemented by underground exploitation, as shown in Pl. III, while in a few cases, one of which is shown in Pl. I, this method was reversed, and a large open cut supplanted underground work. The shafts or adits, which are generally expected to serve as long as the deposit yields ore, are necessarily costly and need to be planned and located with care, for through these the miners have access to the underground workings, and the ore and water are carried through them to the natural surface.

Except when the strata penetrated is exceptionally compact and hard, the shafts or adits must be substantially timbered, so that they can be maintained until the deposit is exhausted, and they are excavated either in the ore or in inclosing rock, and if in the ore large bodies are left adjacent to these avenues of approach as a safeguard against accident.

From these main arteries drifts are opened either parallel or at different angles in wide or shallow deposits, or at determined depths in narrow and deep deposits, and from these in turn supplementary drifts are run and rooms or stopes excavated. In deposits dipping considerably from the horizon, one prevailing method of exploitation is to open a series of drifts at different levels, from which mining is carried on simultaneously; the upper levels are farther advanced than those below, the ore being taken out in horizontal sections, or slices, known in mining parlance as stopes. When the ore is worked above a given level and allowed to fall by gravity, through chutes or otherwise, to vehicles which deliver it to the main arteries, the method is called

TILLY FOSTER MINE, NEW YORK, SHOWING CONCRETE ARCHES FROM FOOT TO HANGING WALL AFTER ROOF HAD BEEN REMOVED (MAGNETITE).

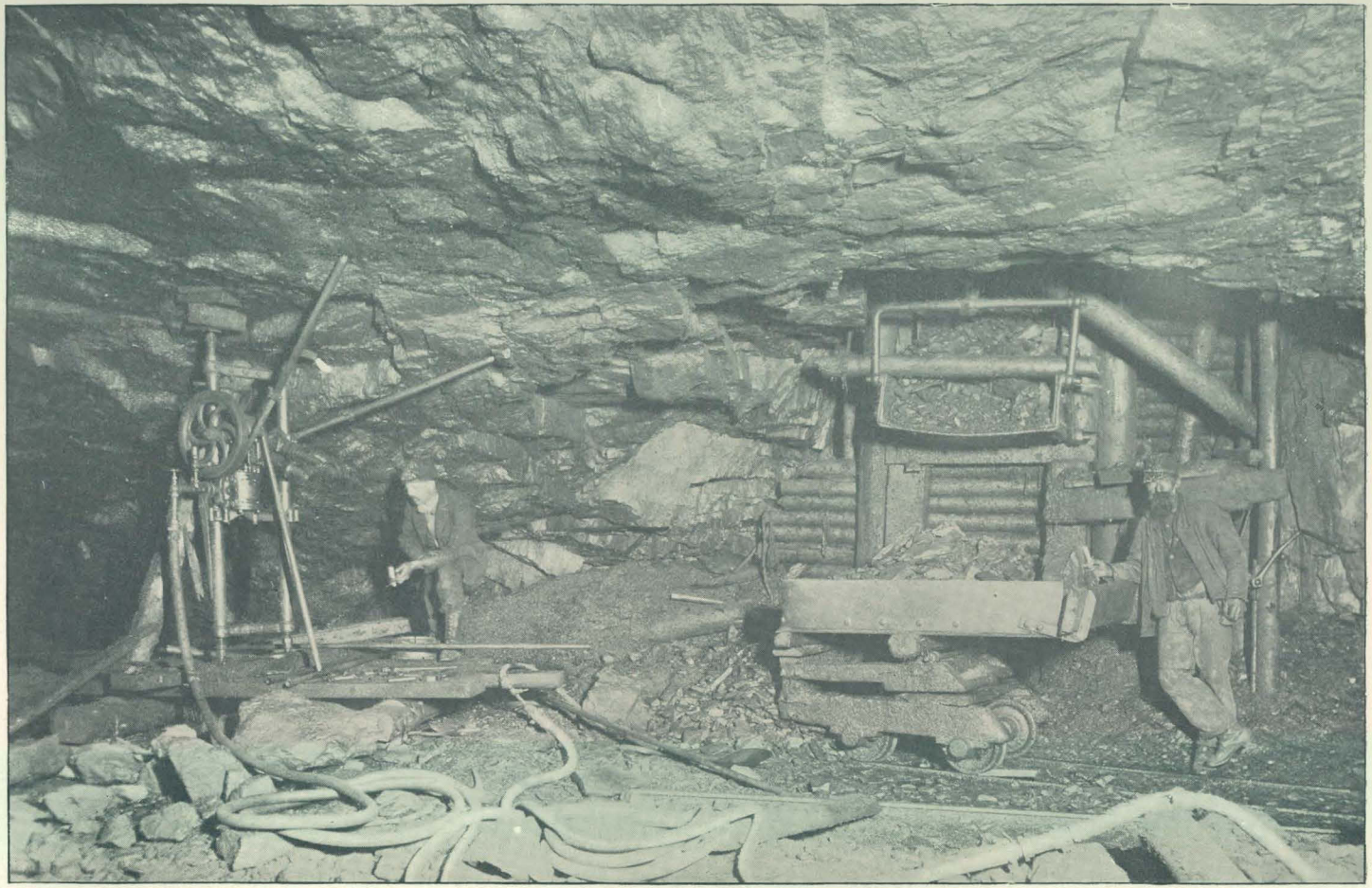
CORNWALL ORE HILLS, PENNSYLVANIA, SHOWING THROUGH CUT IN ORE (MAGNETITE).

NO. 21, PORT HENRY MINE, NEW YORK, SHOWING ORE PILLARS AND INCLINED SKIP-WAY LEADING FROM OPEN PIT INTO UNDERGROUND WORKINGS (MAGNETITE).

BIWABIK MINE, MINNESOTA; STRIPPING AND DIGGING ORE BY STEAM SHOVEL FROM OPEN PIT (RED HEMATITE).

SCRAMMERS IN CAVING SYSTEM (RED HEMATITE MINE).

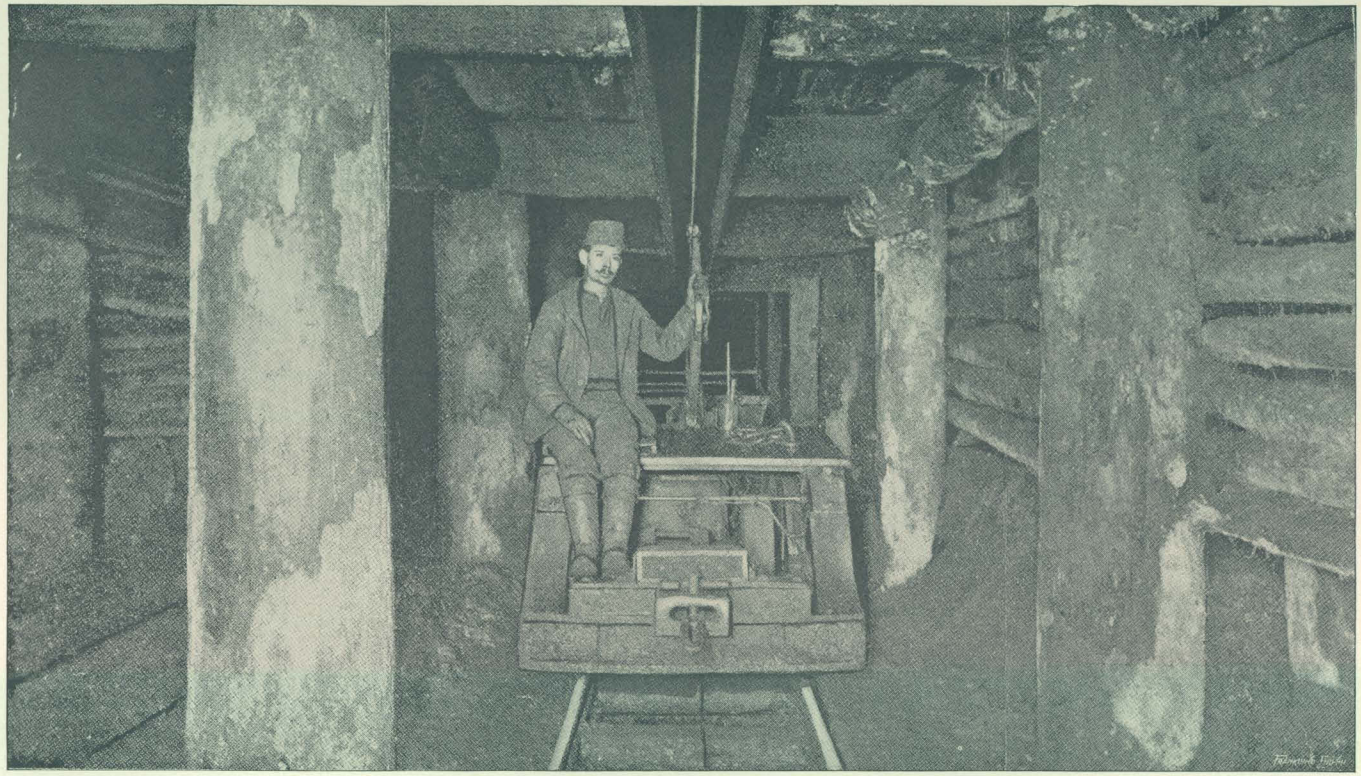
OPEN PIT, NOW ABANDONED, OF LAKE SUPERIOR (HEMATITE) MINE, MARQUETTE RANGE, SHOWING POWER HOUSE, HEAD HOUSES, AND SKIP ROADS LEADING TO UNDERGROUND WORKINGS.



FILLING SYSTEM, MINNESOTA IRON COMPANY, MINNESOTA, WITH CHUTE FOR DISCHARGING REFUSE FROM UPPER LEVELS (HARD RED HEMATITE).

CRATERS MADE BY THE MILLING SYSTEM AT AUBURN MINES (RED HEMATITE), MINNESOTA, BY DRAWING THE ORE FROM BELOW, THROUGH DRIFTS AND RAISES

SLICING SYSTEM, FAYAL MINES, MINNESOTA, SHOWING MINE PROPS AND CAPS IN POSITION.



ELECTRICAL MOTOR USED IN THE LAKE SUPERIOR REGION, SHOWING GANGWAY TIMBERING, PITTSBURG AND LAKE ANGELINE MINE, MARQUETTE RANGE.

DRILLING ROOF IN HARD ORE MINE, MARQUETTE RANGE, MICHIGAN.

"overhand stoping". Where the material is attacked below a level and the ore raised to this level, the method is recognized as "underhand stoping". The overhand system is, under most circumstances, the cheaper and most advantageous, but the underhand stoping is necessary in taking up floors, removing pillars, and in some open-cut work.

In underground operations the space made void as the ore is removed must be filled, at least in part, either by timbering or by rock or other waste material. In many instances the ore, if left in pillars alternating with rooms or stopes, will safely support the roof, but often the proportion of ore necessarily so left is too great to make this method desirable.

After shafts or adits have been sunk and main drifts run, the ore is taken out by various systems, which may be briefly designated as follows:

"Milling," in which the surface earth is removed and the ore drawn through "raises" into drifts located some distance below the top of the ore, making in this way large sinks or craters. This system requires that the cover be stripped, and is specially adapted to shallow deposits of soft ore. Pl. VIII illustrates the milling system.

In "caving," a series of levels connecting with the main shaft or several shafts are simultaneously worked, the ore being taken out from the upper levels and delivered through winzes to lower levels which are protected by the ore "in situ."

As the ore is removed from the portion of one level, the superincumbent rock or earth is allowed to cave upon the ore below, and frequently the material is encouraged to settle by the use of explosives. By this method but little ore need be left in a deposit, and if care is exercised the risks are not great and but little waste becomes mixed with the ore. This method is applied more to soft or moderately soft ores than to those which are harder, but it is used in some hard-ore mines where the roof or hanging wall is insecure. (See Pl. V.)

"Drifting" is employed in all underground mining, but where a series of parallel drifts, one advanced more than another, are employed to slice off the deposit, the method is recognized as the "drifting or slicing system." (See Pl. IX.)

"Room mining" may be considered either as digging out cavities which alternate with pillars, or as opening cavities of considerable length, width, and height, usually from foot wall to hanging wall, and supporting the last-named and the roof by an elaborate arrangement of timbers known as square sets, in which the timbers are so placed as to form the outlines of a series of cubes resting upon one another. This method is liberally employed in removing soft hematite, and some of the cavities thus made and protected are of enormous size.

"Filling" is not so truly a method of mining as a means of protecting the workings by depositing in the cavities waste rock, sand, etc. It is often more economical than introducing timber support, and is adapted to hard-ore mines. This method is illustrated by Pl. VII.

The magnetites, as a rule, are found in fairly well-defined veins

inclosed between walls and dipping at steep angles from the horizon. Some of these veins are of enormous size, as in the Lake Champlain district of New York, where the texture and hardness of the ore permit of its use as pillars in the mines. Other veins are narrow and tortuous, although persistent, and each of these characteristics demands a different method of exploitation.

Where magnetic iron ore is obtained from underground operations the ore left as pillars generally furnishes sufficient support for the roof, but there are instances, as in the Tilly Foster mine, New York, where the proportion of the total ore in the deposits which these pillars represented or the tendency of the mineral to break from the pillars in large masses caused their abandonment. A subsequent attempt to recover the pillars by introducing artificial support of concrete carried in brick arches proved unsatisfactory, and the entire roof was removed and transformed into an open cut, as shown by Pl. I, which exhibits a portion of the concrete support and the arches under it.

The ore from the Tilly Foster mine is hard, and a portion of that won is not rich enough in iron for use in blast furnaces without beneficiation, so that the leaner mineral is crushed and passed over magnetic separators to enrich it. The chemical composition of the ore, as exhibited by analysis, places it in the Bessemer limit and also in the class of self-fluxing ores, that of the shipping ores being as follows:

Analysis of Tilly Foster shipping ore.

Constituent.	Per cent.
Oxides of iron	67.42
Oxides of manganese	.54
Alumina	3.85
Lime	1.44
Magnesia	13.30
Sulphur	.11
Phosphoric acid	0.128
Silica	13.23
Total	100.018
Metallic iron	48.82

The leaner ore, which was sent to the concentrator, contained from 24.96 per cent to 28.57 per cent of iron, while the concentrates made therefrom show from 47.40 per cent to 51.04 per cent of iron.

The deposit of the magnetic class of ore which contributes the largest amount to the iron-ore supply of the United States, that at Cornwall, Pennsylvania, is mined as a great open cut, the ore being moderately soft. The ore in the Cornwall deposit was found in a large body forming the major portion of the three hills, which has been worked since 1740, and has produced to date 14,000,000 long tons of

ore. The average annual output for the past decade has been 600,000 long tons; the maximum yearly production, 769,000 long tons, was in 1889. This deposit is of moderate richness, is of Bessemer grade, and carries some copper and such quantity of sulphur as to require that it be roasted prior to being smelted. A fair average analysis of selected Cornwall ore as mined is:

Analysis of raw Cornwall iron ore.

Constituent.	Per cent.
Metallic iron	48.800
Metallic manganese	.057
Metallic copper	.599
Alumina	2.315
Lime	4.330
Magnesia	5.531
Sulphur	1.807
Phosphorus	.018
Silica	12.940
Phosphorus, 100 parts iron	.063

Pl. II exhibits a cut into the ore deposit of one of the Cornwall ore hills.

These three hills have been practically removed in mining less ore than the United States produced in 1897, but, making allowances for the smaller amount of rich ore required, the impressive excavations at Cornwall give some intimation of the enormous quantity represented by the 17,518,046 long tons of iron ore which the country produced in 1897. Mining is now generally below surface, but is still in the open.

HANDLING AND SHIPPING LAKE SUPERIOR ORES.

Previous reports have shown how the handling of iron ores has resulted in perfecting docks for shipping and receiving ore, with handling appliances for the docks, and in securing a fleet of superb modern vessels for transporting the ores upon the Great Lakes. The shipping docks, the number of pockets for ore in each, their capacity, and cost have already been given in detail.

To provide for the augmented output and to meet the competition of different ranges the transportation facilities for iron ore on the Great Lakes have been improved. The only shipping ports at which new piers or extensions were not reported during the winter of 1897 are Gladstone and Marquette, but at the latter port there is the new dock on the Lake Superior and Ishpeming Railroad, which was finished in 1896.

The Duluth and Iron Range Railroad has rebuilt its dock No. 2 at Two Harbors, at a cost of over $250,000. The Duluth, Missabe and

Northern Railway has extended its pier No. 2, at a cost of $200,000. The Duluth, Superior and Western Railway has made some improvements at its piers at Allouez Bay, on Lake Superior, and the Chicago and Northwestern Railway has expended nearly a quarter of a million dollars in betterments to its piers and docks at Ashland.

In the new additions to the fleet of ore vessels there was no great increase in the size of the boats for the year 1896–97 over that of 1895–96, but there was a considerable difference in 1897–98 over the previous year. In the fall of 1895 a draft of but 14½ feet was available, increasing to 16 feet in the early part of 1896–97, and reaching 17 feet 4 inches in the latter part of the year. The following table taken from the Iron Age will give a good idea of the size, capacity, and value of vessels constructed in the years named:

Capacity of vessels of the lake fleet.

Year and class.	Dimensions.	Capacity.	Draft.	Value.
1895–96.		*Tons.*	*Feet.*	
Steel freight steamer	438 by 45½ by 28	4,000	14½	$270,000
Do	452 by 48 by 28	4,000	14½	270,000
Steel freight barge	360 by 44 by 26	4,000	14½	135,000
1896–97.				
Steel freight barge	380 by 44 by 26	4,900	16	130,000
Steel freight steamer	426 by 406 by 48 by 28	5,000	16	240,000
Steel freight barge	388 by 376 by 46 by 26	5,000	16	150,000
1897–98.				
Steel freight steamer.....	475 by 452 by 50 by 28	6,100	17	255,000
Steel tow barge	450 by 434 by 50 by 28	7,000	17	155,000
Steel freight steamers	450 by 430 by 50 by 28	6,000	17	235,000

Of the boats contracted for in 1897, 7 steamers and 7 barges are intended for the freight trade. The aggregate value of the 14 vessels is $2,425,000, and the combined capacity is 72,900 tons on a draft of 17 feet. All but 4 of these boats are of steel. Sixteen vessels were lost during the season of 1897, the value being $358,500 and the tonnage 11,541, but none of these was of the modern type.

Improvements were also made at the receiving docks at Lower Lake ports, particularly at Conneaut, Ohio, the Lake terminus of the Pittsburg, Bessemer and Lake Erie Railroad, where a new pier was constructed and the old ones improved. The latter part of the year 1897 witnessed the formal opening of the Pittsburg, Bessemer and Lake Erie Railroad, from Conneaut, Ohio, to Duquesne, Pennsylvania. This road was built specially for the iron-ore carrying business, and is controlled by the Carnegie Steel Company. The road is built in a sub-

stantial manner, the grades being made as light as practicable and the line laidwith 100-pound rails. In addition to the wooden gondola cars 1,000 steel cars are to be used, each capable of carrying 100,000 pounds.

The storage docks at Conneaut are equipped with ore conveyors and in the winter of 1897 the McMyler Manufacturing Company installed some rapid ore-unloading machines, capable of handling 800 tons per hour. The plant is arranged for direct transfer from the boats into cars. It consists of 12 legs divided into 4 groups of 3 machines, each running on a 20-foot track; the outer legs of each group may be moved from a 21-foot center to a 36-foot center, thus accommodating the legs to any difference between the vessel hatches. Each leg spans 5 railroad tracks, 2 being under the machine and 3 under the cantilever. On the water side the boom extends to the farther side of the vessel, which permits lifting the buckets perpendicularly, and also of operating more than one bucket at a hatch. The trolley can be stopped and lowered at any point without going into a lock over the vessel's hatch. The buckets dump automatically at any height above the cars on any of the 5 tracks.

The handling of coal to and from vessels has received careful study and by the magnificent dock equipments established for this purpose cheap return cargoes are quickly loaded and unloaded, thus reducing the cost of ore transportation and permitting the wide distribution of the mineral won in the Lake Superior region at rates which were considered impossible a few years ago.

The shipments of iron ore from the various ports on the Upper Lakes for the year 1897 and the preceding five years, according to the Iron Trade Review, are as follows:

Lake shipments of iron ore.

Port.	1897.	1896.	1895.	1894.	1893.	1892.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Two Harbors	2,651,465	1,813,992	2,118,156	1,373,253	903,329	1,165,076
Duluth	2,376,064	1,988,932	1,598,783	1,369,252	440,592	.....
Escanaba	2,302,121	2,321,931	2,860,172	1,644,776	2,048,681	4,010,085
Ashland	2,067,637	1,566,236	2,350,219	1,738,590	1,117,520	2,223,684
Marquette	1,945,519	1,564,813	1,079,485	1,424,850	1,086,934	1,026,338
Superior	531,825	167,245	117,884	.....	80,273	4,245
Gladstone	341,014	220,887	109,211	79,108	203,589	115,886
Total	12,215,645	9,644,036	10,233,910	7,629,829	5,880,918	8,545,314
All rail	241,357	290.792	195,127	118,394	178,037	525,768
Total	12,457,002	9,934,828	10,429,037	7,748,223	6,058,955	9,071,082

From the above table it will be seen that for the first time in recent years Escanaba, Michigan, on Lake Michigan, has been superseded as

the leading shipping port, and has been passed by Two Harbors and Duluth, both in Minnesota and on Lake Superior. This is due in part to the operation of the new Lake Superior and Ishpeming Railroad, which diverted a considerable amount of ore from mines to Marquette, Michigan, that heretofore had been shipped to Escanaba.

The relatively small amount of ore shipped by rail direct from the mines is used principally by blast furnaces within convenient distances of the ore deposits.

STOCKS OF ORE AT LOWER LAKE PORTS.

The greater portion of the ore mined in the Lake Superior region is sent to Lower Lake ports by vessels, and, according to the Cleveland Iron Trade Review, the iron-ore receipts for the last six years were as follows at the ports named:

Iron-ore receipts at Lake Erie ports.

Ports.	1897.	1896.	1895.	1894.	1893.	1892.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Ashtabula	3,001,914	2,272,822	2,474,791	1,987,722	1,845,738	2,555,416
Cleveland	2,456,704	2,313,170	2,312,370	1,624,573	1,260,716	1,950,224
Fairport	1,008,340	941,446	914,617	976,222	792,517	866,611
Erie	1,311,526	847,849	811,989	624,438	469,299	645,230
Buffalo (*a*) and Tonawanda	797,446	545,101	719,742	395,339	308,238	197,000
Conneaut	495,327	327,623	244,967	237,905	203,207	1,130
Toledo	416,438	301,794	260,730	158,384	145,515	139,987
Lorain	355,188	191,445	214,219	150,424	165,667	190,400
Huron	198,231	226,515	146,442	172,775	137,700	65,000
Sandusky	79,792	58,667	12,361	23,043	4,464	49,736
Total	10,120,906	8,026,432	8,112,228	6,350,825	5,333,061	6,660,734

a Buffalo alone in 1892.

Ashtabula regained first position as a receiving port for iron ores, having been slightly superseded by Cleveland in 1896. Erie shows a marked advance, as also Lorain, Buffalo, and Conneaut.

The difference between the receipt at Lake Erie ports, 10,120,906 long tons, and the shipments from Upper Lake ports, 12,215,645 long tons, represents the shipments by water to South Chicago, Bay View, and a few of the Lake Superior and Detroit charcoal furnaces, the total being 2,094,739 long tons.

The stocks of ore carried at Lower Lake ports are a prominent factor in the iron-ore business. Large stocks, accumulated during the shipping season, are held over for the resumption of navigation. These are

decreased by rail shipments to the furnaces in the winter and spring months, when navigation is suspended. The following table shows the stocks of ore on hand at the Lower Lake ports on December 1, 1895, 1896, and 1897, and at the opening of navigation, May 1, 1896, 1897, and 1898:

Stocks of iron ore at Lower Lake ports.

Port.	At close of navigation, December 1.			At opening of navigation, May 1.		
	1895.	1896.	1897.	1896.	1897.	1898.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Ashtabula	1,301,302	1,441,666	1,835,694	636,254	926,865	1,031,441
Cleveland	1,200,792	1,419,311	1,478,355	506,693	979,705	853,776
Fairport	605,470	773,905	825,312	346,847	480,984	501,592
Erie	335,718	355,222	484,871	137,826	153,261	236,485
Conneaut	292,460	275,800	360,895	112,406	207,034	69,047
Lorain	224,264	231,288	317,509	118,820	180,605	158,797
Buffalo	207,199	82,267	111,660	16,644	50,477	53,081
Toledo	113,132	115,959	194,644	10,593	66,337	71,726
Huron	101,000	200,075	230,029	55,173	162,292	143,170
Sandusky	34,375	59,491	84,786	8,442	48,937	48,800
Total	4,415,712	4,954,984	5,923,755	1,949,698	3,256,497	3,167,915

From this it will be seen that the stock of iron ore on dock at the close of the shipping season of 1897 was the largest yet reported, 5,923,755 long tons, and that it had been reduced to 3,167,915 long tons by May 1; the difference, 2,755,840 long tons, being the rail shipments to furnaces from docks during the winter of 1897–98.

The total shipments from Lake Erie ports to furnaces, together with the consumption by the furnaces at Tonawanda, Buffalo, and Cleveland, which receive ore directly into their yards from vessels, was as follows:

Total shipments from Lower Lake ports to furnaces.

Year ending—	Quantity.	Year ending—	Quantity.
	Long tons.		*Long tons.*
May 1, 1898	10,209,488	May 1, 1894	4,840,488
May 1, 1897	6,719,633	May 1, 1893	6,102,125
May 1, 1896	8,805,510	May 1, 1892	5,802,496
May 1, 1895	6,297,215	May 1, 1891	5,148,669

This is an advance over the greatest previous total, May, 1896, of 1,403,978 long tons, or 15.94 per cent.

ANALYSES OF LAKE SUPERIOR ORES.

The Bessemer Ore Association has published tables showing the average cargo analyses of the ores shipped by the various Lake Superior mines in the season of 1897, by ranges. Some of the mines give the analysis which the ore is expected to average during the year 1898. As similar data in the report of 1896 were well received, these analyses are presented in form to preserve as records.

Analyses of Lake Superior ores.

[Bessemer Association.]

GOGEBIC RANGE.

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 (*a*)	62.74	4.09	.055	.82	.92	.47	.11	.018	2.25	12.36
Anvil, East Vein (*a*)	61.00	5.25	.058	2.18	.86	.05	Trace	.014	.....	12.75
Atlantic (*a*)	62.79	4.165	.044	1.0390	1.1055	.1950	.1050	.0152	3.020	11.00
Ashland (*a*)	62.69	4.50	.035	.25	2.11	.12	.10	.026	.....	11.00
Aurora (*a*)	62.44	5.19	.028	.44	1.10	.10	.05	.020	.....	10.00
Buckeye	60.43	6.24	.078	.36	2.10	.40	.35	.014	.....	10.82
Best (*a*)	56.17	10.440	.057	.7150	1.2400	.2150	.1525	.0230	3.1650	12.91
Brotherton	62.51	7.50	.035	.42	1.20	.10	.05	.01	1.30	12.27
Cary Manganese	56.08	.....	.056	6.52	.....	.....	.....	.....	.....	10.06
Cary Empire	59.90	.....	.057	3.08	.....	.....	.....	.....	.....	9.34
Colby	57.20	3.61	.075	5.85	.98	.14	.40	.008	2.10	9.00
Cromwell (*a*)	60.00	3.75	.032	3.10	.75	.10	.13	.010	.....	9.58
Eureka (*a*)	61.65	6.75	.066	1.40	.95	.52	.22	.011	1.97	9.80
Iron Belt	62.95	5.05	.040	.44	1.05	.07	.08	.018	.....	10.65
Lawrence (*a*)	62.00	5.70	.057	.56	1.25	.10	.08	.009	.....	9.78
Melrose (*a*)	62.92	3.15	.030	1.00	.93	.05	.08	.013	.....	9.88
Montreal	65.36	3.40	.040	.30	1.09	.15	.07	.015	.....	8.48
Mikado	59.15	.....	.044	.....	.....	.....	.....	.....	.....	13.00
Newport (*a*)	56.00	3.12	.040	7.00	.77	.08	.06	.011	.....	9.94
New Era (*a*)	58.00	9.60	.030	1.50	1.23	.43	.16	.005	.....	10.50
Norman (Palms)	62.807	2.990	.0730	.8850	1.1500	.2150	.1600	.0135	3.5550	13.19
Norrie and Pabst	63.88	.....	.039	.....	.....	.....	.....	.....	.....	10.31
O'Brien	58.98	12.50	.101	.....	.....	.....	.....	.....	.....	13.85
Palms (*a*)	63.03	3.162	.050	.8434	1.0952	.1550	.1347	.0125	3.3625	12.91
Pearce (*a*)	58.60	11.44	.062	.64	.81	.22	.13	.014	2.07	7.60
Rand	58.57	.....	.036	3.67	.....	.....	.....	.....	.....	9.95
Shores (*a*)	65.00	.....	.025	.....	.....	.....	.....	.....	.....	5.97
Sunday Lake	63.09	8.60	.0265	.39	.90	.36	.14	.010	.82	10.54
Tilden	63.19	.....	.045	.88	.....	.....	.....	.....	.....	13.87
Toronto (*a*)	49.00	26.00	.045	.45	1.25	.40	.25	.015	.....	8.50

a Expected analysis for 1898.

Analyses of Lake Superior ores—Continued.

MARQUETTE RANGE.

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	66.30	2.50	.012	.15	1.75	.15	.04	.015	.60	5.19
Angeline, Hematite	64.40	2.65	.043	.20	1.30	.25	.08	.020	2.20	10.08
Barnum (*a*)	65.50	3.49	.075	.36	1.80	.32	.26	.026	.....	.89
Bell	43.875	34.000	.0340	.1710	.8880	.1250	.0820	.0290	1.5200	2.71
Blue (*a*)	63.40	5.20	.12	.25	1.96	.55	.72	.010	.....	10.50
Buffalo (*a*)	61.80	6.60	.13	.55	1.84	.86	1.16	.003	.....	13.50
Buffalo, South (*a*)	61.95	5.70	.115	.39	1.75	.92	.71	.005	1.70	10.90
Cambria	61.60	6.90	.049	.38	1.87	.97	.34	.009	2.10	10.10
Champion No. 1 (*a*)	65.00	4.16	.044	.09	1.94	.95	.77	.007	.....	.97
Cleveland Bess. (*a*)	66.08	2.75	.040	.11	.20	.25	.24	.017	.....	1.42
Cliffs Shaft (*a*)	62.42	3.65	.113	.35	1.70	1.15	1.00	.020	2.20	1.06
Essex (*a*)	60.00	10.25	.110	.30	2.20	.53	.20	.020	.....	.75
Foster (*a*)	51.45	18.45	.142	.27	1.10	.18	.39	.020	5.18	3.63
Harvard Bess., H'm (*a*)	65.00	2.88	.050	.43	1.64	.23	.15	.018	.....	11.93
Ishpeming (*a*)	59.00	6.75	.070	.480	2.18	.220	.400	.010	4.17	12.85
Jackson	56.76	14.30	.059	.15	3.00	.....	.....	.02	.....	4.5
Jack., H., No. 2 Bess	50.01	24.23	.047	.15	2.93	.....	.....	.02	.....	2.9
Lake	59.87	5.80	.100	.540	2.61	.440	.630	.015	4.21	12.82
Lake Bessemer (*a*)	64.00	4.96	.038	.230	1.05	.210	.170	.029	1.79	10.37
Lake Bess., E't End (*a*)	61.34	7.48	.047	.33	2.09	.23	.30	.014	2.94	12.00
Lake Silica (*a*)	48.16	25.17	.039	.43	1.69	.36	.47	.035	1.65	11.00
Lake Sup'r No. 1 (*a*)	65.00	3.40	.100	.23	2.10	.26	.24	.013	.....	1.15
Lillie	61.56	6.10	.078	.39	1.97	.34	.11	.008	3.12	9.90
Mang'niferous H'm (*a*)	55.29	6.30	.075	3.75	2.00	.82	2.57	.025	.....	10.00
Marquette	42.953	35.156	.0576	.2820	.7913	.1530	.0940	.2430	1.5660	6.17
Missabe Friend (*a*)	39.54	.....	.020	.....	.....	.....	.....	.....	.....	.92
Negaunee, N., Bess	62.05	4.55	.12	.27	2.44	.30	.24	.015	.....	10.54
Norfolk (*a*)	56.00	13.43	.045	.11	3.18	.71	1.05	.030	.....	1.03
Oxford (*a*)	64.50	4.40	.076	.32	1.80	.25	.23	.013	.....	1.15
Old Mine H'm, Bess. (*a*)	62.50	3.75	.070	.40	1.66	.42	.14	.011	.....	12.14
O. M. H'm, H., Bess. (*a*)	61.00	5.96	.101	.54	2.13	.43	.32	.018	.....	11.42
Peninsula	59.00	7.38	.11	.30	3.48	.75	.94	.012	.....	14.64
Prince of Wales (*a*)	61.55	6.10	.12	.36	1.72	1.40	.46	.012	2.20	13.00
Queen	62.00	5.81	.13	.24	2.16	.44	.32	.012	.....	13.48
Republic, Special	67.13	2.180	.017	Trace.	.651	.100	.140	.014	.500	.60
Republic, Specular	67.34	2.50	.035	.03	.97	.48	.10	.010	.42	1.19
Republic, Kingston	64.83	5.91	.035	.19	.90	.35	.18	.038	.04	1.32
Republic Magnetic (*a*)	69.00	2.05	.040	.12	.479	.32	.144	.031	.....	1.00
Salisbury	62.00	4.51	.131	.250	1.84	.370	.140	.023	4.02	13.01
Salisbury, Bessem'r (*a*)	62.00	7.33	.048	.200	1.69	.170	.130	.016	2.30	13.00
Salisbury, Silica (*a*)	49.31	24.10	.054	.36	2.20	.35	.18	.016	2.30	11.10
Savoy (*a*)	60.00	9.25	.090	.34	1.85	.27	.17	.025	.....	2.00
Sec. 16, No. 1 Bess. (*a*)	65.00	4.39	.016	.36	1.68	.19	.15	.015	.....	4.08
Sec. 16, No. 2 Bess. (*a*)	62.25	8.43	.034	.25	1.72	.19	.12	.015	.....	3.25
Sec. 21, Hematite (*a*)	62.00	4.93	.150	.75	1.26	.43	.37	.019	.....	11.34
Sheffield	60.90	8.95	.025	.12	2.36	.20	.05	.045	1.11	2.95
S. Jackson, Silica	42.56	33.71	.040	1.98	1.58	.....	.....	.....	.....	9.79
Swanzy (*a*)	66.00	.....	.045	.....	.....	.....	.....	.....	.....	15.00
Tilden, Silica	41.40	38.75	.028	.100	.56	.180	.070	.018	.47	3.29

a Expected analysis for 1898.

Analyses of Lake Superior ores—Continued.

MENOMINEE RANGE.

Ore.	Iron.	Silica.	Phosphorous.	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.*
Aragon	62.87	4.06	.042	.13	.82	.57	1.74	.007	.....	5.83
Badger	59.60	4.96	.16	.11	2.44	.90	2.99	.088	.....	8.77
Castile	65.64	3.23	.011	.18	1.19	.35	.24	.010	.....	6.42
Chapin (*a*)	62.50	4.172	.066	.2782	.9747	.4250	2.0542	.0137	1.3175	6.87
Clifford	42.41	36.45	.014	.08	1.02	.45	.28	.001	.....	2.87
Crystal Falls	58.80	4.25	.785	.20	1.21	2.58	.94	.008	2.74	7.25
Davidson	56.10	6.70	.20	.30	3.28	1.75	2.80	.10	.....	8.35
Dunn	59.250	4.710	.5440	.3395	1.6305	1.7550	.9455	.0400	4.8850	9.03
Elmwood	57.35	6.35	.16	.75	3.25	1.25	3.28	.073	.....	8.75
Florence	57.600	4.340	.3450	.3590	3.1355	1.4300	1.8165	.1635	5.4550	7.41
Grenada	62.92	3.98	.064	.15	1.36	.49	1.41	.015	.....	7.19
Hemlock	59.74	4.49	.235	.....	.....	.....	.....	.....	.....	4.95
Homestead (*a*)	54.87	4.68	.086	.38	2.05	3.48	4.87	.003	.....	.....
Keel Ridge (*a*)	40.64	37.42	.046	.20	.90	1.35	1.00	.006	.....	2.90
Lerida	63.60	3.82	.17	.19	1.15	.72	1.44	.003	.....	6.64
Loretto	60.173	9.150	.0156	.1960	1.9840	.2800	.5910	.1010	1.1830	9.40
Mastodon (*a*)	61.00	4.50	.35	.30	2.75	.50	.30	.075	.....	9.00
Millie (*a*)	63.95	2.573	.026	.1423	.9230	1.0500	1.6830	.0036	2.0330	5.78
Pewabic	64.78	4.41	.009	.....	.....	.....	.....	.....	.....	7.57
Pewabic Genoa	45.10	30.25	.008	.....	.....	.....	.....	.....	.....	5.14
Rex	56.96	5.865	.063	1.1105	1.2137	1.3400	4.6635	.0150	3.6150	6.17
San Jose	65.272	3.547	.0127	.1975	1.1172	.1850	.2905	.0495	.7350	8.38
Sheridan (*a*)	58.50	6.50	.130	.50	4.00	.60	.70	.250	.....	9.12
Star Ludington	63.370	4.655	.0890	.2542	1.0935	.5100	1.1532	.0052	1.1300	7.75
Toledo	56.18	15.01	.009	.....	.....	.....	.....	.....	.....	6.08
Tyrone (*a*)	62.00	3.91	.106	.19	.72	1.50	1.90	.003	.....	.....

MESABI RANGE.

Adams	63.87	3.14	.035	.44	.95	.25	.12	.005	3.40	8.49
Ainslie (*a*)	62.51	4.00	.074	.40	2.80	.30	.23	.001	.....	9.80
Allegheny	61.649	.....	.0684	.867	.....	.....	.....	.....	.....	11.071
Auburn	64.65	2.63	.043	.32	1.60	.30	.28	Trace.	2.30	10.12
Audrey	62.74	3.05	.060	.54	1.70	.40	.23	Trace.	4.30	12.94
Berringer (*a*)	61.16	4.55	.065	.35	1.59	.11	.07	.012	.....	8.91
Biwabik	63.52	3.75	.033	.50	1.00	.27	.12	.004	3.35	8.20
Canton (*a*)	60.80	4.25	.048	.49	.93	.71	.07	Trace.	.....	9.97
Cincinnati (*a*)	61.02	8.00	.0308	.75	.98	.34	.15	.015	.....	9.00
Climax (*a*)	63.64	1.94	.036	.87	.60	.88	Trace.	Trace.	.....	8.65
Cloquet	61.47	4.30	.046	.54	1.45	.35	.10	.019	5.55	17.37
Commodore	64.10	3.90	.039	.18	1.10	.24	.06	.004	3.40	9.30
Duluth (*a*)	63.00	4.00	.050	.30	1.40	.12	.10	.012	.....	8.50
Fayal	62.81	3.87	.033	.87	1.10	.31	.10	Trace.	3.70	9.52
Franklin	63.150	3.775	.0345	.5010	.9355	.1400	.2090	.0115	3.8250	7.53
Genoa	63.54	3.75	.031	.45	1.30	.22	.14	Trace.	3.30	10.41
Hale (*a*)	60.00	5.00	.100	.55	.52	1.58	.....	.016	.....	9.00
Hartley (*a*)	64.80	3.12	.040	.40	1.47	.40	.19	.003	.....	8.05

a Expected analysis for 1898.

Analyses of Lake Superior ores—Continued.

MESABI RANGE—Continued.

Ore.	Iron.	Silver.	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.*
Hibbing	65.38	2.40	.030	.39	.79	.12	.07	.014	.....	11.10
Juniata	59.565	.....	.0817	1.210	.....	.....	.....	.....	.....	10.667
Linwood (*a*)	63.59	4.25	.054	.45	1.55	.60	.25	.010	.....	8.95
Mangan (*a*)	59.80	5.50	.034	.68	1.52	.32	.10	.....	.....	13.55
Minnewas (*a*)	65.50	2.23	.046	.48	1.12	.20	.18	.010	.....	9.00
Mountain	64.197	.....	.0447	.281	.....	.....	.....	.....	.....	12.260
Norman	61.98	3.84	.067	.72	2.20	.44	.16	.004	3.64	10.40
Oliver	63.844	.....	.0552	.388	.....	.....	.....	.....	.....	11.879
Pillsbury (*a*)	63.00	5.40	.030	.40	.90	.15	.10	.012	.....	9.00
Preble	59.596	.....	.0822	2.688	.....	.....	.....	.....	.....	9.637
Penobscot	63.518	4.075	.0324	.4750	1.210	.1950	.1000	.0115	2.6150	12.27
Roberts (*a*)	60.00	11.02	.0219	.66	.93	.09	.115	.009	1.82	8.705
Saxon (*a*)	64.29	3.75	.039	.56	1.21	.12	.04	.....	.....	8.00
Sparta	65.45	2.98	.029	.20	.88	.30	.25	Trace.	2.25	7.00
Sparta Top Brown	60.52	6.10	.056	.12	1.35	.51	.33	.007	5.00	9.75
Tubal (*a*)	63.25	4.50	.065	.45	1.75	.20	.08	.013	.....	11.54
Valley (*a*)	61.03	5.66	.041	.31	.....	.....	.....	.....	.....	12.76
Vega (*a*)	61.99	5.40	.040	.26	1.45	.33	.18	.....	.....	11.57
VERMILION RANGE.										
Chandler	65.23	3.51	.036	.25	1.80	.28	.12	Trace.	.85	5.47
Long Lake (*a*)	60.59	7.80	.040	.13	1.85	.72	.20	.004	.....	7.55
Minnesota	67.98	1.60	.046	.08	1.35	.47	.11	Trace.	.35	1.02
Pilot (*a*)	61.20	9.96	.030	.66	1.62	.21	.10	.006	.....	8.00
Pioneer (*a*)	64.80	4.19	.036	.28	1.91	.11	.05	.001	.....	7.47
Red Lake	64.70	4.00	.129	.09	2.05	.70	.30	.007	.75	2.74
Soudan	65.94	3.79	.100	.09	.96	.80	.55	.002	.50	1.44
Vermilion	67.08	2.05	.142	.11	.98	1.22	.24	.004	.41	1.11
Zenith	65.03	3.820	.0510	.1600	1.8800	.4700	.1500	None.	.6500	5.04

a Expected analysis for 1898.

Analyses of Lake Superior iron ores.

[Furnished by Messrs. Norton, Oglebay & Co.]

	Iron.	Silica.	Phosphorus.	Manganese.	Sulphur.	Alumina.	Lime.	Magnesia.	Water.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
GOGEBIC RANGE.									
Fairfax	63.21	3.95	.059	1.00	.015	1.22	.45	.25	13.08
Globe (*a*)	63.85	1.90	.088	.15	.004	1.10	.10	.06	9.50
Pence (*a*)	65.20	5.50	.019	.24	.014	.28	.15	.05	.....
Windsor (*a*)	64.00	4.00	.045	.63	.008	.80	.31	.10	.....
MENOMINEE RANGE.									
Appleton (*a*)	63.30	4.61	.018	.27	.019	1.30	.52	.47	8.50
Claire (*a*)	54.46	3.65	1.21	1.26	.015	1.13	3.20	1.22	6.50
Commonwealth	60.00	4.75	.22	.75	.15	1.65	1.40	1.20	6.25
Great Western (*a*)	61.03	3.98	.249	.92	.052	2.31	.92	1.65	6.50
Iron River	59.80	5.29	.356	.37	.028	3.41	.69	.37	9.50
Lincoln (*a*)	60.86	3.86	.24	.45	.010	1.67	.46	.23	11.00
Ludington (*a*)	65.60	.....	.024	.....	.....	.....	.....	.....	7.06
Mansfield (*a*)	63.36	4.14	.044	.38	.019	1.97	.46	.23	11.00
Paint River (*a*)	56.40	3.48	.502	.378	.068	6.12	5.58	.718	8.00
MARQUETTE RANGE.									
Angeline, South (*a*)	62.87	4.45	.128	.27	.023	1.79	.33	.06	11.02
Beacon (*a*)	46.00	29.75	.043	.07	.030	2.50	1.00	.80	.84
Columbia (*a*)	59.13	8.20	.055	.06	.....	1.46	1.35	.06	10.77
Eastend, Bessemer (*a*)	61.06	7.48	.046	.33	.014	2.09	.23	.30	10.33
Foster, silica (*a*)	42.00	27.00	.122	3.86	.002	1.36	.20	3.67	3.00
Humboldt (*a*)	65.90	3.91	.15	.13	.020	1.88	.88	.24	.....
Lake, Bess, No. 1 (*a*)	65.44	.....	.030	.....	.....	.....	.....	.....	9.97
Michigamme (*a*)	66.50	4.67	.013	.23	.050	.07	.25	.62	.75
Negaunee (*a*)	63.53	4.55	.057	.25	.025	2.64	.75	.15	10.67
Platt (*a*)	58.70	.....	.038	.....	.....	.....	.....	.....	8.78
Regent	61.47	7.71	.064	.22	.....	2.33	.76	.17	13.47
Sawmill (*a*)	60.00	.....	.060	.....	.....	.....	.....	.....	.84
Sec. 16, New Shaft (*a*)	64.50	5.43	.035	.27	.016	1.49	.27	.18	2.08
Volunteer (*a*)	57.79	12.46	.069	.20	.019	2.23	.29	1.73	1.50
Winthrop (*a*)	61.25	6.88	.135	.71	.027	1.34	.44	.38	11.37
MESABI RANGE.									
Beaver	63.95	2.20	.079	.17	.012	1.50	.20	.10	10.61
Cincinnati, silica (*a*)	59.00	8.00	.030	.60	.015	1.00	.34	.15	8.00
Etna (*a*)	64.00	3.50	.045	.50	.010	1.85	.35	.15	11.00
Helmer (*a*)	64.00	3.65	.051	.48	.015	1.80	.15	.10	11.15
McKinley (*a*)	62.30	8.36	.026	.37	.016	.93	.48	.23	8.75
Sellers (*a*)	64.23	3.66	.036	.38	.019	.95	.19	.12	8.73
Shenango (*a*)	64.07	2.69	.060	.30	.020	1.62	.20	.16	10.53
South Side (*a*)	61.05	4.22	.070	.....	.013	3.40	.25	.10	9.68
Williams (*a*)	60.40	9.20	.036	.77	.011	.95	.42	.12	9.70

a Expected analysis for 1898.

IMPORTS.

The following figures, supplied as in former years through the courtesy of the Chief of the Bureau of Statistics, Treasury Department, show the imports of foreign iron ore into the United States during the year ending December 31, 1897, by countries, and the entries by customs districts, together with the values of the ore. To these have been added, for the purpose of comparison, similar data for the year 1896:

Quantity and value of iron ores imported into the United States in 1896 and 1897.

From—	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
Cuba	380,551	$463,570	383,820	$454,709
Spain	121,132	230,879	66,193	167,878
French Africa	79,661	163,517	3,504	7,785
Italy	29,882	85,661	.....	.....
Greece	33,750	34,520	.....	.....
Newfoundland and Labrador	20,800	20,965	29,250	29,431
United Kingdom	8,528	23,155	358	4,091
Colombia	3,150	5,800	.....	.....
Portugal	1,101	2,327	3,612	5,831
Other countries	4,251	6,523	3,233	9,187
Total	682,806	1,036,917	489,970	678,912

The total amount imported, 489,970 long tons, was valued at $678,912, or $1.39 per ton. This is a decrease of 192,836 long tons, or 28.24 per cent, over the total of 1896, viz, 682,806 tons, which was valued at $1.52 per ton.

The imports of iron ore in 1897, by customs districts, were as follows, that of 1896 being also given for comparison:

Imports of iron ore into the United States in 1896 and 1897, by customs districts.

Ports.	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
Baltimore, Md	368,761	$577,135	292,613	$369,433
Philadelphia, Pa	308,217	444,687	194,814	302,211
New York, N Y	4,199	10,499	309	1,272
Boston, Mass	78	216	46	112
Total Atlantic ports	681,255	1,032,537	487,782	673,078

Imports of iron ore into the United States in 1896 and 1897, etc.—Continued.

Ports.	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
	Long tons.		*Long tons.*	
Cuyahoga, Ohio	1,033	$1,911	.....	.....
Champlain	.....	.....	104	$156
Detroit, Mich.	Not given.	10	139	186
Vermont	.....	.....	21	81
Total Lake ports	1,033	1,921	264	423
Paso del Norte, Tex. (total Gulf ports)	257	159	919	2,525
Puget Sound, Wash. (total Pacific ports)	126	350	1,000	2,826
Pittsburg, Pa. (interior port)	135	1,950	5	60
Total imports	682,806	1,036,917	489,970	678,912

The war between the United States and Spain has affected, and if continued would affect more seriously, the foreign iron-ore trade. Since 1884 Cuba has been a source of supply for some of the blast furnaces of the United States, and lately has also forwarded this mineral to European ports. The shipments of iron ore, which in 1897 amounted to 451,629 long tons, were from the port of Santiago de Cuba on the southern coast, and from a dock located at Daiquiri, some 20 miles east of Santiago Bay. This dock was of material aid to the United States in landing troops and supplies, and the two railroads were used as avenues of approach in the assault made upon the Spanish intrenchments.

Work at the Cuban iron-ore mines was necessarily abandoned before hostilities began, but will undoubtedly be resumed promptly when the present contest is settled and security given to the labor and shipping engaged. Since 1884, when mining was commenced, three and a half million tons of iron ore have been shipped from the province of Santiago de Cuba. The mines have been developed by capital supplied by the United States, and the management is directed from this country.

Spain has been a large exporter of iron ores from the Bilbao and other districts, and these ores have become of great importance to British and continental furnace managers. Great Britain uses about 5,000,000 long tons of Spanish iron ore annually, which constitute its main reliance to supplement the domestic mineral. In Spain the army and navy demands have depleted the supply of laborers, and the war taxes may seriously affect the iron-ore production. As much of the ore is sent to England from Spain in vessels whose return cargo is coal, any interference with the shipments of iron ore would immediately

affect the coal trade. Hence iron ore threatened to become an important factor in the controversy.

During the year 1897 Spain produced 7,468,000 metric tons of iron ore, an increase of 700,000 tons over 1896. Of the total output, 5,170,000 came from the provinces adjoining the Bay of Biscay. Most of the Spanish iron ore was exported, some 5,000,000 tons going to Great Britain, 1,000,000 tons to Germany, 500,000 tons to France, 200,000 tons to Belgium, and 66,193 tons to the United States. The home consumption in 1897 did not exceed half a million tons.

SHIPMENTS OF CUBAN IRON ORES.

The Juragua Iron Company, Limited, was the earliest producer of iron ore in the Santiago district of Cuba, its first cargo being exported August 7, 1884. The Sigua Iron Company did not ship any ore until October, 1892, and the Spanish-American Iron Company made its first shipment May 27, 1895.

The production of each of these companies has been as follows:

Production of three iron-ore companies in Cuba.

Year.	Juragua Iron Company.	Sigua Iron Company.	Spanish-American Iron Company.	Total.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
1884	21,798	.....	.....	21,798
1885	81,106	.....	.....	81,106
1886	111,710	.....	.....	111,710
1887	97,711	.....	.....	97,711
1888	198,040	.....	.....	198,040
1889	256,278	.....	.....	256,278
1890	362,068	.....	.....	362,068
1891	266,377	.....	.....	266,377
1892	322,527	7,830	.....	330,357
1893	348,863	14,022	.....	362,885
1894	150,440	.....	.....	150,440
1895	311,053	.....	74,991	386,044
1896	298,299	.....	114,101	412,400
1897	244,817	.....	206,812	451,629
Total	3,071,087	21,852	395,904	3,488,843

In addition to the amounts given above for the Juragua Iron Company, Limited, which represents the actual imports, four cargoes, comprising 10,131 long tons, were lost at sea.

THE MARQUETTE RANGE OF MICHIGAN.

The unprecedented record of Minnesota and the phenomenal development of the iron-ore industry in that State, made possible by the ease with which ore is extracted from deposits of enormous extent, raise the question as to the influence thus exerted on mining in other Lake Superior ranges and as to the probable future influence. That the new developments have affected the mines on the other ranges is unquestionable, but an examination of the records shows that the outputs of the latter have been curtailed to a less extent by the product of the newest claimant, the Mesabi Range of Minnesota, than was expected. The production of the various ranges in the past five years has been as follows:

Production of Lake Superior iron ore, by ranges.

Range.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Marquette	2,064,827	1,935,379	1,982,080	2,418,846	2,673,785
Menominee	1,563,049	1,255,255	1,794,970	1,763,235	1,767,220
Gogebic	1,466,815	1,523,451	2,625,475	2,100,398	2,163,088
Vermilion	815,735	1,055,229	1,027,103	1,200,907	1,381,278
Mesabi	684,194	1,913,234	2,839,350	3,082,973	4,220,151
Total	6,594,620	7,682,548	10,268,978	10,566,359	12,205,522

This table is not carried further back than 1893 because, although the Mesabi Range made its first shipments in 1892, the amount sent forward, 29,245 tons, was insufficient to exert any decided influence upon the other ranges and because the output of these ranges in the years 1890 to 1892 were above what might be considered as the normal product, the three years named showing unusually large consumption of domestic ores.

The Marquette Range as the oldest was expected to feel most keenly the competition of the various new ranges as they became producers, and especially that exerted by the Mesabi Range. The statement in the table, however, does not bear out this expectation, for although the Marquette Range would undoubtedly have been called upon to supply some of the ore which has been furnished by the Mesabi Range it appears to have maintained its normal output, and, in fact, to have surpassed this in the years 1896 and 1897. The contribution from the Mesabi Range may therefore be considered as supplying practically new demands; but the reduced expense of winning ore on this range has influenced the price which ores from the other ranges command.

A late visit was made to the Lake Superior region in order to study the effect of the new developments upon the other ranges, but circum-

stances prevented this personal inquiry from being extended beyond the Marquette Range.

The continued exploitation of the larger mines by extending operations laterally and vertically, the sinking of new shafts, the introduction of improved equipments, the additional transportation facilities provided, and the development of new finds demonstrated the faith held by the managers in the permanency of the producing deposits of the Marquette Range. This activity was not confined to the mines furnishing the high-grade ores, but was noticeable at some which produced ores below what has been considered the shipping limits of iron contents. The fact that these lean ores were sold for mixtures, as low phosphoro-siliceous ores, does not detract from their exploitation as an indication of progress, but rather illustrates the economies which have been introduced in mining and transporting ores.

There are fewer producing mines than formerly in the Marquette Range and a number of consolidations have taken place. Some mines which had been under lease have been returned to the lessors, operations at some have been suspended, some have been abandoned, and some have been exhausted. But the general activity throughout the range indicated no prevailing decadence, and a study of the apparent ore reserves encourages faith in the continuation of iron-ore mining on a liberal scale in the Marquette Range.

Should the effort to utilize the leaner ores locally meet with success, the output from the range will be augmented in the future.

In the report for 1895 a list of mines and exploitations in the Marquette Range was published. This list, prepared by Mr. James E. Jopling, M. E., included 19 active mines, 12 mines considered as temporarily suspended, and 44 abandoned enterprises. A late revision of this list shows 17 active mines, 11 suspended mines, and 41 abandoned enterprises. The 17 mines in the active list have contributed a total to date of 38,024,852 tons of iron ore; 2 of these made their first shipments subsequent to the opening of the Mesabi Range. Eight mines which have suspended since 1892 are credited with a total of 3,833,284 tons. The 41 abandoned mines have produced an aggregate of 4,555,209 tons of ore; of these, 8 abandoned subsequent to 1892 have furnished a total of 1,893,193 tons, of which amount the New York mine contributed 1,113,102 tons up to 1894, when the deposit was considered as exhausted.

Mr. Jopling discussed the Marquette Iron Range in a paper[1] as follows:

> The geographical position of this range, nearer to eastern ports than the other iron ranges, and its ready access from Lake Superior gave it for a long time a controlling advantage. The country in which the mines are situated is from 800 to 1,000 feet above the level of the lake, and is for the most part broken by steep hills, which rise from 100 to 200 feet; between these the land is rolling or swampy. The eastern part is on the watershed between Lakes Superior and Michigan, affording good drainage.

[1] Trans. Am. Inst. Min. Eng., Vol. xxvii, p. 541.

Geologically, the range is in the Algonkian area, which is generally less than ten miles wide, and is bounded north and south by the Archæan, consisting of syenite, gneiss, granite, etc. The Lower and Upper Marquette formations, into which the Algonkian has been divided by Dr. Van Hise, of the United States Geological Survey, correspond to the Huronian formation of Canada. It is in a subdivision, termed by the same geologist the Negaunee formation, that most of the ore-bodies occur, generally associated with the greenstones which in many places underlie them, and in others cut across the formation in the form of dikes. Generally speaking, the soft hematite ores occupy a lower geological horizon than the hard ores, which, in some places, are found to rest unconformably upon them.

The ore-bodies are extremely irregular in shape and size, and appear to be segregations in the mass of jasper, with which they are always associated. As a general rule, the soft ores occur beneath the jasper, and either in complete or partial basin-shaped deposits, in synclinal folds of the greenstone or schist, with a pitch to the west. The hard ores, on the other hand, usually occur above the jasper and next to the overlying quartzite, etc., of the Upper Marquette formation. The depth to which these formations extend is still unknown, although in the oldest mines which contain the hard ores from 1,200 to 1,300 feet has been reached. The ore at greater depth is not so extensive as near the surface. Soft ore has not been followed to such a depth on this range; the deepest mine of this description reached nearly 1,000 feet from the surface before the various shoots or chimneys from the main mass pinched out.

When Michigan became a State in 1837 and Dr. Houghton was appointed State geologist, the systematic exploration of the Upper Peninsula was begun. On the failure of the State to raise enough money to carry on the work in detail, he persuaded the authorities at Washington to combine a geological survey with that of the township and subdivision lines; and it was a result of this work that iron ore was first discovered in 1844.

The first attempts at mining in this district were to supply ore for the Catalan forges erected near the mines and also in Marquette.

In 1850 5 tons of ore were sent to Newcastle, Pennsylvania. In 1852 70 tons of Jackson ore were sent to Sharon, Pennsylvania.

The locks at Sault Sainte Marie were completed in June, 1855, and at the same time a plank road was constructed from Marquette to the mines, and regular shipments were begun. In the following year the construction of a railway was begun, and it was completed in 1857.

There had been no returns to any of the capital invested in the district previous to 1862, when the Jackson Company declared its first dividend. From this time the yearly shipments increased from 124,169 tons to 1,162,458 tons in 1873, after which they gained slowly until 1890, when they reached the highest point, namely, 2,993,664 tons.

During the comparatively high prices that obtained until 1890 an enormous amount of exploring was done on the range, but since the opening of the Republic Mine in 1872 there have been few profitable undertakings in new territory. Among these few are the Queen Group and the Negaunee.

It was not until 1870 that the soft hematite ores of the district were considered as of any value, all the previous work having been done in the hard ores. But in the next few years a large number of pits were opened at the east end of the range in this grade of ore.

Beginning in 1880, a number of pits in limonite ore were opened near Champion and also near Michigamme. This ore, which was apparently quite shallow and in no case very clean or regular, could be mined with profit only while prices were higher than usual. The last and the most extensive mine in this kind of ore, the Imperial, was shut down in 1892.

For many years—in fact, as late as 1880—most of the ores at Ishpeming and Negaunee were worked in open pits.

Where the ore had to be raised, use was made of derricks and horse whims, or else of carts on inclined roads. Tram cars were first used about 1880; before this time wheelbarrows and trucks were employed. Powder drills driven by steam or compressed air were not introduced until 1878. The development of these irregular bodies of ore was aided to a marked extent by the introduction of diamond drills, by the use of which a core could be taken, proving the ground in some places to the depth of 1,000 feet. With them it was possible to locate an ore deposit situated under a swamp, or by drilling through the ice of a lake to determine the presence of enough merchantable ore under the bed of it to warrant a large expenditure of money, as was the case with Lake Angeline. The system of stoping hard ores, and leaving pillars enough to support the hanging wall, was the one generally adopted. Many of the mines opened under this plan have been since filled, and the pillars have been removed. No water power has been used for generating electricity for the mines. At Republic the air compressors are driven by the falls of the Michigamme River.

The Marquette Range has shipped 46,542,662 tons of iron ore, or nearly half of the entire Lake Superior product to date. By the adoption of a policy of strict economy in methods of mining, the cost of winning ore has been materially reduced, especially at the mines which had previously been opened up far ahead of their present needs and had been equipped with modern machinery.

Ishpeming and Negaunee remain the center of mining on the range; in fact, except Republic and Champion, nearly all the ore shipped is from their city limits.

The development of the ores of the range has been greatly assisted by the well-known geologists who have been connected with the United States and State survey. Dr. Houghton, who has been mentioned, was followed by Foster and Whitney, who published in 1850 the results of the explorations. The work has been ably carried forward in different lines by Brooks and Pumpelly, Charles E. Wright, Dr. Wadsworth, Dr. Hubbard, and Dr. Van Hise, who have all published valuable reports on the Marquette Range at different stages of its development.

The United States Geological Survey has published a monograph, Vol. XXVIII, accompanied by an atlas, on the Marquette iron-bearing district of Michigan.

The competition with the other iron-ore ranges of the Lake Superior region has demanded that the managers of mines of the Marquette Range employ improved methods of mining to remove the mineral at least expense. Some of the cost sheets show that remarkable results have been obtained under great difficulties. While the ores of the Mesabi Range as a rule command prices below those of ores of similar chemical composition obtained from the other ranges, this difference is not sufficient to permit wasteful methods, and the cost of mining ore from deep underground workings in each of the ranges is remarkably low. Good management is not confined to any of the ranges, for in each there are notable evidences of skill in overcoming difficulties and energy in pushing the work of development.

One of the interesting mining problems of the Marquette Range is the winning of ore from a lense which extended under Lake Angeline, a considerable body of water, which has been drained and the stream supplying it diverted. A large accumulation of mud in the bottom of what was the lake gives trouble by reason of the ore lense approaching the old lake bottom, but from the area formerly covered by water large amounts of ore have been and are being taken.

There seems to be no reason to anticipate an early exhaustion of the known deposits of the Marquette Range, whose extent has been proved by exploratory work, and which, in some cases, have been opened up considerably in advance of immediate requirements. On the contrary, it may be expected to continue as a source of supply for a large quantity of ore of superior quality, and the extent of the deposits of some of its lean ores may, with cheap transportation, encourage increased outputs from these. A strong effort is also being made to rehabilitate the iron-producing industry in the Marquette Range with the purpose of utilizing some of the local ores, especially those which carry insufficient iron to withstand the freight charges to existing furnaces.

With two railroads connecting most of the large producing mines with docks on Lake Superior by a haul of but 15 to 20 miles, and in addition rail connection by competing routes to docks on Lake Michigan, the Marquette Range has good shipping facilities. The distance by vessel travel to the lower lake receiving docks from these ore docks is also less than from the Gogebic, Vermilion, or Mesabi ranges of Lake Superior.

THE IRON ORES OF ALABAMA.

The rapid development of iron production in Alabama has naturally drawn liberal attention to the iron ores of this State and of its neighbors, Tennessee and Georgia.

Much has been written upon these deposits, and they were referred to in the Annual Report of the United States Geological Survey for 1894.

The following, condensed principally from a late contribution by Mr. Henry McCalley, of the Alabama geological survey, is presented in view of the prospective introduction of basic steel production in Alabama.

While Georgia and Tennessee mine considerable red and brown hematite ores, it is in Alabama that the Clinton fossil formation, from which the bulk of the iron ore is obtained, finds its greatest development, particularly in the vicinity of Birmingham, where a great fold occurs.

The hematites of Alabama are in regular stratified seams, somewhat local in their occurrence and importance. They occur in the Upper Silurian, Lower Silurian, and Cambrian formations, although only those in the first-named formation are in sufficient quantity in Alabama to be of any great commercial value.

The Upper Silurian ores in Alabama, known as red ores, dyestone ores, Clinton ores, fossiliferous ores, lenticular ores, oolitic ores, etc., are from the Red Mountain, Dyestone, or Clinton beds, and are variable in thickness and composition. The thickness ranges up to 700 feet, the beds feather out and become coarser or more sandy toward the southeast, and also in a more gradual way toward the southwest.

The principal ore-bearing strata are in the central part of the formation, and good workable ores are found only in places.

The red ore seams are very persistent in the direction of the strike, or from northeast to southwest, notwithstanding the fact that they are variable in both thickness and quality in this direction. The outcrops in Alabama are considerably over 500 miles in length, but they are too thin and lean to be worked over more than a small fraction of this distance. The good workable ores are in from 1 to 5 different seams, that range in thickness from a few inches to over 30 feet.

These seams near the Tennessee line or in the Tennessee Valley are from 1 to 10 feet thick, but they are too lean to be of any value other than as fluxing rocks, being nothing more than slightly ferruginous siliceous limestones. Next to the Georgia line they are from 1 to 4 feet thick, and are of good quality. To the southwest, in Alabama, they are in many places on the outcrops nothing more than leached ferruginous sandstones. The workable Clinton ores of Alabama may therefore be said to be confined to the anticlinals and synclinals just to the northwest of the badly folded and faulted strata of the Appalachian region. Their impurities are almost wholly of siliceous matter and carbonate of lime, except near the southwest end, where they are cut up by partings or interstratified seams of light and reddish unctuous clays.

The dips on the outcrops vary from a vertical to about 10 degrees to the southeast or northwest side of the valley.

The faults, when on the northwest sides of the valleys, are called overthrust faults, because the older strata of the central parts of the valleys to the southeast are thrust over on top of the younger strata to the northwest; and those on the southeast sides of the valleys are called underthrust faults, because the younger strata to the southeast are thrust under the older strata of the central part of the valleys to the northwest.

Though the red ore seams or the Red Mountain strata of Alabama are not the same in two places on the strike but a short distance removed from each other, still the strata of East Red Mountain, between Birmingham and Bessemer, where the Clinton ores are the most highly developed, are approximately represented by the following general section:

Approximate general section of East Red Mountain between Birmingham and Bessemer.

	Thickness in feet.
Fort Payne chert (Lower Carboniferous).	
Black shale (Devonian)	0 to 1
18. Iron sandstone, very hard, calcareous	6 to 8
17. Siliceous limestone, sandstone, and shales	15 to 20
16. Ferruginous siliceous limestones; very limy ore, beyond point of weathering	30 to 35
15. Sandstone	20 to 30
14. Ferruginous sandstone; very sandy ore	40 to 45
13. Sandstone	20 to 25
12. Ore, sandy	2 to 5

	Thickness in feet.
11. Sandstone, sandy ore, a sandstone with from 3 to 20 feet of its central part a sand ore	40 to 60
10. Ore, shales; principally siliceous ore with interstratified shale, with the hickory nut or gray ore seam from 2 to 5 feet thick near its top, and the Ida seam from 2 to 3 feet thick near its bottom	15 to 35
9. Sandstone, shales	0 to 25
8. Upper bench of the Big or Red Mountain ore seam	10 to 22
7. Parting	0 to 5
6. Lower bench of the Big or Red Mountain ore seam	3 to 14
5. Shales, sandstones	0 to 36
4. Ore, Irondale seam	3 to 6
3. Sandstone, shales	25 to 40
2. Ore, silliceous	3 to 10
1. Sandstone, shales	75 to 125

Pelham or Trenton limestones (Lower Silurian).

Three of these ore seams—the Ida seam, the whole or both the upper bench and lower bench of the Big or Red Mountain seam, and the Irondale seam—have all been worked between Birmingham and Bessemer; although the upper 10 to 14 feet, or the upper bench of the Big or Red Mountain seam, has furnished the preponderance of the ore for the Birmingham district. This Big or Red Mountain seam is en masse near Birmingham, but it gradually splits into two parts or benches toward the southwest, until these benches near Bessemer are 5 feet apart. This seam has been stripped, and its upper bench has been worked on the outcrop almost the entire distance of 11 miles between Birmingham and Bessemer. The strippings either cover the crest or occur just to the northwest of the crest of the mountain, as the mountain is comparatively high or low. They extend down on the ore from a few feet to about 150 feet, or until the cover becomes from 15 to 20 feet thick, or too thick to be removed. The dip of the ore on the outcrop between Birmingham and Bessemer is from 25° to 35° to the southeast. It usually keeps this dip for 500 to 600 feet down on the dip, when it begins to flatten. The ore in the big seam is best at the top, becoming gradually more and more siliceous from top to the bottom of the seam. About one-half of the mines between Birmingham and Bessemer—all of those on the southeast side of the mountain—are worked by gravity, the loaded and balance cars in their descent pulling up the empty cars, while the other half of the mines on the steep northwest side of the mountain use steam for hoisting purposes.

The red ore on the outcrop or the leached ore, containing little or no lime, is called soft ore, and the unleached or limy ore is known as hard ore, without any respect to the actual softness or hardness. The soft ore is usually hard enough to blast out in blocks, and extends from 150 to 200 feet on the dip from the outcrop, although in some places it goes down as far as 300 feet, and in others only a few feet, the hard ore setting in at the outcrop. The distance to which the soft ore extends down on the dip is dependent on the cover. The passage from one ore to the other is sudden, or the line between the two ores is distinct

though jagged. The one ore extends in points into the other. The lime increases a little at first in both the soft and hard ores. The hard ore carries 35 to 40 per cent of iron, while the soft ore carries 45 to 50 per cent of iron.

While the limonite deposits are mostly in irregular pockets of bowlders, nodules, and pebbles, in residual loams with clay horses, many of them are in regular stratified seams, some of the pocket deposits being of ore that has come from the outcrops of stratified seams. The most numerous and important limonite deposits of Alabama are either in or over the Lower Carboniferous, Lower Silurian, and Lower Cambrian strata, although there are many such deposits, some quite large, in other formations.

The three principal limonite horizons, or those in which the deposits are the most numerous and as a general rule largest and most workable, commencing with the lowest or oldest, are: (1) At and near the top of the Weisner quartzite (Chilhowee); (2) at and near the bottom of the siliceous (Knox) Dolomite and Chert group, and (3) at and near the bottom of the Lauderdale (Keokuk) Chert group.

The limonite deposits at or near the top of the Weisner quartzite are numerous and extensive, occurring as the outcrops of a stratified seam, in place of two stratified seams and pocket ore. The stratified seams crop out either along the tops of the mountains or just to the southeast of the crests of the mountains, and the pocket deposits usually along the foot of the mountains, and commonly along faults. The stratified limonite deposits of this horizon begin and end suddenly, though they take the place locally of other continuous strata as quartzite, quartzitic conglomerate, etc. They are sometimes extensive, being several hundred yards in length and 40 to 50 feet thick. The pocket is mostly bowlder ore. It is commonly found in a deep red loam with loose quartzite along faults, and frequently overlies strata of the overlying groups, as the Aldrich limestones and Montevallo shales. These pocket deposits comprise some of the most extensively worked banks in the State. In some of them the ore is partly in irregular, stratified strings, etc.

The ore of this horizon is generally a black, waxy ore that is high in silica, iron, and phosphorus. It is often what is termed a "rough" or rocky ore, or a bowlder ore that is made up of partly pure ore and partly quartzite, in irregular masses, streaks, etc. The pocket ore is usually of better quality than the stratified ore, and the nodular ore than the bowlder ore.

The limonite deposits at and near the bottom of the siliceous dolomite and chert group carries, as a rule, the best grade of limonite and hence most of the worked limonite deposits. These deposits are more numerous than those of any other horizon, and many of them are extensive, some having been worked to a depth of nearly 100 feet, with ore still in the floors of the banks. The ore, though mostly of good qual-

ity, comparatively low in silica and phosphorus, is sometimes rough and cherty, and often high in phosphorus. This rough or cherty ore is usually in large bowlders that sometimes occur in rows as outcrops of stratified ledges. The good is always, strictly speaking, in pockets.

The limonite deposits at and near the bottom of the Lauderdale chert group is the least important of the three principal limonite horizons. The ore deposits are the outcrops of a stratified seam, in places two stratified seams, and pocket ore. The pocket ore is believed to have been derived principally from the outcrops of stratified seams. The stratified seams have never been seen over a few feet in thickness. The ore as a rule is not so good as that of the last mentioned horizon, as it is oftener rough and cherty and higher in phosphorus.

Limonite beds occur also at two horizons in and on the Lower Carboniferous formation, or in the bottom strata of the Bangor limestones and over their lower strata. The crystalline or Talladega slates carry some few extensive beds of limonite, though the ore of most of these beds is siliceous. The newer formations, Cretaceous and Tertiary, in Alabama, also carry some limonite deposits. The most important limonite horizon in Alabama, after the three principal ones mentioned above, occurs at the bottom of the Lafayette formation. The limonite beds of this horizon have been worked extensively.

It is, of course, difficult to give an average composition of the Alabama Red Mountain ores, but the three following analyses, dried at 212° F., represent the three different seams: No. 1 is an average of many stockhouse samples, made by Dr. William B. Phillips, of soft ore. The hard ores show considerable variations from different openings, but an average analysis of the ore in its natural state, as made by Dr. William B. Phillips, is given in No. 2. No. 3 gives some representative analyses from furnace samples in the natural state of ore from the Irondale vein:

Analyses of Red Mountain ores, Alabama.

	1.	2.	3.
	Soft ore.	Hard ore.	Irondale vein.
	Per cent.	*Per cent.*	*Per cent.*
Metallic iron	47.24	37.00	52.00 to 53.50
Moisture	7.00	.50	.....
Silica	17.20	13.44	15.50 to 16.00
Alumina	3.35	3.18	4.50 to 5.00
Lime	1.12	16.20	Trace to .50
Phosphorus	.....	.37	.15 to .18
Sulphur	.....	.07	.....
Carbonic acid	.....	12.24	.....
Manganese	.....	.....	.20 to .30

No deposits of brown ores tributary to the Birmingham district have yet been found within the Bessemer limits as to phosphorus. Shipments of good qualities of brown hematite—furnace samples taken of the ore in the natural state—average, according to Mr. John S. Kennedy, 45 to 52 per cent of metallic iron, 11 to 15 per cent of silica, and from 0.4 to 0.8 per cent of phosphorus.

It will be noted that the ore is practically self-fluxing.

THE AMERICAN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,
General Manager of the American Iron and Steel Association.

DISTRIBUTION OF IRON AND STEEL WORKS, BY STATES.

Before we proceed to give the details of the production of the iron and steel industries of the United States in 1897 and immediately preceding years, the reader will be interested in learning from the following table how the country's iron and steel works are distributed among the several States. The table has been compiled from the fourteenth edition of the Directory to the Iron and Steel Works of the United States, published in July, 1898, by the American Iron and Steel Association.

Number of iron and steel works and tin-plate works in the United States in 1898, by States.

State.	Blast furnaces.	Rolling mills and steel works.	Steel works (included in preceding column).			Tin-plate works.
			Bessemer.	Open-hearth.	Crucible.	
Maine	.....	1	.....	.....	.....	.....
New Hampshire	.....	1	.....	1	.....	.....
Massachusetts	3	12	1	4	.....	.....
Rhode Island	.....	1	.....	.....	.....	.....
Connecticut	5	9	.....	1	3	.....
New York	19	23	1	4	4	3
New Jersey	10	21	.....	5	6	.....
Pennsylvania	162	225	20	48	21	31
Delaware	.....	10	.....	1	.....	.....
Maryland	8	5	1	.....	1	4
Virginia	27	7	1	.....	.....	1
West Virginia	4	7	2	.....	.....	2
Kentucky	9	9	1	2	.....	1
Tennessee	19	4	.....	.....	1	.....

Number of iron and steel works and tin-plate works in the United States—Continued.

State.	Blast furnaces.	Rolling mills and steel works.	Steel works (included in preceding column).			Tin-plate works.
			Bessemer.	Open-hearth.	Crucible.	
North Carolina	2	.....	.....	.....	.....	.....
Georgia	4	1	.....	.....	.....	.....
Alabama	45	10	.....	3	.....	.....
Texas	4	1	.....	.....	.....	.....
Ohio	55	67	7	10	2	16
Indiana	.....	33	3	5	1	6
Illinois	17	26	5	8	1	3
Michigan	13	3	1	1	1	1
Wisconsin	6	6	1	3	3	.....
Minnesota	1	3	.....	1	.....	.....
Missouri	3	7	.....	1	.....	1
Iowa	.....	1	.....	.....	.....	.....
Kansas	.....	1	.....	.....	1	.....
Colorado	3	2	1	.....	.....	.....
Wyoming	.....	1	.....	.....	.....	.....
Washington	.....	1	.....	.....	.....	.....
Oregon	1	1	.....	.....	.....	.....
California	.....	5	.....	1	.....	.....
Total	420	504	45	99	45	69

It will be observed, by reference to the table, that our blast furnaces are situated in 22 States, our rolling mills and steel works in 31 States, and our tin-plate works, of which there are 69, in 11 States.

Of the 420 furnaces that are mentioned, all but 79 use bituminous coal and coke and anthracite coal, the remainder using charcoal. The annual capacity of the whole number of furnaces, after making due allowance for those that are not likely to run again, was about 18,000,000 long tons in April, 1898. To the whole number of furnaces may be added 4 large new furnaces that are now in a forward state of construction, and these furnaces will add about 500,000 tons to the total annual capacity we have mentioned.

Omitting all forged products, the annual capacity in finished products of the rolling mills in April, 1898, was 17,929,850 long tons, against 14,763,920 tons in January, 1896. The number of puddling furnaces in April, 1898, each double furnace counting as two single furnaces, was 3,889, against 4,408 in January, 1896, a decrease of 519.

Of the whole number of rolling mills mentioned, 51 were prepared to roll standard, girder, light T, and other rails; 66 were equipped to manufacture all kinds of structural material, including bridge rods,

building rods, plates for bridge work, structural tubing, etc.; 230 were equipped to manufacture plate, sheet, and skelp iron and steel; 46 were devoted in whole or in part to the manufacture of cut nails and spikes, 9 other works buying their nail plate; 24 made wire rods, and 79 made wire nails.

The total number of completed Bessemer steel works in April, 1898, including 2 Clapp-Griffiths plants and 1 Robert-Bessemer plant, was 45, containing exactly 100 converters. The annual converting capacity of the whole number of Bessemer steel plants in April, 1898, was 10,633,000 tons. No new Bessemer steel plants have been built since 1896.

In April, 1898, there were 99 completed open-hearth steel plants, with 283 furnaces built and building, the whole number having an annual capacity of 3,522,250 tons of ingots and direct castings. At the same time there were 45 completed crucible-steel plants, with an annual capacity of 95,000 tons.

The number of pig and scrap iron bloomeries not connected with rolling mills or machine shops in April, 1898, was reduced to 10, of which several were then idle, while in the whole country there were only 2 forges that made blooms directly from the ore. Of all the southern forges that once made bar iron directly from the ore only one is left—Helton forge, in North Carolina, and it was not in operation in 1897.

PRODUCTION OF IRON AND STEEL IN THE UNITED STATES.

The last paper which we had the honor to prepare for the Geological Survey, and which was printed in 1897,[1] gave a 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. Details of the production of iron and steel in the United States in the last few years will now be presented, to be followed by chapters devoted to subjects of special interest relating to the present condition of our iron and steel industries. We pass over the statistics of the production of iron ore, coal, coke, and other raw materials in the production of iron and steel because they will be presented by others. The iron trade of the United States was active and prosperous in the second half of 1897, and has been remarkably active thus far in 1898.

Pig iron.—The following table gives the total production of pig iron in the United States from 1890 to 1897. It shows serious fluctuations in eight years.

[1] Iron and steel and allied industries in all countries: Eighteenth Ann. Rept. U. S. Geol. Survey, Part V (Mineral Resources), 1897, pp. 51-140.

Production of pig iron in the United States from 1890 to 1897, inclusive.

Year.	Production.
	Long tons.
1890	9,202,703
1891	8,279,870
1892	9,157,000
1893	7,124,502
1894	6,657,388
1895	9,446,308
1896	8,623,127
1897	9,652,680

Twenty States made pig iron in 1896 and nineteen States in 1897. The following table gives the production of pig iron by States in 1896 and 1897, in the order of their prominence in 1897.

Production of pig iron in the United States in 1896 and 1897, by States.

State.	1896.	1897.	State.	1896.	1897.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
Pennsylvania	4,024,166	4,631,634	New Jersey	59,163	95,696
Ohio	1,196,326	1,372,889	Kentucky	70,660	35,899
Illinois	925,239	1,117,239	Missouri	12,548	23,883
Alabama	922,170	947,831	Georgia	15,593	17,092
Virginia	386,277	307,610	Connecticut	10,187	8,336
Tennessee	248,338	272,130	Colorado	45,104	6,582
New York	206,075	243,304	Texas	1,221	6,175
Maryland	79,472	193,702	Massachusetts	1,873	3,284
West Virginia	108,569	132,907	North Carolina	2,151	.....
Michigan	149,511	132,578			
Wisconsin	158,484	103,909	Total	8,623,127	9,652,680

The total production of 9,652,680 tons of pig iron in 1897 was divided as follows: Bessemer pig iron, 5,795,584 tons; charcoal pig iron, excluding a few tons of charcoal Bessemer, included above, 251,738 tons; basic pig iron, 556,391 tons; spiegeleisen and ferro-manganese, 173,695 tons; foundry, forge, and other kinds of pig iron, 2,875,272 tons.

Fully nine-tenths of our total production of pig iron is now made with coke, as the following figures of production in 1897 by fuels will show: Raw bituminous coal and coke, but almost entirely coke, 8,464,692 tons; mixed anthracite and coke, 911,628 tons; anthracite alone, 21,149 tons; charcoal, 255,211 tons. Much the larger part of the fuel classed as mixed anthracite and coke is composed of coke. The small quantity of

pig iron produced with anthracite alone in 1897 compares strangely with the details of production as late as 1874, in which year more pig iron was made with unmixed anthracite than with coke and raw bituminous coal combined.

Statistics collected by the American Iron and Steel Association show that the total production of pig iron in the first half of 1898 was 5,909,703 long tons, against 4,403,476 tons in the first half of 1897 and 5,249,204 tons in the second half. The increase in the first half of 1898 over the last half of 1897 was 660,499 tons; over the first half of 1897 it was 1,506,227 tons. The figures for the first half of 1898 indicate a total production in the whole year exceeding 11,500,000 tons and probably near 11,750,000 tons.

Bessemer steel.—Eight States made Bessemer steel in 1897, namely: New York, Pennsylvania, Maryland, West Virginia, Kentucky, Ohio, Illinois, and Michigan. The total production of Bessemer steel ingots in 1897 was 5,475,315 long tons, against 3,919,906 tons in 1896, 4,909,128 tons in 1895, 3,571,313 tons in 1894, and 3,215,686 tons in 1893. There was an increase of 1,555,409 tons, or over 39 per cent, in 1897 as compared with 1896. The production in 1897 was much the largest in our history. The following table shows the production by States of Bessemer steel ingots in the last five years. Direct castings are counted as ingots.

Production of Bessemer steel ingots in the United States from 1893 to 1897.

State.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Pennsylvania	2,126,220	2,334,548	2,978,924	2,292,814	3,060,049
Ohio	348,141	363,974	719,954	568,535	1,041,541
Illinois.....	314,829	581,540	866,531	780,105	943,774
Other States.....	426,496	291,251	343,719	278,452	429,951
Total	3,215,686	3,571,313	4,909,128	3,919,906	5,475,315

Open-hearth steel.—Twelve States made open-hearth steel in 1897, namely: Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Alabama, Ohio, Indiana, Illinois, Wisconsin, Missouri, and California. The total production of open-hearth steel ingots and direct castings in 1897 was 1,608,671 long tons, against 1,298,700 tons in 1896, an increase of 309,971 tons, or almost 24 per cent. Of the total production in 1897, 1,056,043 tons were made by the basic process and 552,628 tons by the acid process. In 1896 the production by the basic process amounted to 776,256 tons and by the acid process to 522,444 tons. The following table shows the production of open-hearth steel ingots and direct castings by States during the last six years:

Production of open-hearth steel ingots in the United States from 1892 to 1897, inclusive.

State.	1892.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
New England.....	18,620	24,759	26,204	36,733	48,055	51,402
New York and New Jersey	19,511	17,591	21,363	32,203	32,120	39,521
Pennsylvania	551,010	616,516	659,969	904,352	1,009,608	1,271,751
Ohio	60,834	50,385	54,182	75,637	64,691	78,357
Illinois.....	19,914	28,639	23,218	49,500	101,832	120,609
Other States.....				38,757	42,394	47,031
Total	669,889	737,890	784,936	1,137,182	1,298,700	1,608,671

Crucible and other steel.—Our crucible-steel industry makes no progress, nor does the crucible-steel industry of any other country. The place of crucible steel has been largely taken by steel made by other processes. Ten States made crucible steel in 1897, namely: Connecticut, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Ohio, Indiana, Illinois, and Wisconsin. The total production in 1897 amounted to 69,959 long tons, against 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894, 63,613 tons in 1893, 84,709 tons in 1892, 72,586 tons in 1891, and 71,175 tons in 1890.

The production of steel in 1897 by various minor processes amounted to 3,012 long tons, against 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892, 4,484 tons in 1891, and 3,793 tons in 1890.

Total production of steel.—The production of all kinds of steel in 1897 was as follows: Bessemer steel, 5,475,315 long tons; open-hearth steel, 1,608,671 tons; crucible steel, 69,959 tons; all other steel, 3,012 tons; total, 7,156,957 tons, against 5,281,689 tons in 1896, 6,114,834 tons in 1895, 4,412,032 tons in 1894, 4,019,995 tons in 1893, and 4,927,581 tons in 1892.

Rails.—Ten States made rails in 1897, namely: Pennsylvania, Maryland, Alabama, Tennessee, Ohio, Illinois, Wisconsin, Colorado, Wyoming, and California. All these States made Bessemer steel rails except Tennessee, Alabama, and Wyoming. Iron rails were made in Pennsylvania, Tennessee, Alabama, Ohio, Illinois, Colorado, and Wyoming. Open-hearth steel rails were made in Alabama and California.

The production of all kinds of rails in the United States in 1897, including light and heavy rails, and street, electric, and mine rails, was 1,647,892 long tons, against 1,122,010 tons in 1896, an increase of 525,882 tons, or over 46 per cent. The production of 1897 was composed of 1,614,399 tons of Bessemer steel rails rolled by the producers of domestic ingots; 30,121 tons of Bessemer steel rails rerolled from old steel rails and rolled from purchased blooms; 500 tons of open-hearth steel

rails, and 2,872 tons of iron rails. The following table gives the production of all kinds of rails in the United States from 1890 to 1897.

Production of all kinds of rails in the United States from 1890 to 1897, inclusive.

Year.	Iron.	Steel.	Total.	Year.	Iron.	Steel.	Total.
	Long tons.	*Long tons.*	*Long tons.*		*Long tons.*	*Long tons.*	*Long tons.*
1890....	13,882	1,871,425	1,885,307	1894	4,674	1,017,098	1,021,772
1891....	8,240	1,298,936	1,307,176	1895	5,810	1,300,325	1,306,135
1892....	10,437	1,541,407	1,551,844	1896	4,347	1,117,663	1,122,010
1893....	6,090	1,130,368	1,136,458	1897	2,872	1,645,020	1,647,892

The maximum production of all kinds of rails in this country was reached in 1887, when 2,139,640 long tons were made. The year of next largest production was 1890, when we made 1,885,307 tons. The year of next largest production was 1897, the output amounting to 1,647,892 tons.

Structural shapes.—In this classification we include beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but do not include plate girders made from plates. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production in 1896 was 495,571 long tons, and in 1897 it was 583,790 tons. In 1895 it was 517,920 tons, and in 1894 it was 360,305 tons.

Plates and sheets.—The production of plate and sheet iron and steel in the United States in 1897, excluding nail plate and skelp iron and steel, amounted to 1,207,286 long tons, against 965,776 tons in 1896, 991,459 tons in 1895, 682,900 tons in 1894, 674,345 tons in 1893, and 751,460 tons 1892. The production of "black plates for tinning" alone in 1897 is reported to have amounted to 271,886 long tons, against 185,387 tons in 1896, an increase of 86,499 tons, or over 46 per cent.

Wire rods.—The production of iron and steel wire rods in 1897 amounted to 970,736 long tons, against 623,986 tons in 1896 and 791,130 tons in 1895, showing an increase of 346,750 tons, or over 55 per cent, over 1896, and 179,606 tons over 1895.

Wire nails.—The production of iron and steel wire nails in 1897 amounted to 8,997,245 kegs of 100 pounds each, compared with 4,719,860 kegs in 1896, an increase of 4,277,385 kegs, or over 90 per cent. In 1895 the production amounted to 5,841,403 kegs, in 1894 to 5,681,801 kegs, and in 1893 to 5,095,945 kegs.

Cut nails.—In the following statistics cut spikes are included with cut nails, but railroad and other spikes and machine-made horseshoe nails are not included. The total production of cut nails in 1897 was 2,106,799 kegs of 100 pounds each, against 1,615,870 kegs in 1896, an increase of 490,929 kegs, or over 30 per cent. With the single exception of 1897 there has been a steady decline in the production of cut nails

since 1886, in which year the maximum production of 8,160,973 kegs was reached.

Comparative nail statistics.—The following table gives the total production of cut nails and wire nails, from 1886 to 1897, in kegs of 100 pounds:

Production of cut nails and wire nails in the United States from 1886 to 1897, inclusive.

Year.	Cut nails.	Wire nails.	Year.	Cut nails.	Wire nails.
	Kegs.	*Kegs.*		*Kegs.*	*Kegs.*
1886	8,160,973	600,000	1892	4,507,819	4,719,524
1887	6,908,870	1,250,000	1893	3,048,933	5,095,945
1888	6,493,591	1,500,000	1894	2,425,060	5,681,801
1889	5,810,758	2,435,000	1895	2,129,894	5,841,403
1890	5,640,946	3,135,911	1896	1,615,870	4,719,860
1891	5,002,176	4,114,385	1897	2,106,799	8,997,245

Total production of rolled iron and steel.—Twenty-six States rolled either iron or steel or both iron and steel in 1897, two less than in 1896. The production of all iron and steel rolled into finished forms in the United States in 1897 was 7,001,728 long tons, against 5,515,841 tons in 1896, an increase of 1,485,887 tons, or almost 27 per cent. The following table gives the total production by States of rolled iron and steel in 1896 and 1897:

Production of rolled iron and steel in the United States in 1896 and 1897, by States.

State.	1896.	1897.	State.	1896.	1897.
	Long tons.	*Long tons.*		*Long tons.*	*Long tons.*
Maine, New Hampshire	5,728	2,519	Alabama	31,864	37,763
Massachusetts	85,308	94,319	Ohio	767,020	1,017,124
Rhode Island, Connecticut	35,288	30,233	Indiana	198,567	254,376
New York	80,873	81,283	Illinois	590,975	863,013
New Jersey	76,522	86,421	Michigan, Wisconsin, Minnesota	137,050	136,016
Pennsylvania	3,138,144	3,956,727	Missouri	32,326	35,505
Delaware	38,818	43,982	Colorado	54,574	22,710
Maryland	4,826	82,926	Wyoming, Washington, Oregon, California	39,733	37,997
Virginia	26,129	26,482			
West Virginia	138,096	151,424			
Kentucky	25,809	30,968			
Tennessee, Georgia	8,191	9,940			
			Total	5,515,841	7,001,728

Iron blooms and billets.—The production of these articles in independent forges that are not connected with rolling mills or machine shops is a decaying industry. The iron blooms and billets produced in forges

directly from the ore in 1897 amounted to 1,455 long tons, against 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, 2,182 tons in 1892, 5,290 tons in 1891, 7,094 tons in 1890; and 11,078 tons in 1889. The iron blooms produced in forges from pig and scrap iron in 1897, and which were for sale and not intended for the consumption of the makers, amounted to 7,159 long tons, against 6,494 tons in 1896, 7,185 tons in 1895, 3,221 tons in 1894, and 6,605 tons in 1893.

Summary of statistics for 1896 and 1897.—In the following table we summarize the leading statistical facts presented in preceding pages concerning the development of our iron and steel industries in 1896 and 1897, anticipating in the last lines information to be given hereafter.

Summary of statistics relating to the iron and steel industries of the United States in 1896 and 1897.

Subject.	1896.	1897.
Production of pig iron, long tons	8,623,127	9,652,680
Production of spiegeleisen and ferro-manganese, included in pig iron, long tons	131,940	173,695
Production of bar, hoop, skelp, etc., and structural shapes, not including wire rods, long tons	2,731,932	3,081,760
Production of iron and steel structural shapes, included above, long tons	495,571	583,790
Production of iron and steel wire rods, long tons	623,986	970,736
Production of plate and sheet iron and steel, except nail plate, long tons	965,776	1,207,286
Production of iron and steel cut nails and cut spikes, kegs of 100 pounds	1,615,870	2,106,799
Production of iron and steel wire nails, kegs of 100 pounds	4,719,860	8,997,245
Production of all rolled iron and steel, including cut nails and excluding rails, long tons	4,393,831	5,353,836
Production of all rolled iron and steel, including both cut nails and rails, long tons	5,515,841	7,001,728
Production of Bessemer steel rails, long tons	1,116,958	1,644,520
Production of open-hearth steel rails, long tons	705	500
Production of iron rails, long tons	4,347	2,872
Production of all kinds of rails, long tons	1,122,010	1,647,892
Production of street rails, included above, long tons	145,210	122,244
Production of Bessemer steel, long tons	3,919,906	5,475,315
Production of open-hearth steel, long tons	1,298,700	1,608,671
Production of crucible steel, long tons	60,689	69,959
Production of blister and patented steel, long tons	2,394	3,012

Summary of statistics relating to the iron and steel industries, etc.—Continued.

Subject.	1896.	1897.
Production of all kinds of steel, long tons	5,281,689	7,156,957
Production of ore, pig, and scrap blooms, for sale, long tons	7,840	8,614
Production of tin plates and terne plates for year ending June 30, pounds	307,228,621	446,982,063
Value of imports of iron and steel	$19,462,561	$13,836,204
Value of exports of iron and steel	$48,670,218	$62,737,250
Imports of iron ore, long tons	682,806	489,970

THE IRON-ORE INDUSTRY OF CUBA.

The first considerable importation of iron ore into this country was in 1873, when about 46,000 tons were imported, the most of which came from Canada. More than one-half of our imports came from Canada in 1873, 1874, and 1875. In 1879 we commenced to import iron ore largely from the Mediterranean countries, virtually all from Spain, Algeria, and Elba. Before that year the imports from Canada had declined. In 1884 we commenced to import iron ore from Cuba, and it is from this country that our imports of iron ore are now chiefly derived. The following table shows our total imports from 1872 to 1897 from all countries:

Imports of iron ore into the United States from 1872 to 1897, inclusive.

Fiscal year.	Quantity.	Calendar year.	Quantity.	Calendar year.	Quantity.
	Long tons.		*Long tons.*		*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 (fiscal)	150,197	1887	1,194,301	1896	682,806
1879 (calendar)	284,141	1888	587,470	1897	489,970

Iron ore of excellent quality, suitable for the manufacture of Bessemer steel, is found in large quantities near the coast in the province of Santiago de Cuba, in the southeastern part of the Island of Cuba, and near to the now famous city of Santiago. Three American companies have undertaken the development of these deposits of iron ore, the Juragua Iron Company, Limited, the Spanish-American Iron Company, and the Sigua Iron Company. These companies have expended large

sums in opening mines, and in building railroads, wharves, and piers. The first two of these companies mentioned have shipped many cargoes of iron ore to the United States, and they have also commenced to ship ore to foreign countries. The first shipments made by the Juragua Iron Company, Limited, were in August, 1884; the first shipments by the Spanish-American Iron Company were in 1895, and the first shipments by the Sigua Iron Company were in October, 1892. The imports of Cuban iron ore into the United States from 1884 to the close of 1897, included in the above table, were as follows:

Imports of Cuban iron ore into the United States from 1884 to 1897, inclusive.

Year.	Quantity.	Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*		*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	1897	397,173
1888	198,048	1893	362,685		

During 1897 the Juragua Iron Company, Limited, exported to the United States 244,817 long tons of iron ore from its Cuban mines, which was a decrease of 53,482 tons as compared with its total exports in 1896. In addition, 5,932 tons were exported by this company to Pictou, Nova Scotia, in 1897. Of the quantity exported by this company in 1897 there were received at Philadelphia 32 cargoes, containing 113,060 tons, and at Baltimore 40 cargoes, containing 131,757 tons. The total exports of iron ore by this company to the United States from 1884 to the close of 1897 amounted to 3,076,827 tons, shipped in 1,103 cargoes.

The Spanish-American Iron Company shipped 74,992 long tons of iron ore from its Cuban mines in 1895. In 1896 the shipments to the United States amounted to 111,584 tons, and in 1897 to 152,356 tons, of which latter quantity 36,919 tons were received at Philadelphia and 115,437 tons at Baltimore. The same company also shipped 51,537 tons of iron ore to various foreign countries in 1897, as follows: to Antwerp, 17,834 tons; to Newcastle-on-Tyne, 6,491 tons; to Glasgow, 10,712 tons; to Pictou, Nova Scotia, 8,916 tons; to Cardiff, 3,800 tons; and to Rotterdam, 3,784 tons.

No iron ore was shipped in 1894, 1895, 1896, or 1897 from the Cuban mines of the Sigua Iron Company. This company exported 14,022 long tons of iron ore in 1893 and 7,830 tons in 1892, when its first shipments were made.

Shipments of iron ore from Cuba were interrupted by the war with Spain, but have been resumed since the termination of hostilities in August last. A great increase in shipments may now be expected as compared with previous years.

Manganese ores are not of frequent occurrence in the United States, but they are an essential raw material in the manufacture of Bessemer and open-hearth steel. Manganese mines of great extent and richness were opened in the interior of the province of Santiago de Cuba a few years ago, and a branch railroad was built which connected them with a railroad to the coast. One cargo of ore was shipped to the United States before the breaking out of the Cuban insurrection in 1895, when operations were stopped until peace should be restored. The mines are situated at Ponupo, and the company mining them is styled the Ponupo Iron Company, the stockholders being Pennsylvanians. The company has recently made arrangements to commence active work at the mines, when shipments to the United States will doubtless be resumed.

THE MANUFACTURE OF TIN PLATES IN THE UNITED STATES.

The manufacture of tin plates in the United States was undertaken in 1873 at Wellsville, Ohio, and at Leechburg, Pennsylvania. In 1875 it was also undertaken at Demmler, near Pittsburg. Owing, however, to the low duty which was imposed on foreign tin plates, domestic tin plates ceased in 1878 to be made at the three places mentioned, and no further attempts to establish the tin-plate industry in our country were made until about the time of the passage of the tariff act of October 1, 1890, in which the previously existing duty on tin plates was more than doubled. Since that date the tin-plate industry in the United States has grown with wonderful rapidity, the production in the six fiscal years beginning with July 1, 1891, and ending with June 30, 1897, having been as follows, in long tons:

Production of tin and terne plates in the United States from 1892 to 1897, inclusive.

[Fiscal years.]

Articles.	1892.	1893.	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Tin plates	2,026	20,421	36,433	53,718	94,906	158,638
Terne plates	4,066	24,141	25,720	32,800	42,250	40,908
Total	6,092	44,562	62,153	86,518	137,156	199,546

The total production of tin plates in the six fiscal years from 1892 to 1897 was 366,142 long tons; of terne plates, 169,885 tons; total, 536,027 tons. In April, 1898, there were in the United States 69 completed tin-plate works, and 1 additional works was in course of erection.

The following table, compiled from the publications of the Bureau of Statistics of the Treasury Department, shows the quantities of tin plates and terne plates imported into the United States in each calendar year from 1872 to 1897, with their foreign values. It shows a steady and rapid decline in imports since 1891.

Imports of tin plates and terne plates into the United States from 1872 to 1897, inclusive.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Long tons.			*Long tons.*	
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
1884	216,181	16,858,650	1897	83,851	4,366,828

The statistics of the production of tin plates and terne plates in the United States in the fiscal year 1898 are not yet available, but there are good reasons for assuming that the total production in that year would amount to almost 300,000 tons. This production, according to the latest statistical information in our possession, is equal to if not in excess of the production of Great Britain in 1897, so that in a period of seven years we have built up a tin-plate industry that already equals that of our tin-plate rival. But for the drawback provision in all our recent tariffs we would not now import any tin plates or terne plates.

OUR IMPORTS AND EXPORTS OF IRON AND STEEL.

Less than twenty years ago the imports of iron and steel into this country were of extraordinary magnitude, notwithstanding the fact that we possessed all the natural resources for the production of these articles that were possessed by any other country, and notwithstanding the further fact that we were not lacking in either the skill or the capital that was necessary to develop these resources. But we had not been able to assemble the raw materials or to manufacture iron or steel as cheaply as our European competitors, and the duties on iron and steel were not sufficient in many instances to counterbalance the increased cost of production at home. Long distances were to be overcome in bringing the raw materials together, and railroad freight rates were still exceedingly onerous. The cost of labor was very much higher than in Europe. The American market was therefore in large part controlled by foreign manufacturers.

In the supply of tin plates and terne plates, which we have elsewhere referred to, foreigners enjoyed a complete monopoly of our market.

Duties on wire rods, cotton ties, crude steel, and even pig iron and bar iron were wholly insufficient to prevent large importations. Gradually, however, as the direct result of the encouragement afforded by protective duties, which led to the improvement of processes, the substitution of more powerful machinery, and the development of new fields of iron-ore supply, the cost of production in all lines in this country has approximated that of European countries, so that to-day, with the help of low railroad rates, our manufacturers of iron and steel not only control their own home market under an exceedingly moderate scale of duties but have entered into active competition with their European rivals in the supply of the world's markets. The great change that has taken place in our imports and exports of iron and steel will be seen at a glance in the following tables, which we have compiled from the reports of the Bureau of Statistics of the Treasury Department.

The following table gives the foreign values of all our imports of iron and steel, including pig iron, bar iron, plate and sheet iron, tin plates, wire rods, iron and steel rails, cotton ties, crude steel, fire arms, hardware, machinery, cutlery, etc., in the calendar years from 1871 to 1897:

Value of all imports of iron and steel and manufactures thereof into the United States from 1871 to 1897, inclusive.

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	19,462,561
1879	33,331,569	1888	42,311,689	1897	13,836,204

The following table gives the total value of our exports of iron and steel and manufactures thereof in the calendar years from 1871 to 1897. These exports embrace chiefly machinery, builders' hardware, sewing machines, saws, shovels, axes, hatchets, and other tools, locomotives, car wheels, printing presses, iron and steel bridges, firearms, scales and balances, pig iron, steel rails, cut nails, wire nails, wire, miscellaneous castings, and engines and boilers, but do not include agricultural implements, which are composed largely of iron and steel.

Value of all exports of iron and steel and manufactures thereof from the United States from 1871 to 1897, inclusive.

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	1897	62,737,250

The decline in our imports of iron and steel and the increase in our exports are still better illustrated in the statistics of both movements in the fiscal year 1898, ending on June 30, 1898. In this year we imported iron and steel and manufactures of iron and steel amounting, in foreign value, to $12,214,938, and our exports of articles in the same classification, not including agricultural implements, amounted to $70,405,923. It is worthy of note that our exports of agricultural implements, which are mainly composed of iron and steel, have also greatly increased in the last fiscal year. For several years these exports had averaged between $4,000,000 and $5,000,000 in value annually, but in the fiscal year 1898 they amounted to $7,609,732.

It is possible to give the details of only a part of our exports of iron and steel. The following table gives the quantities of leading articles of iron and steel and the values of all articles of iron and steel exported in the fiscal year 1898:

Quantity and value of articles of iron and steel exported from the United States in 1898.

Exports—Fiscal year ending June 30, 1898.	Quantity.	Value.
	Long tons.	
Ferro-manganese	8,403	$344,743
All other pig iron	228,465	2,385,252
Scrap and old, for remanufacture	60,195	632,334
Bar iron	4,769	163,261
Band, hoop, or scroll iron	1,552	47,327
Bars, or rods of steel, other than wire	16,864	470,052
Steel wire rods	14,464	330,022
Billets, ingots, and blooms	16,100	290,827
Cut nails and spikes	14,424	612,234
Wire nails	10,221	458,787
All other nails, including tacks	1,923	245,722

Quantity and value of articles of iron and steel exported from United States, etc.—Cont'd.

Exports—Fiscal year ending June 30, 1898.	Quantity.	Value.
	Long tons.	
Iron plates and sheets	4,057	$182,809
Steel plates and sheets	12,215	354,579
Iron rails	2,769	37,150
Steel rails	229,783	4,613,376
Structural iron and steel	30,586	1,183,482
Wire	61,185	2,593,306
Locomotive engines, whole number, 468	.....	3,883,719
Locks, hinges, and other builders' hardware	.....	3,997,796
Saws and tools	.....	2,430,536
Other iron and steel manufactures	.....	45,148,609
Total	717,975	70,405,923

The calendar year 1880 was the year of largest importations of iron and steel, both in quantities and values. In that year we imported 1,886,019 tons of iron and steel the weight of which was ascertained, and in addition we imported large quantities of machinery, hardware, cutlery, firearms, etc., the weight of which was not ascertained. The value of the total importations of iron and steel in 1880 was $80,443,362. The imports of 1880 included 700,864 tons of pig iron, 113,381 tons of bar iron, 118,267 tons of iron rails, 141,277 tons of steel rails, and 619,887 tons of scrap iron and scrap steel. In the following year, 1881, we imported still larger quantities of iron and steel rails—122,333 tons of the former and 222,596 tons of the latter, but of some other articles there was a decline in the imports.

In the fiscal year 1898 we imported only 529 tons of iron and steel rails, 1,502 tons of scrap iron and scrap steel, 15,177 tons of bar iron, and 25,640 tons of pig iron, most of which was spiegeleisen and ferromanganese, while in the same fiscal year we exported, as has been shown in the table above given, 236,868 tons of all kinds of pig iron, 60,195 tons of scrap iron and scrap steel, 229,783 tons of steel rails, 30,586 tons of structural steel, and 61,185 tons of wire.

It is interesting to note the first steps that were made in the development of our export trade in iron and steel and articles made from them. Twenty-two years ago we summarized in one of our Annual Statistical Reports the progress we had already made in finding markets abroad for our iron and steel products. In 1838 the Baldwin Locomotive Works of Philadelphia exported 3 engines, their first shipment to a foreign country, and up to February 1, 1876, they had exported in all 389 engines, valued at $5,005,964. The increase in the number of engines annually sent abroad by these celebrated works had been quite marked since 1869, when 12 engines were built for shipment to foreign

countries, followed in 1870 by 15, in 1871 by 19, in 1872 by 45, and in 1873 by 96. The fact was noted that the Phœnix Bridge Works of Pennsylvania had just sold eight or ten iron bridges to the Great Western Railway of Canada, and had recently sold from thirty to forty iron bridges to the Grand Trunk Railway of Canada and additional bridges to various other Canadian railways.

Our growing export trade in railway cars and agricultural implements was referred to, as was also that in platform and other scales, fire engines, stationary engines, stoves, firearms, hardware, cutlery, and edge tools. At that time the Collins ax and the Ames shovel had proved their superiority by capturing Australian and other markets, and the incident was cited of Mr. Gladstone having recently cut down a large tree with an American ax in preference to an English ax. We had already sent abroad large quantities of cut nails and spikes, chilled car wheels, Hoe's printing presses, hydraulic machinery, and other machinery. We had made a good beginning in building up an export trade in the manufactures of iron and steel, but we had as yet accomplished little worthy of mention in the exportation of pig iron, bar iron, rails, and other crude or heavy forms of iron and steel, and it looked as if we never would accomplish anything in this direction that would gratify our national pride. What we have recently accomplished in the exportation of all lines of iron and steel products has been shown in the tables already given.

Our early triumphs in the exportation of manufactured articles of iron and steel were due almost wholly to the superior quality and adaptability, as well as, in some instances, to the novelty, of these articles, and rarely, if ever, to their cheapness. Now our iron and steel products of every description are sent abroad, not only because they are superior in quality and design, but also because they are produced and sold at low prices.

THE WORLD'S PRODUCTION OF PIG IRON AND STEEL.

On February 21, 1856, the Hon. Abram S. Hewitt, then plain Mr. Hewitt, read a paper before the American Geographical and Statistical Society, at New York, "On the Statistics and Geography of the Production of Iron," in which, for the first time, so far as we are informed, an attempt was made to ascertain the world's production of pig iron. Mr. Hewitt was compelled to estimate the production of several countries, but the total production which he obtained for the world was substantially correct. He found that the total production in 1855, forty-three years ago, was, in round numbers, 7,000,000 long tons. Great Britain's percentage of the total production approximated 50 per cent, while that of the United States was less than 15 per cent.

Twenty years ago, in a review of the iron and steel exhibits at the Universal Exposition at Paris in 1878, we made an attempt to ascertain the world's production of both pig iron and steel in that year, and the

figures then collated from the best available sources we subsequently revised and printed in our Annual Report for 1889. The results then obtained we now reproduce below, including the percentage of production by each country. Long tons are used for Great Britain and the United States and metric tons for all other countries, metric tons being used as the equivalent of long tons in ascertaining total production. Our figures show that the world's production of pig iron just doubled from 1855 to 1878.

The world's production of pig iron and steel in 1878.

Countries.	Pig iron.		Steel.	
	Production.	Percentage.	Production.	Percentage.
	Tons.		*Tons.*	
Great Britain	6,381,051	44.74	1,063,027	36.14
United States	2,301,215	16.13	731,977	24.88
Germany and Luxemburg	2,147,641	15.06	489,151	16.63
France	1,521,274	10.67	312,921	10.64
Belgium	518,646	3.64	102,772	3.49
Austria and Hungary	434,250	3.04	129,416	4.40
Russia	417,239	2.93	66,593	2.26
Sweden	340,858	2.39	25,918	0.88
Spain	60,000	0.42	250	0.01
Italy	20,000	0.14	3,000	0.10
Other countries	120,000	0.84	16,750	0.57
Total	14,262,174	100.00	2,941,775	100.00

It will be seen that Great Britain made 44.74 per cent of the world's production of pig iron in 1878 and that the United States made 16.13 per cent, Great Britain retaining her leadership of 1855 and almost retaining her large percentage of production in that year, while the percentage of the United States in 1878 was almost the same as in 1855, and a very low percentage it was, Germany and Luxemburg making almost as much pig iron as the United States in 1878. Great Britain's production of steel in 1878 was more than one-third of the world's production, while that of the United States was less than one-fourth.

We now present a table showing the world's production of pig iron and steel in 1897, or in the most recent years for which statistics are available, compiled in most instances from official data, the unofficial figures approaching absolute accuracy. Tons are used as in the preceding table. The figures show that the world's production of pig iron more than doubled from 1878 to 1897, and that the world's production of steel increased more than sevenfold in the same period.

The world's production of pig iron and steel in 1897.

Countries.	Pig iron.			Steel.		
	Year.	Production.	Percentage.	Year.	Production.	Percentage.
		Tons.			*Tons.*	
United States	1897	9,652,680	29.30	1897	7,156,957	34.58
Great Britain	1897	8,789,455	26.69	1897	4,585,961	22.16
Germany and Luxemburg	1897	6,879,541	20.89	1896	4,796,226	23.17
France	1897	2,472,143	7.51	1897	1,312,000	6.34
Belgium	1897	1,034,732	3.14	1897	616,604	2.98
Austria and Hungary	1896	1,217,782	3.70	1896	880,696	4.25
Russia	1897	1,868,671	5.67	1895	879,075	4.25
Sweden	1897	538,197	1.63	1897	275,128	1.33
Spain	1897	297,100	0.90	1897	101,800	0.49
Italy	1897	8,393	0.03	1897	63,940	0.31
Canada	1897	53,796	0.16	1897	18,400	0.09
Other countries	1897	125,000	0.38	1897	10,000	0.05
Total	.....	32,937,490	100.00	.....	20,696,787	100.00

The table shows that in 1897 the United States produced 29.30 per cent of the world's production of pig iron and 34.58 per cent of its production of steel, while Great Britain's share of the total production of pig iron was 26.69 per cent, and its share of the total production of steel was 22.16 per cent—the United States having passed since 1878 to the front as a producer of both pig iron and steel, Great Britain taking second place in the production of pig iron and third place in the production of steel, Germany and Luxemburg being second in steel production. The relative position of the United States in the production of pig iron and steel and all iron and steel products will be fully maintained in 1898, as there has been very great activity throughout the year in all branches of our iron and steel industries.

Since the above table was prepared and put in type we have received the statistics of the production of all kinds of steel in Germany and Luxemburg in 1897. The total production was 5,119,300 metric tons. This production will entitle Germany and Luxemburg to a larger percentage of the world's production of steel than is given in the table, but it will not materially modify the percentage of other countries. It brings up the world's total production of steel to 21,019,861 tons.

THE FOREIGN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,
General Manager of the American Iron and Steel Association.

As in the United States, there was a general advance all along the line in the foreign iron trade in 1897 and in the first half of 1898. The iron and steel industries of Great Britain, Germany, Belgium, France, Sweden, Russia, and Austria-Hungary were all active and prices were well maintained. The iron and steel industries of Great Britain would have been more active than they were but for the occurrence in July, 1897, of one of the most determined struggles between capital and labor that has ever occurred, the great English and Scotch organization of machinists known as the Amalgamated Engineers imposing conditions which the Employers' Federation refused to accept. A strike of almost a hundred thousand men followed and lasted seven months, until the end of January, 1898, when the men surrendered. While it continued the iron trade of Great Britain was greatly embarrassed, especially the shipbuilding interest. With this exception, however, the European iron trade was prosperous all through 1897, and it has been equally prosperous thus far in 1898. It had been prosperous also in the latter half of 1895 and in the whole of 1896.

GREAT BRITAIN.

The British Iron Trade Association estimates the production of pig iron in Great Britain in 1897 at 8,789,455 long tons, against an ascertained production of 8,659,681 tons in 1896, these being the official Government figures. The largest annual production of pig iron by Great Britain, as officially ascertained, was in 1896. The next largest production was 8,586,680 tons in 1882. The production in the first half of 1898 is estimated by the British Iron Trade Association to have amounted to 4,432,893 tons, indicating a total production for the year equal to that of any preceding year.

According to the authority just quoted the production of Bessemer steel ingots in Great Britain in 1897 was 1,884,155 long tons, against

1,815,842 tons in 1896, and the production of Bessemer steel rails was 921,131 tons, against 817,476 tons in 1896. There were 70 Bessemer converters at work in 1897 and 12 were idle. The production of open-hearth steel ingots in 1897 was 2,601,806 tons, against 2,317,555 tons in 1896. The production of open-hearth steel rails in 1897 was 31,694 tons. The Bessemer steel ingots produced in 1897 were divided into 1,374,339 tons of acid and 509,816 tons of basic steel. The open-hearth steel ingots produced in 1897 were divided into 2,393,718 tons of acid and 208,088 tons of basic steel. The total number of acid open-hearth furnaces is now 316 and 15 are building. The total number of basic open-hearth furnaces is 37 and 4 are building.

The production of Bessemer steel rails in Great Britain in 1897 was 921,131 tons, against 817,476 tons in 1896. Great Britain also made 31,694 tons of open-hearth steel rails in 1897, against 30,058 tons in 1896.

The British Iron Trade Association has ascertained that the production of Bessemer steel ingots in Great Britain in the first half of 1898 amounted to 913,151 tons, against 997,159 tons in the first half of 1897, 905,522 tons in the first half of 1896, and 801,860 tons in the first half of 1895. The production of Bessemer steel rails in the first half of 1898 was 436,385 tons. The same authority has ascertained that the production of open-hearth steel in the United Kingdom in the first half of 1898 amounted to 1,305,771 tons, against 1,353,768 tons in the corresponding half of 1897.

Strange as it may seem, the production of puddled iron in Great Britain has actually increased in late years. The production of puddled bars in 1897 was 1,238,159 tons, against 1,214,005 tons in 1896 and 1,148,012 tons in 1895.

The maximum annual production of iron ore in Great Britain was attained in 1882, when 18,031,957 tons were mined. Since that year there was a steady decline in production until 1893, when the quantity mined was only 11,203,476 tons. Since 1893 there has been a gradual increase in production, the figures for 1896 being 13,700,764 tons and for 1897 being 13,787.878 tons. As far back as 1870 the production was 14,370,655 tons.

The production of coal in Great Britain in 1897 was 202,129,931 tons, against 195,361,260 tons in 1896 and 189,661,362 tons in 1895.

The total exports of iron and steel from Great Britain to all countries in 1897 amounted to 3,691,065 tons, against 3,550,398 tons in 1896 and 2,835,541 tons in 1895. During the last four years the imports of iron and steel into Great Britain have largely increased. They amounted to 361,300 tons in 1897, against 292,908 tons in 1894. Great Britain imported from Germany and Belgium in 1897 about 76,000 tons of beams and girders, valued at nearly a million pounds sterling. During the same year 18,036 tons of steel rails were exported from Germany to England. The imports of pig iron and steel into Great Britain from the United States in the first seven months of 1897 and 1898 were as

follows: Pig iron, 1897, 47,848 tons; 1898, 33,724 tons; steel, 1897, 24,011 tons; 1898, 15,674 tons.

The exports of iron and steel from Great Britain to all countries in the first seven months of 1898 amounted to 1,931,572 long tons, against 2,183,485 tons in the same months of 1897 and 1,999,211 tons in the same months of 1896. The exports of tin plates to the United States in the same period amounted to 45,162 tons, against 56,564 tons in the first seven months of 1897 and 73,552 tons in the same months of 1896.

GERMANY.

This country is making more rapid progress in the production of iron and steel than any other European country. Its iron and steel statistics embrace the production of Luxemburg.

The production of pig iron in Germany and Luxemburg in 1897 was 6,879,541 metric tons, according to Dr. Rentzsch, the statistician of the Association of German Iron and Steel Manufacturers, against 6,372,575 tons in 1896 and 5,464,501 tons in 1895. Of the production in 1897 Germany made 6,007,083 tons and Luxemburg 872,458 tons. In the first seven months of 1898 the production of pig iron in Germany amounted to 4,219,325 metric tons. The production of all kinds of finished steel in Germany and Luxemburg in 1897 is reported to us by Dr. Rentzsch to have amounted to 5,119,300 metric tons. The production of finished steel in 1896 amounted to 4,796,226 metric tons. Of the pig iron now annually produced in Germany and Luxemburg, about 50 per cent is Thomas, or basic, pig iron.

The production of iron ore in Germany and Luxemburg in 1897 amounted to 15,448,212 metric tons, of which Germany produced 10,099,202 tons and Luxemburg 5,349,010 tons. In 1896 the total production amounted to 14,162,335 tons, of which Germany produced 9,403,594 tons and Luxemburg 4,758,741 tons.

The total production of coal in Germany in 1897 amounted to 120,431,056 metric tons, of which 91,007,624 tons were bituminous coal and 29,423,432 tons were brown coal. In 1896 the total production of coal was 112,471,106 tons, of which 85,690,233 tons were bituminous coal and 26,780,873 tons were brown coal.

FRANCE.

The production of pig iron in France in 1897 was 2,472,143 metric tons, against 2,339,537 tons in 1896 and 2,003,868 tons in 1895. The production of Bessemer steel ingots in France in 1897 amounted to 806,853 tons, against 726,463 tons in 1896, and the production of open-hearth steel ingots in 1897 was 474,742 tons, against 454,280 tons in 1896. The total production of Bessemer and open-hearth steel ingots in 1897 was 1,281,595 metric tons, against 1,180,743 tons in 1896. These statistics are given upon the authority of the Comité des Forges de France, and are provisional for 1897. For 1896 they are final.

The production of iron ore in France in 1896, not including Algeria, amounted to 4,062,390 metric tons, against 3,679,767 tons in 1895. Official statistics for 1897 have not yet appeared.

The production of coal in France in 1897 amounted to 30,735,353 metric tons, against 29,189,900 tons in 1896 and 28,019,893 tons in 1895.

ALGERIA.

The iron ore mined in Algeria in 1896 amounted to 374,476 metric tons, against 318,416 tons in 1895. These are official figures.

BELGIUM.

The production of pig iron in Belgium in 1897 amounted to 1,034,732 metric tons, against 959,414 tons in 1896 and 829,234 tons in 1895. The production of steel ingots in Belgium in 1897 amounted to 616,604 metric tons, against 598,974 tons in 1896 and 454,619 tons in 1895. The production of pig iron in the first seven months of 1898 was 585,095 tons. The production of iron ore in Belgium in 1896 amounted to 307,031 metric tons, against 312,637 tons in 1895.

The production of coal in Belgium in 1897 amounted to 21,534,629 tons, against 21,252,370 tons in 1896 and 20,450,604 tons in 1895.

AUSTRIA-HUNGARY.

The production of pig iron in Austria alone in 1897 was 887,945 metric tons, against 816,967 tons in 1896. Statistics for Hungary for 1897 are not yet at hand. In 1896 the production of pig iron in that country amounted to 400,815 tons. The production of both countries in 1896 was 1,217,782 tons.

The production of Bessemer and open-hearth steel in Austria-Hungary in 1896 amounted to 880,696 metric tons, against 744,547 tons in 1895. Of the total production in 1896, 343,861 tons were made by the Bessemer process and 536,835 tons by the open-hearth process. Almost all the open-hearth steel produced in Austria-Hungary is now made by the basic process. About two-thirds of the Bessemer steel is also produced by the same process. The following are the figures for 1896: Acid Bessemer steel, 120,103 tons; basic Bessemer steel, 223,758 tons; total, 343,861 tons. Acid open-hearth steel, 23,000 tons; basic open-hearth steel, 513,835 tons; total, 536,835 tons.

The production of iron ore in Austria alone in 1897 amounted to 1,613,876 tons. Iron-ore statistics for 1897 have not yet been received for Hungary. In 1896 the total production of iron ore in the whole of Austria-Hungary amounted to 2,718,295 metric tons, of which Austria produced 1,448,615 tons and Hungary 1,269,680 tons.

The production of coal in Austria alone in 1897 amounted to 30,950,863 metric tons, of which 20,458,092 tons were brown coal and 10,492,771 tons were stone coal. The production of coal in Hungary in 1896, the latest year for which we have statistics, amounted to 4,894,353 tons, of

which 3,761,728 tons were brown coal and 1,132,625 tons were stone coal. The total production of all kinds of coal in the Austro-Hungarian Empire in 1896, for which year we have complete statistics for both countries, amounted to 33,676,411 tons, against 32,654,777 tons in 1895.

SWEDEN.

The production of pig iron in Sweden in 1897 was 538,197 metric tons, against 494,418 tons in 1896 and 462,930 tons in 1895. The production of Bessemer steel ingots in Sweden in 1897 was 107,679 tons, against 114,120 tons in 1896, and the production of open-hearth steel ingots was 165,836 tons, against 142,301 tons in 1896. The production of crucible-steel ingots in 1897 was 691 tons, against 604 tons in 1896; and the production of blister steel in 1897 was 922 tons, against 624 tons in 1896. The production of iron ore in 1897 was 2,087,166 tons, against 2,039,019 tons in 1896. The exports of iron ore from Sweden in 1897 amounted to 1,400,399 metric tons, against 1,150,695 tons in 1896, 806,452 tons in 1895, 831,395 tons in 1894, 484,055 tons in 1893, and 320,071 tons in 1892. The production of coal and lignite in Sweden in 1897 amounted to 224,343 tons, against 225,848 tons in 1896.

SPAIN.

The production of pig iron in Spain in 1897 amounted to 297,100 metric tons, against 246,326 tons in 1896 and 206,452 tons in 1895. The production of Bessemer steel ingots in Spain in 1897 amounted to 63,200 tons, against 62,511 tons in 1896, and the production of open-hearth steel ingots in 1897 amounted to 38,600 tons, against 42,066 tons in 1896.

The production of iron ore in Spain in 1897 appears to have been the largest in the history of the country, amounting to 7,468,500 metric tons, against 6,762,582 tons in 1896 and 5,514,339 tons in 1895. There were exported 6,884,588 tons in 1897, against 6,272,588 tons in 1896, of which Great Britain took 5,091,027 tons in 1897 and 4,635,959 tons in 1896.

The estimated production of coal and lignite in Spain in 1897 amounted to 1,939,400 metric tons, against 1,908,360 tons in 1896. Of the total quantity 55,900 tons were classed as lignite in 1897 and 55,413 tons were so classed in 1896. All the statistics we have given for Spain for 1897 are preliminary and are subject to revision.

ITALY.

The production of pig iron in Italy in 1897 amounted to 8,393 metric tons, against 6,987 tons in 1896. The production of all kinds of finished steel in 1897 was 63,940 tons, against 65,955 tons in 1896. The production of iron ore in 1897, nearly all of which was mined on the Island of Elba, amounted to 200,709 tons, against 203,966 tons in 1896. The production of coal in 1897 (anthracite, lignite, and bituminous) amounted to 314,222 tons, against 276,197 tons in 1896.

RUSSIA.

According to a recent issue of the Bulletin Russe de Statistique Financière et de Législation the production of pig iron in Russia and Finland in 1897 amounted to 1,868,671 metric tons, against 1,612,069 tons in 1896, 1,452,380 tons in 1895, 1,332,505 tons in 1894, 1,148,937 tons in 1893, 1,071,813 tons in 1892, 1,004,923 tons in 1891, and 926,482 tons in 1890.

The same authority says that the production of all kinds of steel in Russia, including Finland, amounted in 1895 to 879,075 metric tons, as compared with 726,017 tons in 1894, 630,796 tons in 1893, 514,986 tons in 1892, 433,477 tons in 1891, and 378,422 tons in 1890. The production of steel ingots in Russia in 1897 is given by another authority as amounting to 1,153,000 metric tons and the production of rolled steel to 868,000 metric tons.

According to the same authority the production of iron ore in Russia amounted to 2,924,963 metric tons in 1895, against 2,484,938 tons in 1894, 2,194,102 tons in 1893, 2,044,106 tons in 1892, 1,958,452 tons in 1891, and 1,795,663 tons in 1890.

The same authority says that the production of coal and lignite in Russia amounted to 9,463,300 metric tons in 1896, against 9,098,800 tons in 1895, 8,762,600 tons in 1894, 7,122,500 tons in 1893, 6,946,200 tons in 1892, 6,233,200 tons in 1891, and 6,015,000 tons in 1890. The production of lignite in Russia is very small; in 1895 it amounted to only 133,000 tons.

DOMINION OF CANADA.

The production of pig iron in the Dominion of Canada in 1897, as ascertained from the manufacturers by the American Iron and Steel Association, was 53,796 long tons, against 60,030 tons in 1896. The production of steel in 1897, all made by the open-hearth process, as ascertained by the same authority, was 18,400 long tons, against 16,000 tons in 1896. The production of all kinds of iron and steel rolled into finished forms, excluding muck and scrap bars, billets, etc., amounted to 77,021 long tons in 1897, against 75,043 tons in 1896 and 66,402 tons in 1895.

The production of coal in the Dominion of Canada in 1897 is reported to have amounted to 3,460,894 long tons, against 3,344,389 tons in 1896. The production of coke, all made in Nova Scotia and British Columbia, amounted to 70,367 long tons in 1897, against 44,303 tons in 1896. The production of iron ore in 1897 was 63,796 long tons, against 82,059 tons in 1896. The figures for 1897 are all subject to revision.

Canada now has 8 completed blast furnaces and 1 building, 17 rolling mills, and 1 open-hearth steel plant. The new furnace that is being built is at Deseronto, Ontario. It is now nearly completed.

MANGANESE ORES.

By JOHN BIRKINBINE.

PRODUCTION OF MANGANESE ORES.

As stated in previous reports, the known manganese deposits in this country are generally uncertain as to extent, and surface indications are often deceiving. The influence of a small increase in the phosphorus content upon the commercial values of ores has also restricted the output of this mineral and forced the country to rely upon foreign sources for the greater portion of its supply. Notwithstanding these obstacles, the year 1897 shows a slight increase over the output in 1896, from 10,088 to 11,108 long tons, and the total value from $90,727 to $95,505. The average value, however, has fallen from $8.99 to $8.60 per ton.

Seven States contributed to the total in the year 1897, Georgia, Arkansas, and Virginia being the principal producers. Virginia, which was formerly the leading producer of manganese ores, has in late years fallen off considerably, but in 1896 and 1897 showed a moderate advance, and may in the future take a more prominent position.

The total production of manganese ores in each State, total value, and average value per ton in 1896 and 1897 are given below:

Amount and value of manganese ores produced in the United States in 1896 and 1897.

State.	1896.			1897.		
	Product.	Value.	Value per ton.	Product.	Value.	Value per ton.
	Long tons.			*Long tons.*		
Arkansas	3,421	$36,686	$10.72	3,240	$33,708	$10.40
California	284	3,415	12.02	484	2,788	5.76
Georgia	4,085	27,032	6.62	3,332	22,084	6.63
Michigan	.....	.....	.....	37	370	10.00
North Carolina	2	17	8.50	.....	.....	.....
Pennsylvania	265	1,988	7.50	354	2,832	8.00
Tennessee	None.	None.	.....	11	93	8.45
Virginia	2,018	21,485	10.65	3,650	33,630	9.21
West Virginia	13	104	8.00	None.	None.	None.
Total	10,088	90,727	8.99	11,108	95,505	8.60

No manganese ore was reported in 1897 from North Carolina and West Virginia, which in 1896 contributed small amounts. Michigan and Tennessee supplied manganese ore in 1897, but none in 1896.

The production of the three prominent States, the total amount mined, and the total value for the years 1880 to 1897, inclusive, are given in the following table:

Production of manganese ores in the United States from 1880 to 1897.

[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
1897.....	3,650	3,240	3,332	886	11,108	95,505
Total.	163,980	46,068	50,845	19,482	280,375	2,730,211

The total amounts produced in the last eighteen years are given to indicate the local sources of manganese ores.

PRODUCTION OF MANGANIFEROUS IRON ORES.

For the year 1897 the production of manganiferous iron ores is included in the report of the iron ores of the United States, but the total amount of such ores mined and their valuation is also stated here.

In the Lake Superior region the iron ores from some of the mines carry limited percentages of manganese. Vermont, for the first time in years, contributed a small amount of manganiferous iron ore, while in Colorado considerable amounts of both manganiferous iron ore and manganiferous silver ore were mined and used in the smelters as a flux.

Production of manganiferous iron ores in 1897.

Locality.	Quantity.	Percentage manganese.	Average value per ton at mine.	Total value.
	Long tons.			
Colorado	16,519	27 to 31	$2.40	$39,565
Lake Superior region	184,585	4 to 14.5	1.64	301,819
Vermont	1,200	10 to 20	2.00	2,400
Total	202,304	4 to 31	1.70	343,784

The total production and value of manganiferous iron ore in the United States from 1889 to 1897 has been as follows:

Total production of manganiferous iron ores in the United States from 1889 to 1897.

[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
1897	202,304	343,784	1.70

PRODUCTION OF MANGANIFEROUS SILVER ORES.

In the smelting of precious metals considerable amounts of manganiferous and argentiferous iron ores are used, and as most of the manganiferous silver ores contain iron, these have been included in the production of iron ore, but are stated below for reference.

Production of manganiferous silver ores in the United States from 1889 to 1897.

[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 *c*	.....	.....	138,079	416,020	3.01
1897 *c*	.....	.....	*149,502*	*424,151*	2.84

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.

c In 1896 and 1897 the product was not subdivided upon arbitrary percentages of manganese, for reasons given in the report for 1896.

PRODUCTION OF MANGANIFEROUS ZINC RESIDUUM.

In treating the zinc ores of New Jersey, the resulting clinker or residuum, which carries considerable iron and manganese, is used in the manufacture of spiegeleisen. The total annual production, total value, and average value per ton from 1889 to 1897 will be found in the table below:

Production of manganiferous zinc ore residuum in the United States from 1889 to 1897.

[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
1897	33,924	18,713	.55

PRODUCTION OF MANGANESE AND MANGANIFEROUS ORES.

The total production of all classes of manganese and manganiferous ores in the United States during the year 1897 may be given in summarized form as follows:

Production of manganese and manganiferous ore in the United States in 1897.

Kind of ore.	Quantity.	Value.	Average value per ton.
	Long tons.		
Manganese ore	11,108	$95,505	$8.60
Manganiferous iron ore	202,304	343,784	1.70
Manganiferous silver ore	149,502	424,151	2.84
Manganiferous zinc ore	33,924	18,713	.55
Total	396,838	882,153	*a* 2.22

a Average.

The following notes are offered concerning the production of manganese ores and manganiferous iron ores in the various States.

PRODUCTION OF MANGANESE IN VARIOUS STATES.

ARKANSAS.

For several years there has been little change in the output of manganese ores in the Batesville district, and the production for 1897 approximates the average for the past three years, 3,200 tons. An examination of the appended statement will indicate that in the past twelve years the average output of ore from this district has been 3,606 tons. It is possible that if railroad connections were extended toward the White River from Cushman, and the extension so located as to pass close to the known deposits, a considerable increase could be expected. But the district is distant from the points of consumption, and the expense of mining, added to freight rates, makes the ore costly when delivered to blast furnaces. No new developments have been reported in the deposits in the southwestern portion of the State.

Production of manganese in the Batesville district of Arkansas to December 31, 1897.

Year.	Authority.	Long tons.
1850 to 1867	Estimated	400
1868	do	10
1881	Railroad reports of shipments	100
1882	do	175
1883	do	400
1884	do	800
1885	Mineral Resources of the United States	1,483
1886	do	3,316
1887	do	5,651
1888	do	4,312
1889	Eleventh Census	2,528
1890	Mineral Resources of the United States	5,339
1891	do	1,650
1892	do	6,708
1893	do	2,180
1894	do	1,934
1895	do	2,991
1896	do	3,421
1897	do	3,240

CALIFORNIA.

Exploited deposits of manganese are found in the counties of Alameda, Marin, Napa, San Benito, San Luis Obispo, Santa Clara, and Sonoma, but only some of those in Alameda County are now operated even on a moderate scale.

The following table will show the production in such years as it was reported:

Total production of manganese ores in California to December 31, 1897.

Year.	Tons.	Year.	Tons.
1874 to 1888	6,000	1894	278
1889	53	1895	525
1890	386	1896	284
1891	705	1897	484
1892	----------	Total	9,115
1893	400		

COLORADO.

In last year's reports full analyses were given of a number of Colorado manganiferous iron ores and manganiferous silver ores.

In these silver ores the percentage of silver, manganese, and iron are constantly varying, and it is difficult to give the exact amounts of ore produced containing 20 per cent or over of manganese and those under that percentage. All the ores have therefore been grouped in 1897 as in 1896.

The following table gives the production of this class of ore from 1889 to 1897, and shows a material advance in quantity:

Production of manganiferous ores in Colorado from 1889 to 1897.

	1889.	1890.	1891.	1892.	1893.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
Manganiferous iron ores used for spiegeleisen..	2,075	.....	964	3,100	5,766
Manganiferous silver ores with 20 per cent and over of manganese	9,987	7,826	19,560	17,047	12,642
Manganiferous silver ores with less than 20 per cent of manganese	55,000	44,014	59,951	45,262	41,820
Total.....	67,062	51,840	80,475	65,409	60,228

	1894.	1895.	1896.	1897.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Manganiferous iron ores used for spiegeleisen..	7,022	13,464	9,072	16,519
Manganiferous silver ores with 20 per cent and over of manganese	12,460	11,789	137,597	149,502
Manganiferous silver ores with less than 20 per cent of manganese	17,727	41,717		
Total.....	37,209	66,970	146,669	166,021

GEORGIA.

No new developments are reported from Georgia, and the production of manganese ores in 1897 was less than in either 1895 or 1896.

Production of manganese ores in Georgia from 1866 to 1897, inclusive.

Year.	Quantity.	Year.	Quantity.
	Long tons.		*Long tons.*
1866	550	1882	1,000
1867	5,000	1883 and 1884	(*a*)
1868		1885	2,580
1869		1886	5,981
1870		1887	9,024
1871		1888	5,568
1872		1889	8,208
1873		1890	749
1874	2,400	1891	3,575
1875	2,400	1892	826
1876	2,400	1893	724
1877	2,400	1894	1,277
1878	2,400	1895	3,856
1879	2,400	1896	4,085
1880	1,800	1897	3,332
1881	1,200		

a None reported.

LAKE SUPERIOR REGION.

Manganese, in relatively small percentages, occurs in many of the iron ores mined in the Lake Superior district, but the amount in the greater portion is below 1 per cent, and therefore is not an item of importance. Some few ores, however, have a larger portion of manganese, and the prices received are in a measure governed by this percentage. The amounts of this character of ore produced in 1897, and also in previous years, is given below, together with the approximate manganese content.

Production of manganiferous iron ores in the Lake Superior region from 1886 to 1897.

Year.	Product.	Average per cent of manganese.	Year.	Product.	Average per cent of manganese.
	Tons.			*Tons.*	
1886	100,000	2	1894	50,763	3.07
	157,000	4		57,872	3.55
Total	257,000			6,264	6.50
1887	200,000	4		61,817	7.26
	10,000	10		14,610	7.75
Total	210,000			7,140	18
1888	189,574	4	Total	198,466	
	11,562	11	1895	13,752	8
Total	201,136			10,228	7.608
1889	50,018	6.74		10,000	7.5
	31,341	9+		26,500	7.26
Total	81,359			51,785	3.536
1890	61,863		Total	112,265	
1891	13,711	4.68 to 17.96	1896	69,139	7.44
	11,015	10		47,000	5.75
	9,213	9.68		18,900	5
	98,572	5.38		104,156	4.3
Total	132,511			38,590	3.22
1892	6,710	4.893		51,855	3.1
	102,695	5	Total	329,640	
	7,500	8	1897	18,000	4
	8,272	9.998		38,489	5.85
	22,254	12.028		92,872	6.99
Total	147,431			30,500	7.57
1893	27,353	4.67		35	14.5
	55,009	7.61		4,689	(a)
	15,102	7.77	Total	184,585	
	5,051	10.40			
	7,833	14			
	300	22			
Total	110,648				

a Not given.

PENNSYLVANIA.

This State is comparatively a small producer of manganese ores. Statistics of its production in late years are as follows:

Amount of manganese ores produced in Pennsylvania from 1894 to 1897.

Year.	Production.	Value.
	Tons.	
1894	35	.....
1895	460	$2,300
1896	265	1,988
1897	354	2,832

VIRGINIA.

Virginia occupied in 1897 the rank which it has held for some years as the largest producer of manganese ore in the United States. The amount mined, however, is less than in former years.

Occurrence.—Concerning the Virginia ores Mr. Charles Catlett states, in the Engineering and Mining Journal, that the manganese deposits, which lie along the western base of the Blue Ridge are found at the same horizon more or less from Vermont to Georgia, and apparently reach their greatest development in the valley of Virginia. But the marked success of the single mine at Crimora and the comparative failure of other developments along the same belt give interest to a description of the ores based on recent investigation. These ores are found in a well-defined belt a short distance above the Potsdam sandstone, which is well developed in the central part of the State, to which this description more especially applies. This sandstone aids in forming the most western ridge of the mountain. Its upper bed is at times very hard, being a semivitrified quartzite, and its characteristic worm borings are only visible on weathering. It passes all the way from this into partially or entirely decomposed material, forming at times a clean, white siliceous sand, and at others a very fine siliceous material with a slight greenish cast, which is called "clay" by the native miners.

The mineral belt containing iron and manganese ores is found a short distance above this quartzite—indeed, often in contact with it—while 100 feet would probably mark the limit of separation. This has not been generally accepted owing to the existence of concealed folds and displacements in the sandstone which may make the separation appear greater, and also to the occasional extensive disintegration of the upper layer of sandstone into the soft siliceous material referred to. From the similarity of their occurrence the iron ores and the manganese ores

were probably originally formed under identical conditions, and the passage of pure iron into highly manganiferous iron ore or low-grade manganese ore is common. While iron ore low in manganese is often associated with good manganese ore, the actual passage of one into the other has not been observed, and, without any known reason, the existence at any point of the one ore apparently implies an absence or marked limitation of the other.

While greatly varying in character and thickness from point to point, iron and manganese ores are found along this belt for a distance of 150 miles or more so persistently as to give support to the theory of continuity and of contemporaneous formation. This is as equally true where manganese predominates as where iron ore predominates. At Stanley a series of borings, some of them over 300 feet deep, reaching probably 400 feet below the outcrop and extending over a considerable distance, have all disclosed the bed of manganese-bearing clay a short distance above the Potsdam sandstone. At Elkton this bed has been followed to a considerable depth for three-quarters of a mile or more, and while at times it has thinned out to a few inches, the lead of ore has never been lost, and there has been given to the character of the work a permanency which appears unique. Near 120-Mile Siding borings have shown a similar condition. At other points persistent float over a long distance, together with the information furnished by extensive mining for iron ore, implies a like formation. The inference is that throughout this section there is found, a short distance above the Potsdam sandstone, one or more bands of clay-carrying iron ore, manganese ore and manganiferous iron ore, the preponderance of one of these occurring from point to point and often to the exclusion of the others.

Character of ores.—The ore of these beds is almost entirely psilomelane, though other varieties occur. It is commonly nodular, the spherical forms predominating, and concretionary layers are often conspicuous. The nodules are usually of small size. The ore is commonly dull in fracture, but often bright and dark blue. It passes all the way from a high-grade ore to a highly clayey or siliceous material. The presence of visible free silica along this bed is not common, but the ore is sometimes accompanied by small amounts of black flint. Occasionally the nodules are joined together in a larger mass or more or less flat sheet, and at others the clay may form so small a portion of the whole as to permit it to be spoken of as a mass of manganese ore, but as a rule the nodules are well separated from each other.

Composition.—In analyses the ores of this belt are not usually of high grade, although at some points such has proved to be the case. In general they may be expected to run from 40 to 50 per cent manganese, from 0.10 to 0.30 per cent phosphorus, and 10 to 20 per cent silica. Small quantities of copper, nickel, and cobalt are common. The following analyses of well-selected samples from small openings on the

line of the ore near Vesuvius, and covering a distance of some miles, are submitted:

Analyses of manganese ore near Vesuvius, Virginia.

	1.	2.	3.	4.	5.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Silica	15.000	10.600	12.300	5.250	3.25
Iron	2.800	1.450	1.450	11.300	0.97
Phosphorus	0.114	0.116	0.125	0.196	0.10
Manganese	42.610	47.060	46.590	44.560	47.37

Deposition.—There are two forms of secondary deposits, derived in whole or in part from the above, which are of importance. One of these is simply the natural result of the breaking down and washing of this bed, and may result in concentration of the ore, although at times the opposite is the case. In the latter event the distribution of the ore has not uncommonly deceived prospectors or raised unreasonable expectations. Where collection has taken place these deposits may prove of special value, but possess great irregularity and give few evidences as to their probable location. There is undoubtedly also another kind of secondary deposit formed by solution and redeposition. That this is going on now and has gone on in the past is unquestionable, and some, if not the greater part, of such ore must come from the beds referred to, not necessarily as they now stand, but as they formerly stood, or as they are worn down by the action of disintegrating forces. We find the ore in process of forming, and the water which passes from the manganese beds carrying manganese in solution and redepositing manganese in its course. The springs which break from the Potsdam, and which are remarkable in their purity, often carry manganese in minute quantities, and may contribute their share to the formation of these secondary deposits. Such deposits often exhibit a high degree of purity and concentration, with the possibility of large quantity and the certainty of great irregularity.

As might be anticipated from the mode of formation, the ores of these last deposits differ considerably from the other ores. The difference is more apparent, of course, in the prevalence of certain forms than in their exclusion from the latter. The existence of soft manganese (pyrolusite) of very pure quality is not unusual, but does not appear in large quantities. Heavy beds of wad, carrying crystals of pyrolusite, and another oxide of manganese, probably polianite, disseminated through the mass, are common, as is also the occurrence in such material of numerous small quartz crystals. It must be evident that a mining operation may encounter all three forms, and this often happens, as they may pass into each other. From the geological conditions, the Crimora mine must include all three. At Elkton the original bed alone is worked.

The character of the float, the openings examined in widely separated localities, and the analyses made, lead to the conclusion that this horizon can be expected to furnish only medium-grade ores, but recollecting the bright example of Crimora, the less extensive though apparently permanent success of Elkton, and the absolute inefficiency and insufficiency of most of the investigating work, it does not seem unreasonable to believe that future developments will disclose large and profitable supplies of ore.

Mr Walcott C. Foster, C. E., of New York, has furnished descriptions of a number of manganese deposits which he has examined in Smythe, Tazewell, Boutetourt, and Rockbridge counties.

He states that eleven different deposits show:

	Per cent.
Manganese	27.47 to 50.389
Iron	1.80 to 14.956
Silica	2.4 to 24.38
Phosphorus	0.138 to 0.249

The following table indicates the production of manganese ore in Virginia from 1880 to 1897:

Production of manganese ores and manganiferous iron ores in Virginia from 1880 to 1897.

Year.	Manganese ores.	Manganiferous iron ores.	Year.	Manganese ores.	Manganiferous iron ores.
	Tons.	*Tons.*		*Tons.*	*Tons.*
1880	3,661	.....	1889	14,616	.....
1881	3,295	.....	1890	12,699	.....
1882	2,982	.....	1891	16,248	.....
1883	5,355	.....	1892	6,079	2,842
1884	8,980	.....	1893	4,092	1,188
1885	18,745	.....	1894	1,797	132
1886	20,567	.....	1895	1,715	.....
1887	19,835	.....	1896	2,018	.....
1888	17,646	.....	1897	3,650	.....

Small amounts of manganese ores were also obtained from Michigan and Tennessee, and 1,200 tons of manganiferous iron ore was reported from Vermont in 1897. The residuum before referred to was derived from the zinc ores of New Jersey.

IMPORTS.

As in previous years, the greater portion of the manganese ores used in the United States came from foreign countries, and the total amount imported in 1897 was the greatest recorded—119,961 long tons, valued at $1,023,824, or $8.54 per long ton. Russia was the largest contributor, followed by the British East Indies, Chile, Brazil, and Turkey in Europe. This is the first year that Brazil has exported a large quantity of manganese ore to this country, and it is probable, from the

efforts now being made, that her excellent beds will be extensively exploited. Only 14 tons of manganese ore were received from Nova Scotia, and Colombia furnished 3,378 tons. These deposits were referred to in the 1896 report.

The following table, supplied by the Bureau of Statistics, United States Treasury Department, shows the importation of manganese ore by ports, together with the countries from which the ore was shipped, but not necessarily where it was mined. The high valuation placed on ores from Germany, Scotland, and Nova Scotia is probably due to their adaptability to the chemical industry.

Manganese ores imported into the United States during the calendar year 1897, by countries.

Country.	Quantity.	Value.
	Tons.	
France	8,928	$121,424
Germany	419	18,320
Russia, on the Black Sea	38,910	316,140
Turkey in Europe	10,908	109,856
England	2,856	23,270
Scotland	169	8,516
Nova Scotia, etc	14	875
Mexico	57	832
Dutch West Indies	226	2,260
Cuba	6,992	81,126
Brazil	12,083	117,349
Chile	12,805	84,812
Colombia	3,378	25,890
British East Indies	17,400	73,567
Japan	4,816	39,587
Total	119,961	1,023,824

Manganese ores imported into the United States during the calendar year 1897, by customs districts.

Customs district.	Quantity.	Value.
	Tons.	
Baltimore, Md	11,464	$121,099
Boston and Charlestown, Mass	25	835
New York, N. Y	11,593	143,332
Philadelphia, Pa	96,411	753,337
Newport News, Va	370	1,064
Corpus Christi, Tex	57	832
Paso del Norte, Tex	1	125
Pittsburg, Pa	40	3,200
Total	119,961	1,023,824

It will be noted that the greatest quantity of imported manganese ore (slightly more than 80 per cent) was consigned to Philadelphia for shipment by rail to steel works, the principal part of the balance being about equally divided between New York and Baltimore.

The amounts and values of manganese ore imported in the last nine years are also given for comparison.

Manganese ores imported and entered for consumption into the United States, from 1889 to 1897.

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	.....	.....
1897	*a* 119,961	1,023,824	.....	.....

a Not classified as ore and oxide.

Relative quantities and values of domestic and imported manganese ores from 1889 to 1897.

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
1897	11,108	95,505	119,961	1,023,824
Total for 9 years	131,679	1,206,574	476,166	5,151,721
Average for 9 years	14,631	134,064	52,907	572,413

WORLD'S PRODUCTION OF MANGANESE ORES.

The following résumé of the production and value of manganese ores in various parts of the world is presented, the years taken being as nearly contemporaneous as possible. It is possible that some of the ores included are manganiferous iron ore rather than manganese ores. Effort has been made, however, to eliminate these from the table, which shows the world's production of manganese ores so far as data are obtainable.

World's production of manganese ores.

Country.	Year.	Product.
North America:		*Long tons.*
United States	1897	11,108
Nova Scotia *a*	1897	100
Cuba	1897	None.
South America:		
Brazil *a*	1897	12,083
Chile *a*	1895	10,748
Colombia *a*	1896	10,500
Europe:		
Austria	1895	4,283
Bosnia	1896	6,713
France *a*	1896	30,797
Germany *a*	1896	44,350
Greece	1896	10,974
Italy	1896	1,860
Portugal	1896	1,470
Russia *a*	1897	235,000
Spain	1897	*b* 90,000
Sweden	1896	2,024
Turkey *a*	.....	*b* 15,000
Asia:		
India *a*	1895	15,816
Japan *a*	1895	16,052
Oceanica:		
New South Wales	1895	3
New Zealand	1895	210
Queensland	1896	300
South Australia	1895	48

a Countries so marked contributed to the manganese supply of the United States in 1897, and in addition ore was obtained from Mexico, and the Dutch West Indies.

b Estimated.

PRODUCTION OF MANGANESE IN FOREIGN COUNTRIES.

WEST INDIES.

CUBA.

Unsettled local conditions in Cuba, followed by war with Spain, has interfered with the exportation of manganese ores, and no attempt at mining was made at the Ponupo manganese mines, which are situated in the southeastern portion of the island, in the province of Santiago de Cuba. The stock of this company is principally owned by parties in the United States. There were 6,992 long tons of Cuban ore imported into the United States in 1897. Changed conditions may favor a more liberal exploitation of these deposits.

The record, so far as obtainable, is as follows:

Exportation of manganese ores from Santiago district, Cuba, from 1888 to 1897.

Year.	Tons.
1888	1,942
1889	704
1890	21,810
1891	21,987
1892	18,751
1893	10,640
1895	1,394
1896	(?)
1897	(?)

ST. MARTIN.

It is reported that a valuable bed of manganese ore of superior quality in the island of St. Martin, West Indies, will be operated by an American company.

SOUTH AMERICA.

BRAZIL.

Considerable exploitation of the manganese deposits of Brazil has been attempted, and, in 1897, 12,083 long tons of this ore were shipped to the United States. Messrs. Leech, Harrison & Forwood estimated that the total shipments in 1897 will be from 15,000 to 20,000 tons, and that the ore yields 52 per cent of metallic manganese, 4 per cent of silica, and 0.04 per cent of phosphorus. Messrs. Dreyfus et Cie, of Paris, locate the producing mines in the district of Miguel, Burnier (State of

Minas Geraes), and report that the assays of the first cargo showed manganese varying from 50 to 61 per cent, phosphorus 0.04 per cent, and silica 0.92 per cent, while the second cargo yielded manganese 50 per cent, phosphorus 0.43 per cent, and silica 1.70 per cent.

The Iron Age states that the mines are about 310 miles distant from Rio Janeiro, transportation to that port occupying from eight to ten days. They are situated at an elevation of 4,000 feet above the sea, in a pleasant, healthful climate. It also states that most of the output of ore in 1897 was sent to the United States. Previously the ore was exported to England.

CHILE.

This country has a number of deposits of high-grade manganese ores, but it is difficult to secure exact statistics, the table below giving the annual production from 1885 to 1895. The United States obtained 12,805 tons of ore from Chile in 1897. The ore is shipped from Coquimbo and Carrizal, that from the former port being preferred. It yields, according to Messrs. Leech, Harrison, and Forwood, 48 per cent of metallic manganese, 9 per cent of silica, and .01 per cent of phosphorus, with but little iron.

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

EUROPE.

The character and general location of European manganese deposits having been discussed in former reports, the figures of production will be given with merely a few notes concerning new developments or conditions.

GREAT BRITAIN.

The product in Great Britain continues to decline, as shown in the following table:

Production and value of manganiferous ores in the United Kingdom from 1884 to 1897.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.			*Tons.*	
1884	909	$6,921	1891	9,476	$30,071
1885	1,688	11,669	1892	6,078	21,461
1886	12,763	52,722	1893	1,336	3,688
1887	13,777	53,772	1894	1,809	3,582
1888	4,342	9,361	1895	1,273	3,323
1889	8,852	31,354	1896	1,080	2,983
1890	12,444	32,588	1897	599	*a* 1,650

a Estimated.

GERMAN EMPIRE.

During 1896 manganese mining was more active in Germany than in 1895, the Bonn district alone producing 43,614 tons.

Complete returns for 1897 are not at hand, but the production from 1890 to 1896 is given below.

Production of manganese ores in Germany from 1890 to 1896.

Year.	Long tons.
1890	41,180
1891	39,698
1892	32,341
1893	40,057
1894	43,012
1895	40,674
1896	44,350

PRUSSIA.

The production of the Prussian mines from 1881 to 1896 is shown in the table subjoined:

Production and value of manganese ores in Prussia from 1881 to 1896.

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	1896	42,925	97,469

BELGIUM.

Most of the Belgium ores are more properly manganiferous iron ores, as is indicated by the valuation.

Production of manganese ore in Belgium.

Year.	Product.	Value.	Year.	Product.	Value.
	Tons.	*Francs.*		*Tons.*	*Francs.*
1880	700	4,000	1889	20,905	248,000
1881	770	4,000	1890	14,255	176,000
1882	345	1,750	1891	18,498	254,600
1883	820	4,100	1892	16,775	208,300
1884	750	3,750	1893	16,800	201,000
1885	.....	.....	1894	22,048	277,700
1886	750	9,000	1895	22,478	286,270
1887	12,750	155,850	1896	23,265	345,020
1888	27,787	325,000			

FRANCE.

France exported to the United States in 1897 8,928 tons of manganese ores, a cargo analysis of which, when dried at 212°, is given.

Analysis of a cargo of French manganese ore.

	Per cent.
Peroxide of manganese	21.72
Protoxide of manganese	29.06
Peroxide of iron	15.86
Alumina	9.07
Magnesia	4.81
Lime	5.90
Silica	9.55
Baryta	1.34
Phosphorus	.05
Sulphur	.29
Arsenic	.06
Zinc	Trace.
Copper	Trace.
Carbonic acid	.80
Combined water	.41
Total	98.92
Metallic manganese	36.24
Metallic iron	11.10

The records as received show the following yearly output of manganese ore in France from 1886 to 1896:

Production and value of manganese ores in France from 1886 to 1896.

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	1892	31,894	$205,074	$6.43
1887	11,932	50,501	4.23	1893	37,406	290,073	7.75
1888	10,873	60,757	5.59	1894	32,239	192,264	5.96
1889	9,842	59,000	5.99	1895	30,385	177,698	5.85
1890	15,731	89,517	5.69	1896	30,797	179,297	5.82
1891	15,101	90,316	5.98				

AUSTRIA.

Information in regard to Austrian metalliferous deposits is meager, but to the figures for the years 1876 to 1893, given by Mr. Weeks in centners of 110.23 pounds, is added the reported output for the years 1894 and 1895 in centners—equivalent to 5,056 metric tons in 1894 and 4,283 metric tons in 1895.

Production of manganese in Austria from 1876 to 1895.

Year.	Product.	Year.	Product.
	Centners.		*Centners.*
1876	67,817	1886	92,464
1877	78,999	1887	93,108
1878	41,836	1888	65,541
1879	34,337	1889	39,261
1880	88,744	1890	80,068
1881	91,097	1891	52,793
1882	84,183	1892	46,000
1883	93,821	1893	54,000
1884	79,423	1894	101,120
1885	61,577	1895	87,040

RUSSIA.

The transactions of the American Institute of Mining Engineers contain a late paper on "The manganese ore industry of the Caucasus," by Mr. Frank Drake, of New York City, which is full of interest. In this the author states that all the manganese ore now known in the market as Caucasian comes from Chiaturi. Manganese ores are known to exist in the Caucasus in a number of localities, viz, in the government of Kutais, near the village of Chiaturi; in the same government, near the Choruk River, southward from Batoum, and in the government of Erivan and Tiflis. In smaller quantities they are also found in various other places. The first-mentioned deposits are by far the most important. The others are not only less extensive but remote from present means of communication, and, from their character, expensive to work, although in some cases the ore is of superior quality. No other known deposit of manganese ore can approach that of Chiaturi in capacity for producing large quantities of high-grade ore at a low cost. The deposit is said to have been discovered in 1848, but the first shipments were made in 1879, when 871 long tons were produced. Since that time the production has steadily increased, until now the world relies on this deposit for about one-half its supply of manganese ore.

Production.—The total product of the mines of Chiaturi to date is estimated at 1,682,400 tons. The following table shows the productions and exports of Caucasian ore for a series of years, commencing with 1885, together with the approximate production of the world for the same period. For the year 1898 it is expected that the Caucasian product will be in the neighborhood of 300,000 tons.

Production and exports of Caucasian manganese ore.

Year.	Caucasian production.	Caucasian exports.	World's production.
	Tons.	*Tons.*	*Tons.*
1885	58,722	41,396	140,484
1886	67,985	53,751	208,289
1887	51,890	59,523	253,677
1888	29,401	49,076	186,429
1889	68,439	55,489	258,935
1890	168,840	135,492	415,883
1891	98,670	84,040	323,614
1892	165,101	129,835	424,746
1893	166,420	123,228	388,864
1894	180,533	154,832	403,307
1895	160,277	171,608	.....
1896	.....	193,641	.....
1897	231,868	201,612	.....

Location.—Chiaturi is a village of the trans-Caucasian Russian province of Kutais, on the Kvrilli River (a tributary of the Rion, which enters the Black Sea near Poti), and is now connected by a narrow-gauge railway with the main line of the trans-Caucasian railway 25 miles to the southwest.

Occurrence.—The ore occurs in a bedded deposit lying almost horizontally near the tops of lofty hills in the vicinity of the village and at an altitude of 1,000 feet above the Kvrilli River. The action of the elements in forming the rugged topography observed in this region has carried away perhaps more than one-half the original deposit. The existing beds, as opened on seven of the mountains near Chiaturi, in a brown sandstone of Miocene age, has an average thickness of between 6 and 7 feet and is free from sudden or extreme variations from the average thickness.

The deposit has a distinctly stratified structure and is composed largely of pyrolusite, but other oxides of manganese also occur. In many instances strata of sandstone or of loose friable arenaceous material are intercolated with the manganese ore, varying in thickness from a small fraction of an inch to as much as 10 inches or a foot. It is quite certain that an area of more than 22 square miles of the present

surface is underlaid by ore available for mining, and on this basis it is estimated that, even if the crude and wasteful methods now pursued should be continued, the bed will yield more than 80,000,000 tons of marketable ore.

Composition.—In some localities, over limited areas, the materials composing the bed, without sorting or cleaning, carry 50 per cent of the metal, and the average is probably 40 to 45 per cent, while ore from which barren material has been thoroughly separated contains as much as 61 per cent. The imperfectly sorted ore that is exported generally runs from 46 to 56 per cent in manganese, the average probably being 51 and 52 per cent. With proper care no ore from Chiaturi should carry less than 51 per cent. The phosphorus in the ore as shipped at present averages about 0.16 per cent and silica not above 8 per cent. All of the figures given above refer to ore dried at 212° Fahrenheit.

The following is a complete analysis of a sample of well-assorted and cleaned ore from Chiaturi dried at 212° F.:

Analysis of manganese ore from Chiaturi, Russia.

Substance.	Per cent.
Manganese peroxide	86.25
Manganese protoxide	.47
Iron peroxide	.61
Oxide of copper	.01
Oxide of nickel	.30
Alumina	1.74
Lime	1.73
Magnesia	.20
Baryta	1.54
Potash and soda	.22
Silica	3.85
Carbonic acid	.63
Sulphur	.23
Phosphoric acid (0.141 P.)	.323
Combined water	1.850
Total	99.953
Metallic manganese	54.90

The physical characteristics of the manganese ore of Chiaturi are unfavorable in that the proportion of large pieces obtained is small and much of the ore is quite soft, grinding to a fine powder during the handling incidental to mining, cleaning, and transportation. The loss of ore during transportation is thus larger than it otherwise would be, while the high proportion of fine ore is sometimes considered objectionable by consumers.

Ownership.—The ore fields at Chiaturi are owned mostly by natives, who hold parcels of ground varying in size from half an acre to 40 or 50 acres or possibly more. Some of these proprietors mine the ore from their holdings, while others lease the mining right and receive therefor a royalty varying from 10 to 50 cents per ton.

Labor.—The fact that there is no regular mining population in the district and that the men obtainable for operating the mines have, as a rule, some agricultural land of their own, and thus an occupation apart from the production and transportation of ore to which they return with more or less frequency, introduces an element of uncertainty into the labor supply which is a disadvantage to the industry.

Wages.—The wages earned at Chiaturi are about the same for all classes of labor, and average probably not more than 40 cents per day for a man, and about 70 cents for a man and horse. But small as these wages are, they seem to meet the meager requirements of the workers. The working day begins at sunrise and ends at sunset, with intermissions of various lengths for meals and rest. The actual hours of labor probably do not average the year round more than eight hours per day.

The average number of men employed in the ore industry at Chiaturi is estimated at about 2,700.

Mining.—Seldom can underground mining be undertaken under natural conditions so favorable as those existing at Chiaturi. The bed is of a sufficient thickness for economical breaking of the ore, the inclosing rock is so firm that very little timber is required, and the ore itself is mostly so soft that it can be advantageously mined without the use of explosives. Moreover, there is no water to contend with, nor are expensive shafts or other openings necessary to reach and mine the ore. The distinct bedding planes which characterize the material of the deposit and the weakness of adhesion along these planes result in the separation, in large part, of the pieces of ore and the gangue during the process of mining, and when this does not occur the separation afterwards by hand is rendered easy by the same characteristics.

The features mentioned above, and the additional circumstance that there is a considerable difference in specific gravity between ore and gangue, indicate that excellent results would be obtained by washing the ore mechanically. The native miners have adopted the obvious method of attacking this deposit where it is exposed or may be easily uncovered on the mountain sides. Their practice is to drift on the bed perpendicularly to the exposed face until the drift becomes so long that the expense of removing the ore from it in wheelbarrows or baskets is too great to permit further progress. Later cross drifts may be driven, leaving the roof supported by pillars, which may afterwards be "robbed" until the roof falls in; or, as is frequently the case, no cross drifts are driven, but the main drifts or parts of them are enlarged until they become extensive stopes of irregular size and shape, cave in,

and are abandoned. By these methods probably more than one-half the ore in the ground worked at Chiaturi is being lost.

It is frequently the practice to mine out the whole thickness of the bed and sort the ore outside, but in instances where thick strata of sandstone or of ore occur too poor, from admixture of gangue, to be profitably sorted by hand, it is common to break such waste material separately and stow it underground. The transportation of ore from the working face to the cleaning ground is accomplished almost entirely by the use of baskets and wheelbarrows. But in a few instances, in the longer drifts, a track of wooden rails has been laid, and a primitive mine car has been placed in operation.

The workings described generally do not extend more than 300 feet back from the face of the mountain; but in a few instances they have been carried horizontally from 400 to 500 feet. Thus only the outer edges of the ore bed are being worked.

Sorting.—The ore brought from the mine is dumped on the level ground at the mouth of the tunnel, and, either immediately or after it has been spread out and allowed to dry for some time, a laborer with a shovel throws it against a wire screen of about one-half inch mesh, fixed in an inclined position; the material passing through the screen is considered as waste, and undergoes no further treatment. The portion failing to pass through the screen falls in front of it, and is sorted by hand. The proportion of clean ore yielded by the crude ore of Chiaturi under this treatment varies considerably in different localities, but it is thought that it averages about one-third.

Experiments on mechanical washing indicated that by this means a general product carrying from 59 to 60 per cent of manganese may be obtained from the ore of some localities, and also that, owing to the possibility of saving much that now goes to waste, a larger proportion of clean ore would be yielded than at present. The cost of washing would be greater than that of the present hand-cleaning process, but this would be more than counterbalanced by the increased quantity and value of the product.

Mining and cleaning are generally let together by contract at a fixed rate per "cubic sagene" of clean ore. The contractors mine the ore, transport it outside, and clean it, and the operator or owner supplies timber, lights, etc. The Russian standard cubic sagene contains about 343 cubic feet, and this volume of clean broken ore would weigh about 23 tons; but at Chiaturi cubic sagenes of from 1½ to 2 times this capacity are used, so that the weight of a cubic sagene of ore varies from 34 to 46 tons. Contracts are taken by parties of two men or more, and the rate paid per cubic sagene of clean ore is from $10 to $25, according to the distance of underground tramming, proportion of waste contained in the crude ore, etc. The number of days required for one man to mine and clean a cubic sagene varies from twenty to eighty.

Costs.—Under these widely differing conditions it is difficult to arrive at the average cost for the labor of mining, tramming, and cleaning. For the more favorable-conditioned properties, however, it is thought that the average is about 39 cents per ton of clean ore, and that the following estimate of the total cost at the mine per ton of clean ore is a fair approximation:

Estimated cost of mining manganese ore in Russia.

	Per ton of clean ore.
Labor for mining, tramming, and cleaning	$0.39
Timber and other supplies	.04
General expense	.16
Royalty	.17
Subscription to Producers' Association	.16
	.92

The manganese ore producers all contribute to a fund which is expended, under the supervision of the officials of the Government, for objects of general utility, such as police service, building and maintaining roads, etc.

Transportation.—The transportation of ore from the Chiaturi mines to Poti, on the Black Sea, the principal shipping port, although a small quantity is shipped each year from Batoum, is effected in three stages, the ore being first brought down the mountains from the mines to the railway station at Chiaturi, then carried on the narrow-gauge railroad to Sharapon, and from that point taken over the main line of the trans-Caucasian railway to Poti. The distance from the village to the workings at present opened varies from 1 to 4 miles, and transportation from the mines is in large part effected over narrow trails which traverse in zigzags the precipices and steep slopes of the mountains. Some of these trails are impassable, except for the most sure-footed pack animals, while over others it is impossible to use the primitive two-wheeled ox cart, known as an "arba." The animals, as well as the carts, employed for this work are the property of the peasants engaged in it; and the latter are paid for the transportation of ore, including loading and unloading, at rates varying in good weather from 65 cents to $1.30 per ton, according to the distance from the mine to Chiaturi. In wet weather the steep mountain trails are dangerous and almost impassable, and the cost of transportation over them becomes abnormally high; at the same time the quantity it is possible to transport is greatly decreased.

The adoption of tramways for transportation from the mines to the village is perfectly feasible, and would not only reduce the cost very materially but would render it independent of the varying condition of the mountain roads. The ore received at the station is stored near the railway tracks, and is afterwards loaded on the narrow-gauge cars, 4 tons' capacity, by carrying the ore on the cars in baskets. At Sharopan

the ore train is run out on a trestle extending over a platform level with the floors of the cars of the broad-gauge road to Poti. The narrow-gauge cars are unloaded by the use of shovels, and the ore, falling on the platform below, is transferred to broad-gauge cars by shoveling and the use of baskets.

The freight charge made by the Government railway administration for transporting ore from Chiaturi to Sharopan, a distance of 25 miles, is $3.28 per ton, at the extravagant rate of 13.1 cents per ton mile. To this must be added 36 cents per ton for station expenses, weighing, and loading at Chiaturi and transferring at Sharopan, making the total expense of taking ore from storage at Chiaturi and placing it on board the broad-gauge cars $3.64 per ton. Assuming that a freight rate of 40 cents per ton for transportation from Chiaturi to Sharopan would remunerate the capital invested in the railway, it is evident that, should a formidable competitor arise, the Russian railway administration would have it in its power to reduce immediately the cost at which the ore may be delivered in foreign ports by $2.88 per ton; and a still further reduction could be effected by making the Chiaturi branch of standard gauge.

From Sharopan to the Poti railway station is 82 miles, and from the station to the pier where ore is loaded for export, 1⅓ miles. Ore is carried over the trans-Caucasian railway in covered and in open box cars, both types holding about 10 tons. Like the cars used on the narrow-gauge road, they are not provided with any arrangements to facilitate unloading, which has to be done at Poti, as at Sharopan, with shovels and baskets. Ore is frequently discharged at Poti station and kept in store there for some time, and then reloaded and taken to the pier, from which it is at once carried in baskets on board vessels waiting to receive it.

The freight from Sharopan to Poti station is 52 cents per ton, to which must be added an amount averaging about 29 cents per ton for station expenses, storage, transfer from station to pier, etc., making the total cost of transferring ore, loaded on cars at Sharopan, and placing it on the vessel at Poti, free on board, 81 cents per ton.

Exports.—Great Britain is the largest consumer of Caucasian ore, taking about 100,000 tons annually; then follow Germany, France, the United States, and European Russia. The ocean freights from Poti to the ports of western Europe varies from 9 shillings per ton to 15 shillings, or even more, and is influenced by the demand for grain tonnage. At present the freight to English ports is about 12½ shillings, equivalent to $3.03 per ton, to which must be added 12½ cents for insurance, sampling, checking weights, etc. Freight to America is generally about 35 cents per ton higher than to England.

A duty of 16½ cents per ton is levied on exports of manganese ore from Poti, the proceeds of which are applied to the maintenance and improvement of the port.

The total cost (neglecting moisture and loss in transit) of Caucasian ore, delivered at English ports, may be estimated about as follows:

Cost of Caucasian manganese delivered at English ports.

	Per long ton.
Cost of production	$0.92
Transportation to Chiaturi	.71
	1.63
Loading and storage at Chiaturi and transferring at Sharopan	.36
Freight from Chiaturi to Sharopan	3.28
Freight from Sharopan to Poti station	.52
Unloading, storage, etc., at Poti	.29
Port duty	.16½
	6.24½
Ocean freight, insurance, sampling, etc	3.15½
Total	9.40

Taking the price in England of Caucasian ore, delivered, as about 9½ pence per unit of metal, the percentage of the latter being determined on the basis of ore dried at 212° F., and making reduction from the gross weight for the moisture as shown by sample, a 52 per cent ore is worth $9.97 per ton, dry weight.

While prices, ocean freights, and the manganese percentages in the ores vary considerably, and the figures given above for cost of production and for some other items are only approximate, it is evident, considering that moisture and loss in transit amount to from 5 to 7 per cent, or even more, that there is little or no profit in the business. This, in fact, has been for several years past the complaint of all engaged in it. Although the deposit at Chiaturi is practically free from foreign competition, the local conditions affecting it, particularly the enormous quantity of ore it contains, its large number of proprietors, the ease with which the production of ore may be entered upon, and the lack of other sufficient occupation for the inhabitants of the region, are such as to promote overproduction and severe competition among the producers of the ore, which keep prices at a level affording to those engaged in the industry only a meager subsistence.

Messrs. Leech, Harrison & Forwood give the average analysis of Caucasian ore when dried at 212° as: Metallic manganese, 51.0 per cent; phosphorus, 0.15 per cent; silica, 7.5 to 8.5 per cent, and metallic iron, 1.0 per cent.

Other Russian manganese ores.—Mr. A. J. Ennis reports that Russia has an additional source of supply from the Nicopol district. The

initial shipments to this country in 1897, about 3,000 tons, were of the following composition:

Analysis of manganese ore from the Nicopol district, Russia.

	Per cent.
Moisture	7.00
Metallic manganese	46.00
Metallic iron	1.00
Silica	12.50
Phosphorus	.25

Of the imports into the United States in 1897, 38,910 long tons of manganese ores are credited to Russia, and it is possible that some credited to Great Britain is also Russian ore.

SPAIN.

The war with Spain has interfered with obtaining late data from that country in regard to the amount of manganese and manganiferous ores mined in Spain in 1897, but it is probable that this approximates the production of 1896, viz, 90,000 tons.

Messrs. Ennis & Co. state that the manganiferous ores obtained from Spain have the following general range in analyses:

Composition of Spanish manganiferous ores.

	Per cent.
Moisture when dried	10.50
Metallic manganese	16.5 to 18.00
Metallic iron	26.5 to 29.50
Silica	8.5 to 10.50
Phosphorus	.01 to .014

That firm estimates the amount of this character of ore imported into the United States in 1897 as less than 10,000 long tons. The effect of conscription upon labor and the possibility of restricted shipping facilities may restrict the output of manganese in 1898.

The production of Spain is given in the annexed table:

Production of manganese and manganiferous iron ores in Spain from 1890 to 1897.

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	1897	*a* 90,000

a Estimated.

PORTUGAL.

This country produced small amounts of manganese ores, the figures for 1895 being 1,220 long tons, valued at $8,250, and in 1896 1,470 long tons, valued at $14,678.

ITALY.

Italy contributes some manganese ores and also some manganiferous iron ore from the deposits of these minerals, as will be seen from the following table:

Production of manganese and manganiferous iron ores in Italy from 1887 to 1896.

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.	.....
1896	1,860	19,734	10,000	19,300

GREECE.

It is reported that a French company is carrying on manganese mining at Cape Vani on the Cyclades, Greece, and a similar undertaking has been started at Fourkovuni Point by a British concern. The beds have been proved to exist in parallel layers in a hill rising abruptly from the shore to a height of 400 feet. Over 15 tunnels from 100 to 400 feet long have been opened, and these, it is claimed, show from 2 feet to 6 feet of ore. The ore is intermixed with clay, from which it is easily separated.

The total amount of manganiferous iron ore produced in Greece in 1896 is reported as 404,837 metric tons, in addition to 11,150 metric tons of manganese and iron ores.

Manganese ores are also obtained from Turkey, Bosnia, and Sweden.

AUSTRALASIA.

Manganese ore exists in Queensland, but in late years the only mining districts producing this mineral were Gladstone and Hodgkinson. In 1896 the entire output came from the Gladstone district, in which

the Spiro deposit, situated at Auckland Hill, is the principal producer. A manganese bed has also been worked near Boat Creek, and ore is reported near Calliope River, all of the above being in the Gladstone district.

According to the official report of the Under Secretary of Mines of Queensland, the manganese ore produced during the year 1896 was 300 long tons, valued at £900 ($4,392).

The following table will show the annual production of this province of Australia since 1881:

Production and value of manganese ores in Queensland from 1881 to 1896.

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	1896	300	4,392

SOUTH AUSTRALIA.

The manganese deposits of South Australia appear to be worked intermittently, as is indicated by the following table:

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	174	2,516
1888	1,021	16,974	1895	48	712

No late data concerning the mining of manganese ores in New South Wales and New Zealand have been received.

ASIA.

JAPAN.

Dr. Th. Mukai, in a late issue of Stahl und Eisen, states that considerable manganese ore occurs in Japan, and that in 1897 4,816 tons of Japanese ore was imported into the United States.

Dr. Mukai quotes the following partial analyses to show the quality of the ore:

Analyses of Japanese manganese ores.

	1.	2.	3.
	Per cent.	*Per cent.*	*Per cent.*
Manganese oxide	87.3	71.9	71.7
Silica	1.4	15.25	2.09
Ferric oxide	3.47	.....	.....
Alumina	.43	4.44	6.17
Sulphuric acid	.04	.03	.06
Phosphoric acid	.201	.07	.29
Water	1.25	2.05	2.30

Mr. A. J. Ennis states that the Japanese ores sent to the United States have the following approximate analysis:

Composition of manganese ores imported from Japan.

	Per cent.
Moisture	9
Metallic manganese	49
Silica	8.50
Phosphorus	.09

The table subjoined shows the production of manganese ores in Japan from 1881 to 1895:

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		

INDIA.

Occurrence.—Considerable manganese ore was brought from India in 1897, being shipped from Vizagapatam, on the Madras coast. According to Mr. H. G. Turner, attention was first directed to a small deposit in the Vizagapatam district about six years ago, and further exploration brought to light the occurrence of the mineral in large quantities. The ore outcrops in various places over, so far as is known, an area of 100 square miles, situated within the extensive territories of the Maharajah of Vizianagram, stretching between the eastern Ghats Mountains and the Bay of Bengal. It is about 500 miles north of the city of Madras and about the same distance south of Calcutta. The outcrops occur in a plain country in the form of mounds, as low hills, and in isolated blocks, while in some places the soil, impregnated with black oxide of manganese, gave indications of ore beneath the surface. The first mound was discovered within a few hundred yards of the East Coast Railway, and the contractors broke up the manganese blocks for ballast, unaware of its nature or value. Investigation showed that this was but the end of a deposit of vein-like masses of ore and detached bowlders embedded in detritus of country rock, about 2½ miles in length, comprising an area of 660 acres. The detached blocks of ore exhibited marks of being water-worn, and occurred in all sizes from a pebble up to bowlders of several hundredweight.

Characteristics.—These broken fragments were disseminated throughout the soil, sometimes so sparsely as to make quarrying unprofitable, at other places in drifts and beds several feet thick and of value. The nodules were coated with a thin layer of oxide of iron, and when broken presented a steel-gray color. They contained 45 to 48 per cent of metallic manganese. Other nodules were angular, and when fractured showed a metallic luster. These were richer in composition than the first named, containing 48 to 50 per cent of metallic manganese. The vein-like masses had been worked to a depth of 50 feet. The ore in these veins varied considerably in manganese, in iron, and in phosphorus. Some was of steel-gray color, with 48 per cent of manganese, and associated with it was a cindery ore of 35 per cent. Another variety was porous. The occurrence of phosphorus in adjacent veins was peculiar. Two varieties presenting similar external appearance might contain, one 0.1 per cent of phosphorus and the other 0.2 per cent. Farther along the deposit ore occurred of equally variable nature, a fine character of soft pyrolusite being worked at the extreme end of the property. This ore was of good quality, yielding after selection about 80 per cent peroxide of manganese, while the impure variety yielded about 70 per cent.

There were several outcrops of manganiferous iron ore, which yielded, on an average, 41.2 per cent of manganese, 0.17 of phosphorus, and 17.9 per cent of iron.

Shipments.—The high-class ores went to the ferro-manganese makers, the lower class to the basic furnaces, while the pyrolusite was taken by chemical works. Recently other deposits have been discovered, notably one at a village called Garbham, about 10 miles from the deposit described above.

Messrs. Leech, Harrison & Forwood, of Liverpool, England, state that the manganese ore shipped from Vizagapatam gave in dried state 47 per cent of metallic manganese, with about 9 per cent of iron, 0.25 to 0.30 per cent of phosphorus, and silica as low as 2 per cent.

The quantity of manganese ore exported from the Madras Presidency in the year 1895–96 was 22,758 tons, of which the greater portion was sent to Great Britain and the balance to the United States. The 1894 output was 11,400 long tons and the 1895 output 15,816 long tons.

GOLD AND SILVER.

PRODUCTION.

The statistics collected by the Director of the Mint show that the total product of gold increased to 2,774,935 fine ounces, valued at $57,363,000, in the calendar year 1897. The product of 1896 was 2,568,132 fine ounces; value, $53,088,000.

The silver product declined from 58,834,800 fine ounces in 1896 to 53,860,000 ounces in 1897. The commercial value of this product in 1897 was $32,316,000. The decline in production was distributed among nearly all of the great silver-producing States.

The following tables show the increase and decrease in production for each State for the last three years:

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	2,254,760	46,610,000	55,727,000	72,051,000	118,661,000

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 Corolina	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
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

Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1897.

[As estimated by the Director of the Mint.]

State or Territory.	Gold.		Silver.		Total value.
	Fine ounces.	Value.	Fine ounces.	Coining value.	
Alabama	358	$7,400	100	$129	$7,529
Alaska	86,011	1,778,000	116,400	150,497	1,928,497
Arizona	140,089	2,895,900	2,239,900	2,896,032	5,791,932
California	707,160	14,618,300	474,400	613,366	15,231,666
Colorado	924,166	19,104,200	21,636,400	27,974,335	47,078,535
Georgia	7,222	149,300	600	776	150,076
Idaho	82,320	1,701,700	4,901,200	6,336,905	8,038,605
Iowa	5	100	.....	.....	100
Maryland	5	100	.....	.....	100
Michigan	3,033	62,700	60,300	77,964	140,664
Minnesota	145	3,000	.....	.....	3,000
Montana	211,563	4,373,400	15,667,900	20,257,487	24,630,887
Nevada	143,983	2,976,400	1,228,900	1,588,881	4,565,281
New Mexico	17,246	356,500	539,500	697,535	1,054,035
North Carolina	1,674	34,600	300	388	34,988
Oregon	65,456	1,353,100	69,000	89,212	1,442,312
South Carolina	4,097	84,700	200	259	84,959
South Dakota	275,491	5,694,900	147,600	190,836	5,885,736
Tennessee	5	100	.....	.....	100
Texas	358	7,400	404,700	523,249	530,649
Utah	83,500	1,726,100	6,265,600	8,100,978	9,827,078
Vermont	5	100	.....	.....	100
Virginia	189	3,900	.....	.....	3,900
Washington	20,312	419,900	106,900	138,214	558,114
Wyoming	542	11,200	100	129	11,329
Total	2,774,935	57,363,000	53,860,000	69,637,172	127,000,172

The total increase in the gold product is practically the same as the increase in Colorado, which showed the wonderful gain from $14,911,000 in 1896 to $19,104,200 in 1897. California, on the other hand, shows a slight decrease in the gold product. The entire product of Alaska makes but a trifling showing in the enormous total, being only slightly greater than the gold product of Utah, and less than that of Arizona, California, Colorado, Montana, Nevada, and South Dakota. In fact, the total product from Alaska is reported as slightly less than in 1896, due probably to the exodus of miners from the Alaska side of the international boundary over to the Klondike district.

Mr. E. A. Leach, superintendent of the San Francisco office of the United States Mint Bureau, estimates that the gold output of the

Klondike thus far in 1898 (August) has been about $5,000,000. The receipts at the San Francisco mint up to this date have amounted to about $1,750,000 since the first arrival a few weeks ago of this year's Yukon gold. The receipts of the Seattle assay office have been about the same. The largest single deposit at the San Francisco mint was $120,000. Mr. Leach estimates that there is about $1,000,000 more of this season's output yet to reach this country.

The following tables show the production of gold and silver in the United States for the past three years, and the total increase or decrease in each year, by States and Territories:

Production of silver in the United States in 1895 and 1896, and the increase or decrease in 1897, 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	3,107,800	.....

Production of silver in the United States in 1896 and 1897, and the increase or decrease in 1897, by States and Territories.

State or Territory.	1896.	1897.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	145,300	116,400	.....	28,900
Arizona	1,913,000	2,239,900	326,900	.....
California	600,600	474,400	.....	126,200
Colorado	22,573,000	21,636,400	.....	936,600
Georgia	600	600	.....	.....
Idaho	5,149,900	4,901,200	.....	248,700
Michigan	59,000	60,300	1,300	.....
Montana	16,737,500	15,667,900	.....	1,069,600
Nevada	1,048,700	1,228,900	180,200	.....
New Mexico	687,800	539,500	.....	148,300
North Carolina	500	300	.....	200
Oregon	61,100	69,000	7,900	.....
South Carolina	300	200	.....	100
South Dakota	229,500	147,600	.....	81,900
Texas	525,400	404,700	.....	120,700
Utah	8,827,600	6,265,600	.....	2,562,000
Washington	274,900	106,900	.....	168,000
Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming	100	200	100	.....
Total	58,834,800	53,860,000	.....	4,974,800

Production of gold in the United States in 1895 and 1896, and the increase or decrease in 1896, 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, Connecticut, Iowa, Maryland, Minnesota, Nebraska, Tennessee, Vermont, Virginia, Wyoming	1,693	1,301	.....	392
Total	2,254,760	2,568,132	313,372	.....

Production of gold in the United States in 1896 and 1897, and the increase or decrease in 1897, by States and Territories.

State or Territory.	1896.	1897.	Increase.	Decrease.
	Fine ounces.	*Fine ounces.*	*Fine ounces.*	*Fine ounces.*
Alaska	99,444	86,011	.....	13,433
Arizona	125,978	140,089	14,111	.....
California	737,036	707,160	.....	29,876
Colorado	721,320	924,166	202,846	.....
Georgia	7,305	7,222	.....	83
Idaho	104,263	82,320	.....	21,943
Michigan	1,800	3,033	1,233	.....
Montana	209,207	211,563	2,356	.....
Nevada	119,404	143,983	24,579	.....
New Mexico	23,017	17,246	.....	5,771
North Carolina	2,143	1,674	.....	469
Oregon	60,517	65,456	4,939	.....
South Carolina	3,062	4,097	1,035	.....
South Dakota	240,414	275,491	35,077	.....
Texas	387	358	.....	29
Utah	91,908	83,500	.....	8,408
Washington	19,626	20,312	686	.....
Alabama, Connecticut, Iowa, Maryland, Minnesota, Nebraska, Tennessee, Vermont, Virginia, Wyoming	1,301	1,254	.....	47
Total	2,568,132	2,774,935	206,803	.....

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

[The estimate for 1792 to 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, to July 31, 1834	$14,000,000	$14,000,000	(a)
July 31, 1834, to 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

a Insignificant.

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

Year.	Total.	Gold.	Silver.
1883	$76, 200, 000	$30, 000, 000	$46, 200, 000
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
1897	127, 000, 172	57, 363, 000	69, 637, 172

COPPER.

By CHARLES KIRCHHOFF.

GENERAL TRADE CONDITIONS.

The year 1897 was a very satisfactory one for the producing interests of the United States, and brought continuous work at undisturbed wages to the men engaged in mining, smelting, and allied industries. There was a moderate increase in the production, with an export to foreign countries equal to that of the year 1896, which was phenomenal in this respect. The home consumption took care of the larger surplus, having been stimulated by the same general causes which led to the marked expansion of our iron and steel industry in that year. In common with all the metal industries, copper mining entered 1898 with a demand unprecedented in our history, aided like the others by growing requirements from foreign countries.

There is clear evidence that, in response to the temptations held out by years of prosperity, the copper-mining industry of the United States is entering upon a period of steady expansion. Long-established and successful corporations are in many cases perfecting and adding to facilities and equipment for an increased output. Very promising developments have been made in Lake Superior, although the long preparations necessary and the heavy outlays of capital required make the accession of new mines to the list of producers relatively slow. Arizona promises to be the first to expand materially its output, and a number of smaller undertakings are shaping in different parts of the Rocky Mountain region. As an offset, there is a growing feeling among those who closely watch developments that many circumstances may conspire to keep Montana close to the maximum attained in recent years.

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 1897.

[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
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

Production of copper in the United States from 1845 to 1897—Continued.

[Long tons.]

Year.	Total production.	Lake Superior.	Calumet and Hecla.	Percentage of Lake Superior of total product.
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
1897	220,571	64,858	39,455	29.4

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	.....

Total copper production in the United States, 1883 to 1887—Continued.

Source.	1886.	1887.
	Pounds.	*Pounds.*
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 1897.

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	
Vermont			
Southern States	18,201	18,144	378,840
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

Total copper production in the United States, 1888 to 1897—Continued.

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
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

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 1897—Continued.

Source.	1894.	1895.	1896.	1897.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Lake Superior	114,308,870	129,330,749	143,524,069	145,282,059
Arizona	44,514,894	47,953,553	72,934,927	81,530,735
Montana	183,072,756	190,172,150	221,918,179	230,288,141
New Mexico	31,884	143,719	2,701,664	701,892
California	120,000	218,332	690,237	11,987,772
Utah	1,147,570	2,184,708	3,502,012	3,919,010
Colorado, including copper smelters (*a*)	6,481,413	6,079,243	6,022,176	11,873,033
Wyoming	.....	.....	.....	.....
Nevada	.....	.....	.....	.....
Idaho	.....	1,425,914	.....	183,277
South Dakota	.....	.....	.....	2,440,338
Maine and New Hampshire	2,374,514	3,105,036	4,704,993	4,472,017
Vermont				
Tennessee and Southern States				
Middle States				
Lead desilverizers, etc (*b*)	2,136,473	.....	4,063,173	1,400,000
Total domestic copper	354,188,374	380,613,404	460,061,430	494,078,274
From imported pyrites and ores and regulus	10,678,434	*c* 5,300,000	*c* 5,900,000	*c* 12,000,000
Total (including copper from imported pyrites)	364,866,808	385,913,404	465,961,430	506,078,274

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, 1891 to 1897.

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.	1897.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Production of domestic copper	354, 188, 374	380, 613, 404	460, 061, 430	494, 078, 274
Imports:				
Fine copper in ore, entered for consumption	4, 804, 614			
Fine copper in regulus, entered for consumption	5, 873, 820	a5, 300, 000	a 5, 900, 000	a 12, 000, 000
Bars and ingots	606, 415	7, 979, 322	9, 074, 379	16, 923, 098
Old copper	160, 592	1, 336, 901	2, 422, 554	
Total	365, 633, 815	395, 229, 627	477, 458, 363	523, 001, 372
Exports:				
Ingots and bars	162, 393, 000	121, 328, 390	258, 473, 285	277, 255, 742
Estimated fine copper contents of matte	5, 750, 000	15, 200, 000	22, 881, 936	11, 000, 000
Total	168, 143, 000	136, 528, 390	281, 355, 221	288, 255, 742
Available supply	197, 490, 815	258, 701, 237	196, 103, 142	234, 745, 630

a Estimated.

This statement leaves out of account the stocks concerning which no reliable data are obtainable. For the years 1895, 1896, and 1897 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
1897	204,206	11,900	216,106

The monthly reports, in detail, for the years 1892, 1893, and 1894 are published in Mineral Resources for 1895, and for the years 1895 and 1896 in Mineral Resources for 1896. For 1897 and for the earlier months of 1898 the monthly production was as follows:

American product of copper, monthly, 1897 and a part of 1898.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
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
July	14,244	1,100	15,344
August	16,309	1,100	17,409
September	16,343	1,100	17,445
October	16,341	1,200	17,541
November	16,227	1,200	17,427
December	21,091	1,200	22,291
Total	204,206	11,900	216,106

American product of copper, monthly, 1897 and a part of 1898—Continued.

[Long tons.]

Year and month.	Reporting mines.	Outside sources.	Total.
1898.			
January	16,544	1,200	17,744
February	16,072	1,250	17,322
March	19,131	1,250	20,381
April	21,609	1,300	22,909
May	21,391	1,350	22,741
June	17,940	1,450	19,390
July	14,452	1,600	16,052

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, 1896, and 1897 the product of this group, which retains friendly relations with the American Producers' Association, has been as follows:

Foreign reporting mines.

Year.	Quantity.
	Long tons.
Second half 1882	39,655
1893	81,785
1894	88,531
1895	86,178
1896	86,196
1897	88,270

According to the careful compilations of Mr. John Stanton the exports of fine copper during recent years have been as follows:

Exports of fine copper from the United States.

Year.	Quantity.
	Long tons.
1893	80,392
1894	77,527
1895	64,722
1896	125,605
1897	129,210
1898 (first half)	68,284

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
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

Production of Lake Superior copper mines, 1884 to 1891—Continued.

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 following table records only the output of some of the leading producers in that district:

Production of Lake Superior copper mines in 1892, 1893, 1894, 1895, 1896, and 1897.

Mine.	1892.	1893.	1894.
	Pounds.	*Pounds.*	*Pounds.*
Tamarack	16, 426, 633	15, 085, 113	15, 375, 281
Quincy	11, 103, 926	14, 398, 477	15, 484, 014
Osceola	7, 098, 656	6, 715, 870	6, 918, 502
Franklin	3, 769, 605	3, 504, 244	3, 556, 487
Atlantic	3, 703, 875	4, 221, 933	4, 437, 609
Kearsarge	1, 467, 758	1, 627, 030	1, 998, 710
Tamarack, Junior	796, 769	1, 610, 259	2, 349, 329
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
Centennial	106, 801	.....	.....
Wolverine	500, 074	1, 025, 062	1, 665, 255

Production of Lake Superior copper mines in 1892, etc.—Continued.

Mine.	1895.	1896.	1897.
	Pounds.	*Pounds.*	*Pounds.*
Tamarack	14,840,000	16,095,000	19,300,000
Quincy	16,304,721	16,863,477	16,924,618
Osceola	6,270,373	6,251,304	6,620,000
Franklin	3,086,933	2,746,076	2,908,284
Atlantic	4,832,497	4,895,985	5,109,663
Kearsarge	1,946,163	1,377,226	1,305,000
Tamarack, Junior	2,605,000	2,135,000	1,655,000
Peninsula			
Copper Falls			
Huron			
Allouez			
Central	379,020	469,243	611,172
Centennial			
Wolverine	1,815,391	2,220,933	2,316,296

The annual report of the Calumet and Hecla Mining Company for the fiscal year ending April 30, 1898, shows that the product for the fiscal year was 90,388,346 pounds of copper, against 92,475,595 pounds for the fiscal year 1896–97, 85,552,756 pounds in 1895–96, and 62,466,044 pounds in 1894–95. The dividends for the fiscal year were $4,000,000, as compared with $3,000,000 in 1896–97. The annual report of the president, Mr. Alexander Agassiz, says:

During the past fiscal year we produced mineral equal to 41,961 tons of refined copper; our product in refined copper was 45,194 tons. For the previous year our refined copper product was 46,238 tons. The price of copper has varied from 11 to 12 cents per pound. It is now 11¾ cents.

During the past fiscal year there have been paid four dividends of $10 each. It should be stated to the stockholders that the gradual increase of our surplus since 1890 and the larger dividends paid during the past two years, while due in part to the higher price of copper, have been due mainly to the gradual increase of our working force. This is now about twice what it was in 1890. We are increasing the product of the mine, and obtaining about the same profit per pound of copper as with a smaller output.

The number of men engaged in pushing our openings has continued large, and our reserves have materially increased during the past year. The amount of dead work carried on in unproductive parts of the mine is large, and must of necessity remain so. The shafts Nos. 13, 14, and 15, sinking on the Osceola amygdaloid, have been equipped with small hoisting engines. They have now reached a depth of over 400 feet, and Nos. 13 and 15 have developed some promising ground. At the south end of the mine the sinking of No. 12 has been continued, but there has been no improvement in the character of the conglomerate lode. At the north end the quality of the rock in some of the openings is not up to the general average. The Superior compressor plant is ready to be connected with the general compressed-air system. We have planned to erect at No. 5 Calumet shaft an independent hoisting plant, and to use the engines designed for No. 5 to hoist from No. 4 Calumet to relieve the Superior drums, which are now taxed to their capacity.

The delays incident to the completion of the larger hoisting engines at the Red Jacket shaft have been greater than we anticipated. We have only been able thus far to use the sinking engines. This has greatly interfered with our openings in the vicinity of Red Jacket shaft.

The public library for the use of our employees has been completed, and we hope to open it to the public during the summer. The library will be placed under control of the library board of the Calumet Township school board. We have also erected for the use of the township high school a commodious building, two floors of which will be equipped as a manual training school, and put into commission in the fall. We have erected 24 houses for the workmen and 4 for the officers. The hospital building has been entirely remodeled, and is now a commodious building, well adapted to its purposes and ample for the uses of the mine.

To avoid the delays due to the crossing of the Mineral Range Railroad with our railroad line to Torch Lake, and in accordance with an agreement entered into with us, the Mineral Range Railroad Company has abandoned the old tracks on our land east of the mine works, and transferred the business of the railroad to the west side of Red Jacket village, a more central position, and with better terminal facilities. We have occupied the abandoned roadbed and built two connecting belt lines, which will in the future greatly facilitate our transportation both along the Calumet line and along the line of the Amygdaloid shafts.

During the winter No. 9-10 shaft house was destroyed by fire. It was replaced in a remarkably short time and its loss interfered but little with our product. An extensive addition has been made to the machine shop, and three stalls for locomotives have been added to the roundhouse. We have laid the foundation of another large coal dock of a capacity of 100,000 tons, with a depth of water of over 21 feet along the face of the dock, at Torch Lake. We hope during the coming season to finish the dredging of our canal from Bootjack Bay to Torch Lake. We shall then have a depth of 20 feet and a base of 90 feet along its whole length, enabling us to bring the largest vessels navigating the lakes to our docks.

At the mills all the buildings are now protected with iron sheathing, and we are obtaining an abundant supply of water for our boilers from the driven wells sunk in our sand flats. We have also built a new carpenter shop at the mills. We are continuing at the mills our experiments relating to greater economy in stamping and washing our rock and in treating our mineral product.

At Buffalo we have purchased an additional frontage on Niagara River of about 200 feet; otherwise there have been no changes of importance at the Lake Linden or the Buffalo Smelting works. At Torch Lake we have begun to smelt the mineral of the Quincy Mining Company for the temporary accommodation of that company.

The expenditures on account of the aid fund for the fiscal year amounted to $51,977. In view of the prosperous business of the company, we have determined to pay, during the coming year, the contributions of the men to the fund. The monthly contribution to the aid fund, beginning with 1899, is to be reduced from 50 cents to 25 cents for men, and from 25 cents to 10 cents for boys. It is believed that with a like contribution from the company the income will be sufficient to meet the present conditions. The value of the aid fund at cost is $132,967.

The Tamarack produced a considerably larger quantity of mineral in 1897 than in 1896, having built a new mill which enlarged its capacity. The product was 29,589,380 pounds of mineral in 1897, as compared with 23,628,899 pounds in 1896. Of the total amount of rock broken from the lode—671,718 tons—611,539 tons were stamped at a cost of 26.413 cents per ton, the total cost per ton of rock stamped having been $2.07. The total receipts for copper and interest in 1897 were $2,267,340.75, while the total costs were $1,835,809.86, leaving a net

income of $431,530.89, from which dividends aggregating $360,000 were paid. Contrary to the former practice, there has been charged to operating expenses $204,922.73 for construction, which includes $45,351.28 for the new mill and $111,061.11 for sinking and construction at the new shaft, No. 5, which was sunk 1,029 feet, reaching a depth of 2,015 feet. The other shafts of the company have the following depths: No. 1, 3,240 feet; No. 2, 3,775 feet; No. 3, 4,526 feet, and No. 4, 4,450 feet. The new mill went into commission on March 15. The new and the old mill ran in time equivalent to one head running 1,914½ days. During that time there were stamped 611,539 tons of Tamarack rock and 25,908 tons of Tamarack, Jr., rock, a total of 637,447 tons, or 332.95 tons per head per day.

The Franklin mine in 1897 produced 3,585,854 pounds of mineral, yielding 2,908,284 pounds of copper. There were hoisted 147,121 tons of rock, of which 132,026 tons were sent to the stamp mill, yielding 1.358 per cent of mineral. The amount of mass and barrel work was 1,158,115 pounds. The income was $320,917.33, while the running expenses were $268,264.62, and the expense for freight, smelting, etc., was $43,180.85, leaving a balance of $9,471.86. The expenses include $120,082.32 for development work in the Franklin, Jr., on the Pewabic lode. Stoping for stamp rock in this new mine was begun late in October, and during November and December about 7,000 tons were shipped to the mill. The Franklin is building a new stamp mill.

In 1897 the Quincy Mining Company produced 20,630,625 pounds of mineral, yielding 16,924,618 pounds of refined copper, for which there has been realized the gross sum of $1,872,213.69. Sales of silver yielded $18,024.95; interest account, $8,267.24, and real estate account, $2,244.27.

The running expenses at the mine were $890,732.52; the smelting, transportation, and other expenses were $214,470.86; construction, $18,466.25, and taxes in Michigan, $45,801.69. This leaves the income of the year at $731,278.83. The balance on hand was $927,564.32 on January 1, 1897, and there was received from trust account $390,888.74. The dividends paid aggregated $800,000, and $38,560.60 were paid for the purchase of Mesnard and Pontiac lands. The Quincy is building a smelting plant on Pewabic Lake.

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 increasing 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	2,269,101	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
1897	20,630,625	481	11.1	4.2	393	52.52

a Introduction of steam drills.

In 1897 the Osceola acquired by purchase the Tamarack, Jr., and Kearsarge properties, doubling the capital stock by issuing 50,000 new shares, of which 25,000 shares were applied to pay for the Kearsarge

and 16,000 shares for the Tamarack, Jr., the balance of the stock, 9,000 shares, remaining in the treasury. Although the purchase was not authorized until October 26, 1897, the report of the Osceola includes the operations of the mines purchased for the whole of the year 1897. The gross receipts from sales of copper, interest receipts, and other income were $1,338,056.11, while the total costs were $1,075,655.03, leaving a net income of $262,401.08, from which there were paid $141,000 for two Osceola dividends, $40,000 for a Kearsarge dividend, and $62,611.25 for real estate. The total amount of rock mined from the three properties was 524,364 tons, of which 443,086 tons were stamped, at a cost of 25.574 cents per ton. The mineral obtained was 13,857,373 pounds.

The Wolverine Copper Mining Company has continued its steady progress toward one of the more important mines on Lake Superior. During the fiscal year ending June 30, 1898, it carried its product of mineral up to 3,949,045 pounds, yielding 3,470,927 pounds of refined copper. This metal sold at an average of 11.42 cents per pound, yielding $396,703.86, to which is added, on interest account, $2,664.91. The working expenses at the mine were $232,832.80, while the cost of smelting, etc., was $43,353.52, a total of $276,186.32, leaving a mining profit of $123,182.45. The outlays for construction were $61,688.38, making an addition to the surplus of the previous year of $61,494.07, and carrying it to $218,784.73.

During the year the company purchased adjoining property at a cost of $104,500, paid out of this surplus, and at its close began the payment of dividends. The company leased one of the Allouez stamps, so that during the first half of the calendar year 1898 the product of the mine was 2,277,250 pounds, at a cost of less than 7¾ cents per pound, all expenses paid. During the fiscal year there were hoisted 167,568 tons of rock, 130,089 tons going to the stamp mill, and yielding 1.334 per cent of copper. The cost per ton of rock stamped was $1.79. The total cost at the mine per pound of refined copper was 6.71 cents, and the cost of smelting, freight, and marketing was 1.25 cents, making a total, exclusive of construction, of 7.96 cents.

A very promising series of explorations has been made on the continuation of the Wolverine belt, on what is known as the Fulton property. The outcrop has been stripped, and a series of surface openings has been made on the vein for a distance of 1½ miles.

The Atlantic mine, during 1897, produced 6,766,960 pounds of mineral, which yielded 5,109,663 pounds of refined copper, sold at an average of 11.23 cents per pound. Adding $958.12 for interest, the total income was $574,783.65. The mining expenses included $221,986.81 for underground work, $67,529.65 for surface expenses, $17,914.06 for railroad expenses, and $94,376.44 for stamp-mill work, a total of $401,806.96. The smelting, freight, and all other expenses were $67,162.06. The construction account called for $37,445.75, the explor-

ation of section 16, which is supposed to possess the continuation of the Baltic lode, $4,948.45, and the purchase of property $7,000. The net receipts over expenditures were $57,077.43, which carried the surplus up to $196,362.81.

The following record of cost for a series of years shows how it has been possible by close management to treat an ore yielding less than 0.75 per cent of copper.

Cost of copper at the Atlantic mine per ton of rock treated.

Items of cost.	1888.	1889.	1890.	1891.	1892.
Mining, selecting, breaking, and all surface expenses, including taxes	*Cents.* 83.73	*Cents.* 87.87	*Cents.* 104.14	*Cents.* 95.29	*Cents.* 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.	1897.
Mining, selecting, breaking, and all surface expenses, including taxes	*Cents.* 79.49	*Cents.* 75.18	*Cents.* 75.25	*Cents.* 76.43	*Cents.* 73.43
Transportation to mill	3.28	3.03	4.08	4.96	4.54
Stamping and separating	24.95	23.30	22.20	24.87	23.94
Freight, smelting, marketing, and New York expenses	18.22	17.71	18.81	17.47	17.03
Total working expenses	125.94	119.22	120.34	123.73	118.94
Total expenditures, including construction	160.24	165.07	156.05	135.99	129.69
Yield of copper, per cent	0.669	0.703	0.730	0.660	0.648

An advance of wages of 10 per cent is mainly responsible for the increased cost in 1896.

Explorations have been prosecuted on section 16 of the Atlantic property to locate the continuation of the Baltic belt. From work done thus far underground it is probable that either a bend of the strata or a faulting has displaced the belt.

Comprehensive exploration work is being carried on by the Arcadian Copper Company, among the directors of which are men identified with the Standard Oil Company. The company has acquired seventeen different tracts of land, including the old copper properties of the Arcadian Mining Company, the Edwards, Concord, and Douglass, aggregating 2,846 acres. The land is traversed by the lode on which the Kearsarge and Wolverine are working and the lode on which the Isle Royale Consolidated is exploring. The company has acquired a stamp-mill site on Portage Lake near Grosse Point and the right of way for a railroad from the mines to the mill site.

Energetic work is progressing in opening up the old Isle Royale group of mines, two large shafts, capable of handling large quantities of rock, being sunk on the property.

Development work is also progressing with two shafts on the Winona property, which is closer to the old Mass mine.

The Adventure Consolidated Copper Company has undertaken the working of the old Adventure Hilton and Knowlton properties.

The most interesting work in fresh ground is, however, being conducted on what is known as the Baltic property, and this may enter the ranks of producers at an unexpectedly early date. Three large compartment shafts are being sunk, at distances of 900, 900, and 845 feet apart. A first level has been opened in both directions in two of them, this level being designed to become the adit level. Below it, a second level has been started. One head of stamps is available at the Atlantic mill, and this will probably begin crushing Baltic rock before the close of 1898.

MONTANA.

A good deal of caution must be exercised in compiling the statistics of the production of copper for the Butte district of Montana, because the furnace products of one property are sold for further working to the works of other companies. The duplication of metal has led to excess in returns. Besides, during 1898 a certain quantity of material originating in British Columbia has been worked in Butte. Full reports from all the works have made it possible to follow the metal closely and to eliminate such sources of error.

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
1897	494,078,274	230,288,141	46.6	29.4

The third annual report of the Anaconda Copper Mining Company for the fiscal year ending June 30 shows that 124,417,471 pounds of fine copper, about 5,300,000 ounces of silver, and 16,610 ounces of gold were produced. The quantity of copper sold was larger, as is exhibited in the following table of sales and prices realized:

Sales and prices of Anaconda product.

Fiscal year.	Copper.		Silver.		Gold.	
	Pounds sold.	Price, cents, per pound.	Ounces sold.	Price, cents, per ounce.	Ounces sold.	Price per ounce.
1895-96	85,476,795	10.03	4,498,560	67.91	14,384	$20.62
1896-97	120,864,097	10.76	6,057,067	64.08	18,511	20.65
1897-98	135,002,147	10.82	5,706,377	56.73	19,930	20.67

The receipts for 1897–98 were $14,605,588.45 for copper as compared with $13,003,955.10 during the previous fiscal year, $3,237,277.58 and $3,881,551.75, respectively, for silver, and $411,983.28 and $382,259.70, respectively, for gold, the totals being $18,254,849.31 for 1897–98 and $17,267,766.55 for 1896–97. The value of the stock of copper, silver,

and gold on hand declined from $5,521,031.48 on June 30, 1897, to $4,052,870.43 on June 30, 1898. The income from royalties, rents, and dividends was $79,384.49, the profit for the fiscal year having been $3,551,346.22 as compared with $5,136,048 in 1896–97.

Owing to the breaking out of an old fire in the Anaconda group of mines, these did not furnish as much ore as in former years, the shipments amounting to 628,051 tons; but the Syndicate group furnished 813,487 tons, so that the total shipments, 1,441,538 tons, were 33,169 tons in excess of the previous year. The report presents a detailed schedule of the mining expenditure of both groups, the totals being $3,059,212.65 for the Syndicate and $2,686,571.55 for the Anaconda group. The heaviest items in the two cost accounts, respectively, are: $117,501.17 and $90,360.11 for coal, $255,946.16 and $196,134.83 for freight on ore, $1,825,931.05 and $1,550,570.78 on labor, $91,359.08 and $55,936.72 on powder, $248,133.42 and $181,753.49 on timber, $177,499.18 and $203,031.71 for repairs on machinery and plant, and $89,637.54 and $148,733.36 for new construction.

The total cost for the 1,441,538 tons shipped for mining was $5,745,784.20 less $241,861.61, the latter representing one-half the profit on subsidiary departments like coal mines, foundry, timber, lands, etc. The cost of mining was, therefore, $3.82 per ton.

There was received at the reduction works 1,459,249 tons of ore, of which 17,711 tons was custom ore, purchased. The following statement shows the details of reduction works expenditures.

Reduction works expenditures at Anaconda Copper Company's plant.

	Amount.
Custom ores	$164,398.29
Concentrating	1,124,508.96
Smelting	2,810,268.98
Converting—casting	1,073,938.85
Blast furnace	390,106.96
Refining	603,123.77
Reduction of silver mined	73,467.10
Milling (construction)	10,125.76
Total	6,249,938.67
Deduct one-half profit of subsidiary departments	241,861.62
	6,008,077.05

Interesting details of costs for the reduction plant are submitted. For concentrating the principal items are: $413,380.96 for labor, $319,420.82 for power-house expenses, $52,551.03 for repairs to buildings and structures, $120,232.67 for repairs and renewals of machinery, $48,445.92 for half the cost of a flume, and $36,531.72 for new machinery.

In the smelting department the heaviest outlays were: $1,249,981.05 for coal, $817,289.62 for labor, $142,540.23 for power-house expenses, $54,799.93 for repairs to buildings, $196,494.58 for repairs to machinery and plant, $122,619.91 for four Holthoff-Wethey calcining furnaces, $48,445.94 for half the cost of a flume, $30,417.34 for two reverberatory matte furnaces, and $15,738.52 for new machinery.

For converting and casting the outlay for fuel was $136,622.35; for labor, $484,711.01; for power-house expenses, $112,100.92; for silica, $57,821.95; for repairs to machinery and plant, $96,366.52, and for new construction, $102,774.94. The latter included three new converter stands and nine converters with equipment, which carries the capacity, with 15 stands, up to an output of 14,000,000 pounds of copper per month.

In the blast-furnace department the principal items of cost were: $209,634.94 for coke, $86,258.77 for labor, and $40,573.68 for lime rock.

The refinery has been considerably extended, the total outlays for construction being $159,611.50.

The principal current expenses were $136,361.57 for labor and $199,499.16 for power-house expenses. The product was 60,307,985 pounds of electrolytic copper, of which 99.9 per cent. was above the requirements and tests of the highest-grade copper.

The total outlays for construction and new permanent improvements at the mines and reduction works, all charged to operating expenses, aggregated $802,956.69.

Besides the total cost at the mines of $11,511,999.64, the outlays were: $696,297.66 for railroad and ocean freights, $968,891.38 for refining charges at the seaboard, $34,899.62 interest on advances, and $102,638.23 general expense.

The gross receipts of the Boston and Montana Company during 1897 were $6,949,097.23, from which are deducted the outlays at the mines and smelters, $3,274,579.87, and the expenses of handling copper, such as freight, copper charges, commissions, etc., $658,080.38, leaving a net income of $3,016,436.98. From this is deducted $133,438.01 for sinking fund and interest on bonded debt, leaving $2,882,998.97 applicable to dividends, which were paid to the amount of $1,800,000, or $12 per share. Besides, there was set aside for bonds maturing $138,541.06, and for real estate purchased $200,383.15, leaving a net surplus for the year of $744,074.76.

The directors report that although the ores treated have averaged 2 per cent less copper than the ores treated in 1896, and that the high-grade ores held in reserve have not been drawn upon, the product of

the fine copper has been equal to that of 1896. Improvements in machinery and better methods have reduced the cost of treatment materially; in fact, Mr. Frank Klepetko, the superintendent, states that the question of treating ores in abandoned workings is being closely looked into, since ore which could not be mined five years ago will now yield a profit. Considerable improvements have been made at the mine plant, including a boiler house containing several new locomotive boilers of 250 nominal horsepower each, a 600-horsepower Nordberg triple-expansion three-stage air compressor, and a cooling tower. At the Great Falls smelter a new large blast furnace has been built, to be followed by two additional ones. Some of the reverberatory furnaces are being remodeled to larger capacity, and at the electrolytic plant the production has been brought up to a capacity of 3,700,000 pounds per month.

The Boston and Montana, which is now controlled by strong financial interests not thus far identified with copper mining in Montana, is expected to become an active producer of metal at no distant date.

ARIZONA.

The production of Arizona has increased and promises to develop further in the near future. The Copper Queen, at Bisbee, has three furnaces coupled to its converters, with an average capacity of 1,000,000 pounds each per month. A fourth furnace supplies any deficiency in matte and at times makes 500 to 600 tons of matte per month, which is sold to a works at Aguas Calientas, Mexico, where the copper is used as a carrier for the precious metals.

At Morenci the Detroit Copper Company has two stands of converters, one of which is kept in constant operation, making a little over 1,000,000 pounds of fine copper per month. It is proposed, however, to increase the concentrating capacity by 300 to 400 tons of lean ore, which will probably bring the production up to over 1,500,000 pounds of fine copper per month.

The United Verde Company, at Jerome, which is regarded as one of the great copper mines of the world, has a plant capable of turning out 6,000,000 pounds per month. As yet it has not worked up to capacity, but it is producing not less than 4,000,000 pounds monthly.

The greatest increase in the near future is likely to take place in the Globe district, which is soon to secure railroad connections. Two companies have reduction plants, the United Globe and the Old Dominion. The aggregate product of the two promises to be 2,000,000 pounds per month.

Since the Arizona Copper Company proposes to increase its output by about 5,000,000 pounds per annum, and smaller producers are being added to the list, it is probable that the monthly product of Arizona will attain 12,500,000 pounds of copper at no distant date.

The Arizona Copper Company, Limited, is a Scotch corporation which works the Metcalf mines and owns the Arizona and New Mexico Railroad. During the fiscal year ending September 30, 1897, the total receipts for copper were £278,153, while cost of mining, smelting, and transportation and other expenses were £192,954, leaving a balance of £85,199 as mining profit, from which must be deducted £7,303 for general expenses, leaving a net profit of £77,896. The net railroad earnings were £51,044, making a total of £128,940. Interest, sinking fund, and dividends on preferred stock absorbed £55,166, leaving available £73,774, of which £47,480 were distributed in dividends on the common stock.

There were mined 128,886 tons of ore, of which 53,692 tons were concentrated, yielding 9,810 tons of concentrates.

Among the new mines to be added to Arizona's list is the Middlemarch, which will appear in the ranks of producers in 1898.

NEW MEXICO.

From New Mexico the principal product has been from the Copper Flat mine, near Fort Bayard, the shipping point for the furnace material being Halls Station.

IDAHO.

The New York and Idaho Smelting Company has established a plant at Cuprum, Idaho, but no copper has been marketed as yet, the work of developing the mines being still under way.

CALIFORNIA.

The Montana Copper Company, at Keswick, California, has, during 1898, become one of the larger producers of the country, and is solely responsible for the increase in the production of the State. During the first six months of 1898 103,000 tons of ore, averaging 7.53 per cent, were extracted from the mine and 72,000 tons were smelted, producing 4,329 long tons of copper in matte. The productive capacity is increased.

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 1897, 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	24,960,604	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
1897	b 3,919,680	683,497	2,974,720	226,704	910,201

a Not enumerated until 1871. b Ores.

Copper imported and entered for consumption in the United States, 1867 to 1897, 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	*b* 542	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	.....	.....
1897	12,646,552	1,142,526	1,780,390	158,829	.....	.....

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
1897	.....	.....	3,116	430

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	3,183	303	20,953	973,485
1897	15,282	1,929	30,729	1,334,443

a Does not include copper sheathing in 1867, 1868, and 1869.

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, 1896, and 1897 the tonnage of material is given.

Imports of fine copper in ore in 1893, 1894, 1895, 1896, and 1897.

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).		1897 (ore and matte).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		*Tons.*		*Tons.*	
Germany	.....	.....	.....	.....	10	$2,125
Dominion of Canada:						
Quebec, Ontario	1,168	$72,099	529	$22,638	243	24,191
British Columbia	1,135	117,888	1,031	43,302	3,453	714,078
Newfoundland and Labrador	5,467	15,510	.....	.....	.....	.....
Mexico	1,853	198,171	.....	.....	1,562	76,072
All other countries	11	771	1,171	282,689	5	124
Total	9,634	404,439	2,731	348.629	5,273	816,590

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.

The imports of pigs, bars, and old copper during 1897, by countries, were as follows:

Imports of pigs, bars, and old copper, by countries of origin, in 1897.

Country.	Quantity.	Value.
	Pounds.	
Germany	68,080	$13,265
United Kingdom	597,468	75,937
Quebec, Ontario, etc	96,049	7,198
British Columbia	1,166,364	143,759
Mexico	11,995,023	929,641
West Indies:		
British	352,594	29,584
San Domingo	82,521	8,086
Cuba	1,029,832	86,948
Chile	895,987	97,130
Japan	514,567	53,194
All others	124,613	9,274
Total	16,923,098	1,454,016

At least one-half of the copper imported from Mexico is furnace material smelted in that country and forwarded for refining to electrolytic works in the United States. It is probable that a part, possibly the whole, of the balance is merely Mexican product in transit to Europe. The statement of imports shows that there were received through Corpus Christi, Tex., 2,971,420 pounds, and through Arizona, 2,035,594 pounds.

The British Columbia imports are, of course, new copper, but the quantity credited to Cuba is understood to be entirely old material, from the wreckage of the sugar-plantation machinery.

The channels through which copper ore and matte are introduced into the country, as reported, throw some light on the material. The following table enumerates the districts into which the material was imported:

Imports of copper ore and regulus, 1897, by ports.

	Long tons.	Value.
Newark, N. J	142	$23,377
Corpus Christi, Tex	283	6,867
Paso del Norte, Tex	212	37,453
Saluria, Tex	972	22,534
Arizona	59	7,468
Puget Sound, Wash	2,188	517,067
Memphremagog, Vt	35	3,125
Oswegatchie, N. Y	20	4,467
Kansas City, Mo	909	147,223
Omaha, Nebr	169	26,411
All others	96	3,999
Total	5,085	799,991

Since the imports of British Columbia mattes aggregated 3,453 tons, it is evident that they went chiefly to Butte, Kansas City, and Omaha for treatment, while the Mexican mattes were worked at other points.

It is quite evident that the Bureau of Statistics of the Treasury Department does not classify as copper ore the large quantities of cupriferous pyrites which are handled in this country, nor do the records apparently cover the copper contents of the nickel mattes brought in from the Sudbury district. The absence of any data as to the copper contents of the ores and mattes returned in the import statistics, or of the contents of pyrites and nickel mattes, makes it a somewhat difficult matter to estimate the actual imports. Returns from the refiners, however, indicate that an estimate of 6,150,000 pounds for 1897 is justified for copper-nickel mattes alone.

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 1897.

[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
1897	181,280	1,199,029	277,255,742	30,597,645

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
1897	958,379	32,755,053

The destination of our exports of copper bars, ingots, plates, and old copper during the years 1895, 1896, and 1897 is shown by the following table, the data having been furnished by the Bureau of Statistics:

Exports of copper bars and ingots for 1895, 1896, and 1897.

Countries.	1895.	1896.	1897.
	Pounds.	*Pounds.*	*Pounds.*
United Kingdom	24,064,694	78,479,716	63,774,004
Austria	3,228,545	6,532,949	5,918,993
Belgium	8,384,995	9,648,271	16,651,776
France	25,266,032	45,502,864	59,630,864
Germany	14,962,257	29,609,837	29,716,200
Italy	901,485	4,067,160	3,757,920
Netherlands	40,451,380	72,994,600	86,581,616
Russia	2,968,001	10,741,821	8,515,772
Mexico	151,664	170,340	2,678,597
British North America	398,906	234,845	
West Indies	1,721	1,241,705	
Other countries	548,710		
Total	121,328,390	259,224,108	277,255,742

Of course, practically all the copper returned as having been shipped to Holland is really merely in transit to Germany, and this is true also as regards the greater part of that shipped to Belgium, some of the latter, however, probably going to France.

A large percentage of the total exports of copper bars and ingots goes from New York, Baltimore, and New Orleans, as shown in the following table. During the year 1898 growing quantities of copper have been forwarded from the last-named port. This is due to the fact that the Boleo Company of Lower California is sending a part of its product in transit through this country to Europe, New Orleans being the shipping port. The following table shows the export ports.

Exports of ingots, bars, and old copper in 1897.

District.	Quantity.	Value.
	Pounds.	
Baltimore, Md	88, 389, 939	$9, 830, 604
Boston and Charlestown, Mass	928, 584	103, 431
Newport News, Va	5, 899, 609	644, 973
New York, N. Y	167, 344, 812	18, 603, 642
Philadelphia, Pa	227, 023	20, 760
New Orleans, La	13, 882, 408	1, 354, 550
Detroit, Mich	164, 317	18, 087
Huron, Mich	229, 226	24, 339
Vermont, Vt	102, 718	11, 425
All others	87, 106	16, 134
Total	277, 255, 742	30, 627, 945

The exports of ore and matte aggregated 9,064 long tons, valued at $1,199,029, of which 8,000 tons, valued at $1,062,938, went to Great Britain, and 773 tons, valued at $84,273, to Mexico. It is understood that the latter movement is due to the shipment of material from the Arizona plant to a Mexican works for a special purpose.

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 1897, both inclusive:

Highest and lowest prices of Lake Superior ingot copper, by months, from 1860 to 1897.

[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	23⅝	23⅝	23	23½	23	23¼	22⅝	22½	21⅝
1861	20	19	19½	19	19⅝	19¼	19⅜	19	19⅜	19¼	19	18
1862	28	27	28	25	25	23	23	21½	21½	20⅜	23	20⅜
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	27⅜	27½	27½	24	24½	23½	24¼	24	24½	24
1868	23½	21½	24	22½	24	23¼	24¼	23¼	24¼	24	24	23⅛
1869	26¼	23⅜	27	26	26⅜	24	24	23¼	24¼	23⅜	23⅜	22
1870	22	21⅛	21¼	20⅞	20⅜	19	19⅜	19¼	19½	19	20⅝	19
1871	22⅞	22	22⅜	21⅞	22	21½	21⅜	21¼	21⅜	21⅜	21½	21¼
1872	28½	27⅛	28⅜	28¼	30½	28⅜	44	30½	42	36	34⅜	33
1873	35	32½	35	34	35	34½	34½	33½	33½	32	31½	29⅛
1874	25	24½	25	24⅛	24⅜	24	25	24⅜	25	24½	24⅜	24¼
1875	23½	21½	22⅜	21⅜	21⅜	21½	21⅜	21½	23¼	22⅝	23	23
1876	23¼	23	22⅞	22½	22¼	22	22⅝	22	22⅛	21	21	19¼
1877	19½	19	20½	19½	19½	19	19½	19¼	19¼	19	19⅜	19
1878	17⅝	17½	17½	17⅛	17⅛	16⅞	17	16⅞	16⅜	16¼	16⅜	16¼
1879	16	15½	15½	15½	15⅜	15¼	16	15⅜	16¼	16	16¼	16⅛
1880	25	21⅜	24¼	24	24	22⅜	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	15⅜	16	15⅞	15⅞	15
1884	15	14⅞	15	14⅞	15	14⅝	15	14½	14½	14⅛	14½	14
1885	11½	10⅜	11⅞	10⅛	11⅛	10⅜	11¼	10 1/10	11½	9⅝	11½	11
1886	11⅝	11⅜	11⅝	11⅜	11½	11⅜	11½	11⅜	11⅛	10	10⅛	10
1887	12	11⅛	11⅛	10⅕	10½	10⅜	10⅕	10	10	9 13/20	10¼	10
1888	17 4/10	15 17/20	16 6/10	16	16 7/20	15 9/20	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	14⅜	16¾	15¼
1891	15	14⅜	14⅞	14¼	14¼	13⅝	13¾	13½	13¾	12¾	13	12⅞
1892	11	10¾	10¾	10½	12	10¾	12	11¼	12¼	12	11⅞	11½
1893	12⅛	12¼	12¼	12	12	11¾	11½	11¼	18⅛	11	11	10¾
1894	10¼	10	10	9⅝	9⅝	9⅜	9½	9⅜	9⅜	9¼	9⅛	9
1895	10	9⅞	9⅞	9½	9½	9¼	9¾	9⅜	10⅜	9¾	10⅜	10½
1896	10⅛	9¾	11¼	10	11¼	10⅞	11	10¾	11½	10⅞	11¾	11½
1897	12	11½	12	11⅞	11⅞	11½	11⅛	11	11⅛	10¾	11⅛	10⅞

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	21⅜	21½	21½	21½	22	21¼	22	21½	21½	20¼	20¼	19⅜
1861	18	17½	19	17⅜	20¼	19	20¼	20	22½	20¼	27	22½
1862	24½	22½	24½	24	27	24¼	32⅞	27	32⅞	30½	31½	30½
1863	32	29	31	29	32¼	31	34¼	32¼	38½	34½	38⅜	38½
1864	55	49	52½	50	52½	47½	48	47	49	47	50	48½
1865	30¼	28	32	30½	32⅜	31½	33	32½	45½	33	45½	39¼
1866	33½	31	31	30	31½	30⅜	31	30⅜	30⅜	26½	29	26½
1867	26	24	26¼	25⅜	27¼	26¼	26⅜	22⅜	23	22⅜	23	21½
1868	24½	23⅛	24¼	24	24	23⅜	24	23	24	22½	24½	23⅜
1869	22¼	21⅞	23⅛	21⅞	23	22	22⅜	22	22½	22	22	21½
1870	20½	20⅜	21⅜	20⅛	21½	20⅜	21⅜	21½	23⅜	21⅜	22⅝	22¼
1871	22¼	21⅝	23	22⅜	23⅞	22⅞	23⅞	23¼	24¼	23¼	27	24½
1872	34	33	35	32½	35¼	33	34⅜	31½	32¼	30⅜	32½	30½
1873	29	26⅝	27½	27	27	25½	25½	24	24	21	25	23
1874	24½	20	21	19	21¼	21	22¼	21¼	23⅜	22¼	23¼	23¼
1875	23	22⅝	23⅜	23	23⅛	23⅛	23¼	23	23¼	23	23⅜	23⅜
1876	20	19½	19½	18⅜	21	18⅜	21¼	20½	20½	20	20	19⅝
1877	19¼	19	19	17⅞	18½	17⅞	18	17⅜	17⅜	17⅝	17⅜	17½
1878	16¼	16	16	16	16¼	16	16	15½	15⅞	15½	16	15⅞
1879	16⅛	16	16⅜	16	17	16¼	21½	18	21⅜	21	21½	21
1880	18⅞	18½	19⅛	19	18⅞	18⅜	18⅞	18⅜	18⅞	18⅜	19⅛	18⅞
1881	16½	16	16⅝	16⅜	18⅛	16⅜	18⅜	18	19	18⅛	20⅜	19¼
1882	18¼	18⅛	18¼	18⅛	18¼	18	18¼	18	18⅛	18	18	17⅞
1883	15⅛	15	15	15	15¼	15⅛	15¼	15⅛	15	14⅞	15	14⅞
1884	14⅛	13⅞	14	13⅞	13⅛	13	13⅛	12⅞	13	12⅛	12⅛	11
1885	11¼	10⅞	11¼	11	11½	10½⅝	11⅛	10⅝	11⅛	10⅝	11½	11 1/10
1886	10⅛	10	10¼	10	11⅛	10¼	11⅜	11⅛	12	11⅜	12⅛	11⅞
1887	10⅜	10⅛	10⅜	10⅜	11	10⅝	12 3/20	10 3/10	14 11/20	11 1/10	17⅜	14 9/20
1888	16 9/10	16 13/20	17	16⅜	17 7/10	16 9/10	17⅗	17 7/20	17⅗	17¼	17 9/20	17 1/10
1889	12	12	12	12	12	11	11	11	13¼	11¼	14½	14
1890	17¼	16½	17¼	17	17	17	16⅞	16⅜	16⅜	16⅜	16	15
1891	12⅞	12½	12⅝	12	12½	12⅛	12⅝	11⅝	11½	11	11⅛	10¼
1892	11⅜	11¼	11⅜	11 6/10	11 6/10	11 1/10	11⅜	11 1/10	12	11⅜	12⅜	12¼
1893	10½	10¼	10⅛	9⅜	9⅞	9⅜	9⅜	9⅜	10¼	9⅜	10½	10⅜
1894	9⅛	9	9⅛	9	9⅞	9⅛	9⅜	9½	9½	9⅜	10	9½
1895	11⅜	10½	12¼	11⅜	12¼	12	12	11⅜	11⅝	11	11	10
1896	11⅜	11	11⅛	10⅞	10⅞	10⅜	10⅞	10½	11½	10⅞	11½	11¼
1897	11⅛	11	11¼	11	11⅜	11¼	11¼	11	11	10⅜	11	10⅞

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 3/16
1882	66	17	0	13	6 3/4	13	10 1/16
1883	63	5	10	12	4 1/2	12	10 1/16
1884	54	9	1	10	5 1/2	11	1
1885	44	0	10	8	4	9	0 1/8
1886	40	9	3	7	9	8	3 5/8
1887	43	16	11	8	6	8	11 3/4
1888	79	19	4 1/2	14	3 1/4	16	3
1889	49	10	5	9	6 1/8	.....	
1890	54	5	5	10	7	.....	
1891	51	9	8 1/2	9	7	.....	
1892	45	12	8 3/4	8	7	.....	
1893	43	15	6 3/4	8	5	.....	
1894	40	7	4	7	6 1/2	.....	
1895	42	19	7	8	4 1/4	.....	
1896	46	18	1 3/4	9	1	.....	
1897	49	2	6 3/4	9	5	.....	

In detail the fluctuations, monthly, of good merchant copper in the English market were as follows in 1894, 1895, 1896, and 1897:

Fluctuations in good merchant copper in England in 1894, 1895, 1896, and 1897.

[Per long ton.]

Month.	1894.			1895.			1896.			1897.		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
January	42	1	6 1/2	40	13	9 3/4	41	13	8 1/4	50	10	8 1/4
February	41	6	8 1/4	39	14	3 3/4	44	16	11 1/4	51	6	6
March	40	19	5 1/4	39	1	9 1/2	45	8	0 3/4	50	4	0 1/4
April	40	10	10 3/4	40	3	6 3/4	45	3	2 1/4	48	16	9
May	39	10	5 3/4	43	0	0	46	6	6	48	10	11 1/2
June	38	10	4 1/4	42	15	6 1/4	48	18	0	49	1	1 1/2
July	38	12	8 3/4	44	0	2 1/2	49	3	7 3/4	48	1	0 1/4
August	39	12	4 3/4	46	13	2 1/2	47	16	9 3/4	48	12	10 1/4
September	41	1	0	46	15	7 1/2	47	18	7 1/2	49	8	5
October	41	2	10 1/2	46	4	10	47	11	7	48	10	3
November	40	3	2 1/4	43	16	3 3/4	49	3	11	48	0	11 1/2
December	40	16	5 1/2	42	15	11	48	16	9 3/4	48	7	0 1/4

The year opened with Lake copper firm and quiet at 11½ cents per pound, but under a heavy export business the market strengthened, prices advancing toward the close of January to 12 cents per pound, at which price consumers covered about one month's requirements. London did a heavy business during the month, the sales aggregating 25,000 tons. Prices rose from £49 10s. for G. M. B. to £51 15s., but subsequently declined to £50 16s. 3d. Domestic consumers being supplied, the London market controlled the situation in February, advancing to £51 11s. 3d. Early in the month a decline to £50 8s. 9d. followed, during the second week, from which there was an advance in a few days to £51 13s. 9d., the month closing at £51. In the meantime our domestic market was dull at the prevailing quotation of 11⅞ cents. March developed considerable weakness, and concessions were made which ultimately carried the market down to 11½ cents, the London market falling off to £48 12s. 6d. This movement continued under a much more considerable business during April, the Lake copper price receding to 11 cents and the London G. M. B. reaching £48.

Early in May considerable lots were sold by leading Lake interests, for June delivery, to home consumers at the reported price of 11 cents. Still the spot market continued weak, reaching 10¾ cents toward the middle of the month, there having been heavy offerings in London, too, which eased the market to £47 1s. 3d. Then, under a large business at home and abroad, came a sharp reaction, New York going up to 11⅛ cents, while London reached £49, from which it receded, however, toward the close of the month to £48 13s. 9d. June opened quietly, and showed an easing tendency until quite heavy domestic and export sales caused a recovery to 11⅛ cents, which was lost, however, in July. The event of that month was the beginning of the engineers' strike in England, which caused a decline there, since it interfered with consumption and diverted trade to other countries. Prices declined to £47 11s. 3d., from which, however, there was partial recovery. August was a month of repeated and heavy domestic and export sales, which created a strong feeling and led to an advance of 11¼ cents, London reaching £49 2s. 6d. Aside from a good export demand, September was a quiet month, the market reaching 11⅜ cents. October found offerings freer, the market easing, until at the close of the month considerable export sales were effected on the basis of 11 cents for Lake, London declining to £48. November was dull, with increasing pressure to sell on both sides of the Atlantic, so that Lake copper reached 10¾ cents and London fell off to £47 8s. 9d. December brought large transactions with home consumers for the first three months of 1898 at 11 cents per pound and stiffened the market.

THE WORLD'S PRODUCTION.

Messrs. Henry R. Merton & Co., of London, have compiled the following statement of the world's production, the figures being modified by this office where official statistics are available:

The copper production of the world, 1889 to 1897, inclusive.

[Long tons.]

Country.	1889.	1890.	1891.	1892.
EUROPE.				
Great Britain	905	935	720	495
Spain and Portugal:				
Rio Tinto	29,500	30,000	31,827	31,539
Tharsis	*a* 11,000	*a* 10,300	*a* 11,100	11,258
Mason and Barry	*a* 5,250	*a* 5,600	*a* 4,150	*a* 4,400
Sevilla	1,350	810	875	1,070
Other mines	*a* 7,170	*a* 4,790	*a* 6,390	*a* 7,992
Germany:				
Mansfield	15,506	15,800	14,250	15,360
Other German	*a* 1,850	1,825	1,900	1,935
Austria	1,225	1,210	1,016	823
Hungary	*a* 300	*a* 300	285	285
Sweden	830	830	655	735
Norway	1,357	1,390	1,247	1,410
Italy	1,300	1,362	1,536	2,523
Russia	4,070	4,800	4,800	4,823
Total Europe	81,613	79,952	80,751	84,648
NORTH AMERICA.				
United States	101,239	115,966	126,839	154,072
Canada	3,040	2,685	3,986	3,164
Newfoundland	2,615	1,735	2,040	2,390
Mexico:				
Boleo	3,280	3,450	4,175	6,415
Other Mexican	500	875	1,025	900
Total North America	110,674	124,711	138,065	166,941
SOUTH AMERICA.				
Chile	24,250	26,120	19,875	22,565
Bolivia:				
Corocoro	*a* 1,200	1,900	2,150	2,860
Peru	275	150	280	290
Venezuela:				
New Quebrada	6,068	5,640	6,500	3,100
Argentina	190	150	210	200
Total South America	31,983	33,960	29,015	29,015

a Estimated.

The copper production of the world, 1889 to 1897, 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
South Australia	7,500	6,000	6,100	4,600
Total Australia	11,582	9,455	10,292	8,785

Country.	1893.	1894.	1895.	1896.	1897.
EUROPE.					
Great Britain	425	5	580	555	a 550
Spain and Portugal:					
Rio Tinto	31,954	31,061	32,985	34,501	33,923
Tharsis	11,000	11,000	12,000	12,000	12,000
Mason and Barry	a 4,400	a 4,200	a 4,100	a 3,900	a 4,300
Sevilla	1,270	1,170	1,050	1,025	810
Other mines	6,225	4,805	4,300	3,400	3,050
Germany:					
Mansfield	14,150	14,990	14,860	18,265	17,960
Other German	2,000	2,210	1,695	1,800	2,185
Austria	1,211	1,781	869	1,065	1,210
Hungary	210	310	239	205	445
Sweden	535	350	203	500	545
Norway	1,860	1,885	2,685	a 2,500	3,450
Italy	2,333	2,629	2,236	3,400	3,400
Russia	5,349	5,638	5,326	5,100	a 5,000
Total Europe	82,922	82,474	83,128	88,216	88,828

a Estimated.

The copper production of the world, 1889 to 1897, inclusive—Continued.

[Long tons.]

Country.	1893.	1894.	1895.	1896.	1897.
NORTH AMERICA.					
United States	147,033	158,120	169,917	205,384	220,571
Canada	*a* 1,000	1,204	3,923	4,190	5,938
Newfoundland	2,040	1,900	1,800	1,800	1,800
Mexico:					
Boleo	7,980	10,370	10,450	9,940	10,170
Other Mexican	500	1,400	1,170	1,210	*a* 1,200
Total North America	158,553	172,994	187,260	222,524	239,679
SOUTH AMERICA.					
Chile	21,350	21,340	22,075	23,500	21,900
Bolivia:					
Corocoro	2,500	2,300	2,250	2,000	2,200
Peru	460	440	450	740	1,000
Venezuela:					
New Quebrada	2,850	2,500	.....	.....	.....
Argentina	160	230	150	100	200
Total South America	27,220	26,810	24,925	26,340	25,300
AFRICA.					
Algiers	.....	.....	35	.....	.....
Cape of Good Hope:					
Cape Company	5,200	5,000	5,350	5,470	5,290
Namaqua	890	1,500	1,730	1,980	2,150
Total Africa	6,090	6,500	7,115	7,450	7,440
ASIA.					
Japan	18,000	20,050	18,430	21,000	23,000
Total Asia	18,000	20,050	18,430	21,000	23,000
AUSTRALIA.					
New South Wales	1,558	1,847	3,322	4,467	*a* 4,600
South Australia	4,600	4,944	5,251	5,430	*a* 5,600
Tasmania	.....	.....	.....	*a* 1,000	*a* 4,800
Total Australia	6,158	6,791	8,573	10,897	15,000

a Estimated.

The copper production of the world, 1889 to 1897, inclusive—Continued.

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.	1897.
Europe	88,922	82,474	83,128	88,216	88,828
North America	158,553	172,994	187,260	222,524	239,679
South America	27,220	26,810	24,925	26,340	25,300
Africa	6,090	6,500	7,115	7,450	7,440
Asia	18,000	20,050	18,430	21,000	23,000
Australia	6,158	6,791	8,573	10,897	15,000
Total	304,943	315,619	329,431	376,427	399,247

Since 1889 the world's production has increased by 139,410 long tons, of which there are to the credit of the United States 119,005 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
1897	60,428	76,127	136,555	56,542	84,631

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 Messrs. 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 1888 to 1897, inclusive.

[Long tons.]

Character.	1888.	1889.	1890.	1891.	1892.
Pure in pyrites	15,448	16,097	16,422	15,406	15,110
Pure in precipitate	26,360	25,110	25,563	29,326	28,444
Pure in ore	19,452	22,219	18,000	14,172	13,585
Pure in matte	29,601	37,981	31,803	35,499	42,217
Bars, cakes, etc	44,603	38,576	49,461	44,213	35,015
Total	135,470	139,983	141,249	138,616	134,371
Character.	1893.	1894.	1895.	1896.	1897.
Pure in pyrites	15,320	15,401	14,561	14,726	15,576
Pure in precipitate	24,988	24,878	26,508	23,160	25,932
Pure in ore	11,701	12,804	15,240	12,499	11,980
Pure in matte	35,994	15,767	21,497	25,013	22,639
Bars, cakes, etc	41,829	56,158	42,135	60,458	60,428
Total	129,832	125,008	119,941	135,856	136,555

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 1897, 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 1897, etc.—Continued.

[Long tons.]

Country.	Fine copper.				
	1896.	1894.	1895.	1896.	1897.
Portugal and Spain	29,359	28,645	30,196	28,596	32,821
Chile	2,714	626	212	797	2,233
United States	20,700	2,133	8,337	10,016	5,259
Other countries	8,209	9,242	9,660	8,764	8,258
Total	60,982	40,646	48,405	48,173	48,571

Messrs. James Lewis & Son, of Liverpool, estimate as follows the imports of copper product in Liverpool, London, and Swansea during the years from 1887 to 1897, 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 12,000 tons:

Imports of copper product 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
River Plate	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 product into Liverpool, Swansea, and London—Continued.

[Long tons.]

Country.	1892.	1893.	1894.	1895.	1896.	1897.
Chile	17,619	15,875	16,971	18,197	15,923	14,982
United States	26,475	35,647	30,495	17,098	39,676	32,792
Spain and Portugal	5,372	5,674	4,674	3,288	6,298	7,697
Spain and Portugal (precipitate)	14,831	10,296	10,642	12,612	11,474	17,386
Spain and Portugal (pyrites)	15,110	15,320	15,401	14,561	14,726	15,576
Australia	5,547	6,293	6,481	8,223	10,635	10,218
Cape of Good Hope	8,092	5,472	6,112	6,524	5,905	7,575
Venezuela	5,028	1,434	2,327	360	107	21
Japan	4,989	2,370	3,299	4,258	3,492	3,654
Italy	725	1,091	763	283	418	100
Norway	38	.....	30	486	528	130
Canada	120	50	105	.....	.....	127
Newfoundland	3,229	2,265	1,279	3,244	2,467	2,484
Mexico	869	1,185	1,408	4,623	7,792	6,217
Peru	287	462	443	449	741	998
River Plate	196	160	229	148	94	190
Other countries	1,245	1,944	855	930	797	1,613
Total tons fine	109,772	105,638	101,514	95,284	121,073	121,760

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 into 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

Country.	1892.	1893.	1894.	1895.	1896.	1897.
England:						
Ore	18	23	5	.....	.....	.....
Matte	24,668	20,700	2,133	8,337	10,016	5,259
Bars and ingots	1,427	14,924	28,357	12,250	29,780	27,591
Total	26,113	35,647	30,495	20,587	39,796	32,850
France	4,340	12,483	9,248	11,806	21,998	26,165
United States into England and France	30,453	48,130	39,743	32,393	61,794	59,015
Chile into England and France	19,840	19,717	20,783	22,161	22,593	20,842

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 1897, 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.	1897.
English, wrought and unwrought, and sheets	45,349	34,874	45,299	38,734	35,951
Yellow metal, at 60 per cent	8,745	9,514	8,978	6,773	6,609
Brass, at 70 per cent	4,049	3,808	3,747	4,172	3,936
Total	58,143	48,196	58,024	49,679	46,496
Fine foreign	12,843	6,493	7,966	9,655	10,046
Total	70,986	54,689	65,990	59,334	56,542

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 Messrs. James Lewis & Son:

Direct imports into France from 1887 to 1897, 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
1897	4,806	26,165	5,677	2,557	39,205

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.	1897.
England	8,250	5,596	3,884
Chile	3,494	4,573	2,804
United States	11,157	21,279	28,118
Other countries	11,717	12,197	14,830
Total	34,618	43,645	49,636

A comparison shows that there are striking discrepancies between the statistics collected by Messrs. James Lewis & Son and the official returns, which it seems difficult to harmonize. Messrs. Aron Hirsch & Sohn, of Halberstadt, Germany, in the annual statistical report, present the following as drawn from official sources:

French imports and exports of copper.

[Metric tons.]

	1893.	1894.	1895.	1896.	1897.
Imports of bars, ingots, etc	30,398	28,654	34,618	43,646	49,636
Deduct exports	7,019	5,322	4,910	5,144	4,768
	23,379	23,332	29,708	38,502	44,868
Add old copper, excess of imports over exports	2,892	2,411	4,644	5,524	5,192
Balance imports	26,271	25,743	34,352	44,026	50,060

Imports and exports of ores, matte, etc.

[Metric tons.]

	1893.	1894.	1895.	1896.	1897.
Imports	20,543	11,643	10,448	9,216	12,408
Exports	10,214	5,021	1,771	1,260	2,161
Total	10,329	6,622	8,677	7,956	10,247

Messrs. 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.	1897.
Imports, raw material	26,271	25,743	34,352	44,026	50,060
Contents of ore	7,230	4,635	6,074	5,570	8,685
Total	33,501	30,378	40,426	49,596	58,745
Increase (+) or decrease (—) of stocks	+355	+1,459	—103	—589	—379
Consumption	33,856	31,837	40,323	49,007	58,366

These figures are valuable as showing the very rapid increase in the consumption.

THE GERMAN COPPER TRADE.

German copper consumption has grown very rapidly. The following table, compiled by Messrs. 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.	1897.
Imports	46,153	44,514	51,806	52,504	59,742	73,123	82,903
Exports	9,973	9,817	11,304	10,406	10,893	12,452	12,568
Excess of imports.	36,180	34,697	40,502	42,098	48,849	60,671	70,335
Production	24,688	25,406	24,011	25,857	26,013	29,489	*a*29,550
Total	60,868	60,103	64,513	67,955	74,862	90,160	99,885
Copper contents of imported copper ore and iron pyrites	4,000	4,000	4,000	5,000	4,500	5,000	3,500
Home consumption	56,868	56,103	60,513	62,955	70,362	85,160	96,385

a Estimated.

Turning first to the imports, it may be noted that in 1897 these included 67,572 metric tons of bars and ingots, 4,199 tons of coins and old copper, 1,082 tons copper contents of brass, old and new, and 1,510 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.	1897.
Free port (Hamburg)	1,689	1,185	2,371	2,669
Belgium	356	356	115	9
France	203	152	81	268
Norway	128	362	71	45
Austria-Hungary	50	197	11	9
Sweden	33	83	198	250
Switzerland	.....	.....	5	6
Spain	10	.....	10	41
England	7,430	7,363	7,478	8,660
Netherlands	109	139	73	18
United States	23,795	31,311	42,504	50,420
Japan	2,072	1,932	1,916	2,655
Chile	884	825	827	2,217
Australia	.....	313	183	259
Other countries	173	147	271	46
Total	37,032	44,365	56,114	67,572

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	29,489	18,541
1897	29,541	18,248

It will be observed that Mansfeld considerably increased its production in 1896, and has since held its own.

A very notable fact in connection with the German copper trade is the rapid expansion in exports of copper manufactures, which reached a climax in 1896. Since 1891 the exports have doubled, as is shown by the following table:

Exports of copper manufactures from 1891 to 1897, inclusive.

[Metric tons.]

	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Rods and sheets	4,151	4,507	4,889	5,009	4,700	5,429	5,712
Wire.....	2,166	2,565	3,052	4,433	3,975	5,909	6,175
Cables	2,030	1,526	1,957	2,193	3,713	7,631	8,119
Miscellaneous	558	492	563	501	556	279	245
Coarse forgings	2,311	1,902	2,050	2,538	2,643	2,648	2,703
Cartridges, caps, etc.	2,221	2,374	3,682	3,376	4,450	4,156	2,712
Fine copper goods..	3,106	3,234	3,859	4,117	4,912	7,837	7,425
Totals	16,543	16,600	20,052	22,167	24,949	33,889	33,091

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.	1896.
Imports of fine copper	7,803	12,340	10,442	11,033	14,090
Imports of manufactures....	1,032	1,442	1,049	655	723
Production.....	4,901	5,436	5,730	5,413	5,721
Consumption.....	13,736	19,218	17,221	17,101	20,534

The production of the Russian mines during 1894, 1895, and 1896 was as follows, by districts, in poods:

Copper production in Russia.

[Poods.]

	1894.	1895.	1896.
Caucasus	150,000	145,805	149,698
Ural	155,000	149,032	166,205
Altai	17,000	12,566	13,240
Steppes district	.....	.....	1,868
Finland: Pitkaranda	27,500	20,274	18,000
Total	349,500	327,677	349,011
In metric tons (61 poods)	5,730	5,372	5,721

Summarizing the estimates of Messrs. Aron 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.	1897.
Germany	60,513	62,955	70,349	85,371	96,385
England	96,615	90,069	91,184	115,557	110,210
France	33,856	31,837	40,323	49,007	58,366
Austria	14,901	16,457	15,735	16,498	18,288
Russia	19,218	17,221	17,101	20,534	20,000
Total	225,103	218,539	234,692	286,967	303,249

This is exclusive of the United States, whose consumption is estimated at 101,404 metric tons in 1897, based on the returns of the American Associated Companies and neglecting stocks, a course which is justified by the absence of any reliable data on the subject.

The Metallgesellschaft, of Frankfurt-am-Main, Germany, presents a somewhat different series of statistics, endeavoring to cover the consumption of the world. These statistics exhibit, also, what after all is the main fact, that the consumption of the metal has greatly increased in recent years. We present the data covering the period of 1891 to 1897, both inclusive:

The world's consumption of copper from 1891 to 1897.

[Metric tons.]

Country.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Germany	52,027	50,681	54,949	56,145	63,813	79,438	89,798
Great Britain	91,496	81,279	91,109	100,661	83,476	104,247	105,263
France	32,058	28,438	30,456	30,689	37,738	43,224	49,868
Austria-Hungary	10,287	9,456	12,675	14,744	12,748	14,598	17,058
Italy	3,818	4,535	5,257	6,344	6,641	7,156	7,810
Belgium	*a* 4,000	*a* 4,000	*a* 4,000	*a* 5,000	*a* 5,000	*a* 5,500	*a* 6,200
Netherlands	*a* 2,400	*a* 2,400	*a* 2,400	*a* 2,400	*a* 2,400	*a* 2,400	*a* 2,400
Russia	8,300	11,500	13,800	11,700	12,400	15,200	*a* 15,100
Denmark, Sweden, Switzerland, Spain, Balkan countries	1,500	1,700	2,000	2,100	1,900	2,100	*a* 2,100
Exports of copper from Europe:							
To countries enumerated	3,500	1,200	3,000	800	700	1,000	*a* 1,000
To countries not enumerated	1,100	800	800	700	700	500	*a* 500
European consumption and available for export	210,486	195,989	220,446	231,283	227,516	275,363	297,097
United States consumption, disregarding stocks	82,526	117,465	66,891	88,623	117,817	91,638	96,713
Consumption of Japan copper in eastern Asia	6,348	9,883	12,668	14,027	8,424	15,100	*a* 16,000
World's consumption	299,360	323,337	300,005	333,933	353,757	382,101	409,810

a Estimated.

It will be observed that the most violent fluctuations are those attributed to the United States. This undoubtedly is due to some extent to the absence of any data as to stocks, but if the fluctuations in the demand of other metals, notably of iron, be a criterion, it is probably true that our consumption has undergone extraordinary vicissitudes since 1891.

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.				Pyrites 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
1897	575,733	812,293	1,388,026	2.810	582,540	2.595 .967	20,826

The Rio Tinto Company had the most prosperous year in its history, having paid in 1897 5 per cent on its preference share capital of £1,625,000 and 40 per cent on a like amount of common stock, besides adding £40,000 to the reserve, bringing that fund up to £140,000.

As shown in the table, the total product was 1,388,026 tons of pyrites, with an average content of 2.81 per cent. The quantity of pyrites invoiced to consumers was 582,540 tons in 1897, against 549,585 tons in 1896, 518,560 tons in 1895, and 485,441 tons in 1894. In spite of the smaller production of ore, the quantity of copper brought to market was the largest on record, consisting of 19,894 tons of refined copper, 1,050 tons in sulphate of copper, and 12,487 tons in pyrites, a total of 33,431 tons. The production for the year was 33,924 tons, of which 20,826 tons were produced by treatment at the mines, and 13,098 tons were the copper contents of pyrites shipped. There are now 111,406 tons of fine copper in the reserve heaps, which stand on the books of the company at a cost of £4 6s 10d. The Cwmavon smelting plant of the company turned out 20,038 tons of refined copper, the largest on record.

During the fiscal year the share capital was divided into 325,000 5-per-cent preference shares of £5 each, and a like amount of common stock, while there are outstanding £3,489,860 of 4-per-cent mortgage bonds. After providing for all interest, expenses of administration, income and other taxes, and including a balance brought forward of £21,532, the gross profit amounted to £895,822. Writing off £23,319 for development works, £24,180 for depreciation of plant, £56,160 for bond sinking fund, and £40,000 placed to reserve, left a balance of £752,163, out of which dividends aggregating £729,896 were paid.

The report of the Tharsis Company shows that the total quantity of mineral raised was 565,949 tons in 1897, as compared with 557,577 tons in 1896 and 612,483 tons in 1895. The shipments of pyrites were heavily increased, having been 310,702 tons in 1897, as compared with 239,725 tons in 1896 and 226,829 tons in 1895. A good rainfall favored the local production of precipitate, which was 8,906 tons in 1897, as compared with 7,538 tons in 1896 and 9,443 tons in 1895. The gross profits were £383,972, against £277,469 in 1896 and £301,711 in 1895, the net profits standing, respectively, £310,957, £218,769, and £219,491. The dividend of 25 per cent absorbed £312,500, being an increase as compared with 1895 and 1896, when 17½ per cent was paid.

Mason & Barry, Limited, whose mines are in Portugal, have, like the two preceding concerns, largely increased their sales and shipments of pyrites, having invoiced and shipped ore for its sulphur value to the quantity of 272,498 tons in 1897, as compared with 205,206 tons in 1896. The total quantity of ore broken and raised was 177,549 tons in 1897, as compared with 192,428 tons in 1896. After writing off for depreciation the sum of £18,717, and deducting management expenses and income tax, the profit amounted to £45,088. Out of this dividends aggregating £37,034 were paid.

The report of the Cape Copper Company for the fiscal year ending August 31, 1897, shows that that company has had a prosperous year, having made a profit of £215,238, as against £131,252 in 1895–96. Out of this dividends were paid aggregating £155,250; there was placed to the credit of various reserve and sinking funds and to suspense account £46,112, while £35,918 was carried forward. The principal producing mine is the Ookiep, in Namaqualand, which gave 26,660 tons of ore, of an average assay of 18.93 per cent of copper, compared with an average of 19.29 per cent during the previous fiscal year. The mining costs were reduced to £52,152 in 1896–97 from £55,830 in 1895–96.

Another mine, the Spectakel, produced 1,536 tons in 1896–97, assaying 28.12 per cent of copper, as compared with 1,469 tons, averaging 28.75 per cent in 1895–96. A good deal of development work has been done at the Nabapeep mine, where 175,000 tons of comparatively low-grade ore are in sight. It is proposed to build smelting works at these mines to smelt the ores. The Cape Copper Company also operates the Tilt Cove mines in Newfoundland, which contributed a profit of £28,436, which was obtained from the east mine, the rich ore from the west mine not having been stoped away, since only 674 tons were taken out, yielding 10.97 per cent of copper. From the west mine 73,341 tons of ore, averaging 3.47 per cent, were extracted, the local smelting plant treating 27,670 tons of raw ore and 1,729 tons of slag, which yielded 11,705 tons of matte. There were shipped to Swansea 11,858 tons of matte and 29,923 tons of ore, while the shipments to New York were 16,416 tons of ore. The company owns a smelting plant at Briton Ferry, Wales.

The Namaqua, which is the second South African company, in 1897 produced 8,147 tons of rich ore, yielding a profit of £34,716 and paying a dividend of 13¾ per cent. In 1896 the output was 7,325 tons of ore, at a profit of £29,647 and dividends of 11¼ per cent, while in 1895 the yield was 6,672 tons, netting £21,313 and dividends to stockholders of 7½ per cent.

As the most recent of the larger new mines contributing to the world's markets, the Mount Lyell Mining and Railway Company, Limited, of Tasmania, has attracted wide attention, particularly since the technical management is largely in the hands of American engineers, and American machinery is used.

The company reports semiannually. During the half year ending September 30, 1897, the additions to the smelting plant gradually came into play, two furnaces operating the whole time, one for fourteen weeks, one for seven weeks, and one for two and one-half weeks. During that time the furnaces treated 41,507 tons of ore, averaging 4.40 per cent of copper, 5.06 ounces of silver, and 0.18 ounces of gold. They handled also 9,083 tons of first matte, 3,464 tons of converted slag, and 1,042 tons of flue dust. The converters handled 5,745 tons of matte, producing 2,953 tons of blister copper, averaging 98.85 per cent of copper, 91.77 ounces of silver, and 4.41 ounces of gold. During

the half year the income was £126,503 for blister copper and £10,631 profits of railroad, a total of £137,134. The costs aggregated £64,026 and £6,384 for other expenses, leaving a net profit of £66,724, or £1 12s. 2d. per ton of ore treated. Dividends aggregating £44,220 were paid, leaving a balance of £22,504. The half year ending March 31, 1898, found the entire smelting plant of five furnaces running, the quantity of ore treated being 62,868 tons. During that period the cost of mining was 2s. 4.64d., of removal of over burden 2s., of smelting 17s. 9.87d., and of converter operations 2s. 9.18d., a total of £1 4s. 11.67d.

Another Australian company, which has been a producer for many years, is the Wallaroo and Moonta Mining Company, of South Australia, which during its history has paid in dividends £1,710,254. During the calendar year 1897 the company made a net profit of £22,294, paying £8,000 in dividends. In 1896 the company mined 29,817 tons of ore, which yielded an average of 16.4 per cent of copper, the product having been 4,801 long tons of refined copper. In 1897 the output of ore had reached 32,790 tons of an average of 15.5 per cent, the product of copper being 5,073 long tons. The company is embarking also in lead-silver smelting at Wallaroo.

LEAD.

By CHARLES KIRCHHOFF.

INTRODUCTION.

Stimulated by a considerable rise in prices, and unhampered by any labor complications, the quantity of lead produced from ores mined in the United States reached its maximum in the year 1897 with a total of 212,000 short tons as compared with 188,000 tons in 1896 and 178,554 tons in 1891.

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.	Production.	Year.	Production.	Year.	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 1897.

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 1897—Continued.

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.*
1886	135,629	114,829	20,800	*c* 5,000	*c* 130,629
1887	160,700	135,552	25,148	*c* 15,000	*c* 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	202,406	171,009	31,397	23,852	178,554
1892	213,262	181,584	31,678	39,957	173,305
1893	229,333	196,820	32,513	65,351	163,982
1894	219,090	181,404	37,686	59,739	*d* 162,686
1895	241,882	201,992	39,890	76,173	*d* 170,000
1896	264,994	221,457	43,537	77,738	*d* 188,000
1897	291,036	247,483	43,553	83,671	*d* 212,000

a Including foreign base bullion refined in bond.
b Including a small quantity of lead produced in the Southern States.
c Estimated.
d Arrived at from direct returns from smelters.

Since 1891 special returns from desilverizers have been made on the quantity of antimonial or hard lead produced. The quantity was 4,043 tons in 1891, 5,039 tons in 1892, and 5,013 tons in 1893. In 1896 the production of hard lead was 7,507 tons, rising to 8,867 tons in 1897.

The following is a comparison of half-yearly periods:

Comparison of half-yearly periods.

	1894.		1895.	
	First half.	Second half.	First half.	Second half.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Desilverized lead	86,772	94,632	87,957	114,035
Soft lead	15,610	22,076	18,013	21,877
Total production refined lead	102,382	116,708	105,970	135,912
Exported:				
Base bullion, refined in bond	21,392	17,243	17,458	37,238
Ores, smelted in bond				
Available for home consumption	80,990	99,465	88,512	98,674

	1896.		1897.		1898.
	First half.	Second half.	First half.	Second half.	First half.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Desilverized lead	109,592	111,865	111,838	135,645	131,188
Soft lead	21,103	22,434	21,621	21,932	24,486
Total production refined lead	130,695	134,299	133,459	157,577	155,674
Exported:					
Base bullion, refined in bond	26,119	25,656	26,838	25,431	33,439
Ores, smelted in bond			2,720	7,420	7,308
Available for home consumption	104,576	108,643	103,901	124,726	114,927

For a series of years returns have been received from the smelters of lead ores in the United States showing the source, geographically, of the lead contents of the ores worked by them. This is the only method for obtaining a close estimate of the lead products of the different States and Territories. It is found to yield better results than a laborious and uncertain census of the mines.

The returns since 1894 are summarized in the following table:

Source of lead in American ores smelted.

State or Territory.	1894.	1895.	1896.	1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Colorado	50,613	46,984	44,803	40,576
Idaho	33,308	31,638	46,662	58,627
Utah	23,190	31,305	35,578	40,537
Montana	9,637	9,802	11,070	12,930
New Mexico	2,973	3,040	3,461	9,123
Nevada	2,254	2,583	1,173	959
Arizona	1,480	2,053	1,165	2,184
California	478	949	691	383
Washington, Oregon, Alaska, South Dakota, Texas	150	381	1,006	638
Missouri, Kansas, Wisconsin, Illinois, Iowa, Virginia	46,300	53,596	51,887	56,542
Total lead contents American ores smelted	170,383	182,331	197,496	222,499
Contents Mexican ores	a 21,000	16,437	15,403	13,430
Contents Canadian ores		5,040	10,100	19,515
Contents miscellaneous or unknown	.....	.....	2,118	344

a Estimated.

The figures presented for Missouri, Kansas, etc., are an aggregate of two sets of returns, one the actual pig lead made by local smelters, usually reported, as above, as "soft lead," and the other the lead contents of ores, concentrates, and furnace products purchased by lead desilverizing works. In estimating the actual lead product the soft lead must first be deducted from the totals in the table. Then the allowance for waste in smelting and desilverizing is made on the balance. For the year 1897 the results are as follows: The lead contents of ores smelted, deducting the pig lead from Missouri, Kansas, and other districts (43,553 tons), amounted to 178,946 tons. Deducting 6 per cent for loss in smelting and desilverizing, we have 168,209 tons from American ores. Adding the 43,553 tons of pig lead, we reach a total of American lead of 211,772 tons. Based on these figures this office accepts 212,000 short tons as the product of American lead for the year 1897.

It is interesting to check this result by another method of reaching the net American product, which, however, is not considered to be so accurate. The total lead product for 1897 was 291,036 short tons. Deducting the base bullion desilverized in bond, 58,154 tons, and 94 per cent of the 33,289 tons of lead contents of foreign ores smelted, a total deduction of 89,446 tons is reached, leaving as a balance 201,590

tons, which compares with 212,000 tons reached by the direct method. This, of course, is based on an assumed waste of 6 per cent in smelting ores and in subsequent desilverizing.

CONSUMPTION.

Based on the data at hand, the following estimate is presented of the consumption of lead in recent years. The figures representing domestic stocks are aggregates of returns received by this office. They are not, however, complete.

Estimate of the consumption of lead in the United States from 1894 to 1897.

	1894.	1895.	1896.	1897.
Supply—				
Total product desilverized lead	*Short tons.* 181,404	*Short tons.* 201,992	*Short tons.* 221,457	*Short tons.* 247,483
Soft lead	37,686	39,890	43,537	43,553
Imports, foreign refined	8,200	22,947	2,020	2,000
Stock, domestic, beginning of year	7,496	8,586	9,557	9,299
Stock, foreign in bond, beginning of year	3,302	7,181	9,865	4,124
Total supply	238,088	280,596	286,436	306,459
Deduct—				
Foreign base bullion and ores refined in bond and exported	29,000	18,130	57,612	62,409
Lead in manufactures exported under drawback	950	2,000	1,500	500
Stock, domestic, close of year	8,586	9,557	9,299	17,608
Stock, foreign in bond	7,181	9,865	4,124	6,694
Total	45,717	39,552	72,535	87,211
Consumption	192,371	241,044	213,901	219,248

It will be observed that there has been only a moderate increase in the consumption in 1897, in the face of a heavily increased output from domestic sources. The exports of foreign material under drawback was not much expanded, but stocks of lead held in this country, as indicated by the partial returns, were considerably increased.

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 1897.

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
1897	31,036,882	535,094	16,050,987	314,549

Lead imported and entered for consumption in the United States, 1867 to 1897—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
1897	95,891	4,042	.....	.....	513	854,198

Old and scrap lead imported and entered for consumption in the United States, 1867 to 1889.

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		[b] 16,359,452	442,496	607,373
1897	150,473	210,282		[b] 7,725,624	223,037	433,319

[a] Not enumerated between 1868 and July 1, 1894.
[b] Part of this is foreign lead returned by collectors of customs by mistake as domestic lead.

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

According to the returns of the Treasury Department, the imports of lead in the calendar years 1894, 1895, 1896, and 1897 were as follows:

Sources of imports of lead.

Country.	1894.	1895.	1896.	1897.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
United Kingdom	6,357,937	8,161,411	1,365,132	1,120,528
Germany	1,792,305	1,113,148	.....	.....
Other Europe	14,452,179	36,618,228	1,235,981	1,101,151
Total refined pig lead	22,602,421	45,892,787	2,601,113	2,221,679
British North America	4,969,993	15,860,906	25,672,833	44,171,421
Mexico	112,148,130	138,312,146	130,388,173	137,364,677
Total ore and base bullion	117,118,123	154,173,052	156,061,006	181,536,098
Other countries	241,367	931,116	1,656,398	1,560,635
Total imports	139,961,911	200,996,955	160,318,517	185,318,412

The subdivision by groups representing refined pig lead, and lead in ore, and base bullion is made by this office.

The following table, compiled from monthly reports of the Bureau of Statistics, shows the warehouse transactions in lead ore and base bullion during half-yearly periods from July 1, 1896, to July 1, 1898:

Warehouse transactions of lead in ore and base bullion.

Customs districts.	In warehouse first day of half year.	Entered warehouse.		Additions by liquidation.	Withdrawn from warehouse.			Deductions by liquidation.	In warehouse close of half year.
		Direct importation.	From other districts.		For exportation.	For transportation.	For consumption.		
Second half 1896.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Arizona		842,471				842,471			
Corpus Christi		731,384				731,384			
Denver			749,725				749,725		
Galveston			934,692		934,692				
Kansas City	827,398		9,061,201			9,602,103			286,496
Montana and Idaho		2,398,554	160,826	25,546			2,555,888	28,946	
Newark	4,985,365		11,856,601		13,967,111		436,897	752,963	2,684,995
Newport News			9,415,780		9,415,780				
Omaha			14,000				14,000		
Paso del Norte	1,024,825	8,594,243	1,174,534			9,124,995	1,134,779		533,828
Perth Amboy	3,185,812		31,565,326	161,613	29,266,965	400,236	548,222	1,374,222	3,323,106
Puget Sound		2,341,375				2,341,375			
Pittsburg	497,535	11,087,533				10,452,461	289,500		843,107
Saluria, Tex		5,694,002				5,694,002			
Chicago	564,148		133,733	12,505		710,386			
New York	160,184	39,162,777	1,375,045		255,916	39,162,777	1,119,129		160,184
San Francisco	387,189	251,770		17,046	83,074		97,764	57,752	416,415
Total	11,632,456	71,104,109	66,441,463	216,710	53,923,538	79,062,190	6,945,904	2,213,883	8,248,131

Warehouse transactions of lead in ore and base bullion—Continued.

Customs districts.	In warehouse first day of half year.	Entered warehouse.		Additions by liquidation.	Withdrawn from warehouse.			Deductions by liquidation.	In warehouse close of half year.
		Direct importation.	From other districts.		For exportation.	For transportation.	For consumption.		
First half 1897.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Arizona		770, 150				770, 150			
Corpus Christi		541, 471				541, 471			
Denver		33, 590	5, 012, 140		2, 703, 203	2, 342, 527			
Galveston			438, 247		438, 247				
Kansas City	286, 496	33, 160	5, 621, 858	958		2, 684, 053	2, 754, 606		503, 813
Montana and Idaho		169, 084	232, 750				401, 834		
Newark	2, 684, 995		22, 278, 763	2	17, 768, 997		4, 860, 935	812, 378	1, 521, 450
Newport News			3, 475, 256		3, 475, 256				
Omaha			975, 681				975, 681		
Paso del Norte	533, 826	6, 086, 101	769, 361			5, 514, 775	615, 410		1, 259, 105
Perth Amboy	3, 323, 106		32, 901, 315		29, 443, 598		2, 470, 497	1, 812, 397	2, 497, 929
Puget Sound		8, 854, 347				8, 854, 347			
Pittsburg	843, 107	3, 485, 729		153, 085		4, 082, 100	399, 821		
Saluria		3, 687, 134				3, 687, 134			
Chicago			141, 900			139, 083		2, 817	
New York	160, 184	50, 494, 317	300, 166			50, 491, 317	454, 088		6, 262
San Francisco	416, 415	1, 095, 986	70	5, 116	366, 000		229, 049	26, 436	896, 102
Total	8, 248, 129	75, 251, 069	72, 147, 507	159, 161	54, 195, 301	79, 109, 957	13, 161, 921	2, 654, 028	6, 684, 661

Warehouse transactions of lead in ore and base bullion—Continued.

Customs districts.	In warehouse first day of half year.	Entered warehouse.		Additions by liquidation.	Withdrawn from warehouse.			Deductions by liquidation.	In warehouse close of half year.
		Direct importation.	From other districts.		For exportation.	For transportation.	For consumption.		
Second half 1897.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Arizona		525,421				525,421			
Corpus Christi		827,711				827,711			
Denver			11,725,362			11,725,362			
Galveston			4,767,957		4,767,957				
Kansas City	503,813	1,120,241	5,202,223	24,468		5,246,765	503,784		1,100,196
Montana and Idaho		1,497,484	37,530				1,535,014		
Newark	1,521,450		28,104,335		18,351,479		4,091,560	2,173,885	5,008,861
Newport News			3,365,254,		3,365,254				
Omaha		2,407,861	2,045,619			2,015,220	1,051,400		1,386,860
Paso del Norte	1,259,105	8,092,551	1,941,822			8,408,334	2,032,639		852,505
Perth Amboy	2,497,929		33,999,644		28,246,242		1,447,951	2,845,387	3,957,993
Puget Sound		15,655,524				15,655,524			
Saluria		5,836,847				5,836,847			
Chicago			716,816	29,449	249,067		105,300	48,540	343,338
New York	6,262	51,687,838	1,967,482			53,655,320			6,262
San Francisco	896,102	463,080		92,784	671,856			47,753	732,357
Total	6,684,661	88,114,558	95,816,066	146,701	55,651,855	103,896,504	10,767,648	5,115,565	13,388,372

Warehouse transactions of lead in ore and base bullion—Continued.

Customs districts.	In warehouse first day of half year.	Entered warehouse.		Additions by liquidation.	Withdrawn from warehouse.			Deductions by liquidation.	In warehouse close of half year.
		Direct importation.	From other districts.		For exportation.	For transportation.	For consumption.		
First half 1898.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Arizona		1,214,635				1,214,635			
Corpus Christi		684,188				684,188			
Denver			6,755,787		224,000	5,469,287			1,469,179
Galveston			6,991,093		6,991,093				
Detroit			1,468,179		1,468,179				
Huron			25,070		25,070				
Kansas City	1,100,196		1,574,845			2,556,439	42,372		76,230
Minnesota		53,550				53,550			
Montana and Idaho			178,547				13,142		165,405
Newark	5,008,861		32,377,456		31,077,971		1,097,164	3,223,207	1,987,975
Newport News			1,904,615		1,904,615				
Omaha	1,386,860	3,107,006	11,737	235,054	745,077	3,668,425		181,180	145,975
Paso del Norte	852,505	8,639,700	5,012,494			8,043,955	2,103,808	3,330,541	1,026,395
Perth Amboy	3,957,993	7,751,343	29,570,099	152,898	30,818,598		370,648	7,171,731	3,071,356
Puget Sound		6,964,091				6,964,091			
Saluria		5,852,753				5,852,753			
Chicago	343,338	215,172	1,674,042	137,101	1,598,686	533,820		62,348	174,799
New York	6,262	44,504,319	5,268,297		896,000	48,875,044			7,834
San Francisco	732,357	698,096		61,244	973,122		3,836	99,076	415,653
Total	13,388,372	79,685,853	92,812,261	586,297	76,722,311	83,916,187	3,630,970	14,068,083	8,540,801

DOMESTIC PRODUCERS.

An increasing quantity of ores from the southeastern Missouri district is handled by outside smelters, in contrast with the former method when local ores were locally treated. The greater part of the ores and furnace products shipped from the mines goes to the St. Louis Smelting and Refining Company and the Missouri Smelting Company, both at Cheltenham, Missouri, near St. Louis. The pig-lead product of the mining companies therefore no longer represents the metal output of the district. In 1897 the total local pig-lead production of the St. Joseph Lead Company, the Mine la Motte estate, the Desloge Consolidated Lead Company, and the Central Lead Company aggregated 31,231 short tons. The National Lead Company has lately acquired property in this district, the development of which promises to lead to a further increase.

From the Joplin-Galena district the desilverizers and the St. Louis lead smelters are drawing increasing percentages of the lead ore mined, although some additional local lead-smelting plants have been established in recent years. Local returns of the aggregate weekly lead sales show that there were marketed—which is practically identical with mined—30,825 short tons of lead ore and concentrates, the highest record yet reached. The Joplin Herald has collected monthly reports of sales from the different camps of southwest Missouri and southeast Kansas for the first six months of 1898, which show the following aggregates:

Output of camps, southwest Missouri and southeast Kansas, for the first six months of 1898.

Camp.	Zinc ore.	Lead ore.	Total value.
	Short tons.	*Short tons.*	
Joplin	18,120	4,446	$639,427
Carterville	11,948	2,563	381,286
Duenweg	7,288	1,327	217,816
Webb City	7,427	391	184,530
Oronogo	7,418	206	188,627
Galena, Kansas	38,792	4,657	1,086,868
Stotts City	3,005	66	78,326
Aurora	9,274	270	173,947
Carthage	1,778	.....	30,784
Central City	3,034	303	98,041
Belleville	497	20	13,207
Springfield	420	39	11,694
Sundries	919	201	21,695
Total	109,920	14,489	3,126,248

The principal gain in the production of lead has taken place in Idaho, by far the greater part of the total being from the Cœur d'Alene district, which now overshadows every other one. It is the principal reliance of the majority of the great smelters of Denver and of Pueblo, Colorado, and also of some Montana and Washington smelters.

As showing from what widely scattered sources material is drawn, the following table is presented, giving the lead contents of the ores smelted by what are generally known as the valley smelters—those at Denver and Pueblo, Colorado:

Source of lead in ores smelted by valley smelters in 1897.

	Pounds.		Pounds.
Colorado	55,850,292	California	209,243
Idaho	70,236,742	New Mexico	809,019
Utah	22,708,918	Nevada	53,277
Montana	3,597,023	Missouri and Kansas	895,696
Arizona	1,330,155	Mexico and Canada	17,841,602

The Colorado lead product declined further in 1897 owing to the strike of the miners at Leadville. The Herald-Democrat of Leadville compiles statistics showing that the lead contents of ores smelted by Leadville and outside smelters in 1897 aggregated 13,278 short tons. In 1895 the estimate was 31,236. This shows that the yield of lead from ores mined in other camps must have increased very considerably.

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 1897, 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
1897	3.12½	3.02½	3.37½	3.12½	3.40	3.35	3.40	3.25

a Gold. *b* Currency.

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1897, 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
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
1897	3.37½	3.22½	3.60	3.25	3.90	3.65	4.10	3.70

Highest and lowest prices of lead at New York City, monthly, from 1870 to 1897, 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
1897	4.35	4.25	4.25	3.85	3.85	3.75	3.75	3.65

THE LEAD MARKET.

Since the panic of 1893 prices of lead have been very low, and it was only in 1897 that a recovery took place to a level approaching that of former years. The advance has been due largely to the higher rate of duty on lead and lead ores, which was anticipated months before it was actually established. The year opened with the price of lead in New York hovering close to 3 cents, the market improving under quite heavy sales toward the end of January until 3.12½ cents was reached. Buying by consumers and speculators, in anticipation of a higher duty,

carried values up to 3.37½ cents during February, the market quieting down, however, and receding slightly as March approached. In that month a further buying movement carried the market up to 3.40 cents. The delay in the passage of a new tariff law led speculators to realize in April, causing the market to develop a weaker tone, which lasted through the greater part of May, the price receding at one time in that month to 3.22½ cents. With June came a steadier tone, and as the month advanced the volume of buying increased, and the price was carried up to 3.60 cents. July witnessed heavy consumption and speculative buying, culminating with the passage of the tariff act, the price advancing to 3.90 cents. Realizing sales in August led to a moderate reaction to 3.70 cents; but then heavy purchases again carried up the price, the movement continuing well into September, when the maximum price of 4.35 cents was attained. Heavy speculative holdings hung over the market, however, and caused an uneasiness which found expression in a weaker market, relieved by occasional spurts of buying. In October the break came and speculators were forced to unload. This carried the market down to 3.85 cents at the close of October. November brought alternate spells of weakness and resistance to a decline, but in general that month and December witnessed a dull and weak market, under the weight of which the price declined to 3.65 cents.

WORLD'S PRODUCTION.

An effort to state correctly the lead production of the world is beset by many difficulties. In some countries there are no reliable official statistics whatever. In others the official statistics deal only with the production of lead ores or concentrates, without any reference to their metal contents. Metallurgical statistics, which after all are the only ones of commercial value, are not touched at all. Lead ores are shipped, often in large quantities, to distant countries for smelting, and base bullion travels from the country of origin to distant refineries and desilverizing works. This renders the danger of duplication very great and makes it almost impossible to assign the lead to its actual country of origin. Thus the mineral statistics of Great Britain deal only with the production of dressed lead ore. There is no attempt to present figures relating to the production of refined lead from domestic or foreign sources. The same is true of the Australian colonies.

The only comprehensive effort to deal with these difficulties is that of the Metallgesellschaft of Frankfort-on-the-Main. It must be understood, however, that the figures given for some countries—for Great Britain, for instance—include the estimated contents of the foreign ores imported, and do not deal exclusively with lead obtainable from ores mined in the country.

The world's production of lead during the years 1886 to 1897.

[Metric tons.]

Country.	1886.	1887.	1888.	1889.	1890.	1891.
Germany	91,000	95,000	97,000	100,000	101,000	95,000
Spain	*a* 102,000	*a* 119,000	129,200	136,900	140,300	145,700
Great Britain	*a* 51,000	*a* 50,000	*a* 50,000	*a* 47,800	49,800	49,000
Austria	8,000	7,800	8,000	8,000	8,300	7,600
Hungary	2,100	1,800	2,000	2,300	1,200	2,100
Italy	19,000	*a* 19,000	17,000	18,000	17,700	18,500
Belgium	10,000	10,000	11,000	9,400	9,600	12,700
France	4,000	*a* 5,000	6,500	5,400	4,600	6,700
Greece	*a* 10,000	12,500	14,500	13,500	14,200	13,300
Other European countries	*a* 2,000	*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	161,948
Mexico	16,000	18,100	30,100	27,500	22,300	30,200
Australia *b*	*a* 5,000	*a* 10,000	*a* 19,000	*a* 35,000	40,500	56,000
Other countries	*a* 1,000	*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	601,748

Country.	1892.	1893.	1894.	1895.	1896.	1897.
Germany	98,000	95,000	101,000	111,058	113,792	118,881
Spain	152,300	157,100	152,620	160,786	167,017	170,000
Great Britain	44,900	38,200	42,800	55,300	57,200	*a* 60,000
Austria	7,300	7,200	7,500	8,085	10,120	9,300
Hungary	2,300	2,500	2,113	2,277	1,911	1,800
Italy	22,000	19,900	19,600	20,353	20,786	20,469
Belgium	10,100	12,000	13,500	15,573	15,300	14,834
France	8,800	8,100	8,758	7,627	8,232	*a* 9,000
Greece	14,400	12,800	14,000	19,800	13,200	15,600
Other European countries	*a* 2,500	*a* 3,000	*a* 4,000	*a* 4,000	*a* 4,000	*a* 4,000
United States	157,187	147,627	147,600	154,265	170,600	192,000
Mexico	47,500	64,000	57,000	68,000	63,000	70,000
Canada	.....	1,000	2,586	10,467	10,977	17,719
Australia *b*	54,000	58,000	50,000	38,000	30,000	22,000
Other countries	*a* 1,000	*a* 1,000	*a* 1,000	.....	.....	.....
Total	622,287	627,427	624,077	675,591	686,135	725,203

a Estimated. *b* Exclusive of that part of product not exported to Europe and America.

SPAIN.

During recent years the production of Spain has increased. The following table presents the statistics, by provinces, the figures for 1894, 1895, and 1896 being official, while those for 1897 are the estimate of Ramon Oriol, of the Revista Minera of Madrid:

Production of lead in Spain, 1894 to 1897.

Province.	1894.	1895.	1896.	1897.
	Metric tons.	*Metric tons.*	*Metric tons.*	*Metric tons.*
Murcia	85,465	79,636	81,922	90,000
Jaén (Linares)	31,529	38,847	36,169	40,000
Córdova	17,795	25,260	32,971	30,000
Almeria	13,295	13,707	11,658	11,000
Guipúzcoa	4,536	3,336	4,297	5,000
Total	152,620	160,786	167,017	176,000
Export pig lead and base bullion	160,316	151,129	168,585	171,774
Export lead ore	12,164	9,203	6,285	8,267

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 1897.

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	1897	118,881

For a number of years the imports of lead have been increasing, while the exports of pig lead have declined. On the other hand, the exports of manufactured lead have developed steadily. The following table shows the exports and imports of pig lead since 1888:

German imports and exports of lead during the years 1888 to 1897, 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	1897	35,092	24,075

In former years German statistics did not separate the figures relating to the export and import movement of copper and lead ores. Since 1896 they have been separately stated. They show that the imports of lead ores, which were 61,472 metric tons in 1896, rose to 88,226 metric tons in 1897, while the exports declined from 2,541 tons in 1896 to 2,106 in 1897. It seems evident that the lead drawn from these sources is counted as a part of the German product. The statistics show that the production of lead ores in Germany declined from 157,504 tons in 1896 to 150,179 tons in 1897; and yet the product of pig lead rose from 113,792 to 118,881 metric tons. In 1893 the ore output was 168,400 tons, and yet the pig lead product was only 94,659 tons.

THE WORLD'S CONSUMPTION.

The Metallgesellschaft of Frankfort-on-the-Main figures the consumption of lead in the world, as follows:

World's consumption of lead, 1893 to 1897.

Country.	1893.	1894.	1895.	1896.	1897.
	Metric tons.	*Metric tons.*	*Metric tons.*	*Metric tons.*	*Metric tons.*
Germany	94,571	100,678	111,652	121,980	129,898
Great Britain	178,415	161,847	170,130	196,200	202,334
France	77,065	86,160	64,657	77,773	85,819
Austria-Hungary	15,604	18,442	19,276	18,814	16,938
Italy	19,985	19,942	18,747	20,533	18,858
Switzerland	1,941	1,412	1,837	2,485	2,640
Belgium	23,088	21,858	16,221	18,723	20,421
Netherlands	*a* 5,000	*a* 5,000	*a* 5,000	*a* 5,000	*a* 5,000
Russia	24,600	27,000	22,000	21,000	24,000
Other European countries	1,500	1,700	1,600	2,800	*a* 2,800
United States	179,163	173,413	218,007	179,692	205,839
All other countries	14,700	12,300	10,600	12,100	11,500
Total	635,632	629,752	659,727	677,100	726,047

a Estimated.

The most striking fact is the large increase in the consumption of lead, which is further emphasized when it is considered that it was only 566,703 metric tons in 1890.

ZINC.

By CHARLES KIRCHHOFF.

PRODUCTION.

The first half of 1897 brought an improvement in the spelter production which was emphasized during the second half, the year far exceeding the record. To some extent, however, artificial conditions stimulated the output, a group of smelters having formed a combination to maintain prices. This stimulated production from outside sources, which in turn forced the associated producers to unload accumulations of metal into foreign channels. The heavy output was therefore coupled with large exports, the domestic consumption being about the same as in 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	1889	58,860
1875	15,833	1890	63,683
1880	23,239	1891	86,873
1882	33,765	1892	87,260
1883	36,872	1893	78,832
1884	38,544	1894	75,328
1885	40,688	1895	89,686
1886	42,641	1896	81,499
1887	50,340	1897	99,980
1888	55,903		

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	*a* 9,582 *b* 4,913	*c*31,383	24,715	16,667	87,260
1893	*a* 8,802 *b* 3,882	*c*29,596	22,815	13,757	78,832
1894	*a* 7,400 *b* 1,376	*c*28,972	25,588	11,992	75,328
1895	*a* 9,484 *b* 3,697	*c*35,732	25,775	14,998	89,686
1896	*a* 8,139 *b* 2,427	*c*36,173	20,759	14,001	81,499
1897	*a* 7,218 *b* 3,365	*c*37,876	33,396	18,125	99,980

a Eastern. *b* Southern. *c* Including Indiana.

The principal gain has been in Kansas and in Missouri, particularly during the second half of the year. The following statement of the production semiannually for a series of years reflects even more closely the fluctuations in the output. It presents a report also for the first half of 1898, which shows that even the high rate of the second half of 1897 was exceeded during the first six months of the current year.

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 and 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	36,038

States.	First half 1894.	Second half 1894.	First half 1896.	Second half 1896.	First half 1897.	Second half 1897.	First half 1898.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Eastern	5,064	3,712	4,517	3,622	3,866	3,352	2,955
Southern			1,200	1,227	1,305	2,060	1,695
Illinois and Indiana	13,392	15,580	16,305	19,868	18,054	19,822	22,129
Kansas	11,250	14,338	11,351	9,408	15,722	17,674	21,464
Missouri	6,458	5,534	5,548	8,453	7,956	10,169	10,371
Total	36,164	39,164	38,921	42,578	46,903	53,077	58,614

The first half of 1898 therefore shows a further development in the output, Kansas in particular reaching a very high total.

Capacity for the production of spelter has been considerably increased during 1897, and an additional number of plants have either entered or are preparing to enter the ranks of producers in 1898. In 1897 the Nevada Spelter Company built a large plant. The Robert Lanyon's Sons Spelter Company and Messrs. W. & J. Lanyon erected works at Iola, Kansas, and Matthiessen & Hegeler contemplate building in the same locality. The Midland Coal and Smelting Company, at Midland, Kansas, started new works in 1898. The Swansea Vale Zinc Company has erected one furnace at Sandoval, Illinois, and expects to build others. In August the Robert Lanyon's Sons Spelter Company will have in operation 1,200 retorts at La Harpe, Kansas, and will have from 3,000 to 3,600 retorts running during the coming winter. Mr. S. C. Edgar, owner of the long-established Glendale Zinc Works at St. Louis, Missouri, has begun the erection of a plant of 1,200 retorts at Cherryvale, Kansas, where he has successfully drilled for natural gas. The Humphrey Spelter Company has rebuilt and started the plant at Upland, Indiana, and Messrs. La Tourette & Co. are operating works at Marion, Indiana. In Missouri the Empire Zinc Company added one block to its Joplin works.

The two works at Girard, Kansas, which were under lease to the Cherokee-Lanyon Spelter Company, have passed into the hands of the Cambridge Iron and Steel Company of Cambridge, Ohio, manufacturers of galvanized sheets.

There has therefore been a very notable movement, which is still in progress, toward enlarging capacity. To what extent this constitutes a shifting of the locality of production nearer the ore or the adjacent fuel it is yet too early to estimate. That the movement partakes of that character to some extent is certain.

During recent years the production has outrun domestic consumption and large quantities of spelter have been exported. The consumption of the United States, from the data at hand, may be estimated as follows:

Consumption of spelter, 1895, 1896, and 1897.

	1895.	1896.	1897.
	Short tons.	*Short tons.*	*Short tons.*
Production	89,686	81,499	99,980
Imports	432	428	1,279
Stocks at beginning of year	4,911	5,802	7,477
Total supply	95,029	87,729	108,736
Deduct—			
Exports of foreign	.....	4	.....
Exports of domestic	1,530	10,130	14,245
Stock at end of year	5,802	7,477	5,709
Total	7,332	17,611	19,954
Apparent home consumption	87,697	70,118	88,782

These figures show that home consumption recovered during 1897 from the heavy falling off in 1896. The demand from galvanizers was heavier, the wire trade notably taking large quantities. The brass industry, too, called for larger requirements, while the building trade continued rather dull.

IMPORTS AND EXPORTS.

Zinc imported and entered for consumption in the United States, 1867 to 1897.

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
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
December 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
1897	2,905,451	109,520	15,971	786

Zinc imported and entered for consumption in the United States, 1867 to 1897—Continued.

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
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
1897	41,643	886	11,459	122,651

Imports of zinc oxide from 1885 to 1897.

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	1897	5,564,763	502,357

Exports of zinc and zinc ore of domestic production, 1864 to 1897.

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	3,083	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
1897	165,200	211,350	28,490,662	1,356,538	71,021	1,638,909

The following table shows the exports of zinc ore and of spelter during the calendar year 1897, grouped first by customs districts and secondly by countries of destination:

Domestic exports of zinc for calendar year 1897.

	Zinc.			
	Ore.		Pigs, bars, plates, and sheets.	
Customs districts.	*Tons.*		*Pounds.*	
Baltimore, Maryland			137,909	$8,277
Boston and Charlestown, Massachusetts			24,063	1,219
Newport News, Virginia			443,286	18,696
New York, New York	6,869	$159,970	1,197,421	57,433
Galveston, Texas			12,791,077	561,969
Mobile, Alabama			732	51
New Orleans, Louisiana	1,391	51,380	13,655,472	696,196
Arizona			16,060	944
Los Angeles, California			120	13
San Diego, California			800	76
Detroit, Michigan			146,200	7,025
Huron, Michigan			47,261	3,311
Miami, Ohio			30,050	1,300
Vermont			161	28
Total	8,260	211,350	28,490,612	1,356,538
Countries.				
Austria-Hungary			24,927	1,047
Belgium	516	15,840		
France			257,753	10,005
Netherlands	7,250	175,510		
United Kingdom (England)	494	20,000	27,163,091	1,300,785
Quebec, Ontario, etc			193,262	10,364
Mexico			51,366	2,682
All other countries			800,213	31,655
Total	8,260	211,350	28,490,612	1,356,538

The ore shipped from New York is the product of New Jersey mines, which goes to the Netherlands in transit to Germany and to Belgium, where it is used for special requirements. The ore shipped via New Orleans is from southwest Missouri and southeast Kansas. The spelter exported from Baltimore, Newport News, and New York is the high-grade metal made in the Eastern and Southern States, and is purchased abroad for the manufacture of brass of the highest quality, chiefly in the manufacture of cartridges. The ordinary spelter made in the West finds its outlet chiefly through the ports of Galveston and New Orleans, practically all of it going to the United Kingdom. A part is distributed from the United Kingdom to other foreign countries.

The principal source of supply of zinc ore in the United States is the Joplin-Galena district of southwest Missouri and southeast Kansas. Local statistics show that the output was 89,300 tons in 1888, which rose to 98,440 tons in 1889 and 114,900 tons in 1890. In 1892 a product of 148,150 tons was reached. In 1896 the product was 147,588, but in 1897 it attained the maximum of 181,535 tons, the Galena district furnishing increasing quantities.

PRICES.

January developed weakness in the spelter market, prices declining to 3.90 cents toward the end of the month. February, however, opened better, with an advancing tendency which was carried well through March and into April. Then cutting prices again became a feature. In May the metal recovered under a better demand. June, July, and August showed only small fluctuations under the influence of an understanding among some of the leading makers of spelter in the West. These producers attempted to establish prices in the home markets at the same time forcing sales for export when demanded by the exigencies of the situation. A rupture came in November, however, causing demoralization, and low prices prevailed during the closing months of the year.

The following table summarizes the prices of spelter since 1875:

Price of common Western spelter in New York City, 1875 to 1897.

[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
1897	4.10	3.90	4.10	4	4.15	4.10	4.15	4.10

Price of common Western spelter in New York City, 1875 to 1897—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
1897	4.20	4.10	4.25	4.15	4.30	4.20	4.35	4.25

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 1897—Continued.

[Cents per pound.]

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
1897	4.35	4.25	4.30	4.15	4.25	3.90	3.90	3.75

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.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
Rhine district and Belgium	184,455	179,730	172,135	152,420	149,750	143,305	139,695
Silesia	94,045	95,875	93,620	91,145	90,310	87,760	87,080
Great Britain	23,430	25,880	29,495	32,065	28,375	30,310	29,410
France and Spain	32,120	28,450	22,895	21,245	20,585	18,662	18,360
Austria	8,185	9,255	8,355	8,580	7,560	5,020	6,440
Poland	5,760	6,165	4,960	5,015	4,530	4,270	3,760
Total	347,995	345,355	331,460	310,470	301,110	289,327	284,745

Country.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Rhine district and Belgium	137,630	134,648	133,245	130,995	129,020	129,754	129,240
Silesia	87,475	85,653	83,375	81,375	81,630	79,623	76,116
Great Britain	29,145	30,806	26,783	19,839	21,230	24,299	29,259
France and Spain	18,240	16,785	16,140	16,028	15,305	14,847	15,341
Austria	7,135	6,330	4,977	5,338	5,000	5,610	6,170
Poland	3,620	3,026	3,785	3,580	4,145	5,019	4,164
Total	283,245	277,248	268,305	257,155	256,330	259,152	260,290

The output of the works in the different districts was as follows:

Production of zinc by principal foreign producers from 1893 to 1897.

[Long tons.]

Country.	1897.	1896.	1895.	1894.	1893.
Rhine district and Belgium:					
Vieille Montagne	67,600	67,500	63,545	54,030	54,305
Stolberg Co	17,650	16,715	16,385	15,170	15,135
Austro-Belge	9,630	9,810	9,855	9,595	9,855
G. Dumont & Frères	11,360	10,040	10,080	9,415	8,680
Rhein-Nassau Co	9,495	8,870	9,085	8,165	8,205
L. de Laminne	7,260	7,050	6,440	6,930	6,920
Escombrera Bleyberg	5,075	5,575	5,690	5,750	5,775
Grillo	6,155	6,320	6,195	5,615	5,625
Märk, Westf., Bergw., Verein	5,825	6,220	6,155	5,620	5,620
Nouvelle Montagne	8,255	7,695	6,815	5,290	5,290
Berzelius	5,055	5,010	5,535	5,350	5,345
Eschger Ghesquiere & Co	3,450	3,810	4,205	4,375	4,370
Société Prayon	8,840	*a* 8,000	7,330	4,110	4,250
Société de Boom	7,855	8,380	7,155	7,065	7,110
Zinkmaatshappy in Limburg	.....	.....	.....	*a* 700	*a* 2,000
Société Campine	6,600	4,770	4,200	*a* 2,810	*a* 700
Schulte & Co	4,350	3,965	3,465	2,430	565
Total	184,455	179,730	172,135	152,420	149,750
Silesia:					
Schlesische Actien-Gesellschaft	26,270	26,430	25,950	25,230	25,255
G. von Giesche's Erben	20,185	20,355	19,860	19,385	18,920
Herzog von Ujest	24,460	25,995	21,140	17,265	17,210
Graf H. Henckel von Donnersmarck	12,185	11,980	11,680	12,005	11,695
Graefin Schaffgotsch	.....	.....	3,570	6,940	6,885
Graf G. Henckel von Donnersmarck	4,025	4,320	4,400	4,185	4,215
H. Roth	3,550	3,250	3,320	1,805	1,775
Wünsch	1,925	2,065	2,155	1,980	2,075
Vereinigte Königs & Laurahütte	1,260	1,340	1,400	1,270	1,170
Baron v. Horschitz'sche Erben	.....	.....	.....	935	960
Fiscus	185	140	145	145	150
Total	94,025	95,875	93,620	91,145	90,310

a Estimated.

Production of zinc by principal foreign producers—Continued.

[Long tons.]

Country.	1897.	1896.	1895.	1894.	1893.
Great Britain:					
Vivian & Sons	5,050	5,120	6,970	8,005	7,060
English Crown Spelter Co., Limited	5,435	5,360	5,700	5,515	5,380
Dillwyn & Co	4,040	4,265	4,935	4,870	3,450
Swansea Vale Spelter Co	1,305	1,665	2,375	2,380	2,105
Villiers Spelter Co	*a* 1,180	1,670	2,155	2,300	2,050
Pascoe, Grenfell & Sons	1,190	1,320	1,680	1,455	1,260
Nenthead & Tynedale Co	.....	640	1,775	1,870	1,855
John Lysaght, Limited	3,540	2,790	1,805	2,915	2,760
H. Kenyon & Co	490	550	500	505	500
Leeswood Co	1,200	1,500	1,600	1,750	1,495
Sundries	.....	.....	.....	500	460
Total	23,430	24,880	29,495	32,065	28,375
France and Spain:					
Asturienne	23,385	20,710	17,915	18,695	18,695
St. Amand	2,580	2,585	2,520	2,550	1,890
Malfidano	4,780	5,155	2,460	.....	.....
Côte d'Or	1,375	.....	.....	.....	.....
Total	32,120	28,450	22,895	21,245	20,585
Austria:					
Sagór	955	1,310	1,080	1,225	1,360
Cilli	2,505	2,310	1,990	2,580	2,510
Siersza-Niedzieliska	4,525	4,650	4,300	4,420	3,690
Merklin	.....	985	985	355	.....
Trzevinia	200	.....	.....	.....	.....
Total	8,185	9,255	8,355	8,580	7,560
Poland	5,760	6,155	4,960	5,015	4,530

a Estimated.

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 1897, inclusive.

Country.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
	Metric tons.	*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	119,110
England	80,755	73,547	75,042	75,504	83,828	94,682	86,463
France	41,418	40,783	44,721	45,421	39,667	51,483	54,433
Austria-Hungary	17,240	18,519	22,046	23,582	25,140	25,686	24,143
Italy	1,628	1,575	1,682	2,230	2,374	2,563	2,969
Belgium	39,600	42,600	42,300	48,100	47,900	48,000	49,500
Netherlands	*a* 3,600	*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	2,329
Russia	8,521	9,438	9,600	10,800	11,670	11,463	13,653
United States	71,327	73,465	69,058	64,028	78,424	66,054	77,680
Other countries	*a* 8,000	*a* 9,500	*a*13,000	*a* 8,000	*a* 7,000	*a* 7,000	*a* 7,600
Total consumption	365,169	376,312	378,124	384,351	415,131	424,330	441,480
Total production	362,204	372,900	378,093	380,877	416,621	425,154	443,181

a Estimated.

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 1897.

Year.	Calamine.	Blende.	Total.
	Metric tons.	*Metric tons.*	*Metr ic 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
1897	240,266	270,420	510,686

Nearly one-fifth of the 10,292 persons employed in the zinc and lead mines of Silesia are women. The total wages paid were 5,988,965 marks, the annual average for men being 689.06 marks, for boys 197.70 marks, and for women 241.96 marks. The production of calamine in Silesia is declining, while the mining of blende is restricted because the preparation of this ore for the furnaces is meeting with obstacles. Permission for the building of roasting plants is only granted when the gases are used in the manufacture of sulphuric acid. Rates of freight on the acid are so high that markets at a distance greater than about 100 miles can not be reached. Complaint is also made of an inadequate and irregular supply of tank cars for shipment.

During 1897 the 23 zinc works of Silesia employed 7,738 persons, to whom wages aggregating 5,457,876 marks were paid, the average earnings of men being 833.87 marks, of women 326.32 marks, and of boys 266.90 marks.

The consumption of material was 258,758 metric tons of calamine, 227,779 of blende, 438 tons of furnace accretions, 7,412 tons of zinc dust and scrap, 1,074,805 tons of coal, and 26,413 tons of fire clay.

The production was 95,547 metric tons of spelter, 15,527 tons of cadmium, and 1,174 tons of lead. The average value of the spelter was 386.40 marks per ton. The deliveries during the year amounted to 94,599 metric tons, as compared with 101,140 tons in 1896.

Five rolling mills employed 763 persons, to whom 524,714 marks were paid, the average yearly earnings for men declining from 825.93 marks in 1896 to 764.69 marks in 1897. These rolling mills consumed 37,860 tons of spelter to make 36,618 tons of sheet zinc, the value of which aggregated 12,866,725 marks, or 351.38 marks per ton.

The Vieille Montagne Company, the largest producer in the world, had a very prosperous year. The production of crude zinc was 68,604 metric tons in 1897, as compared with 68,581 tons in 1896, 64,497 tons in 1895, and 54,839 tons in 1894. The product of sheet zinc was 68,024 tons, contrasted with 66,893 tons in 1896, 57,000 tons in 1895, and 54,515 tons in 1894. The production of zinc white was 8,357 tons in 1897, as against 8,777 tons in 1896, 8,988 tons in 1895, and 7,669 tons in 1894.

The average price of spelter rose further in 1897, having advanced from 353.26 francs per metric ton in 1895 to 402.75 francs in 1896, and 424.85 francs in 1897. M. Saint Paul de Sinçay, the managing director, reports, however, that costs have risen, and that they will continue to advance in 1898, owing to higher prices for ore, higher fuel, labor, and materials, and the necessity for organizing the mines for a larger output and for spending money for prospecting. The company has built a large modern concentrating plant at the Bensberg mines, is developing the recently acquired Nenthead property, and is extending its roasting plant, because the proportion of blendes treated is increasing, the quantities of calamine being on the decline.

In 1897 the gross profit was 6,647,641.48 francs, as compared with 6,328,725.89 francs in 1896. From the profit in 1897 there must be deducted for general costs of administration, interest, discounts, etc., 628,323.96 francs. The gross profit was distributed as follows: 1,231,317.52 francs written off from value of works and mines; 867,600 francs to reserve; 433,800 francs to the administration; 108,450 francs to the direction, and 3,375,000 francs to the stockholders as an outstanding share capital of 9,000,000 francs. In 1896 the dividends aggregated 2,925,000 francs and in 1895 2,250,000 francs.

From 1837 to 1897 the company reduced its capital by 2,250,000 francs and paid off two issues of bonds aggregating 14,800,000 francs. On its mining property and works it has written off during the sixty years 53,105,604.55 francs and has accumulated the following funds: Insurance, 1,240,708.31 francs; special reserve, 1,585,000 francs; special profit fund, 1,000,000 francs; and statutory reserve fund, 6,628,366.53 francs. It also has a workmen's savings bank with 2,871,017.33 francs, a fund for helping workmen of 15,803.87 francs, a life assurance and endowment fund of 838,979.35 francs, and a special fund with Vieille Montagne of 1,183,135.59 francs.

ALUMINUM.

PRODUCTION.

The increase in the production of aluminum from the sources noted in previous reports was even more significant than in 1896, the product for 1897 being 4,000,000 pounds, or three times the product of 1896. Its value is estimated at $1,500,000, or 37½ cents per pound. This price represents, of course, the metal in the first stage of its manufacture, the price for sheets, wire, and other manufactures bearing the usual approximate additional cost.

Production of aluminum in the United States from 1883 to 1897.

Year.	Pounds.	Year.	Pounds.
1883	83	1892	259,885
1884	.150	1893	333,629
1885	283	1894	550,000
1886	3,000	1895	920,000
1887	18,000	1896	1,300,000
1888	19,000	1897	4,000,000
1889	47,468		
1890	61,281	Total	7,662,779
1891	150,000		

IMPORTS.

Aluminum imported and entered for consumption in the United States from 1870 to 1890.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	*Pounds.*		June 30—	*Pounds.*	
1870		$98	1882	566.50	$6,450
1871		341	1883	426.25	5,070
1873	2	2	1884	595	8,416
1874	683	2,125	1885	439	4,736
1875	434	1,355	Dec. 31—		
1876	139	1,412	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
1881	517.10	6,071			

Imports of crude and manufactured aluminum from 1891 to 1897.

Calendar year.	Crude.		Leaf.		Plates, sheets, bars, and rods.		Manufactures.	Total value.
	Pounds.	Value.	Packs of 100.	Value.	Pounds.	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
1897	1,822	1,082	4,260	368	4,424	$3,058	221	4,729

BAUXITE.

PRODUCTION.

The production of bauxite, as given below, showed the customary slight increase from the usual source:

Production of bauxite in the United States from 1889 to 1897, by States.

Calendar year.	Georgia.	Alabama.	Total.
	Long tons.	*Long tons.*	*Long tons.*
1889	728	.....	728
1890	1,844	.....	1,844
1891	3,301	292	3,593
1892	5,110	5,408	10,518
1893	2,415	6,764	9,179
1894	2,050	9,016	11,066
1895	3,756	13,313	17,069
1896	7,313	11,051	18,364
1897	.....	.....	20,590

QUICKSILVER.

PRODUCTION.

The production in 1897 amounted to 26,691 flasks, valued at $993,445. The decline in 1896 continued in 1897, and up to the present time there are no signs of new sources to draw upon during the current year. The supply in 1897 came entirely from the well-known sources in Calusa, Lake, Napa, San Benito, Santa Clara, San Luis Obispo, Sonoma, and Trinity counties, California.

The following table shows the range of prices per month during 1897:

PRICES.

Highest and lowest prices of quicksilver in 1897.

[Per flask.]

Month.	Price in San Francisco.		Price in London.					
	Highest.	Lowest.	Highest.			Lowest.		
			£.	s.	d.	£.	s.	d.
January	$37.50	$36.50	5	17	6	6	12	6
February	38.00	37.50	7	0	0	6	17	6
March	40.00	38.75	7	5	0	6	17	6
April	40.00	40.00	7	5	0	7	0	0
May	40.50	40.00	7	7	6	7	5	0
June	40.50	40.50	7	7	6	7	5	0
July	40.00	40.00	7	5	0	7	5	0
August	40.00	38.00	7	5	0	6	17	6
September	38.00	38.00	6	17	6	6	15	0
October	39.00	38.00	7	0	0	6	17	6
November	39.00	39.00	7	0	0	7	0	0
December	39.00	39.00	7	0	0	7	0	0
Extreme range	40.50	36.50	7	7	6	6	12	6

Highest and lowest prices of quicksilver during the last forty-eight years.

[Per flask.]

Year.	Price in San Francisco.		Price in London.					
	Highest.	Lowest.	Highest.			Lowest.		
			£.	s.	d.	£.	s.	d.
1850	$114.75	$84.15	15	0	0	13	2	6
1851	76.50	57.35	13	15	0	12	5	0
1852	61.20	55.45	11	10	0	9	7	6
1853	55.45	55.45	8	15	0	8	2	6
1854	55.45	55.45	7	15	0	7	5	0
1855	55.45	51.65	6	17	6	6	10	0
1856	51.65	51.65	6	10	0	6	10	0
1857	53.55	45.90	6	10	0	6	10	0
1858	49.75	45.90	7	10	0	7	5	0
1859	76.50	49.75	7	5	0	7	0	0
1860	57.35	49.75	7	0	0	7	0	0
1861	49.75	34.45	7	0	0	7	0	0
1862	38.25	34.45	7	0	0	7	0	0
1863	45.90	38.25	7	0	0	7	0	0
1864	45.90	45.90	9	0	0	7	10	0
1865	45.90	45.90	8	0	0	7	17	6
1866	57.35	45.90	8	0	0	6	17	0
1867	45.90	45.90	7	0	0	6	16	0
1868	45.90	45.90	6	17	0	6	16	0
1869	45.90	45.90	6	17	0	6	16	0
1870	68.85	45.90	10	0	0	6	16	0
1871	68.85	57.35	12	0	0	9	0	0
1872	66.95	65.00	13	0	0	10	0	0
1873	91.80	68.85	20	0	0	12	10	0
1874	118.55	91.80	26	0	0	19	0	0
1875	118.55	49.75	24	0	0	9	17	6
1876	53.55	34.45	12	0	0	7	17	6
1877	44.00	30.60	9	10	0	7	2	6
1878	35.95	29.85	7	5	0	6	7	6
1879	34.45	25.25	8	15	0	5	17	6
1880	34.45	27.55	7	15	0	6	7	6
1881	31.75	27.90	7	0	0	6	2	6
1882	29.10	27.35	6	5	0	5	15	0
1883	28.50	26.00	5	17	6	5	5	0
1884	35.00	26.00	6	15	0	5	2	6
1885	33.00	28.50	6	15	0	5	10	0
1886	39.00	32.00	7	10	0	5	16	3
1887	50.00	36.50	11	5	0	6	7	6
1888	47.00	36.00	10	0	0	6	12	6

Highest and lowest prices of quicksilver during the last forty-eight years—Continued.

[Per flask.]

Year.	Price in San Francisco.		Price in London.					
	Highest.	Lowest.	Highest.			Lowest.		
			£	s.	d.	£	s.	d.
1889	$50.00	$40.00	9	15	0	7	10	0
1890	58.00	47.00	10	10	0	9	1	0
1891	51.00	39.50	8	12	6	7	5	0
1892	47.50	41.50	7	10	0	6	2	6
1893	43.50	30.00	6	17	6	6	2	0
1894	37.00	28.50	6	15	0	5	7	6
1895	41.00	35.90	7	10	0	6	10	0
1896	40.00	36.00	7	7	6	6	7	6
1897	40.50	36.50	7	7	6	6	12	6
Extreme range	118.55	25.25	26	0	0	5	2	6

The following table continues the statistics of production since the quicksilver industry began in the United States, showing the grand total of 1,770,476 flasks as the entire product. In the column headed "Various mines" are included in 1897 Central, Chicago, Corona, Manhattan, and Sunderland mines. The Mount Jackson mine was worked under the management of the Great Eastern, and its product is found in that column.

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	.....	.....	.....
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
1897	4,700	3,605	1,550	.....	2,709	6,200
Total ..	961,921	140,820	106,754	92,938	86,996	101,617

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 United States—Continued.

[Flasks of 76½ pounds, net.]

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
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
1897	*b* 1,538	375	3,600	838	475	1,101	26,691
Total	26,586	28,263	19,662	8,969	4,903	191,047	1,770,476

a Includes 65 flasks from Oregon.

b Including Mount Jackson.

IMPORTS.

In the following table is given a statement of the imports of quicksilver from 1867 to 1897:

Quicksilver imported and entered for consumption in the United States, 1867 to 1897, inclusive.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
June 30—	*Pounds.*		June 30—	*Pounds.*	
1867	.....	$15,248	1883	1,552,738	$593,367
1868	152	68	1884	136,615	44,035
1869	.....	11	1885	257,659	90,416
1870	239,223	107,646	Dec. 31—		
1871	304,965	137,332	1886	629,888	249,411
1872	370,353	189,943	1887	419,934	171,431
1873	99,898	74,146	1888	132,850	56,997
1874	51,202	52,093	1889	341,514	162,064
1875	6,870	20,957	1890	802,871	445,807
1876	78,902	50,164	1891	123,966	61,355
1877	38,250	19,558	1892	96,318	40,133
1878	294,207	135,178	1893	41,772	17,400
1879	519,125	217,707	1894	7	6
1880	116,700	48,463	1895	15,001	7,008
1881	138,517	57,733	1896	305	118
1882	597,898	233,057	1897	45,539	20,147

NICKEL AND COBALT.

PRODUCTION.

As in the previous year the product of nickel and cobalt was limited to the by-product obtained in lead smelting at Mine La Motte, Missouri. The production of nickel from this source increased from 17,170 pounds in 1896, valued at $4,464, to 23,707 pounds in 1897, valued at $7,823. The ruling price in 1897 for refined nickel was 33 cents per pound.

Cobalt oxide from the same source also increased from 10,700 pounds to 19,520 pounds. Its price remained at $1.60 per pound from first hands.

The principal interest in the nickel industry continued to be the importation of nickel matte from Canada. This increased from 23,718,411 pounds in 1896 to 27,821,232 pounds between January 1 and December 31, 1897. This increased importation was accompanied by increased exports of nickel products, which is shown in the following tables.

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 1897.

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
1897	23,707	7,823

Production of cobalt oxide in the United States, 1869 to 1897.

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	1897	19,520
1878	4,508	1888	8,491		

[a] Including cobalt oxide in ore and matte.

IMPORTS AND EXPORTS.

In the following tables are given the statistics of the imports of cobalt oxide and of nickel into the United States from 1868 to 1897:

Cobalt oxide imported and entered for consumption in the United States, 1868 to 1897.

Year ending—	Oxide.		Year ending—	Oxide.	
	Quantity.	Value.		Quantity.	Value.
June 30—	*Pounds.*		June 30—	*Pounds.*	
1868	.....	$7,208	1884	25,963	$43,611
1869	.....	2,330	1885	16,162	28,138
1870	.....	5,019	Dec. 31—		
1871	.....	2,766	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	1897	24,771	34,773
1883	13,067	22,323			

Nickel imported and entered for consumption in the United States, 1868 to 1897.

Year ending—	Nickel.		Nickel oxide, alloy of nickel with copper, and nickel matte.		Total value.
	Quantity.	Value.	Quantity.	Value.	
June 30—	*Pounds.*		*Pounds.*		
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
1897	.....	.....	*h* 27,821,232	781,483	781,483

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 in matte from Canada, containing about 20 per cent nickel.

Exports of nickel oxide and matte from the United States from 1894 to 1897.

Year.	Quantity.	Value.
	Pounds.	
1894 (*a*)	1,235,588	$247,568
1895	1,061,285	239,897
1896	2,756,604	606,833
1897	4,255,558	997,391

a Latter six months; not separately classified prior to July 1, 1894.

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 occurs 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 do not exist east of the Mississippi River, 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. Mr. D. F. Hamilton of Monarch, Colorado, reports an interesting occurrence of antimony in a spur of the Sawatch Range in Chaffee County, Colorado, between the Monarch and White Pine mining districts. The antimony occurs in a vein of quartz 15 to 20 feet wide, and in sight for about 300 feet on the surface. It is in a region intersected by dikes of porphyry greatly eroded by glaciation. The vein has a strike nearly north and south, and is located about 3 miles from the Denver and Rio Grande Railroad, which is easily reached by wagon road. The locality is about 11,000 feet above sea level. Mr. Hamilton says that he has been informed that the antimony can be panned from the quartz in grains somewhat larger than wheat. The antimony is of tin-white color and easily cut with a knife. A sample about the size of a walnut of a similarly colored antimony ore has been received by the Geological Survey, but the location of the deposit from which it came was not stated.

PRODUCTION.

Antimony ore, or stibnite, was mined in five States in 1896. These were California, Idaho, Montana, Nevada, and Utah. The total amount of ore produced was 489 tons, worth $8,864. This domestic ore repre-

sented only about one-fourth of the total amount smelted. The antimony smelters depend upon foreign sources for their principal supply, as the domestic production, being irregular, can not be depended upon. The amount of foreign ores smelted in the United States in 1897 was 1,400 short tons. The total amount of metallic antimony produced from both foreign and domestic ores was 756 tons, worth $109,655, an increase of a little more than 25 per cent in both amount and value over 1896, when the production of metallic antimony or regulus was 601 tons, worth $84,290. The industry has shown a steady increase since 1894, when the principal smelting company in the United States removed from San Francisco to Staten Island, New York. Here, with increased facilities and a regular supply of ore, operations are carried on with greater economy, and the prices to the consumer in the last five years have been cut in half. In addition to the 756 short tons of metallic antimony produced in the United States in 1897, there were smelted 548,600 pounds of antimonial lead, of which the antimony contents amounted to 175,552 pounds. Basing the value of this included antimony at 7 cents per pound, which was about the average price during 1897, the total value of the domestic product is increased by $12,289.

The earlier volumes of Mineral Resources contain the only records of the antimony produced in previous years. From 1880 to 1887 the product did not exceed 75 tons in any one year, and in 1886 was as small as 35 tons. During the next seven years it averaged a little over 200 tons per year. In 1895 it increased 125 per cent over the preceding year. In 1896 the product was 33⅓ per cent more than in 1895, and a further increase of 25 per cent, excluding antimonial lead, is recorded for 1897.

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	1891	278	$47,007
1881	50	10,000	1892:		
1882	60	12,000	Metallic	150	56,466
1883	60	12,000	Ore	380	
1884	60	12,000	1893	250	45,000
1885	50	10,000	1894	200	36,000
1886	35	7,000	1895	*a* 450	68,000
1887	75	15,000	1896	*a* 601	84,290
1888	100	20,000	1897	*a* 756	109,655
1889	115	28,000		*b* 88	12,289
1890	129	40,756			

a Principally from imported ores. *b* Antimony contained in antimonial lead.

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 four years only, while the imports have fallen below $200,000 only four times in the last eighteen 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 1897.

Year ending—	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

Antimony and antimony ore imported and entered for consumption, etc.—Continued.

Year ending—	Crude and regulus.		Ore.		Ground. Value.	Total value.
	Quantity.	Value.	Quantity.	Value.		
	Pounds.		*Pounds.*			
June 30, 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
1897..	2,282,245	143,370	3,719,186	55,400	.....	198,770

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, in 1896, 7⅛ cents, and fell to 7 cents during July and August, 1897. The latter part of 1897 showed a slight improvement, the lowest price for Cookson's during the last four months of the year being 8 cents, and the highest 8½ cents per pound.

The following tables show by months and years the ruling prices of the several brands of antimony as reported to the *Iron Age* from 1892 to 1897, inclusive:

Prices of antimony at New York since 1892, by months.

[Cents per pound.]

Month.	1892.			1893.		
	Cookson's.	L. X.	Hallett's.	Cookson's.	L. X.	Hallett's.
January	15½ to 16	12 to 15	12¼ to 12½	11	10½	10¼
February	15 to 15½	12 to 14	11¼	10⅜	10½	9⅞ to 10
March	14⅜ to 15	11⅜ to 13	10⅜ to 11⅛	10⅜	10 to 12	10
April	14¼ to 15½	12¼ to 12½	10⅞ to 11	10⅜	10⅜	10
May	15	12⅜	11½	10½	10¼	10
June	14½	12⅜	11¼	10½	10¼	9⅞
July	13¼	12¼	10⅞	10⅜	10⅛	9⅞
August	12	11½	10⅜	10¼	10	9⅜
September	11½ to 11⅜	11 to 11¼	10 to 10¼	10¼	10	9⅜
October	12	11¼	10⅝ to 10⅜	10¼	10	9⅜
November	11⅜	11	10½	10	9⅜	9⅜
December	11¼	11	10¼ to 10⅜	10⅛ to 10¼	9½ to 9⅝	9⅛ to 9¼

Month.	1894.			1895.		
	Cookson's.	Hallett's.	L. X.	Cookson's.	Hallett's.	Japanese.
January	10¼	9½	9⅛	8½ to 8⅝	7⅛ to 7¼	.....
February	10	9⅜	8⅞	8¼ to 8½	7⅛ to 7¼	.....
March	10⅛	9½	8⅞	8¼	7⅛ to 7¼	.....
April	10⅛	9⅜	8⅞	7⅞ to 8⅛	7 to 7⅛	6⅞ to 7
May	10⅛	9¼	8⅜	7⅞ to 8	7	6⅞
June	9⅜	9⅛	8⅜	7⅞ to 8	7 to 7⅛	6⅞
July	10	8⅜	8⅜	8 to 8⅛	7⅛ to 7¼	7
August	10	8⅞	8¼	8	7⅛	7
September	9½	8⅞	7⅝	8	7⅛	6⅞ to 7
October	9⅝	8¼	7½	7⅜ to 8	7 to 7⅛	6⅞
November	8½	8¼	7⅜	7⅜ to 7⅞	7	6⅜ to 6⅞
December	8⅜	8⅛	7⅜	7⅜ to 7⅞	6⅞ to 7	6⅜ to 6⅞

Prices of antimony at New York since 1892, by months—Continued.

[Cen ts per pound.]

Month.	1896.			1897.		
	Cookson's.	Hallett's.	Japanese.	Cookson's.	Hallett's.	Japanese.
January	8¼	7¼ to 7½	7	7¼ to 7½	6½ to 6¾	6⅜ to 6⅝
February	8¼	7½	7	7¼ to 7½	6⅝ to 6⅞	6½ to 6¾
March	8¼	7½	7	7¼ to 7½	6¾ to 7⅛	6⅝ to 7
April	8¼	7½	7	7¼ to 7½	7 to 7⅛	7 to 7⅛
May	8 to 8¼	7¼ to 7½	6⅞ to 7	7¼ to 7⅝	7 to 7¼	6¾ to 7¼
June	8	7¼	6⅞ to 7	7¼ to 7½	6½ to 7	6½ to 6¾
July	8	7¼	6⅞ to 7	7 to 7¾	6⅞ to 7½	6¾
August	8	7¼	6⅞ to 7	7 to 8¼	7⅜ to 7½	6¾ to 7
September	8	7¼	6⅞ to 7	8 to 8¼	7¼ to 7½	7 to 7¼
October	7¼ to 7⅜	6½	6⅜	8 to 8½	7¼ to 7½	7 to 7⅛
November	7⅛ to 7⅜	6⅜ to 6½	6¼ to 6⅜	8 to 8½	7¼ to 7½	7 to 7¼
December	7¼ to 7½	6½	6⅜	8 to 8¼	7¼ to 7⅜	7 to 7¼

CHROMIC IRON ORE.

INTRODUCTION.

The production of chrome iron ore in California was discontinued during 1897, owing to facilities for obtaining richer ore at lower prices from the deposits in Asia Minor, which are described in the following pages. It is not improbable, however, that small quantities of chrome iron ore will continue to come from the Pacific coast.

PRODUCTION.

The production in the United States from 1885 to 1897 has been as follows:

Production of chromic iron ore in the United States from 1885 to 1897.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Long tons.			*Long tons.*	
1885	2,700	$40,000	1892	1,500	$25,000
1886	2,000	30,000	1893	1,450	21,750
1887	3,000	40,000	1894	3,680	53,231
1888	1,500	20,000	1895	1,740	16,795
1889	2,000	30,000	1896	786	6,667
1890	3,599	53,985	1897		
1891	1,372	20,580			

IMPORTS.

The following table shows the imports of chrome ore, chromate and bichromate of potash, and chromic acid imported and entered for consumption into the United States from 1867 to 1897:

Chromate and bichromate of potash, chromic acid, and chrome ore imported and entered for consumption in the United States, 1867 to 1897, inclusive.

Years ending—	Chromate and bichromate of potash.		Chromic acid.		Chrome ore.		Total value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
June 30—	*Pounds.*		*Pounds.*		*Long tons.*		
1867	875,205	$88,787	.....	.....	.....	.....	$88,787
1868	777,855	68,634	.....	.....	.....	.....	68,634
1869	877,432	78,288	.....	$3	.....	.....	78,291
1870	1,235,946	127,333	.....	8	.....	.....	127,341
1871	2,170,473	223,529	.....	5	.....	.....	223,534
1872	1,174,274	220,111	514	49	.....	.....	220,160
1873	1,121,357	178,472	922	276	.....	.....	178,748
1874	1,387,051	218,517	44	13	.....	.....	218,530
1875	1,417,812	183,424	45	22	.....	.....	183,446
1876	1,665,011	175,795	120	45	.....	.....	175,840
1877	2,471,669	264,392	13	10	.....	.....	264,402
1878	1,929,670	211,136	32	35	.....	.....	211,171
1879	2,624,403	221,151	.....	.....	.....	.....	221,151
1880	3,505,740	350,279	5	3	.....	.....	350,282
1881	4,404,237	402,088	124	89	.....	.....	402,177
1882	2,449,875	261,006	52	42	.....	.....	261,048
1883	1,990,140	208,681	290	338	.....	.....	209,019
1884	2,593,115	210,677	.....	120	2,677	$73,586	284,383
1885	1,448,539	92,556	.....	39	12	239	92,834
Dec. 31—							
1886	1,985,809	139,117	.....	101	3,356	43,721	182,949
1887	1,722,465	120,305	.....	5,571	1,404	20,812	146,668
1888	1,755,489	143,312	.....	281	4,440	46,735	190,328
1889	1,580,385	137,263	.....	2,974	5,474	50,782	191,019
1890	1,304,185	113,613	.....	634	4,353	57,111	171,358
1891	755,254	55,897	634	203	4,459	108,764	165,297
1892	496,972	94,055	772	204	4,930	55,579	149,838
1893	976,706	78,981	3,708	641	6,354	58,629	138,251
1894	1,483,762	125,796	5,680	837	3,470	38,364	164,997
1895	2,045,910	181,242	2,083	414	5,230	82,845	264,501
1896	952,794	80,538	2,429	387	8,669	187,400	268,325
1897	1,329,473	108,497	71,220	5,457	11,570	187,439	301,393

THE CHROME ORES OF TURKEY.

By WILLIAM GLENN.

Districts.—The high officials at Constantinople divide the Turkish chrome regions into two chief ones: The European field and the Asiatic field.

The principal European chrome province is that of Uskup, on the river Vardar, the ores from which reach Salonica, whence they are shipped. There is also a lesser province, that of Adrianople, on the river Maritza.

The Asiatic region is by far the more important one. As regards abundance of ores it stands without a rival in any land. It will suit our present purpose to divide the Asiatic region into two provinces: That of the government of Broussa and that of the government of Smyrna.

The chrome province of Broussa is that which was discovered by our countryman, Dr. J. Lawrence Smith, in 1848, while employed in studying the mineral wealth of the Ottoman Empire. His original discovery was made just south of the city, but subsequently chrome ores were found to exist over an area reaching far northward and eastward well into the government of Eski Shehir. It is in this one of our assumed divisions that the comparatively enormous mines of chrome ores exist. By means of pack trains and of ox carts they are brought to the railway, on which they are hauled to ports on the Sea of Marmora.

The lesser Asiatic chrome province is that of the government of Smyrna. While its mines are important and valuable, they are not so numerous or extensive as are those of the Broussa province. There is no railway for the transport of these ores. They are packed on camels to Makri and shipped thence into Europe and America and the British Isles.

Production.—Leaving out of consideration the regions supplying small quantities of chrome ores, which safely may be done in this account, the world's market knows but two chief areas of production. The ores of the lesser region are called Australian, and their quantity is about 8,000 tons annually. The greater area is that of the Ottoman Empire, the yearly production of which is not known. The Turkish Government has not kept statistics of the chrome ore produced in its realm.

The officials of the department of mines and forests at Constantinople now are trying to compile statistics of the chrome ores mined in the Empire during the years from 1894 to 1898, and they are making some progress; but their task is much heavier than apparently it should be, because of the peculiar way in which government mining affairs have been conducted heretofore. These statistics seem to be a

first attempt at ascertaining the mineral wealth of the Empire. The work is being done by trained and competent officials of the department of mines, and they are apt to succeed in due time.

Those familiar with the Turkish chrome ore industry are entirely out of accord as to how much is mined in an average year. Nevertheless, as their ideas are better founded than those which the reader might evolve for himself, it may be said that the production of Turkish chrome ores is somewhere between 17,000 tons and 35,000 tons in an average year, which statement does not embody much information.

Royalty.—The mines of the Ottoman Empire are the property of the Sultan. The operators of them are all concessionnaires of one kind or another, and all of them pay tribute to the imperial Government. There are various methods of doing this. Most of them appear to pay a fixed sum for each ton of ore shipped. The most important concessionnaire, himself an official of the Sultan's household, pays for his concession an annual rental in money, in addition to a definite quantity of the ore itself, which is delivered by him at a seaport. But no matter in what form paid, the tax per ton is a considerable sum of money.

Conditions of occurrence.—The best obtainable information is to the effect that the Turkish chrome mines are similar to those in the United States, Canada, the Urals, Australia, and New Caledonia, and elsewhere. They are open pits, or quarries. They reach to various depths below the present surface; but the greater part of them do not extend deeper than 20 meters; then the ores cease. To put this statement in another form, all chrome mines are ore pockets. After a fairly exhaustive attempt to inform himself, the writer is compelled to say that he knows of but a single exception to this behavior of chrome mines. The Woods Mine, of Pennsylvania, is a genuine and astonishing one. As the writer has stated elsewhere, "It is as truly an ore chute—a vein—as are the copper mines at Capelton, in the Province of Quebec, or at Ely, or at Elizabeth, in Vermont."

The Turkish deposits conform to the general statement that, geologically, all chrome mines are alike. They are found in basic magnesian rocks, of which serpentine may be regarded as the type, and they never are found in any other class of rocks. In respect of habitat, the mineral seems to be unique. To add to it additional interest, Dr. Sterry Hunt pointed out long ago that while gold, copper, and other minerals are now being dissolved out of the rocks and deposited into what we call mines, the conditions essential to the formation of mines of chrome ore appear to be no longer present in the earth's crust.

Transportation.—So far as my information extends, there are but few carriage roads in European Turkey, and almost none in the Asiatic part of the Empire. Indeed, the Asiatic exhibits no desire for roads and sees little necessity for them. There is much of reason in his position. If we fully appreciate why the American Indian was right enough in not taxing himself to construct highways, then we should not

wonder that the Asiatic continues to travel over trails. To my mind, the wonder of Asiatic Turkey is not its lack of roads, but the fact of its railway which starts at Constantinople. Setting out from the suburb of Scutari, it passes around the eastern projection of the Sea of Marmora, via Ismidt and Ghemlek, to Broussa, a former capital of Asia Minor. Its direction thereafter is southeastward, along the slopes of Olympus, and onward to some point in Eski Shehir, I think. Its destination is said to be the valley of the Euphrates, a region far distant southeastward from its present terminus. In this account the importance of the railway is this: It makes more or less available the ores of much the richest chrome region known to exist on the globe. No ores were being transported during my brief stay in Turkey. The time was late winter, when the mountainous ore region was covered with snow and subject to storms which swept down upon it from the Black Sea. The transport season is from April to November.

Ore transport is chiefly by pack trains of camels. In one district, at least, a kind of cart is used, the motive power for which is oxen. In the government of Smyrna the ores are transported by animals direct to the seaports. In the government of Broussa the pack trains move to the railway, over which the ores find transport to shipping points on the Sea of Marmora, and in all regions the movement of ore is slow and difficult and costly. At present there is almost no hope of better or cheaper transport from the mines to the shipping ports, either on the Mediterranean or the Sea of Marmora.

Mining cost.—No machinery is used in mining the chrome ores of European or of Asiatic Turkey. There is no present reason for expecting any change in this matter. The cost of labor is cheap and its employment may be freely indulged in. The ore regions are without establishments for repair of machinery.

Naturally the cost of mining must vary with the conditions which surround it. There are producers who do not know what it costs them simply to mine a ton of chrome ore. There are others who know but are not inclined to mention the sum. One of the well-informed of them stated that the cost of mining a ton (2,240 pounds) of chrome ore from one of the good Asiatic mines was about 4 shillings (British). And that may be assumed as not far from the cost of mining a ton of chrome ore from the Turkish mines in general.

But mining is one of the least costs involved in the delivery of a ton of ore at one of the shipping ports. Transport is costly, as are the various sorts of government tax. All the items vary with the conditions surrounding the mines and the distances of them from the shipping ports. But that we may reach a definite conclusion, an approximation based on reasonable grounds, we may assume generally that when a ton of chrome ore has been delivered at a Turkish shipping port, it has cost the producer not less than 64 shillings (British). He may have done better—he may have done much worse—all depending

upon his mine, his management, and what interest he has had to pay for his capital; for nearly all of them are borrowers of the money they use, and interest is high.

Composition.—The ores offering in the Turkish market vary from 44 per cent to 53 per cent chromic oxide. The greater quantity is of the leaner ore, just as is true of all ores in all markets the world over. And while the Ottoman Empire possesses a great deal of high-grade chrome ore, the likelihood is that much the larger part of the production is from 44 to 46 chromic oxide. This is mixed with the higher grades and sold in cargoes of 48 to 50 chromic oxide.

Future supply.—Another consideration is quantity, and in that the Sultan's mines stand easily first. They have no serious rival. Considering the present consumption of chrome ore and the probable increase of it in the near future, it may safely be said that those of us now living are not apt to see any cessation of the Turkish supply. There are good reasons for believing that on the slopes of Mount Olympus alone there are now a million of tons of merchantable ore awaiting extraction from the mines. And that is only a single locality.

The sparsely settled character of the Ottoman Empire causes it to be difficult to keep in subjection the lawless elements, such as are found in all lands, for which reason it is never safe for an utter foreigner, like an American, to travel alone in the interior. But he will be well received who presents himself fully accredited before the high Turkish officials. Once his mission is known to be lawful and useful, passports and safe conduct will be supplied him for any required region of the Empire.

PLATINUM.

By DAVID T. DAY.

PRODUCTION.

The product of platinum during 1897 in the United States came chiefly from Trinity and Shasta counties, California, and amounted to about 150 ounces, worth in the crude state $900.

The production since 1880 has been as follows:

Product of platinum in the United States since 1880.

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
1890	600	2,500
1891	100	500
1892	80	550
1893	75	517
1894	100	600
1895	150	900
1896	163	944
1897	150	900

a The chief variations in price have been due to the quality of the crude grains.

LOCALITIES OF OCCURRENCE.

During the year 1898 a demand has developed for osmium which has greatly stimulated the search for iridosmine, and hence for all the platinum metals, since osmium either in the form of iridosmine or as an impurity in platinum and in platiniridium is almost invariably found where any of the other platinum metals occur. The demand for osmium comes from the Welsbach Light Company, of Philadelphia, who need it for the incandescent lights. It is probable that very much more will be known in the next few months concerning the distribution of the platinum metals on the Pacific slope. In fact, a general search for the platinum metals will be made by this company throughout the United States, Canada, Alaska, and South America. On the Pacific slope platinum was noticed by Siliman in the black sand obtained as the heaviest material with the gold in placer mining at Cherokee Flat, Butte County, California. Siliman speaks of it as being plentiful, and the iridosmine more plentiful than platinum, but that the miners have no way to save it. Since then platinum has been noticed on the coast of California as far south as San Bernardino County. All the work done in the search for platinum, including that of the writer during the present summer, 1898, tends to strengthen the belief that it occurs only in more or less direct association with placer sands derived from serpentine rocks, and especially those rich in chromite. A glance at the recent geological map of California, in which the occurrence of serpentine rocks and the deposits of chromite are noted in colors, will give a fair idea of the distribution of gold-bearing sand in which platinum metals have also been found. Thus, coming north from San Bernardino County, California, platinum has been obtained when washing for gold in the beach sands of the coast near Santa Barbara; again at Lompoc Beach; on the beaches of San Luis Obispo County; farther north again in the neighborhood of Santa Cruz; and it has occasionally been found between Santa Cruz and the Golden Gate. But the coast sands which have yielded the platinum metals most prolifically in California are those of Humboldt and Del Norte counties. The beach mines of Gold Bluff, north of Arcata, and the mines at Big Lagoon, Stone Lagoon, Little River, and going north those in the neighborhood of Crescent City, and coming inland from there the mines in the neighborhood of Gasquet and Smith River, have furnished considerable amounts of platinum, and would doubtless have furnished more but for the fact that the platinum is extremely fine, making it difficult to separate from iron pyrite, chromite, magnetite, and ilmenite. Further, it has contained a discouragingly large amount of iridosmine that is practically valueless; it was too fine for pen points and had no other use.

Going farther north in Oregon, the same conditions concerning the occurrence of platinum along the coast are principally noticeable at Gold Beach and at Port Orford in the Coos Bay region. Sharpless and

Winchell have carefully examined the sands at Bandon, at the mouth of Rogue River, Oregon, and found platinum almost invariably, although the proportion was smaller than has usually been reported by less careful observers. Thus, beach mining for gold, in which platinum has frequently been saved, continues as far north as Yaquina Bay, Oregon, and more or less successful efforts have been made to save the platinum associated with fine gold in the black sands of the Pacific beach north of Astoria, Oregon, and still farther north on the beaches of Washington. The saving of platinum from beach sands, however, as indicated below, reached its maximum extent in the mines of Gold Bluff, Crescent City, Gold Beach, and Port Orford.

Meanwhile, the interior of the State has also furnished platinum from the black sand associated with gold in the placers of the American River, and in Plumas, Shasta, and Trinity counties, California. In these counties both gold and platinum have usually been coarser, and thus the platinum has been more easily saved and separated from the finer grains of iridosmine. In fact, the main seat of the platinum industry of the Pacific slope has been in the Hay Fork district of Trinity County and along the Trinity River from Chapman's mine, 6 miles south of Junction City, northward to North Fork. Here both the large mines and the small Chinese workings have furnished the bulk of the platinum produced in the United States. Nuggets one-quarter of an inch in diameter have very frequently been found. In the Hay Fork district, iridium, in the form of platinum iridium or iridosmine, has been a noticeable feature. The region of Grants Pass, on the Rogue River, Oregon, has also furnished small quantities of platinum, and will probably furnish much more in the future.

Much of the general information has been obtained from the records of the California State Mining Bureau, furnished by Professor Durden and by Mr. Charles G. Yale, but was supplemented by a personal visit of the writer—in company with Col. W. E. Barrows, president of the Welsbach Light Company—to most of the inland regions which have been described.

By continuing to Portland and examining all the black sands which could be found from various points in Oregon, Idaho, and elsewhere, traces of platinum were found in sands at various points on the Snake River from Bakersville to Lewiston, and a specimen of platinum sand was also obtained from Miles City, Montana.

In regard to the conditions of occurrence of platinum in California and Oregon, the general statement that the black sands are richer as one proceeds farther north should be modified. This undoubtedly is true if one considers the coast from San Bernardino through to the northern limit of California, the richest deposit having been found in Del Norte County; and the same conditions continue in Oregon as far as Coos Bay, but above this there is no information at hand to show that the black sands farther north are richer in platinum or gold than those farther south, or, indeed, that they are so rich.

For years the region known as the Similkameen district, in British Columbia, has been looked upon as the richest source of platinum in America, and a visit to this point, which is reached most easily by a wagon drive of 120 miles south from Kamloops, British Columbia, on the Canadian Pacific Railroad, was made by Colonel Barrows and the writer. It was found that there are large bodies of serpentine containing chromite near the headwaters of Tulameen and Granite branches of the Similkameen River, and below this the sands of both creeks are remarkably rich in the platinum metals.

Platinum has also been found on Slate Creek, which empties into the Tulameen River a short distance above Granite Creek. This region is particularly interesting because of the characteristics of the platinum grains found there. It is practically easy to determine whether a given nugget of platinum was found on the Similkameen River proper, or whether it came from the region of the Tulameen or Granite Creek district. In the latter case the nuggets are usually black and very magnetic, due probably to the fact that they are frequently coated with either magnetite or magnetite and chromite, or with some oxidation product of pyrrhotite. The platinum sand coming from the Similkameen River, on the contrary, is bright, as though the greater part of the coating had been rubbed away. There is every indication that the platinum of Granite Creek is in close proximity to the original source. This fact is made particularly evident by the finding of a platinum nugget to which a considerable amount of the mother rock was still attached. This rock proves to be peridotite, mixed with chromite and magnetite. A careful search will be made of the various rocks in the vicinity, with the probability of finding platinum in place.

In regard to the proportion of platinum metals to gold, the only direct evidence was the fact that at the Pogue mine, operated by Mr. T. H. Murphy, about 20 ounces of coarse platinum, the principal nuggets one-fourth inch in diameter, were found in mining 100 ounces of gold dust, and this proportion can be taken as perhaps fairly representative of the district, although the proportion must necessarily vary considerably, because not all either of gold or platinum is saved, the fine gold and fine platinum usually being put aside with the black sand to be worked up at some future day. The total output of platinum in the Similkameen district has declined very greatly. In fact, the large output for one or two years, about 1886, was due to a clean up of various lots of black sand, rich in platinum, which had accumulated for several years. The output of 1897 did not vary considerably from 200 ounces.

Word was received that a considerable proportion of platinum was found with the gold of the Caribou district, 250 miles north of Ashcroft, British Columbia, and Mr. W. Pellew Harvey, of Vancouver, has found $\frac{3}{100}$ of an ounce per ton in the unconcentrated sand of the Saskatchawan River, 60 miles up the river from Edmonton, British Columbia. It is said that the Edmonton black sand is regularly purchased for shipment abroad, in order to obtain platinum from it.

PLATINUM IN RUSSIA.[1]

Platinum is produced only in the Ural, in the mining districts of Perm and Verhotursk. In the following table is shown the production by works in 1896, the last year for which any official figures are available:

Production of platinum in Russia in 1896, by mines.

Name of mine.	Production.
	Troy ounces.
Goroblagodat	116,980
Nizhne-Tagilski	31,288
Krestovozdvizhenskie	23,635
Nikolaye-Pavdinski	1,573
Bogolovski Mining Co	362
Total	173,838

In 1896, as well as in preceding years, the largest quantity of the output was produced in the Goroblagodat region, viz, 116,980 ounces, or a little over two-thirds of the entire product. Next follow the mines of the Nizhne-Tagilski works with 31,288 ounces, or 18 per cent, and the Krestovozdvizhenskie with an output of 23,635 ounces, or 13½ per cent of the total. Compared with 1895, when the production was 155,646 ounces, the output of platinum increased by 18,192 ounces, or nearly 12 per cent, owing principally to the increased demand and good prices paid for the metal.

The production of platinum in Russia during the four latest years for which statistics are obtainable is given in the subjoined table, which also demonstrates that the rank of the producing mines has remained the same.

Production, by mines, of platinum in Russia, from 1893 to 1896.

Mines.	1893.	1894.	1895.	1896.
	Ounces.	*Ounces.*	*Ounces.*	*Ounces.*
Goroblagodat	107,267	108,242	94,045	116,980
Nizhne-Tagilski	44,702	45,625	36,558	31,288
Krestovozdvizhenskie	22,342	23,045	22,091	23,635
All other	5,490	6,752	2,952	1,935
Total	179,801	183,664	155,646	173,838

[1] Authority: Sbornik Statisticheskyh Svyedyenii o Gornozavodskoi promyshlennosti, Rossii 1894 i 1895, Otchet Gornava Departmenta za 1896 goda, St. Petersburg, 1897.

The production and value of platinum for a series of years, and also the production of this metal for the twelve years from 1885 to 1896, are given in the two following tables:

Production and value of platinum in Russia, from 1893 to 1896.

Year.	Production.	Value.	Average price per ounce.
	Ounces.		
1893	179,801	$1,765,669	$9.83
1894	183,664	1,714,020	9.33
1895	155,646	1,701,623	10.93
1896	173,838	2,085,930	12.00

Production of platinum in Russia for twelve years, 1885 to 1896.

Year.	Production.	Year.	Production.
	Ounces.		*Ounces.*
1885	91,944	1893	179,801
1886	152,195	1894	183,664
1887	155,415	1895	155,646
1888	95,799	1896	173,838
1889	92,946		
1890	100,289	Total, twelve years	1,692,136
1891	149,365		
1892	161,234	Average yearly output	141,011

The year 1894 represents the greatest quantity of platinum obtained in any one year. Of this amount (183,664 ounces) 181,029 ounces of platinum were washed out of 1,833,219 short tons of platinum-bearing sand, while the remaining 2,635 ounces were washed out of gold-bearing sand. In 1895 there were washed 1,728,816 short tons of platinum-bearing sand, yielding 154,862 ounces of platinum, besides a small amount, 784 ounces, obtained from gold-bearing sand.

Establishments for refining platinum.—The crude platinum obtained from the mines, before being put to use, is subjected to a refining process. This is done in various establishments, but mainly in foreign ones, and consequently a large part of the metal produced is exported in the crude state over the frontier. In Russia there exist only two establishments refining platinum: The Tentelevski Chemical Works, and the laboratory of Kolbe & Lindfors. Both are located at St. Petersburg, and are under the supervision of the mining department. The former of these establishments in 1896 purchased 1,343 ounces of the crude platinum, from which 1,114 ounces of pure metal were pro-

duced; the Kolbe & Lindfors laboratory in 1896 neither bought nor refined any platinum.

Two new companies were formed in 1896 for the production of gold, platinum, and associated metals.

OSMIUM-IRIDIUM.

This metal is obtained from only one locality—the Miasski gold mine in the government of Orenburg. The production for the last three years for which any information can be obtained is given in the following table:

Production of osmium-iridium in Russia for the years 1894, 1895, and 1896.

Year.	Production.
	Ounces.
1894	125
1895	159
1896	224

The production in 1896 shows an increase over that of 1895 of 65 ounces, or nearly 41 per cent.

COAL.

By EDWARD W. PARKER.

INTRODUCTION.

The usual methods employed in the preparation of the reports on the production of coal for previous volumes of Mineral Resources have been continued in the present paper. The statistical tables showing the production in 1897 in the several States have been compiled from direct returns of operators to the Survey or its duly appointed agents, with only one exception. As formerly, the statistics of coal production in Illinois have been obtained from the report of the State Bureau of Labor Statistics. In connection with his duties as chief mine inspector of Alabama, Mr. James D. Hillhouse has continued to act as an agent for the Geological Survey in collecting the statistics for that State. The report on the production of anthracite coal in Pennsylvania has been prepared, as usual, by Mr. William W. Ruley, of Philadelphia. The cooperation of mining inspectors or other State officials has been asked and cordially given, notably in Colorado, Ohio, and Pennsylvania, in securing reports from producers who had failed to respond to the inquiries sent from this office. Acknowledgment is due and gratefully made to these gentlemen who have so willingly assisted in the preparation of the report. The author desires also to make special acknowledgment of the efficient services rendered by Mr. Theodore H. Johnson, who for a number of years has borne the burdens of tabulating the returns from between 3,000 and 4,000 coal producers, and preparing the tables of production by fields, States and counties, and of compiling the statistics relating to mining machines, the strike of 1897, and rates paid for mining coal, which have been made special features of this report.

To the coal operators themselves, who have contributed to the completeness of this and previous reports by furnishing statements of their production, the Survey is also, and in no less degree, indebted. It is an evidence that the value of the statistical work of the Geological Survey is becoming more thoroughly appreciated when operators respond more promptly and willingly with each successive year. By this willing cooperation on the part of the producers the work of the Survey is made more accurate and complete, and the prompt publication

of the results is rendered possible. It was through this cooperation that the Survey was able to publish early in April a preliminary statement of the coal production of the United States in 1897. The statistics for many of the States were complete at that time. The estimates made in those cases, where final figures were not at hand, were conservative, and the result as published at that time is found to have been about 1 per cent less than the actual production.

A special and interesting feature of these reports consists of a review of the coal trade at the important trade centers and shipping ports. This feature is composed chiefly of original contributions by secretaries of boards of trade, etc. These are gratefully acknowledged here, and by name and proper credit in connection with their contributions under the head of "Coal trade review." When any reference has been made to the files of technical journals due credit is given in the proper place.

Two subjects affecting the coal-mining industry are given special prominence in the subsequent pages. These are the statistics of the remarkable strike among the bituminous coal miners during the summer of 1897 and more complete information regarding the development of the use of mining machines. Special efforts have been made to secure accurate information on these two points. The returns have been carefully tabulated and are discussed in connection with the tables showing 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 the 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 record of the production of the different fields since 1887. It shows that the output of anthracite coal, including the product of Colorado and New Mexico, has increased from 39,548,255 short tons in 1887 to 52,500,839 short tons in 1897. The production in the latter year, however, was not the maximum. The largest output of anthracite coal was obtained in 1895, when the product amounted to 58,066,516 short tons, 47 per cent more than the product of 1887. Several influences, which are discussed later, have combined to cause a diminution of the output in the last two years, and the record for 1897 shows that the product for that year was 5,565,677 short tons less than in 1895, and only 33 per cent more than in 1887. In the bituminous fields the coal areas of the Appalachian system are

by far the most important. The product of these fields in 1887 was 55,193,034 short tons, or nearly 63 per cent of the total yield of bituminous coal. In 1897 the Appalachian fields produced 97,308,137 short tons, or 65.8 per cent of the total output, and 42,115,103 short tons, or 76.3 per cent in excess of their yield, in 1887. Second in importance in the bituminous coal areas is the Central coal fields, comprising those of Illinois, Indiana, and western Kentucky, which produced 14,478,883 short tons, or 16½ per cent of the total bituminous product, in 1887, and 26,414,127 short tons, or 17.9 per cent of the total, in 1897. The Western field, embracing all the States west of the Mississippi River and east of the Rocky Mountains, is third in importance, with a product of 10,193,034 short tons in 1887 and 13,164,059 short tons in 1897, the percentage in the two years being 11.6 and 8.9, respectively. The Rocky Mountain fields are fourth in importance, yielding 4.15 per cent of the total bituminous product in 1887 and 5.99 per cent in 1897. The Pacific Coast field yielded not quite 1 per cent of the total product in 1887 and 1.11 per cent in 1897. The production of these five fields, with their percentages of the total bituminous output in the two years, the increase and percentage of increase in each, was as follows:

Production of the five principal bituminous coal fields in 1887 and 1897 compared.

Fields.	1887.		1897.		Increase in 1897.	
	Product.	Per cent of total.	Product.	Per cent of total.	Amount.	Per cent.
	Short tons.		*Short tons.*		*Short tons.*	
Appalachian	55,193,034	63.0	97,308,137	65.8	42,115,103	76.3
Central	14,478,883	16.5	26,414,127	17.9	11,935,244	82.4
Western	10,193,034	11.6	13,164,059	8.9	2,971,025	29.1
Rocky Mountain	3,646,280	4.15	8,854,182	5.99	5,207,902	142.8
Pacific Coast	854,308	1.0	1,639,779	1.11	785,471	91.9

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 1897:

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	31,516,856	30,796,727	36,174,089
Ohio	10,000	10,301,708	10,910,951	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	4,881,620	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	55,888,088	60,966,245	62,972,222
Northern:				
Michigan	6,700	71,461	81,407	67,431
Central:				
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

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.				
Western:	*Sq. miles.*	*Short tons.*	*Short tons.*	*Short tons.*
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	2,222,543
Kansas	17,000	1,596,879	1,850,060	
Arkansas	9,100	129,600	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	10,172,634	11,842,764	10,036,356
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	.....	124,689,909	142,037,740	.....
Colliery consumption	.....	5,960,302	6,621,667	.....
Total product, including colliery consumption	.....	130,650,211	148,659,407	141,229,613

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.	1893.
Anthracite.				
New England (Rhode Island and Massachusetts)	*Short tons.*	*Short tons.* 500	*Short tons.*	*Short tons.*
Pennsylvania	46,468,641	50,665,431	52,472,504	53,967,543
Colorado and New Mexico	(*a*)	(*a*)	64,963	93,578
	46,468,641	50,665,931	52,537,467	54,061,121
Bituminous. (*b*)				
Triassic:				
Virginia	19,346	17,290	37,219	19,878
North Carolina	10,262	20,355	6,679	17,000
Appalachian:				
Pennsylvania	42,302,173	42,788,490	46,694,576	44,070,724
Ohio	11,494,506	12,868,683	13,562,927	13,253,646
Maryland	3,357,813	3,820,239	3,419,962	3,716,041
Virginia	764,665	719,109	637,986	800,461
West Virginia	7,394,494	9,220,665	9,738,755	10,708,578
Kentucky	1,206,120	1,222,918	1,231,110	1,245,785
Tennessee	2,169,585	2,413,678	2,092,064	1,902,258
Georgia	228,337	171,000	215,498	372,740
Alabama	4,090,409	4,759,781	5,529,312	5,136,935
	73,008,102	77,984,563	83,122,190	81,207,168
Northern:				
Michigan	74,977	80,307	77,990	45,979
Central:				
Indiana	3,305,737	2,973,474	3,345,174	3,791,851
Kentucky	1,495,376	1,693,151	1,794,203	1,761,394
Illinois	15,274,727	15,660,698	17,862,276	19,949,564
	20,075,840	20,327,323	23,001,653	25,502,809

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.	1893.
Bituminous (*a*)—Cont'd.				
Western:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Iowa	4,021,739	3,825,495	3,918,491	3,972,229
Missouri	2,735,221	2,674,606	2,733,949	2,897,442
Nebraska	2,259,922	1,500	1,500	
Kansas		2,716,705	3,007,276	2,652,546
Arkansas	399,888	542,379	535,558	574,763
Indian Territory	869,229	1,091,032	1,192,721	1,252,110
Texas	184,440	172,100	245,690	302,206
	10,470,439	11,023,817	11,635,185	11,651,296
Rocky Mountain, etc.:				
Dakota	30,000	30,000	40,725	49,630
Montana	517,477	541,861	564,648	892,309
Wyoming	1,870,366	2,327,841	2,503,839	2,439,311
Utah	318,159	371,045	361,013	413,205
Colorado	3,094,003	3,512,632	3,447,967	4,018,793
New Mexico	375,777	462,328	659,230	655,112
	6,205,782	7,245,707	7,577,422	8,468,360
Pacific Coast:				
Washington	1,263,689	1,056,249	1,213,427	1,264,877
Oregon	61,514	51,826	34,661	41,683
California	110,711	93,301	85,178	72,603
	1,435,914	1,201,376	1,333,266	1,379,163
Total product, including colliery consumption	157,770,963	168,566,669	179,329,071	182,352,774

a Including lignite, brown coal, and scattered lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—			
	1894.	1895.	1896.	1897.
Anthracite.				
New England (Rhode Island and Massachusetts)	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Pennsylvania	51,921,121	57,999,337	54,346,081	52,431,763
Colorado and New Mexico	71,550	67,179	79,492	69,076
	51,992,671	58,066,516	54,425,573	52,500,839
Bituminous. (a)				
Triassic:				
Virginia	52,079	57,782	95,670	95,670
North Carolina	16,900	24,900	7,813	21,280
Appalachian:				
Pennsylvania	39,912,463	50,217,228	49,557,453	54,597,891
Ohio	11,909,856	13,355,806	12,875,202	12,196,942
Maryland	3,501,428	3,915,585	4,143,936	4,442,128
Virginia	1,177,004	1,310,542	1,159,053	1,432,632
West Virginia	11,627,757	11,387,961	12,876,296	14,248,159
Kentucky	1,218,072	1,490,057	1,486,016	1,411,897
Tennessee	2,180,879	2,535,644	2,663,106	2,888,849
Georgia	354,111	260,998	238,546	195,869
Alabama	4,397,178	5,693,775	5,748,697	5,893,770
	76,278,748	90,167,596	90,748,305	97,308,137
Northern:				
Michigan	70,022	112,322	92,882	223,592
Central:				
Indiana	3,423,921	3,995,892	3,905,779	4,151,169
Kentucky	1,893,120	1,867,713	1,847,462	2,190,200
Illinois	17,113,576	17,735,864	19,786,626	20,072,758
	22,430,617	23,599,469	25,539,867	26,414,127

a Including lignite, brown coal, and scattering lots of anthracite.

Classification of the coal fields of the United States—Continued.

	Product in—			
	1894.	1895.	1896.	1897.
Bituminous (*a*)—Cont'd.				
Western:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Iowa	3,967,253	4,156,074	3,954,028	4,611,865
Missouri	2,245,039	2,372,393	2,331,542	2,665,626
Nebraska	.....	.....	3,560	*b* 645
Kansas	3,388,251	2,926,870	2,884,801	3,054,012
Arkansas	512,626	598,322	675,374	856,190
Indian Territory	969,606	1,211,185	1,366,646	1,336,380
Texas	420,848	484,959	544,015	639,341
	11,503,623	11,749,803	11,759,966	13,164,059
Rocky Mountain, etc.:				
Dakota	42,015	39,197	78,050	77,246
Montana	927,395	1,504,193	1,543,445	1,647,882
Wyoming	2,417,463	2,246,911	2,229,624	2,597,886
Utah	431,550	471,836	418,627	521,560
Colorado	2,776,817	3,027,327	3,054,711	3,307,644
New Mexico	580,238	709,130	600,823	701,964
Nevada	150	.....	.....	.....
	7,175,628	7,998,594	7,925,280	8,854,182
Pacific Coast:				
Washington	1,106,470	1,191,410	1,195,504	1,434,112
Oregon	47,521	73,685	101,721	101,755
California	67,247	75,453	*c* 93,776	*c* 103,912
	1,221,238	1,340,548	1,391,001	1,639,779
Total product, including colliery consumption	170,741,526	193,117,530	191,986,357	200,221,665

a Including lignite, brown coal, and scattering lots of anthracite.
b Includes Idaho. *c* Includes Alaska.

PRODUCTION.

For the first time in our history the production of coal in the United States has reached a total of 200,000,000 short tons. This statement carries with it the announcement that the output of coal in 1897 reached the highest figure ever recorded. The total product last year amounted to 200,221,665 short tons, equivalent to 178,769,344 long tons of 2,240 pounds, with an aggregate value at the mines of $198,869,178. The largest output previously obtained was in 1895,

when the product amounted to 172,426,366 long tons, or 193,117,530 short tons, valued at $197,799,043. The production in 1896 was 171,416,390 long tons, or 191,986,357 short tons, worth $196,640,166. The output in 1897 was, therefore, 7,352,954 long tons (or 8,235,308 short tons) more than in 1896, and 6,342,978 long tons (or 7,104,135 short tons) in excess of that of 1895. The value of the product in 1897 exceeded that of 1896 by $2,229,012, and was $1,070,135 more than the value of the product in 1895.

It is to be observed that all of the increase in production in 1897 was in the output of bituminous coal. In fact the production of bituminous coal has shown an increase in each year since 1894, and had it not been for a falling off of over 3,000,000 long tons in the production of anthracite coal in 1896, the total output in that year would have exceeded that of the preceding one. The bituminous coal product in 1896 was 2,522,083 short tons more than in 1895, but this gain was more than wiped out by the decrease in the production of anthracite. The production of bituminous coal in 1897 was 10,149,626 short tons more than in 1896 and 12,671,709 short tons more than in 1895. The production of anthracite coal showed a decrease of 1,914,318 short tons as compared with 1896, and of 5,567,574 short tons as compared with the production of 1895.

It will be observed that while the total product in 1897 was 8,235,308 short tons more than in 1896 the value increased only $2,229,012, and that the general average price declined from $1.02 per short ton in 1896 to 99 cents in 1897. Furthermore it is seen that while the increase in output in 1897 was confined to the production of bituminous coal, the decrease in price is also limited to the bituminous product. In spite of unfavorable influences that effected a falling off in the demand for anthracite coal, and notwithstanding the fact that the close of the year found a considerable accumulation of unsold coal in stock (although the production decreased 1,709,213 long tons), producers were able to maintain prices at the same figures that obtained in 1896. Such was not the case in bituminous circles, however. 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 decline of 3 cents in 1896 brought the average price down to 83 cents, and a further decline of 2 cents in 1897 made the average for the year 81 cents, the lowest price ever recorded. There is no doubt that one of the causes of lower prices for bituminous coal has been the introduction of mining machines, which have enabled operators to produce their coal with less men, or more coal with the same number of men, and, consequently, at a diminished cost. The amount of bituminous coal mined by machines in 1897, as reported to the Survey, was 22,649,220 short

tons, against 16,420,252 tons in 1896, and 6,211,732 tons in 1891. Operators report that the amount of coal mined by machines increases the output per miner by from 50 to 100 per cent. The average price paid for hand mining is about 50 cents per ton. The increase of about 6,229,000 tons of machine-mined coal in 1897 over 1896 would, with an increase of 50 per cent in the efficiency per miner, represent a saving of about $1,000,000 in the mining cost alone. A further economy is accomplished in a larger percentage of lump coal when mined by machines. The inference to be drawn from the statistics of the past few years is that operators have been inclined to utilize machine mining in the effort to increase production rather than to decrease the number of employees, and the benefits that might be derived from lessened expenses are partly lost by keeping the production in excess of a natural demand.

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.

The coal shipped, sold to local trade and employees, and used in the manufacture of coke is considered the marketable product. The colliery consumption averages about 8 per cent of the total product in anthracite production and about 1½ per cent in bituminous mining. The marketable product in 1897 amounted to 193,280,246 short tons as compared with 184,801,525 short tons in 1896.

ANTHRACITE.

The product of Pennsylvania anthracite in 1897 was 46,814,074 long tons, or 52,431,763 short tons, valued at $79,129,126, against 48,523,287 long tons, or 54,346,081 short tons, valued at $81,748,651 in 1896, and 51,785,122 long tons, or 57,999,337 short tons valued at $82,019,272 in 1895. Compared with 1896 the production of anthracite coal in 1897 shows a decrease of 1,709,213 long tons, or 1,914,318 short tons. The maximum yearly product of anthracite coal was reached in 1895, compared with which the output in 1897 shows a loss of 4,971,048 long tons, or 5,567,574 short tons. In fact the amount of anthracite coal mined in 1897 was the smallest in six years, with the exception of 1894, when, because of the panic, the production fell off to 46,358,144 long tons, about 450,000 long tons less than the output of 1897. The increase of over 5,000,000 tons in the production for 1895 indicates that the industry had recovered from the effects of the financial panic, and other causes

must be looked for to account for the decreased product in the next two years.

Mr. William W. Ruley, in his contribution on the production of Pennsylvania anthracite, cites two reasons which have been assigned for the decrease in anthracite consumption. The first of these is the increased use of bituminous coal in competition with the smaller sizes of anthracite for steam raising; the second is the increased consumption of gas for cooking and other domestic purposes. To these must be added another factor—the decrease in the production of anthracite pig iron. The output of anthracite pig iron in 1897 was more than 200,000 long tons less than that of 1896, while the production of pig iron made from bituminous coal and coke increased nearly 1,300,000 long tons. The decrease in the output of anthracite pig iron was directly responsible for a decrease of 160,000 long tons in the consumption of anthracite coal, based on an average of 2,500 pounds of coal to 1 ton of pig with anthracite alone, or of about 1,675 pounds when mixed with coke. The increase of 1,300,000 long tons in the production of pig iron from bituminous coal and coke was directly responsible for about 2,200,000 short tons of the increase in the product of bituminous coal, based on an average of 1½ tons of coal to 1 ton of pig.

The three causes mentioned have undoubtedly had an adverse effect upon the anthracite interests. Nor is it practicable, in the face of existing conditions, to so reduce the selling price of anthracite coal that it may successfully meet the competition of bituminous coal, coke, and gas. The success of these competitors to anthracite coal may be directly attributed to the unwisdom shown in overdeveloping the anthracite fields. Enormous outlays of capital in acquiring property and constructing improvements in the boom days of anthracite development are reflected now in "fixed charges" and other expenses which make it impossible to materially decrease the cost of production. The facts brought out by the unfortunate affair at Hazleton during the summer of 1897 furnish reliable evidence that the miners are not overpaid. The rate per ton paid for mining is low enough now, and as the mines are frequently closed down one-third or one-half the time the employees are necessarily unable to earn more than two thirds of the wages possible if they were allowed to work full time. As will be seen further on, the miners endeavor to make up for this, in part, by mining more coal per day than they are accustomed to when the mines are running regularly. But such efforts do not offset the losses they suffer through compulsory idleness.

It would seem that with a restricted production and prices well controlled the anthracite interests would be in excellent condition, so far as the operators are concerned; but restricted production and higher prices have reflex actions upon the industry which are not always considered. In the first place, when the tonnage is reduced the mining cost of every ton of the product won, owing to the regularity and uni-

formity of the "fixed charges," etc., is proportionately increased, while every additional advance in the price produces a diminution in the market demand, and offers an opportunity for the increased consumption of soft coal, coke, or gas, as the case may be. Under the prevailing conditions there is reason to believe that the maximum of anthracite production has been, or soon will be, reached. It is certainly safe to predict that the demand will never exceed the present capacity of the anthracite mines.

In addition to the anthracite production of Pennsylvania in 1897, there were 69,076 short tons mined in Colorado and New Mexico, making the total output of anthracite coal in the United States 52,500,839 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.

As previously stated, the miners in the anthracite fields endeavor to offset the days of idleness, caused by the shutting down of the mines two or three days in the week, by increasing their tonnage on working days. This is shown in the fact that, while the total product in 1897 was only 3.5 per cent less than in 1896, the average working time fell off nearly 14 per cent, and the number of employees was nearly the same in both years. The number of men employed in 1896 was 148,991, who worked an average of 174 days. In 1897 the average number of working days was 150—less than one-half the number of working days in a year—and the number of men employed was 149,557. In 1894, 131,603 men made an average of 190 days, and in 1895, 142,917 men made an average of 196 days. From this it will be seen that the miners made a little less than two-thirds time in 1894 and 1895, somewhat less than three-fifths time in 1896, and less than half time in 1897. The tonnage per man per day in 1894 and 1895 averaged 1.85. In 1896 it increased to 1.87, and in 1897, with increased effort, the average tonnage per man per day increased to 2.09.

The "number of men employed" includes, besides the miners, the day laborers inside and outside the mines, teamsters, mechanics, etc. The tonnage per miner, therefore, would be considerably in excess of the figures given; but as no separation of the number of miners has been made it is not possible to ascertain their average tonnage. Taking the total number of employees, we find that the number of tons produced for each man in 1894 was 251.5; in 1895 each man produced 362.6 tons; in 1896 the total for each man was 325.4, while in 1897, notwithstanding the larger tonnage per man per day, the total tonnage for each man employed was only 313.5. If each employee were a miner, this would indicate a loss of 15 per cent in his earning capacity, provided the rate paid per ton remained constant. The difference would be even greater if the tonnage per miner could be shown.

BITUMINOUS.

The bituminous coal product, as collated in these reports, includes, in addition to strictly bituminous coals, semibituminous, semianthracite, cannel, splint, and "block" coals, and lignite or brown coal. The anthracite coal mined in Colorado and New Mexico is also included in the bituminous product. The aggregate output of these in 1897 amounted to 147,789,902 short tons, valued at $119,740,052, against 137,640,276 short tons, valued at $114,891,515, in 1896, and 135,118,193 short tons, worth $115,779,771, in 1895. It is seen from this that while the product in 1897 was somewhat more than 10,000,000 short tons in excess of the product in 1896, and more than 12,500,000 over that of 1895, the value of the product in 1897 was less than $5,000,000 more than that of 1896, and only $4,000,000 more than that of 1895.

The production of 147,789,902 tons of bituminous coal in 1897 makes that the banner year in the history of coal mining. Production has shown an increase each year since 1889, with one exception (1894), and with three exceptions the production has increased each year since 1880. In 1880, according to the Tenth Census, the amount of bituminous coal produced in the United States was 42,831,758 short tons. In the seventeen years following that the production has increased annually (with three exceptions) until, in 1897, the output was nearly 3.5 times that of 1880. At the time of taking the Eleventh Census (in 1889) the bituminous coal product was 95,684,543 short tons, showing that in the eight years since 1889 the product has increased nearly 55 per cent.

The value of the bituminous product has not increased in the same proportion. While the amount of coal produced in 1897 was 3.5 more than that of 1880, the value was only two and one-fourth times as much. The average price per ton received for the product in 1880 was $1.25, whereas in 1897 it had fallen to 81 cents, a decline of about 35 per cent. The average price per ton has not exceeded $1 since 1887. Once before (in 1884) it had fallen below that figure, but recovered in the following year. There has been no reaction against the decline in price since 1887, and the average price per ton obtained in 1897 is the lowest ever recorded. There were two years in which, with a smaller output, the value exceeded that of 1897. In 1892 the product was nearly 21,000,000 tons less than that of 1897, while the value exceeded it by more than $5,000,000. The value of the product in 1893 was $3,000,000 more than that of 1897, while the amount was more than 19,000,000 tons less.

The increased production of bituminous coal and the decreased price were due partly to the use of mining machines. Sixty per cent of the increased product in 1897 was the increased amount mined by machines. The details of the machine mined product are discussed in another part of this report. Increased activity in the iron and steel industries in 1897 is responsible for a considerable increase in the demand for bitumi-

nous coal, while the gradual diminution of the supply of natural gas also tends to enhance the consumption of soft coal. The remarkable feature of the industry in 1897 was that the increased production was effected in spite of a bitterly contested strike, which lasted from July 5 until the latter part of September, and which affected the competitive fields in eastern Pennsylvania, Ohio, Indiana, Illinois, and a part of West Virginia. The Survey has taken great care to collect the statistics regarding this and other strikes which prevailed during the year, and the results are given in tabulated form in a subsequent part of the report. It is pertinent to state here, however, that in only one of the States affected was there a decrease in the production. Ohio's production fell off 678,260 tons. There were only three other States in which there was a decreased production. The total decrease in these three States was only about 60,000 tons, and they were not affected by the big strike.

Including the Territory of Alaska, there were thirty-one States and Territories producing coal in 1897. Two of these, Idaho and Nebraska, might be excluded without appreciable effect upon the total, as their combined product amounted to but 645 short tons. As in 1896, there were eighteen States whose product exceeded 1,000,000 tons. Two of these exceeded 20,000,000 tons and four exceeded 10,000,000 tons. Only two of these eighteen States had a decreased production in 1897. These were Ohio and the Indian Territory. Illinois enjoyed the solitary distinction of an output exceeding that of 1896 with a decrease in the value. There were eleven States in 1897 producing more than 3,000,000 tons of bituminous coal, as compared with ten in 1896, Kansas having passed that figure for the third time in her history. Three of these eleven States are west of the Mississippi River—Colorado, Iowa, and Kansas. The other eight were Alabama, Illinois, Indiana, Kentucky, Maryland, Ohio, Pennsylvania, and West Virginia. The total bituminous coal product of the eight Eastern States was 119,204,914 short tons, an average of nearly 15,000,000 tons each; the three Western States aggregated 11,027,580 short tons, an average of about 3,675,000 tons. There were in all thirteen coal-producing States east of the Mississippi River, whose aggregate product in 1897, exclusive of Pennsylvania anthracite, was 124,062,806 short tons, against eighteen States west of the Mississippi River, whose product aggregated 23,727,096 short tons.

Pennsylvania, of course, maintains her position as the premier coal producer, having an output of 54,597,891 short tons of bituminous coal in addition to 52,431,763 short tons of anthracite. The output of bituminous coal in Pennsylvania during 1897 was 37 per cent of the total bituminous product and 27 per cent of the entire output of the country, while the combined product of anthracite and bituminous coal in Pennsylvania was 53 per cent of the total for the United States. Illinois retains its position as second in importance, with 13½ per cent of the bituminous product and 10 per cent of the total. West Virginia

increased her lead over Ohio more than 2,000,000 tons, giving her substantial title to third place, with a little less than 10 per cent of the bituminous product and a little over 7 per cent of the total. If West Virginia continues to increase her production in the same proportion for the next few years as she has done in the last decade, the State will occupy second place before ten years more are added to her history. Since 1886 her product has increased 250 per cent, while the output in Illinois in the same time has increased 117 per cent.

Ohio now ranks fourth as a coal producer, having been displaced by West Virginia in 1896. Her product in 1897 was 8 per cent of the bituminous output and 6 per cent of the total. Alabama continues in fifth place, with 4 per cent of the bituminous yield and not quite 3 per cent of the total. Iowa is sixth, displacing Maryland, producing 3 per cent of the one and 2.3 per cent of the other. Maryland's percentages were a little less than Iowa's, and Indiana was a little below Maryland. Kentucky, Colorado, and Kansas occupy the same positions as in 1896, standing ninth, tenth, and eleventh, respectively.

The total number of bituminous coal mines (exclusive of small local banks) which are included in the tabulated returns for 1897 was 2,455, against 2,599 in 1896, a decrease of 144. The average production per mine was not quite 53,000 short tons in 1896 and a little over 60,000 tons in 1897. The number of men employed in 1897 was 248,144, who worked an average of 196 days, against 237,665 men for 192 days in 1896. The tonnage per day for each man employed was 3.04 in both years.

The following tables show the production of all kinds of coal in the United States in 1896 and 1897, 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 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	311,911	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 bituminous	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 product.	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 bituminous	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

Coal product of the United States in 1897, 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	78	4,543,597	86,790	126,187	1,137,196
Arkansas	14	827,518	11,588	18,084	.....
California, Alaska	8	87,642	11,349	4,921	.....
Colorado	97	2,649,042	76,699	93,782	542,180
Georgia	2	120,398	1,481	5,500	68,490
Idaho, Nebraska	2	195	450	.....	.....
Illinois	310	16,358,221	3,041,712	669,012	3,813
Indiana	115	3,630,499	393,012	111,376	16,282
Indian Territory	19	1,250,066	9,068	47,501	29,745
Iowa	162	4,001,311	516,427	71,494	22,633
Kansas	71	2,745,101	253,933	54,730	248
Kentucky	109	3,088,132	404,099	55,033	54,833
Maryland	25	4,391,703	27,762	22,663	.....
Michigan	13	188,636	24,686	10,270	.....
Missouri	105	2,384,797	239,686	41,143	.....
Montana	22	1,434,858	29,707	18,410	164,907
New Mexico	15	689,423	7,844	19,714	.....
North Carolina	1	21,280	.....	.....	.....
North Dakota	20	65,032	10,458	1,756	.....
Ohio	350	10,725,047	1,259,290	192,755	19,850
Oregon	8	85,903	15,409	443	.....
Pennsylvania	575	40,419,846	1,653,049	556,604	11,968,392
Tennessee	45	2,150,179	37,620	39,275	661,775
Texas	16	621,635	8,357	9,349	.....
Utah	11	424,770	22,667	9,198	64,925
Virginia	21	969,973	29,017	43,087	486,225
Washington	23	1,347,915	7,149	39,902	39,146
West Virginia	198	11,312,408	446,795	58,694	2,430,262
Wyoming	20	2,435,091	17,845	93,974	50,976
Total bituminous	2,455	118,969,218	8,643,949	2,414,857	17,761,878
Pennsylvania anthracite	349	46,634,408	1,270,793	4,526,562	.....
Grand total	2,804	165,603,626	9,914,742	6,941,419	17,761,878

Coal product of the United States in 1897, by States—Continued.

State.	Total product.	Total value.	Average price per ton.	Average number of days active.	Average number of employees.
	Short tons.				
Alabama	5,893,770	$5,192,085	$0.88	233	10,597
Arkansas	856,190	903,993	1.06	161	1,990
California Alaska	103,912	265,236	2.55	156	381
Colorado	3,361,703	3,947,186	1.17	180	5,852
Georgia	195,869	140,466	.72	304	469
Idaho Nebraska	645	2,150	3.33	91	7
Illinois	20,072,758	14,472,529	.72	185	33,788
Indiana	4,151,169	3,472,348	.84	170	8,886
Indian Territory	1,336,380	1,787,358	1.34	176	3,168
Iowa	4,611,865	5,219,503	1.13	201	10,703
Kansas	3,054,012	3,602,326	1.18	194	6,639
Kentucky	3,602,097	2,828,329	.79	178	7,983
Maryland	4,442,128	3,363,996	.76	262	4,719
Michigan	223,592	325,416	1.46	230	537
Missouri	2,665,626	2,887,884	1.08	191	6,414
Montana	1,647,882	2,897,408	1.76	252	2,337
New Mexico	716,981	991,611	1.38	208	1,659
North Carolina	21,280	27,000	1.34	215	51
North Dakota	77,246	83,803	1.08	168	170
Ohio	12,196,942	9,535,409	.78	148	26,410
Oregon	101,755	313,890	3.09	171	254
Pennsylvania	54,597,891	37,636,347	.69	205	77,599
Tennessee	2,888,849	2,329,534	.81	221	6,337
Texas	639,341	972,323	1.52	220	1,766
Utah	521,560	618,230	1.19	204	704
Virginia	1,528,302	1,021,918	.67	213	2,344
Washington	1,434,112	2,777,687	1.94	236	2,739
West Virginia	14,248,159	8,987,393	.63	205	20,504
Wyoming	2,597,886	3,136,694	1.21	219	3,137
Total bituminous	147,789,902	119,740,052	.81	196	248,144
Pennsylvania anthracite	52,431,763	79,129,126	1.51	150	149,557
Grand total	200,221,665	198,869,178	.99	179	397,701

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. It will be observed that in the seventeen years from 1880 to 1897 the output of anthracite coal has increased from 25,580,189 long tons, or 28,649,811 short tons, to 46,814,074 long tons, or 52,431,763 short tons, the production in 1897 being 83 per cent more than that of 1880. The annual production of bituminous coal has increased 245 per cent from 42,831,758 short tons in 1880 to 147,789,902 tons in 1897. As compared with 1880 the value per ton of the anthracite product in 1897 shows a gain, the percentage of increase in the value being 88, against 83 per cent increase in product. The percentage of increase in the value of the bituminous product, on the other hand, was 125, or about one-half the percentage of increase in the amount.

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	66,646,947	74,644,581	78,481,056
1887	79,073,227	88,562,014	98,004,656
1888	91,107,002	102,039,843	101,860,529
1889	85,432,717	95,684,643	94,504,745
1890	99,377,073	111,302,322	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
1897	131,955,270	147,789,902	119,740,052

Annual production of coal in the United States since 1880—Continued.

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
1897	46,814,074	52,431,763	79,129,126

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	101,500,024	113,680,027	154,600,176
1887	116,651,974	130,650,211	182,498,737
1888	132,731,613	148,659,407	190,881,012
1889	126,097,869	141,229,613	160,226,323
1890	140,866,931	157,770,963	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
1897	178,769,344	200,221,665	198,869,178

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 1897, 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 1897.

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	129,600	194,400
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	3,000,000	3,450,000	3,217,711	4,324,604
Indian Territory	534,580	855,328	685,911	1,286,692
Iowa	4,315,779	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	27,094,501	21,016,235	31,516,856	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	4,881,620	4,594,979
Wyoming	829,355	2,488,065	1,170,318	3,510,954
Total product sold	108,618,833	147,112,755	124,689,909	173,537,896
Colliery consumption	5,061,194	.....	5,960,302	8,960,841
Total	113,680,027	147,112,755	130,650,211	182,498,737

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	2,221,043	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	10,910,951	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	90,0000	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	142,037,740	204,222,790	141,229,613	160,226,323
Colliery consumption	6,621,667	7,295,834	----	----
Total	148,659,407	211,518,624	141,229,613	160,226,323

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	15,274,727	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	4,807,999
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	157,770,963	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.		1897.	
	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*	
Alabama	5,748,697	$5,174,135	5,893,770	$5,192,085
Arkansas	675,374	755,577	856,190	903,993
California	*a* 93,776	220,523	*a* 103,912	265,236
Colorado	3,112,400	3,606,642	3,361,703	3,947,186
Georgia	*b* 246,359	179,770	*b* 217,149	167,466
Idaho	.....	.....	645	2,150
Illinois	19,786,626	15,809,736	20,072,758	14,472,529
Indiana	3,905,779	3,261,737	4,151,169	3,472,348
Indian Territory	1,366,646	1,918,115	1,336,380	1,787,358
Iowa	3,954,028	4,628,022	4,611,865	5,219,503
Kansas	2,884,801	3,295,032	3,054,012	3,602,326
Kentucky	3,333,478	2,684,306	3,602,097	2,828,329
Maryland	4,143,936	3,299,928	4,442,128	3,363,996
Michigan	92,882	150,631	223,592	325,416
Missouri	2,331,542	2,518,194	2,665,626	2,887,884
Montana	1,543,445	2,279,672	1,647,882	2,897,408
Nebraska	(*c*)	(*c*)	(*f*)	(*f*)
New Mexico	622,626	930,381	716,981	991,611
North Carolina	(*d*)	(*d*)	(*d*)	(*d*)
North Dakota	78,050	84,908	77,246	83,803
Ohio	12,875,202	10,253,461	12,196,942	9,535,409
Oregon	101,721	294,564	101,755	313,890
Pennsylvania:				
Anthracite	54,346,081	81,748,651	52,431,763	79,129,126
Bituminous	49,557,453	35,368,249	54,597,891	37,636,347
Tennessee	2,663,106	2,281,295	2,888,849	2,329,534
Texas	544,015	896,251	639,341	972,323
Utah	418,627	500,547	521,560	618,230
Virginia	1,254,723	848,851	1,528,302	1,021,918
Washington	1,195,504	2,396,078	1,434,112	2,777,687
West Virginia	12,876,296	8,336,685	14,248,159	8,987,393
Wyoming	*e* 2,233,184	2,918,225	2,597,886	3,136,694
Total product	191,986,357	196,640,166	200,221,665	198,869,178

a Includes Alaska.
b Includes North Carolina.
c Included in Wyoming.
d Included in Georgia.
e Includes Nebraska.
f Included in Idaho.

Comparing the amount and value of the products in 1897 with that of 1896, the following statement of increases and decreases is obtained:

Increases and decreases in coal production during 1897 compared with 1896, by States.

State or Territory.	Increase.		Decrease.	
	Short tons.	Value.	Short tons.	Value.
Alabama	145,073	$17,950		
Arkansas	180,816	148,416		
California	*a* 10,136	44,713		
Colorado	249,303	340,544		
Georgia			42,677	$27,584
Idaho	*b* 645	2,150		
Illinois	286,132			1,337,207
Indiana	245,390	210,611		
Indian Territory			30,266	130,757
Iowa	657,837	591,481		
Kansas	169,211	307,294		
Kentucky	268,619	144,023		
Maryland	298,192	64,068		
Michigan	130,710	174,785		
Missouri	334,084	369,690		
Montana	104,437	617,736		
New Mexico	94,355	61,230		
North Carolina	13,467	15,280		
North Dakota			804	1,105
Ohio			678,260	718,052
Oregon	34	19,326		
Pennsylvania bituminous	5,040,438	2,268,098		
Tennessee	225,743	48,239		
Texas	95,326	76,072		
Utah	102,933	117,683		
Virginia	273,579	173,067		
Washington	238,608	381,609		
West Virginia	1,371,863	650,708		
Wyoming	364,702	218,469		
Total	10,149,626	4,848,537		
Pennsylvania anthracite			1,914,318	2,619,525
Grand total	8,235,308	2,229,012		

a Includes Alaska.

b Includes Nebraska.

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 eight 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.		1897.	
	Number of days active.	Average number employed.	Number of days active.	Average number employed.	Number of days active.	Average number employed.
Alabama	244	10,346	248	9,894	233	10,597
Arkansas	176	1,218	168	1,507	161	1,990
California	262	190	*a* 291	177	*a* 156	381
Colorado	182	6,125	172	6,704	180	5,852
Georgia	312	848	*b* 301	731	*b* 296	520
Idaho	------	----------	------	----------	*c* 91	7
Illinois	182	38,630	184	39,560	185	33,788
Indiana	189	8,530	163	8,806	176	8,886
Indian Territory	164	3,212	170	3,549	176	3,168
Iowa	189	10,066	178	9,672	201	10,703
Kansas	159	7,482	168	7,127	194	6,639
Kentucky	146	7,865	165	7,549	178	7,983
Maryland	248	3,912	204	4,039	262	4,719
Michigan	186	320	157	320	230	537
Missouri	163	6,299	168	5,982	191	6,414
Montana	223	2,184	234	2,335	252	2,337
Nevada	------	----------	------	----------	------	----------
New Mexico	190	1,383	172	1,569	208	1,659
North Carolina	226	61	------	----------	------	----------
North Dakota	139	65	166	141	168	170
Ohio	176	24,644	161	25,500	148	26,410
Oregon	69	414	191	254	171	254
Pennsylvania bituminous	206	71,130	206	72,625	205	77,599
Tennessee	224	5,120	211	6,531	221	6,337
Texas	171	1,642	187	1,953	220	1,766
Utah	203	670	202	679	204	704
Virginia	225	2,158	198	2,510	213	2,344
Washington	224	2,840	221	2,622	236	2,739
West Virginia	195	19,159	201	19,078	205	20,504
Wyoming	184	3,449	*c* 210	2,937	219	3,137
Total	194	239,962	192	244,171	196	248,144
Pennsylvania anthracite.	196	142,917	174	148,991	150	149,557
Grant total	195	382,879	185	393,162	179	397,701

a Includes Alaska. *b* Includes North Carolina. *c* Includes Nebraska.

PRICES.

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.	1891.
Alabama	$1.43	$1.30	$1.15	$1.11	$1.03	$1.07
Arkansas	1.60	1.68	1.50	1.42	1.29	1.19
California	3.00	3.00	4.00	2.36	2.56	2.20
Colorado	2.35	2.20	2.20	1.51	1.40	1.37
Georgia	1.50	1.50	1.50	1.50	1.04	1.50
Illinois	1.11	1.09	1.12	.97	.93	.91
Indiana	1.15	1.34	1.40	1.02	.99	1.03
Indian Territory	1.60	1.87	1.88	1.76	1.82	1.74
Iowa	1.25	1.34	1.30	1.33	1.24	1.27
Kansas	1.20	1.40	1.50	1.48	1.30	1.31
Kentucky	1.15	1.15	1.20	.99	.92	.93
Maryland	.95	.95	.95	.86	.86	.81
Michigan	1.50	1.50	1.66	1.71	1.99	1.66
Missouri	1.30	1.34	2.21	1.36	1.24	1.23
Montana	3.50	3.50	3.50	2.42	2.42	2.27
Nevada	.....	.....	.....	.....	.....	.....
New Mexico	3.00	3.00	3.00	1.79	1.34	1.68
North Carolina	.....	.....	.....	.....	1.74	1.93
North Dakota	1.59	1.50	3.50	1.43	1.40	1.40
Ohio	.95	.88	.93	.93	.94	.94
Oregon	2.50	2.20	3.00	.....	2.89	3.00
Pennsylvania bituminous	.80	.90	.95	.77	.84	.87
Tennessee	1.15	1.30	1.10	1.21	1.10	1.11
Texas	1.85	2.00	2.05	2.66	2.53	2.40
Utah	2.10	2.00	2.10	1.59	1.74	1.80
Virginia	1.00	.94	1.00	.93	.75	.83
Washington	2.25	2.20	3.00	2.32	2.71	2.31
West Virginia	.94	.95	1.10	.82	.84	.80
Wyoming	3.00	3.00	3.00	1.26	1.70	1.53
Total bituminous	*a* 1.06	*a* 1.12	*a* 1.00	1.00	.99	.99
Pennsylvania anthracite	*a* 1.95	*a* 2.01	*a* 1.95	1.44	1.43	1.46
General average	*a* 1.30	*a* 1.45	*a* 1.42	1.13	1.12	1.13

a Exclusive of colliery consumption.

Average prices for coal at the mines since 1886—Continued.

State or Territory.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	$1.05	$0.99	$0.93	$0.90	$0.90	$0.88
Arkansas	1.24	1.34	1.22	1.25	1.11	1.06
California	2.46	2.31	2.31	2.33	*a* 2.35	*a* 2.55
Colorado	1.62	1.24	1.24	1.20	1.16	1.17
Georgia	.99	.98	.85	.83	.70	.72
Idaho	.....	.....	.....	.....	.....	*b* 3.33
Illinois	.91	.89	.89	.80	.80	.72
Indiana	1.08	1.07	.96	.91	.84	.84
Indian Territory	1.71	1.79	1.59	1.43	1.40	1.34
Iowa	1.32	1.30	1.26	1.20	1.17	1.13
Kansas	1.31½	1.27	1.23	1.20	1.15	1.18
Kentucky	.92	.86	.88	.86	.78	.79
Maryland	.89	.88	.77	.81	.80	.76
Michigan	1.56	1.79	1.47	1.60	1.62	1.46
Missouri	1.23	1.23	1.17	1.12	1.08	1.08
Montana	2.36	1.99	2.04	1.89	1.47	1.76
Nevada	.....	.....	3.15	.....	.....	.....
New Mexico	1.62	1.47	1.57	1.49	1.49	1.38
North Carolina	1.44	1.50	1.76	1.66	1.50	1.34
North Dakota	.96	1.13	1.12	1.07	1.09	1.08
Ohio	.94	.92	.83	.79	.79	.78
Oregon	4.29	3.57	3.87	3.36	2.90	3.09
Pennsylvania bituminous	.84	.80	.74	.72	.71	.69
Tennessee	1.13	1.08	.97	.93	.86	.81
Texas	2.32	2.28	2.32	1.88	1.65	1.52
Utah	1.56	1.48	1.40	1.31	1.20	1.19
Virginia	.86	.84	.76	.63	.63	.67
Washington	2.28	2.31	2.33	2.16	2.00	1.94
West Virginia	.80	.77	.75	.68	.65	.63
Wyoming	1.27	1.35	1.31	1.33	*b* 1.37	1.21
Total bituminous	.99	.96	.91	.86	.83	.81
Pennsylvania anthracite	1.57	1.59	1.52	1.41	1.50	1.51
General average	1.16	1.14	1.09	1.02	1.02	.99

a Includes Alaska. *b* Includes Nebraska.

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 1897, 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. The tariff act of 1897 provides that all coals containing less than 92 per cent fixed carbon, and which will pass over a half-inch screen, shall pay a duty of 67 cents per ton. Slack or culm was not changed by the act of 1897. Tons are all 2,240 pounds. 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 imported and entered for consumption in the United States, 1867 to 1897.

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
1897	24,534	59,222	*d* 1,276,135	3,424,833

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.
d Including 42,954 tons of slack or culm, valued at $44,962.

Coal of domestic production exported from the United States, 1867 to 1897.

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
1897	1,297,282	5,830,633	2,400,744	5,332,858

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 (1897)	long tons	202,119,196	226,373,500
United States (1897)	do	178,769,344	200,221,665
Germany (1897)	metric tons	120,430,000	132,713,860
France (1896)	do	29,310,832	32,300,537
Austria-Hungary (1896)	do	33,678,000	37,113,156
Belgium (1896)	do	21,213,000	23,376,726
Russia (1896)	do	9,229,000	10,170,358
Canada (1897)	short tons	3,876,201	3,876,201
Japan (1895)	metric tons	4,849,000	5,343,598
India (1896)	long tons	3,848,000	4,309,760
New South Wales (1897)	do	4,383,591	4,909,622
Spain (1897)	metric tons	1,939,400	2,137,219
New Zealand (1896)	long tons	793,000	888,160
Sweden (1896)	metric tons	226,000	249,052
Italy (1896)	do	276,197	304,369
South African Republic (1897)	long tons	1,600,212	1,792,237
Queensland (1896)	do	371,000	415,520
Victoria (1896)	do	227,000	255,240
Natal (1896)	do	216,000	241,920
Cape Colony (1896)	metric tons	107,050	117,969
Tasmania (1896)	do	36,856	40,615
Other countries (*a*)	long tons	2,000,000	2,240,000
Total			689,391,284
Percentage of the United States			29

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 1897 this country produced 29 per cent of the world's total, while Great Britain's output was only 11½ per cent more than that of the United States. Great Britain's percentage of the total in 1897 was 33. Germany increased her percentage from 15 in 1868 to to 19 in 1897, but her total was only 66 per cent of that of the United States. The output of France was only 5 per cent of the total in 1897 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	101, 500, 024	113, 680, 027	157, 518, 482	176, 420, 700
1887	116, 651, 974	130, 650, 211	162, 119, 812	181, 574, 189
1888	132, 731, 613	148, 659, 407	169, 935, 219	190, 327, 445
1889	126, 097, 869	141, 229, 613	176, 916, 724	198, 146, 731
1890	140, 866, 931	157, 770, 963	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
1897	178, 769, 344	200, 221, 665	202, 119, 196	226, 373, 500

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
1897	120,430,000	132,713,860	----------	----------

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	33,678,000	37,113,156	21,213,000	23,376,726
1897				

World's production of coal, by countries, since 1868—Continued.

Year.	Russia.		Japan.	
	Metric tons.	Short tons.	Metric tons.	Short tons.
1868				
1869				
1870	696,673	768,082		
1871				
1872				
1873				
1874				
1875	1,709,718	1,884,964		
1876				
1877				
1878	2,483,575	2,738,141		
1879	2,874,790	3,169,456		
1880	3,238,470	3,570,413		
1881	3,439,787	3,792,365		
1882	3,672,782	4,049,242		
1883	3,916,105	4,317,506	1,021,000	1,125,142
1884	3,869,689	4,266,332	1,159,000	1,277,218
1885	4,207,905	4,639,215	1,314,000	1,448,028
1886	4,506,027	4,967,895	1,402,000	1,545,004
1887	4,464,174	4,921,752	1,785,000	1,967,070
1888	5,187,312	5,719,011	2,044,000	2,252,488
1889	6,215,577	6,852,674	2,435,000	2,683,370
1890	6,016,525	6,633,219	2,653,000	2,923,606
1891	6,233,020	6,871,905	3,230,000	3,559,460
1892	6,816,323	7,514,996	3,228,000	3,557,256
1893	7,535,000	8,307,337	3,350,000	3,691,700
1894	8,629,000	9,509,158	4,311,000	4,750,722
1895	9,079,138	10,005,210	4,849,000	5,343,598
1896	9,229,000	10,170,358		
1897				

World's production of coal, by countries, since 1868—Continued.

Year.	Other countries.	Total.	Per cent of United States.
	Short tons.	Short tons.	
1868	1,152,665	220,566,870	14.35
1869	1,107,395	228,564,335	13.85
1870	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	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	3,176,050	318,441,990	18.17
1879	3,362,605	333,585,069	19.92
1880	3,621,342	364,737,405	19.60
1881	5,185,974	392,663,253	21.87
1882	6,128,631	420,082,472	24.58
1883	6,930,279	450,990,835	25.55
1884	7,367,309	454,022,811	26.37
1885	7,570,507	447,581,529	24.79
1886	9,058,136	450,824,114	25.22
1887	*a* 10,338,437	481,351,907	27.14
1888	11,548,758	521,281,385	28.52
1889	12,679,474	531,697,155	26.56
1890	13,058,616	563,507,020	28.00
1891	14,789,656	587,599,910	28.69
1892	15,003,435	593,502,684	30.22
1893	15,201,842	582,056,539	31.33
1894	*b* 18,254,353	610,671,233	27.96
1895	*c* 19,462,803	644,145,027	29.98
1896	*d* 20,864,266	663,866,000	28.92
1897	.....	.....	.....

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, 500,000 tons; 1888, 700,000 tons; 1889, 900,000 tons; 1890, 1,000,000 tons; 1891, 1,000,000 tons; 1892, 1,400,000 tons; 1893, 1,500,000 tons.

b This includes, in addition to the countries named on the following pages, the output of Natal, 169,702 tons; Cape Colony, 78,053 tons; Tasmania, 34,633 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,522,388 tons.

c This includes, in addition to the countries named on the following pages, the output of Natal, 172,425 tons; Cape Colony, 98,543 tons; Tasmania, 41,279 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,552,247 tons.

d This includes, in addition to the countries named on the following pages, the output of Natal, 241,920 tons; Cape Colony, 117,969 tons; Tasmania, 40,615 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,640,504 tons.

Product of minor coal-producing countries since 1868.

Year.	New South Wales.		Queensland.	
	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
1879	1, 583, 381	1, 773, 387	55, 012	61, 613
1880	1, 466, 180	1, 642, 122	58, 052	65, 018
1881	1, 769, 597	1, 981, 949	65, 612	73, 485
1882	2, 109, 282	2, 362, 396	74, 436	83, 368
1883	2, 521, 457	2, 824, 032	104, 750	117, 320
1884	2, 749, 109	3, 079, 002	120, 727	135, 214
1885	2, 878, 863	3, 224, 327	209, 698	234, 862
1886	2, 830, 175	3, 169, 796	228, 656	256, 094
1887	2, 922, 497	3, 273, 197	238, 813	267, 470
1888	3, 203, 444	3, 587, 857	311, 412	348, 781
1889	3, 655, 632	4, 094, 308	265, 507	297, 368
1890	3, 060, 876	3, 428, 181	338, 344	378, 945
1891	4, 037, 929	4, 522, 480	271, 603	304, 195
1892	3, 780, 968	4, 234, 684	265, 086	296, 896
1893	3, 278, 328	3, 671, 727	264, 403	296, 131
1894	3, 672, 076	4, 112, 725	270, 705	303, 190
1895	3, 737, 536	4, 186, 040	322, 977	361, 734
1896	3, 909, 517	4, 378, 659	371, 000	415, 520
1897	4, 383, 591	4, 909, 622	.....	.....

Product of minor coal-producing countries since 1868—Continued.

Year.	New Zealand.		Victoria.		Canada.
	Long tons.	Short tons.	Long tons.	Short tons.	Short tons.
1868	.....	.....	.....	.....	.....
1869	.....	.....	.....	.....	.....
1870	.....	.....	.....	.....	.....
1871	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....
1873	.....	.....	.....	.....	.....
1874	.....	.....	.....	.....	1,058,446
1875	.....	.....	.....	.....	984,905
1876	.....	.....	.....	.....	933,803
1877	.....	.....	.....	.....	1,002,395
1878	162,218	181,684	.....	.....	1,034,081
1879	231,218	258,964	.....	.....	1,123,863
1880	299,923	335,913	.....	.....	1,424,635
1881	337,262	377,733	.....	.....	1,487,182
1882	378,272	423,665	.....	.....	1,811,708
1883	421,764	472,376	.....	.....	1,806,259
1884	480,831	538,531	.....	.....	1,950,080
1885	511,063	572,390	.....	.....	1,879,470
1886	534,353	598,475	.....	.....	2,091,976
1887	558,620	625,654	.....	.....	2,418,494
1888	613,895	687,562	.....	.....	2,658,134
1889	586,445	656,818	14,421	16,152	2,719,478
1890	637,397	713,885	20,750	23,240	3,117,661
1891	668,794	749,049	22,834	25,574	3,623,076
1892	673,315	754,113	23,363	26,166	3,292,547
1893	691,548	774,534	91,726	102,733	3,201,742
1894	719,546	805,892	175,175	196,196	3,903,913
1895	727,000	814,240	194,171	217,472	3,512,504
1896	793,000	888,160	227,000	255,240	3,743,234
1897	.....	.....	.....	.....	.....

Product of minor coal-producing countries since 1868—Continued.

Year.	India.		Spain.	
	Long tons.	Short tons.	Metric tons.	Short tons.
1868				
1869				
1870				
1871				
1872				
1873				
1874				
1875				
1876				
1877				
1878				
1879				
1880				
1881	997,543	1,117,248		
1882	1,130,242	1,265,871		
1883	1,315,976	1,473,893		
1884	1,266,312	1,418,269		
1885	1,294,221	1,449,528		
1886	1,401,295	1,569,450	1,001,432	1,104,079
1887	1,560,393	1,747,640	1,038,305	1,144,731
1888	1,802,876	2,019,221	1,036,565	1,142,813
1889	2,045,359	2,290,802	1,153,755	1,272,015
1890	2,168,521	2,438,744	1,212,089	1,336,328
1891	2,328,577	2,608,006	1,287,988	1,420,007
1892	2,537,696	2,842,220	1,461,196	1,610,969
1893	2,529,855	2,833,438	1,484,794	1,636,986
1894	2,810,929	3,158,240	1,657,010	1,830,853
1895	3,538,000	3,962,560	1,783,783	1,965,729
1896	3,848,000	4,309,760	1,878,399	2,069,996
1897			1,939,400	2,137,219

Product of minor coal-producing countries since 1868—Continued.

Year.	Italy.		Sweden.		South African Republic.	
	Metric tons.	Short tons.	Metric tons.	Short tons.	Long 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	243,325	268,266	.....	.....	.....	.....
1887	327,665	361,251	.....	.....	.....	.....
1888	366,794	404,390	.....	.....	.....	.....
1889	390,320	432,533	.....	.....	.....	.....
1890	376,326	415,500	187,512	206,132	.....	.....
1891	289,286	318,938	198,033	218,331	.....	.....
1892	295,713	326,024	199,380	219,816	.....	.....
1893	317,249	349,767	199,933	220,426	548,534	614,358
1894	271,295	299,103	213,633	235,532	791,358	886,321
1895	305,321	336,563	223,652	246,464	1,133,466	1,269,482
1896	276,197	304,369	226,000	249,052	1,437,297	1,609,772
1897	.....	.....	.....	.....	1,600,212	1,792,237

MACHINE-MINED BITUMINOUS COAL.

In Mineral Resources for 1896 some statistics were presented which exhibited the development of the use of mining machines in the bituminous coal mines of the United States during a period of six years. The investigation was continued in collecting the statistics of production in 1897, with the results shown in the following table. The report for 1896 covered fifteen States, and, while incomplete, was sufficiently accurate to serve the purpose. It did not include, for instance, the statistics of machine mining in Illinois, which are included in the present report, and which show that the total amount of coal mined by

machines in 1891 was somewhat more than double the amount stated in the previous report, and that the percentage of the machine-mined coal to the total product in that year was 5.49 instead of 3.27.

The reports for 1897 show that mining machines were in use in twenty States in 1897, as compared with sixteen in 1896, and eight in 1891. Utah and Washington, which had a machine-mined tonnage of 760 and 3,920, respectively, in 1896, did not report any product so won in 1897; while six States which did not report any coal won by machines in 1891 or 1896 had a combined machine-mined product of nearly 2,000,000 short tons in 1897. These States, with the amounts of coal extracted by machines, were as follows: Alabama, 294,384 short tons; Kansas, 4,500 short tons; Kentucky, 1,299,436 short tons; Tennessee, 47,207 short tons; Texas, 11,750 short tons; and Virginia, 323,649 short tons.

The number of firms using machines has increased from 51 in 1891 to 136 in 1896 and 211 in 1897. The number of machines in use has increased from 545 in 1891 to 1,446 in 1896 and 1,988 in 1897. The amount of coal won by machines has increased from 6,211,732 short tons in 1891 to 16,424,932 in 1896 and 22,649,220 short tons in 1897. The most significant increase shown by these statistics, however, is in the percentage of machine-mined coal to the total product. In 1891 the proportion of the total product won by machines was 5.49 per cent, in 1896 12.41 per cent, and in 1897 15.95 per cent, nearly 3 times the percentage won in 1891. These increases are rendered all the more significant when the total tonnage in the States included in this tabulation is considered in comparison with the machine-mined product. The total product of the twenty-two States included in the following table in 1891 was 113,199,882 short tons; in 1897 the product of the same States was 141,993,577 short tons; showing an increase of 28,793,695 short tons, or 25 per cent. The product won by machines has increased from 6,211,732 short tons to 22,649,220 short tons, a gain of 16,437,488 short tons, or 265 per cent. The total bituminous product of the United States from 1891 to 1897 increased 25 per cent, or 29,888,665 short tons, of which 16,437,488 short tons, or 14 per cent, was represented by the increase in machine-mined coal.

With the exception of Utah and Washington, every State in the following table had a larger product from machines in 1897 than in 1896, and in only two other cases, Indiana and Missouri, was the ratio of machine product to the total less in 1897 than in 1896.

Practically all of the coal mined in Alaska is extracted by machines, giving that Territory a percentage of 100. Montana's machine-mined coal was 43.77 per cent of the total in 1897 against 37.54 per cent in 1896. Of Kentucky's product in 1897, 36.07 per cent was mined by machines. These two States represent the most important development in machine mining as compared to the total production. Pennsylvania, the largest producer, has also the largest machine tonnage, but the latter was only 12.29 per cent of the total product of the State in 1896, and 16.35 per cent in 1897. Illinois comes second both in total output and machine product, the latter being a little over 19½ per cent

of the total output of the State in each year. Ohio, fourth in production, is third in the amount of coal mined by machines, her machine-won product in 1897 being within 3 per cent of that of Illinois. West Virginia, the third State in amount of production, has a comparatively unimportant machine product. Kentucky ranks eighth in amount of product and fourth in machine tonnage; Indiana ranks seventh and fifth, respectively; Montana, fourteenth and sixth; and Wyoming, thirteenth and seventh. These are the only States whose production by the use of machines exceeded 500,000 short tons in 1897.

The remarkable increase in the production of coal by the use of machines, superseding a large amount of manual labor and cheapening the cost of production, has undoubtedly had an important bearing on the prices of bituminous coal, which, as shown elsewhere, have declined steadily for several years. In some cases selling prices have been lowered on account of the lessened cost of production; in other cases machines have been introduced in order to meet reduced prices caused by an already glutted market. In nearly all cases the benefit that might have been derived from the introduction of machines has been sacrificed in the effort to increase tonnage rather than to continue previous output with a shortened pay roll.

The statistics of the production of coal by machines in 1891, 1896, and 1897 are shown in the following table:

Bituminous coal mined by machines in twenty-two States in 1891, 1896, and 1897.

State.	Number of firms using machines.			Number of machines in use.			Number of tons mined by machines.		
	1891.	1896.	1897.	1891.	1896.	1897.	1891.	1896.	1897.
Alabama	.....	.....	3	.....	.....	45	.....	.....	294,384
Alaska	.....	1	1	.....	6	6	.....	15,232	17,920
Arkansas	.....	1	1	.....	14	15	.....	21,094	87,532
Colorado	1	6	8	20	34	37	284,646	318,172	352,400
Illinois	16	21	35	241	307	320	3,027,305	3,871,410	3,946,257
Indiana	3	11	11	47	186	174	212,830	964,378	1,023,361
Indian Territory	.....	3	3	.....	56	54	.....	191,585	263,811
Iowa	2	5	7	9	45	67	41,540	84,556	181,209
Kansas	.....	.....	1	.....	.....	1	.....	.....	4,500
Kentucky	.....	.....	13	.....	.....	162	.....	.....	1,299,436
Missouri	.....	1	1	.....	4	3	.....	47,827	59,692
Montana	.....	3	2	.....	62	61	.....	579,414	720,345
North Dakota	.....	1	1	.....	1	2	.....	15,000	20,000
Ohio	19	31	39	114	209	224	1,654,081	3,368,349	3,843,345
Pennsylvania	7	41	64	72	454	690	431,440	6,092,644	8,925,293
Tennessee	.....	.....	2	.....	.....	8	.....	.....	47,207
Texas	.....	.....	1	.....	.....	5	.....	.....	11,750
Utah	.....	1	.....	.....	1	.....	.....	760	.....
Virginia	.....	.....	1	.....	.....	22	.....	.....	323,649
Washington	.....	1	.....	.....	3	.....	.....	3,920	.....
West Virginia	1	7	13	8	25	47	205,784	430,944	673,523
Wyoming	2	2	4	34	39	45	354,106	419,647	555,526
Total	51	136	211	545	1,446	1,988	6,211,732	16,424,932	22,649,220

Bituminous coal mined by machines in twenty-two States in 1891, 1896, and 1897—Cont'd.

State.	Total tonnage.			Percentage of total product mined by machines.		
	1891.	1896.	1897.	1891.	1896.	1897.
Alabama	4,759,781	5,748,697	5,893,770	.....	.....	4.99
Alaska	.....	15,232	17,920	.....	100.00	100.00
Arkansas	542,379	675,374	850,190	.....	3.12	10.30
Colorado	3,512,632	3,112,400	3,361,703	8.10	10.22	10.48
Illinois	15,660,698	19,786,626	20,072,758	19.33	19.57	19.66
Indiana	2,973,474	3,905,779	4,151,169	7.16	24.69	24.65
Indian Territory	1,091,032	1,366,646	1,336,380	.....	14.02	19.74
Iowa	3,825,495	3,954,028	4,611,865	1.09	2.14	3.93
Kansas	2,716,705	2,884,801	3,054,012	.....	.....	0.15
Kentucky	2,916,069	3,333,478	3,602,097	.....	.....	36.07
Missouri	2,674,606	2,331,542	2,665,626	.....	2.56	2.24
Montana	541,861	1,543,445	1,645,799	.....	37.54	43.77
North Dakota	30,000	78,050	77,246	.....	19.22	25.89
Ohio	12,868,683	12,875,202	12,196,942	12.85	26.16	31.51
Pennsylvania	42,788,490	49,557,453	54,597,891	1.01	12.29	16.35
Tennessee	2,413,678	2,663,106	2,888,849	.....	.....	1.63
Texas	172,100	544,015	639,341	.....	.....	1.84
Utah	371,045	418,627	521,560	.....	0.18	.....
Virginia	736,399	1,254,723	1,528,302	.....	.....	21.18
Washington	1,056,249	1,195,504	1,434,112	.....	0.33	.....
West Virginia	9,220,665	12,876,296	14,248,159	2.23	3.35	4.73
Wyoming	2,327,841	2,229,624	2,597,886	15.21	18.82	21.38
Total	113,199,882	132,350,648	141,993,577	5.49	12.41	15.95

In addition to the inquiries addressed to the producers regarding the statistics of coal mined by machines, letters of similar nature were sent to the manufacturers of coal-mining machines. The letters addressed to the manufacturers asked for a statement of the number of machines actually in use each year since they were introduced, and, if possible, a record of the coal tonnage won by each make of machine during the last five years. The inquiries were coupled with the assurance that individual statements would be held confidential and that only the totals would be published. The inquiries met with cordial response and replies were received from the following companies:

Geo. S. Whitcomb Company, Chicago, Illinois. Began making machines in 1880.

Jeffrey Manufacturing Company, Columbus, Ohio. Began shipping in 1887.

Ingersoll-Sargent Drill Company, Cleveland, Ohio (also New York and Chicago). Began shipping in 1887.

Morgan-Gardner Electric Company, Chicago, Illinois. Began shipping in 1894.

Link Belt Machinery Company, Chicago, Illinois. Began making machines in 1894.

Morgan Standard Company, Chicago, Illinois. Began in 1895.

General Electric Company, Schenectady, New York. This company began making a new type of under-cutting machine in 1897.

The manufacturers were not able in all cases to state how many machines were actually in use each year, nor to give the producing records of the machines. From the replies received, however, it has

been possible to give the following approximate statement of the number of machines installed since the first mining machine was placed upon the market:

Approximate number of mining machines installed each year in coal mines of the United States.

Year.	Number.	Year.	Number.
Prior to 1888	735	1894	305
1888	165	1895	440
1889	180	1896	565
1890	195	1897	597
1891	215	Total	3,872
1892	205		
1893	270		

From this it appears that there have been installed since 1880 a total of 3,872 mining machines in the coal mines of the United States. The returns from the operators show that 1,988 machines were in operation during 1897, so that there were approximately 1,874 mining machines which have been discarded or were not in actual use during 1897. Probably not more than half of these have been discarded, from which it is shown that about 75 per cent of all the mining machines installed since their use was begun are still in operation or available. It should be remembered that these statistics apply only to under-cutting machines driven by electricity or compressed air. They in no way refer to generators, haulage locomotives, or drills for blasting.

STRIKES IN COAL MINES DURING 1897.

The general strike which occurred among the bituminous coal miners in the competitive fields of Illinois, Indiana, Ohio, and western Pennsylvania, and even extended its influence into Kentucky and West Virginia, was in some respects the most remarkable on record. It had its beginning in a fight against the New York and Cleveland Gas Coal Company of Pittsburg, because of the contracts entered into by that company with its employees, by which the company was to pay and the miners to receive 10 cents per ton less than the scale adopted for the Pittsburg region. The company maintained that as it did not own nor have any interest in a company store, but paid its employees in cash, it was entitled to make up for the store profits by paying a lower rate of wages. The miners were encouraged in their struggle by the majority of the operators in the field who held that the differential rate paid for mining by the New York and Cleveland Gas Coal Company enabled that company to market its product at lower prices than

its competitors could afford to meet. The contest was bitterly waged, but can not be said to have been entirely successful from the strikers' standpoint, so far as the original cause of complaint was concerned. The attempts to make the miners of the New York and Cleveland Company quit work by marching with bands of music and other demonstrations were only partially successful, many of those who stopped work claiming it was from fear of violence. The strike, however, was conducted in a manner so notable for its peacefulness and want of violence as to mark it as an epoch in the history of labor troubles.

The ultimate results of the strike were beneficial to the strikers. Wages were generally advanced, and were it not for the mining stores still remaining in many places as a thorn in the flesh, the conclusion of the strike would have accomplished all that was desired. The New York and Cleveland Gas Coal Company has declared its intention to pay its employees the full wage scale as soon as operators representing 95 per cent of the product in the Pittsburg field shall have abandoned mine stores and adopted the plan of paying employees in cash, enabling them to make their purchases in the open market.

This strike was inaugurated on July 5 and terminated September 15. It was remarkable in its origin, its peaceful conduct, and from the fact that the sympathy not only of the public but of their employers was with the striking miners. It was, in fact, a contest among the mining companies in which the miners were merely instrumental. It is safe to assert that the mining companies appreciated the underpaid conditions of their employees, but felt their inability to afford any amelioration of their condition in the face of existing competition.

The general strike, while it was the most important of the labor disaffections throughout the year, did not represent all of the troubles. Illinois had its own struggles apart from its participation in the general strike. The subsequent table, which contains a compilation of the statistics relating to labor troubles in the coal mines of all the States, shows that Illinois was the principal sufferer from these. In that State, as shown by the report of the bureau of labor statistics, 266 mines were affected, and 26,407 men were idle for an average of 101 days, entailing a total loss in working time of 2,660,334 days. This great loss of time, however, is not shown in the tonnage of the State, which in 1897 amounted to 286,132 tons more than in 1896. The disadvantage experienced on account of this loss of time was merely comparative. The increase in tonnage would have been much larger but for the time lost in strikes. The total number of men employed in the coal mines of Illinois in 1897 was 33,788, and the average working time 167.1 days, equivalent to a total of 5,645,975 working days. It appears from this that the time lost was equal to 47 per cent of the time made, and estimating that the efficiency per day of the men on strike was equal to that of the tonnage made during the working time, the State was

capable of producing during 1897 a total of 29,500,000 tons, against a product actually won of 20,072,758 tons.

The report of the bureau of labor statistics of Illinois divides the statistics relating to the strike of 1897 according to the important coal fields. (1) The northern field embraces the counties of Whiteside, Bureau, Lasalle, Grundy, Will, Marshall, Woodford, Livingston, and McLean. This field was the one most seriously affected by the labor troubles. The total number of men idle was 11,249, and the average time lost by each man was 131 days, involving a total loss in working time of 1,479,129 days. (2) The Rock Island field, embracing Mercer and Rock Island counties, had 893 men, employed at 15 different mines, idle for an average of 71 days, the total working time lost being 63,468 days. (3) The Peoria field, containing Peoria and Fulton counties and contiguous mines in Tazewell County, lost 61,116 working days, an average of 41 days lost by the 1,500 men on strike. (4) The Danville field is all contained in Vermilion County. In this district 1,645 men were idle 89 days, the total working time lost amounting to 146,665 days. (5) The Springfield field, embracing Logan, Menard, and the northern part of Sangamon counties, lost 190,850 days, distributed among 2,394 men, an average of 80 days for each man. (6) The Pana, Mount Olive, and Virden field, consisting of Macoupin, Christian, Shelby, and the southern part of Sangamon counties, had 3,616 men idle for an average of 106 days, the total time lost being 382,588 days. (7) The Belleville field, composed of Bond, Clinton, Madison, and St. Clair counties, had 1,749 men on strike for an average of 64 days, and a total loss of 112,733 working days. (8) The Centralia and Duquoin field, consisting of Marion, Jefferson, Washington, Randolph, Perry, and Jackson counties, lost 43,153 days in working time, 1,354 men being idle an average of 32 days. The foregoing does not include 21 mines in the State in which machines are used and at which strikes occurred with a loss of 180,632 working days, an average of 90 days for the 2,007 men on strike.

Next to Illinois, Ohio had the largest number of mines affected by the strike, but the number of men on strike and the total time lost in that State were not so large as in Pennsylvania. In Ohio the number of mines affected was 228; in Pennsylvania, 188. Ohio had 21,685 men idle for an average of 78 days, making the total time lost equivalent to 1,690,549 working days; Pennsylvania had 29,112 men on strike for 72 days, involving a total loss in working time of 2,102,336 days. In proportion to the total tonnage of the two States and the total number of men employed in the coal mines, the loss in Ohio was much greater than that in Pennsylvania. The effect of the strike in Ohio appears in a decrease of the product in 1897 as compared with the preceding year, while Pennsylvania shows a substantial increase, the counties in the central portion of the State not being affected. The total amount of time made at the Ohio coal mines was 3,900,617 work-

ing days, the time lost being equivalent to 43.3 per cent of the time made. In Pennsylvania the time made was 15,901,230 days, and the time lost was consequently only 13.2 per cent of the time made.

The strike in Ohio was most seriously felt in the five large producing counties of Athens, Hocking, Jackson, Perry, and Stark. The miners in Jackson County were the chief sufferers, 3,840 men being idle an average of 81½ days and involving a total loss of 313,028 days. The product of the county decreased 66,575 short tons as compared with 1896. Perry County had 2,774 men on strike for 81 days, involving a total loss of 224,687 days. The output of the county decreased 127,373 short tons. Stark County lost 194,372 working days, 1,771 men being idle for 110 days, and the product fell off 323,553 short tons. Hocking County had 2,389 men idle for 70 days, making a total loss of 167,679 working days. The operations in Hocking County are all on a large scale, and the county was able to overcome nearly all of the effects of the strike, the decrease in output being only 3,561 short tons. Athens County was the greatest loser in tonnage, the product falling off 244,499 short tons. The total time lost in this county was 165,351 working days, an average of 73½ days for the 2,249 men involved.

In Pennsylvania, Allegheny County was the chief loser, and suffered more loss in time than any State except Ohio and Illinois. Out of a total of 83 mines, 72 had men on strike. The total number of men idle was 12,410, who lost an average of 85 days, making a total loss of 1,052,386 working days. The product of the county in 1897 was 640,828 short tons less than in 1896. Washington County had 5,506 men employed at 32 mines on strike an average of 82 days, the total loss of time being 450,110 days. The product decreased 177,315 short tons. Fayette County lost 176,184 working days distributed among 14 mines and 2,313 men for an average of 76 days. Westmoreland County had 2,447 men on strike an average of 70 days.

In Indiana Clay County was the principal sufferer, 19 mines out of a total of 28 being affected, and 2,295 men out of a total of 2,682 being on strike for an average of 74 days, entailing a total loss of 169,036 working days. The output of Clay County in 1897 was 306,708 short tons less than in 1896. Parke County, adjoining Clay, had 857 men idle for 78 days, making a total loss of 66,857 days.

The details of strikes in other States, as well as other counties in Pennsylvania, Ohio, and Indiana, are given in connection with the statistics of production by States.

The following table exhibits the statistics of strikes in 1897 by States:

Strikes in bituminous coal mines in United States during 1897.

State.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Alabama	7	1,175	18	21,235
Arkansas	3	480	70	3,460
Colorado	3	103	13	1,231
Illinois	266	26,407	101	2,660,334
Indiana	57	5,923	73	431,837
Iowa	44	3,456	39	135,586
Kansas	1	120	4	480
Kentucky	33	2,818	110	309,651
Michigan	4	170	11	1,837
Missouri	11	833	21	16,844
New Mexico	4	380	7	2,680
Ohio	228	21,685	78	1,690,549
Pennsylvania	188	29,112	72	2,102,336
Tennessee	14	2,056	75	154,864
Texas	1	10	4	40
Virginia	1	300	30	9,000
Washington	1	200	24	4,800
West Virginia	70	6,136	54	328,000
Wyoming	2	293	22	6,469
Total	938	101,657	77½	7,881,233

According to the foregoing statement, the total number of men made idle by strikes in 1897 was 101,657, and the average time lost by each man was 77½ days. From this it would appear that the total time lost was 7,881,233 working days. Estimating the average wages earned per day by each man at $1.50, this would mean a total loss to the miners in money of $11,821,850. That this amount may be considered as lost to the men who struck is true, but it was not lost to miners as a class, for the increased production in other fields gave extra employment to miners in those fields who reaped the benefit of the losses incurred by their fellow-workmen. If the coal production of the United States had decreased in proportion to the extent of the strike, the loss to the entire mining trade would have been very great. As it was, the wages which would have been paid to the striking miners were distributed among other regions.

RATES PAID FOR MINING BITUMINOUS COAL.

In collecting the statistics of coal production in 1897 an attempt was made for the first time to ascertain to what extent bituminous coal mining is paid for by run-of-mine coal, to what extent the coal is screened before being weighed and paid for, and over what sized screens it is passed; also to ascertain the rates paid for mining coal however paid. The results of these inquiries are shown in the following tables. Considering that the inquiries were the first that had been made for this particular information the replies were satisfactory. In some cases, however, the operators state what sizes of screens were used, but not the amount of screened coal paid for. Some neglected to give the mining rates or failed in some other detail. Others did not have proper records from which to supply the information, or else the coal was paid for by miners' cars, the contents of which were uncertain quantities. In all such cases the reports were excluded from the tabulation.

After eliminating these imperfect reports the total tonnage reported and tabulated was 105,017,692 out of a total product of 147,789,902 short tons, practically 71 per cent. In order that the tables might be reduced as much as possible all coal passed over screens having less than 1-inch mesh or bar space has been included with 1-inch screened coal, and all over 2 inches is lumped with 2-inch screens. For the same reason all rates between multiples of five have been combined. Almost every rate from 18 cents to $1 (and sometimes fractions of a cent are given in the rate) are paid in one State or another, so that to be exact would require a table of nearly 100 columns. Consequently all rates above 20 cents, up to 25 cents, inclusive, are given in one column, with the total tonnage paid for at those rates. All coal paid for at rates above 25 cents and up to 30 cents, is given in the next column, and so on. The $1 rate and over includes a small amount of coal paid for at the rate of $1.75 per ton, and another small product paid for at a $2 rate. These, of course, are exceptional and in remote districts.

It will be observed that the mining is paid for principally by run-of-mine coal. The first of the two tables following shows the statistics for the ten leading coal-producing States. The second table gives the same information for fourteen other States. Alaska, Nebraska, Nevada, California, and North Carolina are not included in the tabulation. The rate paid in California ranges from 60 cents to 75 cents, but no statements were given as to the amount of coal paid for at different rates. The production in the other three States and in Alaska is insignificant. A little over two-thirds of the total tonnage shown in the tables was run-of-mine coal, the percentage of run-of-mine coal being somewhat larger in the ten leading States than in the other fourteen. This is due largely to Pennsylvania, where 80 per cent of the tonnage reported was run-of-mine.

Maryland's entire output was paid for by run-of-mine, and all of it at the 40 to 45 cent rate, the only instance of the kind. West Virginia also helped to swell the percentage of the run-of-mine basis, 85 per cent of her total being so paid for, while in Alabama 96 per cent was paid for run-of-mine. In Ohio, on the other hand, only 200,410 tons out of a total of 8,649,065 was paid for unscreened. The statistics regarding Illinois, taken from the Illinois bureau of labor statistics, show that the proportion of run-of-mine and screened coal is nearly equal. The machine-mined product of this State is excluded from the tabulation, as only in a few instances were the rates paid for machine mining given. The pick-mined coal of Illinois included in the table amounted to 13,781,303 short tons, or about 65 per cent of the total product of the State. The State report does not separate the amount of coal passed over different-sized screens, and the statistics for Illinois lack uniformity with other States in this unimportant particular.

In Iowa only about 8 per cent of the total included in the table for that State was paid for by run-of-mine coal, leaving 92 per cent that was screened before weighing. It is also to be noted that about 60 per cent of the tonnage of Iowa included in this table was passed over 1¼-inch screens. About 60 per cent of the coal mined in Indiana and Kentucky was paid for by screened coal, while in Colorado only 22 per cent was screened.

When it comes to considering the rates paid for mining, the largest portion of the product in the ten leading States was at the 35 to 40 cent rate, a little over 21 per cent of the total being at that rate. Next comes the 25 to 30 cent rate, with about 18 per cent of the total; then the 40 to 45 cent rate, with about 12.7 per cent, followed by the 50 to 55 cent rate, with a little more than 9 per cent, and the 55 to 60 cent rate, with about 8.5 per cent. As many of the less important States are among the Rocky Mountain and the Pacific groups, higher rates prevail, more than 50 per cent being paid for at rates above 65 cents. More than 40 per cent was paid for between 65 and 80 cents. Over 1,900,000 tons was paid for at the 65 to 70 cent rate, most of which was in Washington, Wyoming, Montana, New Mexico, and Utah, all far Western States. Nearly 1,800,000 tons was at the lower 45 to 50 cent rate, all run-of-mine, in Kansas, Missouri, and Arkansas, all in the middle West. Next, about 1,600,000 tons at 90 cents to $1, chiefly in Kansas, Montana, and Texas, and all over 1-inch screens. And, finally, 1,140,000 tons at the 70 to 75 cent rate, principally in Missouri and Montana (run-of-mine and 1-inch screened), and Indian Territory (1-inch screened).

Among the ten leading States, Pennsylvania paid for nearly 12,300,000 tons at 35 to 40 cents, 10,400,000 tons at 25 to 30 cents, and 5,150,000 tons at 40 to 45 cents. When screens were used, 1½ inch was the principal size. About 2,800,000 tons were paid for at 50 to 55 cents, a little over half as much was paid for at 55 to 60 cents, and not quite half at 60 to

65 cents. Most of the coal screened over 1-inch screens or less (largely ⅞-inch screens) was paid for at 45 to 50 cent rate. Very little coal is screened over 1¼-inch screens in Pennsylvania, by far the greater portion of screened coal paid for being over 1½-inch screens. It will be observed that there is practically a steady increase in price paid with the increase in the size of the screen spaces. The 25 to 30 and 35 to 40 cent rates predominate for run-of-mine coal, the 45 to 50 cent rate for 1-inch screens, and the 50 to 55, 55 to 60, and 60 to 65 cent rates for 1½-inch screens. It is noticeable, too, that while practically no coal is passed over 1¼-inch screens in Pennsylvania, in the neighboring State, Ohio, this size of screen is used in the great majority of cases. The amount of coal reported as screened over 1¼-inch screens in Ohio was more than double that of all the other, screened and run-of-mine combined. The 1¼-inch screen predominates also for screened coal in Iowa, Indiana, and Kentucky, while the 1½-inch screen predominates in West Virginia and Colorado, and is the only size used in Alabama.

In Illinois the greater portion of run-of-mine coal is paid for between 20 and 40 cents, while most of the screened coal is paid for between 65 and 85 cents.

The table on pages 64–65 shows the amount of coal paid for at each rate given, so far as reported, according to the character of the coal, etc., in the ten leading States. It must be remembered that when screened coal is given the amount of coal stated is that which passes over the screens only, the amount of small coal and screenings varying considerably. The total tonnage, when screened coal is paid for, is from 15 to 25 per cent more than the amounts given. The States are arranged according to their rank in importance.

Tennessee stands at the head of the 14 comparatively less important States, with Kansas second, Missouri third, and Wyoming fourth. In all of these most of the miners are paid by run of-mine coal. Very little coal is screened in Tennessee, most of which is over 1½-inch screens. In Kansas and Missouri only ⅞-inch and 1-inch screens are used, and in Wyoming, outside of the Union Pacific Coal Company (see footnote to table), only 1-inch and 1¼-inch screens are used, the latter predominating. Montana miners are paid principally by coal screened over 1-inch screens, while Virginia and Washington miners are paid almost exclusively by run-of-mine. About 80 per cent of the tonnage reported by Indian Territory was 1-inch screened. In Arkansas the coal is about equally divided between run-of-mine and screened, the screens being usually 1-inch and 1¼-inch. Most of the coal produced in Texas is passed over 1-inch screens, and that of Utah over 1¼-inch screens.

The details of the rates in the foregoing States are shown in the table on pages 66–69.

Rates paid for mining bituminous

State.	20 cents and under.	Over 20 cents up to 25 cents.	Over 25 cents up to 30 cents.	Over 30 cents up to 35 cents.	Over 35 cents up to 40 cents.	Over 40 cents up to 45 cents.	Over 45 cents up to 50 cents.	Over 50 cents up to 55 cents.
Pennsylvania:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Run-of-mine	26,045	1,977,570	10,395,612	2,162,994	12,293,513	5,149,057	561,381	326,520
1-inch screen					148,944	27,823	1,754,720	10,000
1¼-inch screen								
1½-inch screen		94,749		44,285	244,744	137,685	578,664	2,771,944
1¾-inch screen								
Illinois:								
Run-of-mine	121,784	940,047	1,424,798	1,710,095	941,852	236,805	244,256	233,789
Screened		104,579	228,704	23,411	605,982	135,160	340,116	631,043
West Virginia:								
Run-of-mine		223,984	3,615,249	2,370,394	540,107	125,215	60,890	37,747
1¼-inch screen				2,711	3,725		27,733	97,696
1½-inch screen			95,789	4,940	26,943	12,079	209,428	
1¾-inch screen							20,467	23,132
2-inch screen							42,188	
Ohio:								
Run-of-mine			5,864	11,463	104,306	18,273	10,120	7,084
1¼-inch screen					24,985	133,744	64,557	2,624,044
1½-inch screen							8,857	1,094,748
1¾-inch screen								37,601
Alabama:								
Run of-mine			271,533	403,064	3,367,064	231,423	438,309	18,566
1¼-inch screen								
Iowa:								
Run of-mine					18,693	5,766	58,847	
1-inch screen								
1¼-inch screen							1,136	
1½-inch screen					423		1,200	
2-inch screen								
Maryland:								
Run-of-mine						4,442,128		
Indiana:								
Run-of-mine		5,000	68,000	44,263	467,211	71,426	3,135	21,800
1-inch screen								
1¼-inch screen					95,000	14,242	110,686	209,832
1½-inch screen							26,000	22,220
2-inch screen								
Kentucky:								
Run-of-mine	42,701	190,500	140,000	38,516	60,898		30,900	
1¼-inch screen							26,463	27,225
1½-inch screen					27,961		78,507	25,000
1¾-inch screen								
2-inch screen			46,731	3,626	33,375		27,538	3,000
Colorado:								
Run-of-mine				9,570	99,133	954,196	522,217	270,302
1-inch screen							10,106	
1¼-inch screen							33,500	
1½-inch screen								
2-inch screen								
Total	190,530	3,536,429	16,292,280	6,829,332	19,104,859	11,695,022	5,291,921	8,493,293

coal in the ten leading States.

Over 55 cents up to 60 cents.	Over 60 cents up to 65 cents.	Over 65 cents up to 70 cents.	Over 70 cents up to 75 cents.	Over 75 cents up to 80 cents.	Over 80 cents up to 85 cents.	Over 85 cents up to 90 cents.	Over 90 cents up to $1.	Over $1.	Total.
Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
198,056	851,689	193,720	.....	3,947	.....	.....	.....	.....	34,140,104
176,427	.....	.....	.....	.....	.....	.....	.....	.....	a2,117,914
49,839	16,600	.....	.....	.....	.....	.....	.....	.....	66,439
1,464,734	1,326,026	52,566	.....	.....	.....	.....	.....	.....	6,715,397
41,126	.....	.....	.....	.....	.....	.....	.....	.....	41,126
282,757	33,211	241,256	29,658	3,868	1,640	1,440	10,000	.....	6,457,256
178,073	478,723	1,004,349	1,046,036	1,614,247	769,960	52,589	.....	111,085	7,324,057
.....	28,328	.....	2,910	.....	.....	.....	.....	2,090	7,006,914
147,831	14,300	.....	.....	.....	.....	.....	.....	.....	293,996
75,031	18,936	.....	.....	.....	.....	.....	.....	.....	443,146
7,918	.....	.....	.....	.....	.....	.....	.....	.....	51,517
112,500	125,283	.....	.....	.....	.....	.....	.....	.....	279,971
43,300	.....	.....	.....	.....	.....	.....	.....	.....	200,410
2,745,425	193,586	10,146	.....	.....	.....	.....	.....	.....	5,796,487
1,290,371	161,612	3,300	.....	.....	.....	.....	.....	.....	2,558,888
55,679	.....	.....	.....	.....	.....	.....	.....	.....	93,280
51,028	.....	.....	.....	.....	.....	.....	.....	.....	4,780,987
138,620	.....	51,165	.....	.....	22,657	.....	.....	.....	212,442
3,356	.....	32,200	11,536	16,389	655	30,129	1,420	.....	178,991
.....	.....	27,179	.....	104,787	11,011	139,300	5,860	.....	288,137
6,553	.....	195,818	992,815	107,799	20,364	129,297	8,297	.....	1,462,079
1,394	.....	6,000	316,184	111,982	59,917	25,284	.....	7,279	529,663
.....	.....	8,456	.....	.....	.....	.....	.....	.....	8,456
.....	.....	.....	.....	.....	.....	.....	.....	.....	4,442,128
140,325	4,304	.....	.....	.....	.....	.....	.....	.....	825,464
1,750	64,279	256,004	400	.....	.....	.....	.....	.....	322,433
183,327	64,534	211,596	3,548	.....	.....	.....	.....	.....	892,765
224,034	3,274	.....	.....	.....	.....	.....	.....	.....	275,528
1,000	4,200	.....	.....	.....	.....	.....	.....	.....	5,200
28,557	2,240	.....	3,900	.....	.....	.....	.....	.....	538,212
61,813	257,055	35,690	53,503	23,334	9,326	.....	.....	.....	494,409
30,000	141,856	42,029	10,957	.....	.....	.....	.....	3,202	359,512
.....	47,232	.....	.....	.....	.....	.....	.....	.....	47,232
.....	100,688	.....	.....	.....	.....	.....	.....	.....	214,958
29,502	4,000	104,202	.....	.....	2,150	.....	.....	.....	1,995,272
.....	.....	.....	.....	.....	.....	.....	.....	1,327	11,433
.....	.....	49,941	.....	65,853	.....	16,979	396	.....	166,669
.....	.....	192,537	.....	.....	.....	43,766	145,101	.....	381,404
.....	.....	.....	.....	.....	.....	.....	1,100	.....	1,100
7,770,326	3,941,956	2,718,154	2,471,447	2,052,206	897,680	438,784	172,174	124,983	92,021,376

a1,923,072 tons over ¾-inch screen.

Rates paid for mining bituminous

State or Territory.	20 cents and under.	Over 20 cents up to 25 cents.	Over 25 cents up to 30 cents.	Over 30 cents up to 35 cents.	Over 35 cents up to 40 cents.	Over 40 cents up to 45 cents.	Over 45 cents up to 50 cents.	Over 50 cents up to 55 cents.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Tennessee:								
Run-of-mine			192,190	162,477	875,620	281,961	211,481	
1¼-inch screen								
1½-inch screen								
1¾-inch screen								
Kansas:								
Run-of-mine							363,557	
1-inch screen							2,320	
Missouri:								
Run-of-mine						361,142	666,314	36,912
1-inch screen							1,500	
Wyoming: *b*								
Run-of-mine				227,000		1,646	60,684	
1-inch screen								
1¼-inch screen								
Montana:								
Run-of-mine								
1-inch screen							120,186	
1¼-inch screen								
Virginia:								
Run-of-mine		214,034	162,567	170,356	10,193			
1½ inch screen								
Washington:								
Run-of-mine							13,825	125,535
1-inch screen								
1½-inch screen								
Indian Territory:								
Run-of-mine			49,499			71,265		
1-inch screen								
Arkansas:								
Run-of-mine		10,671				700	317,654	
1-inch screen								
1¼-inch screen								
1½-inch screen								
New Mexico:								
Run of-mine								
1-inch screen								
1½-inch screen								
2-inch screen								
Texas:								
1 inch screen			23,400	56,500	10,800	15,750		
1¼ inch screen								
1½-inch screen								
1¾-inch screen								

a 683,702 tons over ⅞-inch screen.

b Production of Union Pacific Coal Company, about 900,000 tons, not included: Rates paid for mining, from 55 to 70 cents a ton; size of screens used, ¼-inch, ½-inch, ⅝-inch, 1-inch, 1¼-inch, and 1¾-inch; amounts not reported. In California the rate for run-of-mine was from 60 to 75 cents.

coal in fourteen States.

Over 55 cents up to 60 cents.	Over 60 cents up to 65 cents.	Over 65 cents up to 70 cents.	Over 70 cents up to 75 cents.	Over 75 cents up to 80 cents.	Over 80 cents up to 85 cents.	Over 85 cents up to 90 cents.	Over 90 cents up to $1.	Over $1.	Total.
Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
.....	8,109	.....	.....	.....	.....	.....	.....	.....	1,731,838
.....	7,988	19,628	6,810	.....	.....	.....	.....	.....	34,426
.....	29,989	22,693	.....	8,706	6,173	9,377	.....	.....	76,938
.....	12,300	.....	.....	.....	.....	.....	.....	.....	12,300
478,606	.....	.....	.....	84,229	7,993	92,850	.....	.....	1,027,235
.....	.....	.....	25,933	302,261	12,800	293,561	375,021	.....	a1,011,896
34,213	13,944	32,676	119,149	2,228	6,589	260,531	112,936	41,412	1,688,046
10,931	.....	50,618	133,521	6,148	.....	19,230	.....	.....	221,948
2,042	391,670	.....	.....	.....	.....	.....	.....	.....	683,042
.....	.....	137,389	.....	.....	.....	3,000	.....	.....	140,389
.....	.....	185,883	.....	.....	.....	.....	.....	.....	185,883
.....	.....	1,100	111,200	4,389	131,413	1,125	1,200	.....	250,427
.....	.....	302,372	243,678	.....	.....	.....	582,202	.....	1,248,438
.....	.....	.....	2,083	.....	.....	.....	35,000	.....	37,083
.....	.....	.....	.....	.....	.....	.....	.....	.....	557,150
.....	.....	.....	2,000	.....	487	.....	.....	.....	2,487
21,000	46,171	299,188	.....	368,297	.....	.....	.....	.....	874,016
.....	.....	.....	700	.....	.....	.....	.....	.....	700
.....	1,863	.....	.....	.....	1,900	.....	.....	.....	3,763
11,972	.....	.....	.....	.....	.....	.....	.....	.....	132,736
.....	.....	.....	455,305	.....	.....	.....	.....	.....	455,305
.....	.....	.....	.....	.....	.....	.....	.....	.....	329,025
.....	.....	65,406	.....	91,272	.....	.....	.....	.....	156,678
.....	.....	60,122	.....	85,303	.....	.....	.....	.....	145,425
.....	.....	.....	.....	.....	.....	10,000	20,000	.....	30,000
.....	.....	362,546	300	.....	97,292	13,600	8,900	.....	482,638
.....	.....	102,836	.....	.....	.....	.....	2,498	.....	105,334
.....	.....	.....	12,000	.....	.....	.....	.....	.....	12,000
.....	.....	562	.....	.....	.....	.....	.....	.....	562
.....	.....	.....	.....	.....	.....	.....	372,825	.....	479,275
.....	.....	.....	.....	.....	.....	.....	20,641	.....	20,641
.....	.....	.....	.....	.....	.....	.....	.....	140	140
.....	.....	.....	.....	.....	.....	.....	34,673	.....	34,673

Rates paid for mining bituminous coal

State or Territory.	20 cents and under.	Over 20 cents up to 25 cents.	Over 25 cents up to 30 cents.	Over 30 cents up to 35 cents.	Over 35 cents up to 40 cents.	Over 40 cents up to 45 cents.	Over 45 cents up to 50 cents.	Over 50 cents up to 55 cents.
Utah:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Run-of-mine								
1-inch screen								23,641
1¼-inch screen								
1⅜-inch screen			7,028	25,967				
2-inch screen								
Michigan:								
Run-of-mine								
1-inch screen								
1¼-inch screen							18,283	
Oregon:								
1-inch screen								
1¼-inch screen								
Total		224,705	434,684	642,300	896,613	732,464	1,775,804	186,088

in fourteen States—Continued.

Over 55 cents up to 60 cents.	Over 60 cents up to 65 cents.	Over 65 cents up to 70 cents.	Over 70 cents up to 75 cents.	Over 75 cents up to 80 cents.	Over 80 cents up to 85 cents.	Over 85 cents up to 90cents.	Over 90 cents up to $1.	Over $1.	Total.
Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
.....	.....	.....	500	.....	.....	.....	.....	.....	500
.....	.....	.....	.....	.....	.....	.....	.....	.....	23,641
212,387	.....	139,713	.....	.....	93,140	.....	.....	.....	445,240
.....	.....	.....	.....	.....	.....	.....	.....	.....	32,995
.....	.....	12,376	.....	.....	.....	.....	.....	.....	12,376
.....	.....	12,000	26,800	5,374	.....	24,790	3,006	.....	71,970
.....	.....	59,050	.....	.....	.....	38,467	1,400	.....	98,917
.....	.....	.....	.....	10,197	.....	14,000	.....	.....	42,480
.....	.....	.....	1,200	3,100	.....	.....	44,800	.....	49,100
.....	.....	46,660	.....	.....	.....	.....	.....	.....	46,660
771,151	512,034	1,912,818	1,141,179	971,504	357,787	780,531	1,615,102	41,552	12,996,316

In connection with the statistics presented above, the following agreement, made and entered into in joint interstate convention in Chicago, Illinois, January 26, 1898, between the operators and miners of Illinois, Indiana, Ohio, and western Pennsylvania (the Pittsburg thin-vein district), will be found of interest:

1. That an equal price for mining screened lump coal shall hereafter form a base scale in all the districts above named, excepting the State of Illinois, the block-coal district of Indiana to pay 10 cents per ton over that of Hocking Valley, western Pennsylvania, and Indiana bituminous district, and that the price of pick run-of-mine coal in Hocking Valley and western Pennsylvania shall be determined by the actual percentage of screenings passing through such screen as is hereinafter provided; it being understood and agreed that screened or run-of-mine coal may be mined and paid for on the above basis at the option of the operators, according to market requirements, and the operators of Indiana bituminous shall also have like option of mining and paying for run-of-mine or screen coal.

2. That the screen hereby adopted for the State of Ohio, western Pennsylvania, and the bituminous district of Indiana shall be uniform in size, 6 feet wide by 12 feet long, built of flat or akron-shaped bar of not less than five-eighths of an inch surface, with 1¼ inches between bars, free from obstructions, and that such screen shall rest upon a sufficient number of bearings to hold the bars in proper position.

3. That the block-coal district of Indiana may continue the use of the diamond screen of present size and pattern, with the privilege of run-of-mine coal, the mining price of which shall be determined by the actual screenings, and that the State of Illinois shall be absolutely upon a run-of-mine system, and shall be paid for on that basis.

4. That an advance of 10 cents per ton of 2,000 pounds for pick-mined screened coal shall take effect in western Pennsylvania, Hocking Valley, and Indiana bituminous districts on April 1, 1898; and that Grape Creek, Illinois, and the bituminous district of Indiana shall pay 40 cents per ton run-of-mine coal from and after same date, based upon 66 cents per ton screen coal in Ohio, western Pennsylvania, and the Indiana bituminous district; same to continue in force until the expiration of this contract.

5. That on and after April 1, 1898, the eight-hour workday with eight hours' pay, consisting of six days per week, shall be in effect in all the districts represented, and that uniform wages for day labor shall be paid the different classes of labor in the fields named; and that internal differences in any of the States or districts, both as to prices or conditions, shall be referred to the States or districts affected for adjustment.

6. That the same relative prices and conditions between machine and pick mining that have existed in the different States shall be continued during the life of this contract.

7. That present prices for pick and machine mining and all classes of day labor shall be maintained in the competitive States and districts until April 1, 1898.

8. That the United Mineworkers' organization, a party to this contract, do hereby further agree to afford all possible protection to the trade and to the other parties hereto against any unfair competition resulting from a failure to maintain scale rates.

9. That this contract shall remain in full force and effect from April 1, 1898, to April 1, 1899, and that our next annual interstate convention shall convene in the city of Pittsburg on the third Tuesday in January, 1899.

COAL TRADE REVIEW.

A study of the conditions which affected the anthracite coal trade in 1897 reveals the fact that anthracite producers must look to some other solution of the problems which confront them than simply restricting production and maintaining prices. The statistics presented in this report indicate that the operators have been able to accomplish these results with a fair amount of success during 1896 and 1897; but other conditions have developed from these. Higher prices for anthracite have caused consumers to consider other kinds of fuel, and the year just closed shows that bituminous coal for steaming purposes and coke and gas for domestic purposes are encroaching upon the territory formerly occupied exclusively by anthracite coal. This has already been referred to in discussing the statistics of production, and is mentioned again here because the reports on the trade in the various cities, contained in the following pages, emphasize the facts brought out in the statistical tables. The reviews of the movements of coal at the trade centers show that in nearly every instance the receipts of anthracite coal decreased in 1897, while the receipts of bituminous coal, almost without exception, increased, and in the few instances that anthracite receipts were ahead of 1896, they were not at all in proportion to the increase in the receipts of bituminous coal. Moreover, notwithstanding the restricted production, considerable quantities of anthracite coal were carried over unsold at the end of the year, showing that the demand was not equal to even the smaller output.

Bituminous production continues to be marked by keen competition and excessive production. Prices were lower than ever in 1897, in spite of increased consumption, due to exceptional pig-iron production, and a temporary period of higher prices induced by the strike and its resulting coal famine. Operators are endeavoring to meet the lower prices by lowering the cost of production in the use of mining machines. The result so far reached seems to be a larger, though doubtless cheaper, output, which, by adding to an already glutted market, must eventuate in still lower prices and a sacrifice of the benefits derived from the use of machines.

The movements of coal at the trade centers and shipping ports are treated in the following pages.

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:

The city of New York and its vicinity form a locality where more coal is sold and handled in the course of the year than anywhere else in the world except the city of London, England. In its vicinity are the shipping ports of millions of tons of every grade and quality of anthracite and bituminous coal, so that 15,000,000 tons is probably an

underestimate of the sales actually consummated at this point. The several shipping points on the New Jersey shore of the Hudson River, the Kill von Kull, and Raritan Bay, known as South Amboy, Perth Amboy, Port Reading, Elizabethport, Port Johnson, Port Liberty, Jersey City, Hoboken, and Weehawken, are feeders to the trade of the metropolis for local use and for shipment to eastern ports. The docks of the Pennsylvania Coal Company, at Newburg, New York; the Delaware and Hudson Canal Company's railroad, at Rondout, New York; the New York, Lake Erie and Western Railroad, at Piermont, New York, and the Ontario and Western Railroad, at Cornwall, New York, also furnish tribute to the trade of the parties doing business here.

The quantity used locally is set down at 6,000,000 tons, to which may be added 2,750,000 tons for Jersey City and Brooklyn.

Bituminous coal comes in schooners and steam colliers from Norfolk, Newport News, and Baltimore, and in barges from South Amboy, Port Reading, and Port Liberty, New Jersey, and is used locally for all the purposes to which it is adapted. An approximate statement of the bituminous coal loaded into ocean steamers at the port of New York shows that there are over 1,500,000 long tons annually so taken.

The year was not a good one from the point of view of the anthracite producer, either in the matter of tonnage won or of the quantity disposed of, and it is evident that an arrangement for handling the output of this important fuel supply is absolutely necessary, if the interests of the owners are to be protected. As a matter of interest to the public, it is not likely that they will object if the usual oversupply continues, bringing in its train the low range of prices.

The nominal opening prices were as below, free on board at the loading ports, in the beginning of the years named:

Opening prices for anthracite coal at New York loading ports.

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
1897	3.75	4.00	4.25	4.00

It was not possible to realize prices at any time during 1897, for even at the usual busy season, during September and October, the net result was fully 10 per cent off this list. A list issued in July showed an advance of 25 cents per ton over the quotations above given, but

no sales were made at such figures; in fact, after the middle of August all hope of list prices being realized was abandoned.

As showing the fluctuation in the value of certain grades of anthracite throughout the year, the following schedule of tide-water averages is appended. These averages include the sizes of commercial coal known as broken, egg, stove, chestnut, pea, and buckwheat:

Average monthly prices for all sizes of anthracite coal at New York in 1896 and 1897.

Month.	1897.	1896.	Difference.
January	$2.85	$2.65	*a* $0.20
February	3.11	2.70	*a* .40
March	3.10	2.82	*a* .28
April	3.11	2.87	*a* .24
May	3.09	2.90	*a* .19
June	3.10	2.97	*a* .13
July	3.12	3.03	*a* .09
August	3.12	3.03	*a* .09
September	3.14	3.23	*b* .09
October	3.11	3.18	*b* .07
November	3.00	3.18	*b* .18
December	3.00	3.07	*b* .07

a Increase. *b* Decrease.

The range of prices is a low one, and too low for this fuel, in view of cost and charges. An improvement is noticed in price the past year as compared with that preceding, in months when tonnage was kept back, and this was lost as the tonnage grew beyond market requirements. The trade has grown in past years, as is shown in the fact that in 1850 the shipments reached 3,358,899 tons; in 1860, 8,513,123 tons; in 1870, 15,849,800 tons; in 1880, 23,437,242 tons; in 1890, 35,865,174 tons, and in 1895, 46,511,477 tons. This apparently was high water mark, for shipments in the past two years have fallen off materially.

There was no pool, agreement, or anything like it on soft coal, and the result was a good year of low prices, which to those who have known this trade for any length of time is marvelous. Mining rates have suffered materially, but freight charges have been cut to a very low rate. It is doubtful if the carrying companies get 3 mills per ton per mile for hauling soft coal from the mines to tidewater. This gives cheap fuel to the industrials of the country, far below anything that can be had elsewhere, but it has put many of the carriers into the hands of receivers. A fair exhibit of the course of prices of the best Georges Creek coal is shown below:

Prices of Georges Creek coal at New York, 1890 to 1897.

1890	$3.50	1894	$3.00
1891	3.50	1895	2.75
1892	3.40	1896	3.00
1893	3.25	1897	2.60

The Anthracite Operators' Association, representing the individual producers, in its report for the year, states:

In January, 1897, the market had been broken by shipping in November and December of the previous year a tonnage largely in excess of the needs for consumption. There had been a steady gain in the selling price until the middle of November, but at that time the break occurred, and during the latter half of that month prices went down steadily, following the same course in December. Consequently, in January, the market was badly demoralized, although the shipments were much less than in the preceding month. The results for the previous year had been so alarming that the varied interests saw that their safety lay in producing only what the market required for actual consumption. As a result, the prices in February showed a slight improvement, which continued to gain steadily until July, for during that time the output was not in excess of the demand. In estimating the requirements for the latter month, however, too optimistic a view was taken of the situation, and mining began at the rate of 3,500,000 tons for the month. Though this was clearly more than was needed, it would not have brought about any lasting disarrangement had it not been exceeded, but toward the close of the month it was found that much more than this quantity would be produced, and that efforts were being made to dispose of it. Prices were affected at once, and as the tonnage for August and the succeeding months was also greatly in excess of the needs of the market, the downward step which began in July continued without abatement.

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 fifteen years have been as follows:

Receipts of coal at Boston for fifteen 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
1897	1,948,283	1,591,245	98,510	50,235	3,688,273

The figures for 1897 are the largest in the history of the port. The falling off in the receipts of anthracite coal were more than counterbalanced by the increased receipts of bituminous.

Of the total amount of domestic coal received, 1,152,712 tons, substantially one-third, were forwarded to interior New England points, making the net receipts of the city of Boston, representing consumption, 2,535,561 tons.

The combination among the principal local dealers has maintained prices at a profitable level throughout the year and trade has been generally satisfactory.

The restricted production has affected the local dealers favorably, contributing the strength and confidence that has been lacking in years of unrestricted and excessive production.

In the bituminous market unusual activity was caused by the miners' strike, owing to fears entertained by many of the mills and other large consumers of running out of coal supply.

The receipts of foreign coal were less than during 1896, amounting to but 50,235 tons, substantially the whole amount from Cape Breton.

Carriers' rates have covered a wide range, the average being about as during the previous years. The range of published prices during the year from the different ports was as follows:

Coal freights to Boston, Massachusetts.

From—	Per ton.
Philadelphia	$0.55 to $0.95
Baltimore	.60 to 1.00
Norfolk and Newport News	.55 to .85
New York	.40 to .65

The highest rates were reached in February and November; the lowest in July.

The year opened with stove coal at $6 and a quiet market, owing to unfavorable weather conditions and a somewhat heavily stocked market. The market showed some improvement beginning with March, and the trade during the next three months was quite satisfactory as to volume. A reduction in price to $5.50 was made in May, at which figure the price remained until the last of August, when an advance to $6 was inaugurated.

In the bituminous market trade has been quite uniform throughout the year, with no unusual features save those contributed during the continuance of the coal miners' strike.

The year opened with Georges Creek Cumberland quoted at $3.80, at which price it remained during the first four months of the year. A reduction was made in May to $3.60; later, prices ranged from $3.50 to $3.75, remaining within these limits during the remainder of the year. The large movement of coal at times during the continuance of the

strike rendered the volume light during the later months of the year. The following table shows the monthly receipts of coal at Boston during 1897:

Monthly receipts of coal at Boston during 1897.

Month.	Domestic.			Foreign.	Total.
	By water.		All rail (anthracite and bituminous).		
	Anthracite.	Bituminous.			
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
January	121,204	106,234	6,889	6,975	241,302
February	121,545	80,142	7,256	4,306	213,249
March	134,998	128,404	11,488	4,856	279,746
April	165,147	145,331	7,072	6,383	323,933
May	176,886	135,434	7,517	6,254	326,091
June	174,805	107,982	8,956	3,517	295,260
July	199,749	111,675	10,002	8,305	329,731
August	214,189	187,222	8,754	2,610	412,775
September	179,294	159,802	5,426	2,787	347,309
October	149,889	113,553	8,445	2,641	274,528
November	151,550	144,537	7,881	781	304,749
December	159,027	170,929	8,824	820	339,600
Total	1,948,283	1,591,245	98,510	50,235	3,688,273

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 reports by him in previous volumes of Mineral Resources.

The year 1897 in the coal trade at Philadelphia was among the best as to tonnage and among the worst as to profits of recent years. The aggregate shipments of anthracite and bituminous coal to Philadelphia were 9,801,000 long tons, a very considerable gain as compared with the 8,859,000 long tons shipped here in 1896, and almost equal to the record-breaking shipments of 9,914,000 long tons in the year 1895. But while there is little ground for complaint as to the amount of business done, yet the increased competition of bituminous coal in the market with the high-priced anthracite, and the consequent low prices realized, made the trade disappointing in the matter of profits to miners, shippers, and carriers of both kinds of fuel. Two small railroads owned in this city, whose traffic consists almost exclusively of bituminous coal hauled to one of the trunk lines for carriage to Philadelphia, were so severely affected by the lack of profits that one was compelled to pass the dividend on its entire capital stock and the other

was compelled to pass the dividend on its common shares and reduce the distribution to its preferred shareholders. But the fact has been recognized that the coal trade is in a transition state and that new influences are operating, the extent of which can not yet be measured, and all interests have been adjusted as much as possible to the new conditions.

The break in the prices of bituminous coal from the level that has prevailed for a number of years was the controlling factor in the trade. In 1896 bituminous coal sold in Philadelphia for the export and coastwise trade at about $2.25 per long ton (free on board), although in some instances a somewhat lower figure was named. But in the early part of 1897 a Southern railroad, in conjunction with its shippers, suddenly and unexpectedly reduced the price to $1.75. The cut was quickly followed by a scramble for contracts by the Northern roads, and before summer sales as low as $1.30 (free on board) were reported. This breakdown, which of course affected all the Eastern soft-coal roads, caused an immense expansion in the bituminous tonnage to tide water. In 1896 this business amounted in all to a little less than 9,000,000 tons. In 1897 the total was almost exactly 10,550,000 tons, a gain of 1,550,000 tons, or nearly 17 per cent. The Philadelphia shippers, being late in the field, lost many desirable contracts to their Southern competitors, including some that had been held here for many years, and with their utmost industry late in the season were unable fully to regain their position. Still the tide-water tonnage from this port was very considerable, amounting to 2,630,000 tons, as against 2,320,000 tons the preceding year and 2,710,000 tons in 1895. Since scarcely any coal was sold for tide-water markets last year at more than $1.75 per ton delivered at the wharves, and much was sold below $1.50, while in former years scarcely any had been sold below $2, the reduced receipts were felt very severely by all concerned in the business, and no adequate compensation was afforded by the moderate increase in the volume of business.

Some advantage was gained, however, in the city of Philadelphia from the sales of bituminous coal to local manufacturers, which showed an immense increase. The local consumption of soft coal was 1,600,000 tons, as against 935,000 tons the year before, an increase of 665,000 tons, or 71 per cent. This comparison is not strictly accurate, so far as the use of bituminous coal by manufacturers is concerned, as these totals include about 300,000 tons of gas coal used each year by the city gas works. If this tonnage be deducted, the result is about 1,300,000 tons used by manufacturers in 1897, as against about 635,000 tons so used in 1896, a gain of about 100 per cent. This large increase was due chiefly to greater activity in the manufacturing industries, but at least 250,000 tons represents the displacement of so much anthracite. The price of soft coal was made so attractive that all steam raisers were obliged to lay aside their prejudices and consider very seriously the question of

adopting soft coal for fuel. In 1896 its price for local consumption was $2.50 or $2.65, delivered on tracks in consumers' yards, and at these prices many manufacturers operating extensive plants found it economical either used alone or mixed with the smaller sizes of anthracite. The price for 1897 was originally fixed at $2.50, but was reduced to $2 when the collapse came in the tide-water market. As against $1.30 received for tide-water shipments this price of $2 made the business very desirable for the producing interests, and the city was canvassed thoroughly for customers. The result was that many manufacturers abandoned anthracite altogether, as did also many steam raisers in the heart of the city. Two of the leading hotels, the post-office building, and several other important buildings were equipped with an apparatus said to consume 95 per cent of the smoke produced in combustion, and used bituminous coal for the first time, and with satisfactory results. The board of health has made no complaint about the matter, and presumably, therefore, they have no occasion to interfere. One sugar refinery, two electric-light companies, and a host of smaller consumers also made the change to bituminous coal, and the inference is that this fuel will continue to be used unless it should advance materially in price, a contingency that now seems improbable. The cost of buckwheat coal to manufacturers is not less than $2, delivered in their yards, and bituminous costs no more, while it is claimed to be 25 per cent more valuable as a steam raiser than anthracite of buckwheat size. Rice and culm may be had from anthracite producers for $1.60, delivered, and perhaps for $1.50, but these are less efficient as steam raisers than is buckwheat. This very important gain in local territory has encouraged bituminous operators considerably, and their operations along this line will be extended into other desirable markets during the present year.

THE ANTHRACITE TRADE.

Up to midsummer the anthracite trade was firm and the producing interests manifestly had control of the situation, but the large production in July and August changed the tone of the market completely; prices became unsettled, and dealers refused to lay in as large stocks as usual for the winter. Still the shipments from this port to cities and towns outside the capes of the Delaware were 1,600,000 tons as against 1,770,000 tons in the year 1896 and 1,750,000 tons in the year 1895, showing that in its coastwise business Philadelphia about retained its position and shipped its proper proportion of the reduced production of the country. The local demand was also very satisfactory in view of the substantial loss that was sustained to the bituminous interest.

The local consumption of anthracite is placed at 3,570,000 long tons as against 3,500,000 long tons in 1896 and 3,960,000 long tons in 1895; a very considerable gain under existing circumstances. Two reasons

are assigned for the increase, first, the improvement in business conditions, which induced a greater consumption of coal by householders, and second, the steady growth of the city's population. Moreover, during most of the year—certainly up to August—prices were very well maintained, but in the fall months there was a good deal of cutting by individual producers. The price circulars of the Philadelphia and Reading Coal and Iron Company, which constitute the standard, quoted the following prices on January 1, July 1, and October 1, 1897, the circular prices for 1896 being given for the purpose of comparison:

Prices at mines of anthracite coal for Philadelphia delivery in 1896 and 1897.

Size.	1896.			1897.		
	January.	July.	September.	January.	July.	October.
Lump and steamboat	$2.50	$2.50	$2.50	$2.50	$2.50	$2.50
Broken	2.25	2.40	2.50	2.50	2.45	2.50
Egg	2.65	2.80	2.90	2.90	2.80	2.90
Stove	2.75	2.90	3.00	3.00	2.90	3.00
Chestnut	2.50	2.65	2.80	2.80	2.65	2.80
Pea	1.30	1.30	1.30	1.30	1.30	1.30
Buckwheat	.85	.85	.85	.85	.85	.85

These prices are subject to the usual agents' commission of 15 cents per ton. They are for coal free on board cars at the mines, and railroad freight charges must be paid in addition. While nominally prices changed but little, in the latter months of the year, as indicated above, there was a good deal of weakness. There is always some cutting of prices, but generally it is of a character that can be ignored, as the seller who cuts prices, almost always an individual operator, finds it advantageous, owing to the development of unforeseen contingencies in his business, to dispose of a quantity of coal promptly, and when the few cargoes he has to offer are disposed of, he is out of the market for an indefinite period except at full circular prices. Competition of this irregular character is never dangerous, and does not fix the market price for the commodity. But in the fall of 1897 there was an exceptional number of cases of this kind, and they developed into a regular supply when the tide-water prices dropped without any reduction being made in the local circular. As the local market was above its normal parity with the tide-water market, operators simply directed their shipments from tide-water to this city, and were able to make a profit even when cutting prices here from 25 to 50 cents per ton on some sizes. This weakness had not been altogether obviated at the end of the season.

There was no change in freight rates for local delivery during the

year. The charges, which vary according to the region from which the shipment is made and according to the size of coal, 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

The tendency to withdraw pea coal from the list of manufacturing sizes and classify it as a domestic fuel was even more noticeable in 1897 than in previous years. In 1895 not more than 33 per cent of the pea coal sent to this city was used by housekeepers. In 1896 the proportion had risen to 40 per cent, and in 1897 probably 66 per cent was so consumed. At the close of the year pea coal was used at the power stations of the passenger-railway companies, at the pumping stations of the water department, and in the establishments of a few steam raisers in the heart of the city, but nearly all the rest went into retail dealers' yards for domestic distribution. Great improvements have been made in the machinery for preparing this coal for the market, and it now comes uniform in size and free from slate and dirt. It retails at $3.75 per long ton as against $5.75 per long ton for egg, stove, and chestnut; a very important saving for the consumer. It costs the dealer $2.65 per long ton delivered as against $4.70 per long ton for stove, so that there is as much profit to him in selling the small coal as the larger and more expensive size, and he is therefore inclined to favor its more extensive use.

Naturally, the greater demand for this size has been at the expense of the higher-priced coals, and the producing interests are the sufferers by the substitution of what was once a waste material as a standard product. This loss, as will readily be seen, is the difference between $2.65 and $4.70, and when this difference is measured upon the large quantity of pea coal now consumed by housekeepers it becomes a very important matter.

It has been about decided that either the price of pea coal at the mines must be advanced or the freight charge increased in order to check to some extent this displacement of the more profitable sizes. But it is noticeable that all classes of consumers are breaking away from the old traditions that impelled them to use certain sizes for certain purposes, and the tendency is unmistakably in the direction of using smaller sizes throughout. Some housekeepers, who formerly burned egg and stove coal in their furnaces during the winter, are now burning chestnut, and they claim with satisfactory results; and furnaces designed to burn pea coal have been put upon the market, from the use

of which good results are expected. It is not altogether certain, therefore, that even an extreme advance of $1 in the cost of pea coal will induce a general return to the larger sizes.

While pea coal is thus gradually being withdrawn from the reach of manufacturers, they in turn are seeking smaller sizes. Some now consume the lower-priced buckwheat or No. 2 pea, and some have taken up the even cheaper rice. One modern-built plant, originally designed to consume pea coal, has in the course of two years successfully changed, first to buckwheat, then to rice, and now exclusively consumes the screenings from the yards of retailers, which can be had for not over $1 per ton.

THE EXPORT TRADE.

The shipments of coal to foreign countries out of this port were again small, although somewhat larger than in 1896. Nearly all of the anthracite coal exported was sent to Canada, and nearly all of the bituminous coal exported was sent to Cuba or the other West Indian Islands.

The insurrection in Cuba naturally restricted the shipments there, and entirely prevented any development of the business. The whole problem of sending coal to Cuba is involved in the question of the supply of vessels. The Pennsylvania Steel Company, of Harrisburg Pennsylvania, and Sparrows Point, Maryland, and the Bethlehem Iron Company, of Bethlehem, Pennsylvania, jointly own the rich iron ore mines at Juragua, near Santiago de Cuba, which are capable of a much greater production than at present, and which would be developed if tranquillity reigned on the island. With the certainty of a back loading, an ample supply of vessels could be obtained to carry coal to Cuba, and a large business built up. There has been some investigation into the possibility of a market for coal in Mexico, and some results of this inquiry may possibly be seen in another year.

The supply of vessels for coastwise ports was ample during the year, and freight rates were somewhat higher, ruling at from 60 to 75 cents per ton during the open season, against 50 to 65 cents in 1896. A manifest change is taking place in the method of handling this coastwise business, as the producers and the railroad companies are equipping themselves with fleets of barges to carry coal to their customers in New England. Three years ago not over 33 per cent of the coal shipped from this port to New England seaboard cities was carried in bottoms belonging to the mining or railroad companies, but in 1897 fully 70 per cent of the tonnage was so carried, and the percentage promises to increase until practically the whole business will be so conducted. This practice enables the producer to name a price for coal delivered at destination, and introduces a new element of flexibility into the price circulars.

The Reading company has practically extended its transportation system to Boston, as it owns forty barges, besides several steam col-

liers and a number of powerful towboats, and, as it is also engaged in the mining business, it has absolute control of its coal until delivery is made on the dealer's wharf. The Pennsylvania Railroad owns no fleet, but operates a very important line of barges. This practical elimination of outside influences can not be said to have worked unfavorably to the trade, and it has certainly facilitated the operations of the railroad companies, since the efficiency of their car supply has been greatly increased by the steady supply of vessels, while the shipping expenses at the wharves have been slightly reduced.

The capacity of the barges now in service ranges from 1,400 to 3,600 tons, and one is about being completed that will carry 4,200 tons. This enormous hulk will accommodate the cargoes of two or three trains. In competition with such vessels, which are assured both of prompt loading at this port and prompt unloading at their destination, the individual vessel owner with a moderate-sized craft has little chance of success. Twenty years ago a 360-ton vessel was a marvel in the coal trade, but now a vessel with a capacity of less than 1,200 tons can not be made to pay expenses. While the vessel freight rates rose slightly in 1897, the improvement can only be temporary, as the coming season will see more large barges than ever before. With 27 feet of water in the Delaware River from the capes to Philadelphia, there is no reason to believe that 4,200 tons is the limit of vessel capacity, nor is there any reason why coal can not be carried from Philadelphia to Boston as cheaply as grain is carried from Chicago to Buffalo—that is, at from 30 cents to 40 cents per ton. This large barge business is of course confined to Boston and other important cities along the New England coast, and small sailing vessels are still employed for shipping to the smaller towns and to Southern points.

Through the courtesy of officers of the Pennsylvania Railroad Company, the Philadelphia and Reading Railway Company, and the Baltimore and Ohio Railroad Company, the data have been furnished from which the following table has been compiled, showing the distribution of coal at Philadelphia for the export trade, the coastwise and harbor trade, and the Philadelphia local trade. The figures for 1896 are also given for the purpose of comparison.

Distribution of coal at Philadelphia in 1896 and 1897.

[In tons of 2,240 pounds.]

	1896.		1897.	
	Anthracite.	Bituminous.	Anthracite.	Bituminous.
Export	19,181	315,555	23,898	378,092
Coastwise and harbor	1,770,000	2,320,000	1,600,000	2,630,000
Local	3,500,000	935,000	3,570,000	1,600,000
Total	5,289,181	3,570,555	5,193,898	4,608,092

PITTSBURG, PENNSYLVANIA.

While the city of Pittsburg and its vicinity constitute the most important center of trade in the bituminous coal industry, there is no local bureau devoted to the collection and dissemination of information regarding the volume of business transacted. The statistics presented herewith have been collected independently by the Survey for this report, and the writer desires to make special acknowledgment to the following officials for the courtesy extended in furnishing the information: Mr. W. H. Joyce, freight traffic manager Pennsylvania Railroad; Mr. W. L. Andrews, assistant coal and coke agent Baltimore and Ohio Railroad at Pittsburg; Mr. James Means, division freight agent Pittsburg, Cincinnati, Chicago, and St. Louis Railroad, Pittsburg; Mr. Edwin P. Bates, general freight agent Allegheny Valley Railway; Maj. W. H. Bixby, corps of engineers, United States Army, in charge of the Monongahela River slack-water improvements.

From the reports received from these gentlemen the following statement is compiled of the movement of coal at Pittsburg in 1896 and 1897:

Shipments of coal to and through Pittsburg in 1896 and 1897.

	1896.	1897.	1897.			
			Increase.		Decrease.	
			Amount.	Per cent.	Amount.	Per cent.
Pennsylvania R. R.:	*Tons.*	*Tons.*	*Tons.*		*Tons.*	
To Pittsburg	346,541	372,763	26,222	7.57	.....	.....
To Pittsburg Division, except Pittsburg	585,197	649,631	64,434	11.01	.....	.....
To Monongahela Division, except Pittsburg	294,867	230,579	.....	.....	64,288	21.80
To West Penn Division	118,080	126,745	8,665	7.34	.....	.....
To west of Pittsburg	688,740	1,206,598	517,858	75.19	.....	.....
Baltimore and Ohio R. R.:						
To Pittsburg district	552,031	395,265	.....	.....	156,766	28.4
To west of Pittsburg	839,145	581,851	.....	.....	257,294	30.66
Pittsburg, Cincinnati, Chicago and St. Louis Rwy. *a*	2,585,547	2,369,022	.....	.....	216,525	8.37
Allegheny Valley Rwy.: *b*						
To Pittsburg	162,945	125,445	.....	.....	37,500	23.01
To west of Pittsburg	64,887	20,721	.....	.....	44,166	68
Monongahela River docks:						
To Pittsburg	1,607,062	2,619,469	1,012,407	63	.....	.....
To west of Pittsburg	4,102,190	2,670,369	.....	.....	1,431,821	34.9
Total to Pittsburg and vicinity *a*	4,700,942	5,719,897	1,018,955	21.67	.....	.....
Total west of Pittsburg	7,246,290	5,648,561	.....	.....	1,597,729	22.05
Total shipments	11,947,232	11,368,458	.....	.....	578,774	4.85

a Shipments over the Pittsburg, Cincinnati, Chicago and St. Louis Railway are separated in the same ratio as the totals of other lines. Total shipments only over this line were reported.

b Coal originating on this road only. Does not include coal received from the Pennsylvania Railroad and forwarded over the Allegheny Valley Railway.

The above table brings out distinctly the effects of three conditions upon the coal trade of the Pittsburg district in 1897, as compared with 1896. These were, (1) the miners' strike, from July to September; (2) low water in the Ohio River in the summer of 1897; and (3) the revival in the manufacture of iron and steel. The effects of the miners' strike is seen in the decrease of 578,774 tons in the total movement of 1897, as compared with 1896. This difference would have been much larger but for the receipts of coal via the Pennsylvania Railroad and the Monongahela River, from points beyond the limits to which the strike extended. This coal received over the Pennsylvania lines went west of Pittsburg, while there was an increase of over 1,000,000 tons of river coal consumed in Pittsburg and vicinity.

The amount of coal passing through the Davis Island dam in 1897 was 1,431,821 tons less than in 1896. Most of this decrease was due to low water in the Ohio River during 1897, though a portion of the loss was doubtless due to increased consumption in and around Pittsburg. The increased activity in the iron and steel trade is reflected in an increase of more than 1,000,000 tons in the local consumption. Shipments of coal over the Pennsylvania Railroad to its Pittsburg, Monongahela, and West Penn divisions are included in the consumption of the Pittsburg district.

MONONGAHELA RIVER SHIPMENTS.

Maj. W. H. Bixby, Corps of Engineers, U. S A., who has charge of the Government improvements on the Ohio and Monongahela rivers, has prepared for this report the following statement, showing the amount of coal which passed through the locks of the Monongahela River and Davis Island dam from 1890 to 1897. The difference between the amounts passing the locks and the amounts passing the dam may be considered the amount of river coal consumed at Pittsburg, and has been so taken in compiling the preceding table:

Movements of coal through Monongahela River locks and Davis Island dam.

Year.	Passed through locks on Monongahela River.	Passed Davis Island dam, Ohio River, near Pittsburg. (From annual reports, Ohio River improvement).	Difference, approximate consumption of river coal at Pittsburg.
	Tons.	*Tons.*	*Tons.*
1890	4,652,104	3,420,357	1,231,747
1891	4,276,588	2,893,752	1,382,836
1892	3,872,340	2,299,294	1,573,046
1893	3,860,072	2,364,401	1,495,671
1894	4,649,612	2,453,787	2,195,825
1895	4,183,596	2,393,873	1,789,723
1896	5,709,252	4,102,190	1,607,062
1897	5,289,838	2,670,369	2,619,469

About 250,000 tons of river coal are estimated to have been mined in 1897 on the Monongahela River and used in the pools where mined, and consequently are not included in the amount locked. A proportionate amount, considering the yearly tonnage, applies in the same way for the other years.

RECEIPTS AND SHIPMENTS BY RAIL.

The following tables show the receipts and shipments of coal by railroads entering the Pittsburg district:

Receipts of coal via Pennsylvania Railroad in 1896 and 1897.

To—	1897.	1896.	Difference.	Per cent.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Pittsburg, town	372,763	346,541	*a* 26,222	7.57
Pittsburg division, except Pittsburg	649,631	585,197	*a* 64,434	11.01
Monongahela division, except Pittsburg	230,579	294,867	*b* 64,288	21.08
West Penn division	126,745	118,080	*a* 8,665	7.34
West of Pittsburg	1,206,598	688,740	*a* 517,858	75.19
Total	2,586,316	2,033,425	*a* 552,891	27.19

a Increase. *b* Decrease.

Shipments of coal and coke via Baltimore and Ohio Railroad to and through Pittsburg.

Year.	Pittsburg district.		Via Pittsburg to all points.	
	Coal.	Coke.	Coal.	Coke.
	Tons.	*Tons.*	*Tons.*	*Tons.*
1896	552,031	447,866	839,145	727,219
1897	395,265	487,745	581,851	1,020,430

Shipments of coal via Allegheny Valley Railroad to and through Pittsburg.

Year.	Pittsburg district.	Via Pittsburg to all points.	Total.
	Tons.	*Tons.*	*Tons.*
1895	162,600	33,399	195,999
1896	162,945	64,887	227,832
1897	125,445	20,721	146,166

The shipments over the Allegheny Valley Railroad include only the amount of coal originating on the line of that road. The following

table shows the amount of coal and coke received from other lines and forwarded over the Allegheny Valley Railroad. The coke to Pittsburg yard came from Connellsville and was only handled in switching limits:

Coal and coke received by Allegheny Valley Railroad from other lines and forwarded.

Year.	Pittsburg yard.		Other points.		Total.	
	Coal.	Coke.	Coal.	Coke.	Coal.	Coke.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1895	308,207	275,457	112,825	50,118	421,032	325,575
1896	278,299	267,481	80,747	28,335	359,046	295,816
1897	387,867	317,547	171,603	64,904	559,470	382,451

Shipments of coal over the Pittsburg, Cincinnati, Chicago and St. Louis Railroad.

Year.	Tons.
1895	2,417,096
1896	2,585,547
1897	2,369,022

BUFFALO, NEW YORK.[1]

The anthracite coal tonnage passing through Buffalo via water and rail in 1897 was 10 per cent less than that in 1896, and was the smallest amount handled in ten years. There was also a falling off in the receipts of bituminous coal, but the decrease was less marked than that of the anthracite tonnage. In fact, the falling off in the bituminous trade is remarkable for being so slight, for during the miners' strike in the bituminous regions Buffalo was almost entirely shut off from supply, and in several instances the closing down of manufacturing plants was necessary.

[1] From the annual report of the Buffalo Merchants' Exchange.

The following tables show the receipts and shipments of coal at Buffalo for a series of years:

Coal receipts at Buffalo for a series of 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	7,275,500
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	2,661,840	25,000	7,274,901
1897	4,109,052	2,616,185	25,000	6,750,237

Lake shipments of anthracite coal from Buffalo.

Year.	Tons.	Year.	Tons.
1883	1,467,778	1891	2,365,895
1884	1,431,081	1892	2,822,230
1885	1,428,086	1893	2,681,173
1886	1,531,210	1894	2,475,255
1887	1,894,060	1895	2,612,768
1888	2,514,906	1896	2,379,068
1889	2,151,670	1897	2,229,329
1890	2,157,810		

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
1897	100,000	5,000

Shipments of bituminous coal by canal.

Year.	Short tons.	Year.	Short tons.
1890	25,872	1894	8,840
1891	34,060	1895	4,250
1892	29,216	1896	956
1893	19,336	1897	*a* 164

a Anthracite.

Anthracite wholesale circular prices at Buffalo in 1897.

Date.	Free on board vessels at Buffalo.				On cars at Buffalo or Suspension Bridge.			
	Grate.	Egg.	Stove.	Chestnut.	Grate.	Egg.	Stove.	Chestnut.
January 1	$5.05	$5.30	$5.30	$5.30	$4.75	$5.00	$5.00	$5.00
May 1	4.80	5.05	5.05	5.05	4.50	4.75	4.75	4.75
July 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 1897.

Date.	Grate.	Egg.	Stove.	Nut.	Pea.	Blossburg.
January 1	$5.00	$5.25	$5.25	$5.25	$4.00	$4.00
May 1	4.75	5.00	5.00	5.00	3.75	4.00
July 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 conditions which governed the Cleveland coal market during the year 1897 were varied and peculiar. From January 1 to July 1 prices ruled very low; in fact, taking into consideration the rate paid for mining in Ohio and competing States, they were unprecedented. The general miners' strike, which was inaugurated July 4, continued for nearly two and a half months. During this time mining was practically suspended in the States of Ohio, Indiana, and Illinois, the western part of Pennsylvania, and in some of the mining districts of West Virginia. As a result of the strike prices advanced very materially, but did not rule nearly so strong as during the strike of 1894. During the period of the strike of 1897 the Cleveland market was supplied with coal, in a moderate way, from the mines of eastern Pennsylvania, West Virginia, and Virginia. An agreement was reached September 11 between the miners and operators on a compromise basis, miners receiving 65 cents per ton instead of 69, as demanded. From the time of resumption of work to the end of the year prices were more favorable to the producer. The car supply was inadequate to the demand made upon the railways, thus in a measure regulating the output and assisting somewhat in maintaining prices. The supply of coal for the lake trade was not equal to the demand, the strike having been settled so late in the season as to leave but little time for lake shipment.

Coal and coke receipts and shipments at Cleveland since 1887.

RECEIPTS.				
	1887.	1888.	1889.	1890.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Bituminous	1,454,744	1,737,781	1,600,000	1,560,208
Anthracite	176,769	181,551	160,000	205,856
Coke	114,924	124,827	150,000	194,527
Total	1,746,437	2,044,159	1,910,000	1,960,591
SHIPMENTS.				
Anthracite by rail	20,296	29,735	25,000	29,056
Bituminous by rail Bituminous by lake	703,506	1,000,000	1,100,000	1,200,000
Total	723,802	1,029,735	1,125,000	1,229,056

Coal and coke receipts and shipments at Cleveland since 1887—Continued.

RECEIPTS.

	1891.	1892.	1893.	1894.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Bituminous	2,838,586	3,651,080	3,603,984	2,715,540
Anthracite	201,927	259,150	262,266	207,604
Coke	189,640	351,527	235,248	298,061
Total	3,230,153	4,261,757	4,101,498	3,221,205

SHIPMENTS.

Anthracite by rail	34,910	50,742	49,497	44,177
Bituminous by rail	1,525,000	1,728,831	24,128	30,000
Bituminous by lake			1,257,326	1,106,000
Coke by rail				42,048
Total	1,559,910	1,779,573	1,330,951	1,222,225

RECEIPTS.

	1895.	1896.	1897.
	Tons.	*Tons.*	*Tons.*
Bituminous	2,842,333	2,994,802	3,779,305
Anthracite	201,022	142,832	201,756
Coke	432,216	338,678	503,935
Total	3,475,571	3,476,312	4,484,996

SHIPMENTS.

Anthracite by rail	31,894	20,299	33,750
Bituminous by rail	64,908	25,872	71,770
Bituminous by lake	1,125,624	1,803,709	2,027,693
Coke by rail	49,536	85,256	117,390
Total	1,271,962	1,935,136	2,250,603

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 last eleven years:

Clearances of coal from the Cuyahoga (Ohio) district for eleven years.

Year.	Tons.	Year.	Tons.
1887	1,433,035	1893	3,052,342
1888	1,855,260	1894	2,239,829
1889	2,020,996	1895	2,948,324
1890	2,328,663	1896	3,863,645
1891	2,635,461	1897	3,613,245
1892	2,957,988		

The foregoing figures include only the coal actually rehandled, and do not include freight passing through Cleveland without transfer. Bituminous coal received via Ohio Canal at Cleveland, and amounting to 35,000 tons or more a year, is not included in the tables. Following are the average wholesale prices ruling at Cleveland in 1897:

Wholesale prices of coal at Cleveland, Ohio, in 1897.

Kind.	Average price per ton.	Kind.	Average price per ton.
Bituminous:		Bituminous—Continued.	
Massillon	$2.15	Coshocton	$1.75
Palmyra	2.25	Hocking	1.80
Pittsburg	1.70	Anthracite:	
Salineville	1.40	Grate	4.68
Kentucky cannel	5.50	Egg	4.91
Goshen	1.50	Stove	4.91
Sherodsville	1.50	Chestnut	4.91
Osnaburg	1.50		

TOLEDO, OHIO.[1]

The coal receipts at Toledo in 1897 show a gratifying recovery from the depression of 1894 and the strikes of 1895. The increase in the receipts in 1897 over 1896 was more than 50,000 tons, and over 1895 about 1,048,000 tons.

Part of the increase is attributed to extended manufacturing enterprises and part is ascribed to improved harbor conditions, permitting the advent of larger steamers, and the consequent lower freights. Toledo is claimed to be a natural and ideal place for the meeting of

[1] Extract from the annual report of Mr. Denison B. Smith, secretary Produce Exchange.

iron ore and coal. Large sums are being expended yearly in improvements for the rapid handling of these commodities, and the harbor will soon be in condition to float, load, and unload ships of 6,000 tons burden. It is the nearest port to the upper lakes and will soon be one of the safest and most commodious harbors on Lake Erie.

The following tables give a summary of coal receipts at Toledo since 1886:

Coal receipts at Toledo since 1886.

Railroad.	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

Coal receipts at Toledo since 1886—Continued.

Railroad.	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

Railroad.	1894.	1895.	1896.	1897.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Wabash R. R	.....	1,000	5,000	6,000
Lake Shore and Michigan Southern Rwy	22,126	38,000	44,000	50,000
Cincinnati, Hamilton and Dayton R. R	72,000	30,000	35,000	40,000
Pennsylvania Co	78,792	.....	529,968	573,000
Columbus, Hocking Valley and Toledo Rwy	540,000	500,000	850,000	730,000
Toledo and Ohio Central Rwy	767.670	721,914	705,272	777,129
Lake	116,000	124,000	119,000	88,705
Wheeling and Lake Erie Rwy	914,220	520,000	646,471	720,000
Total	2,510,808	1,934,914	2,934,711	2,984,834

CHICAGO, ILLINOIS.

The following tables show the receipts of coal at and shipments from Chicago during 1896 and 1897, as collected by the Chicago Bureau of Coal Statistics, room 601, Temple Court Building.

The anthracite coal receipts at Chicago during 1897, and as compared with 1896, are instructive as shown in the following table. The receipts by lake were 85,922 tons less than in 1896; receipts by rail show a decrease of 98,371 tons; while the total receipts are 184,293 tons less.

Receipts of anthracite coal at Chicago in 1896 and 1897, by months.

Month.	Anthracite by lake.		Anthracite by rail.	
	1897.	1896.	1897.	1896.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	.....	.....	51,649	54,121
February	.....	.....	35,752	24,933
March	.....	.....	26,294	23,682
April	2,300	5,826	14,161	14,999
May	105,405	141,858	13,147	11,251
June	131,253	185,839	35,179	39,641
July	85,132	104,746	38,186	68,790
August	153,949	135,537	65,512	60,003
September	96,830	175,565	56,942	78,281
October	227,491	175,403	62,727	99,144
November	263,945	224,553	90,775	101,969
December	167,466	170,366	52,305	64,186
Total	1,233,771	1,319,693	542,629	641,000

Month.	Total anthracite.		1897.	
	1897.	1896.	Increase.	Decrease.
	Tons.	*Tons.*	*Tons.*	*Tons.*
January	51,649	54,121	.....	2,472
February	35,752	24,933	10,819	.....
March	26,294	23,682	2,612	.....
April	16,461	20,825	.....	4,364
May	118,552	153,109	.....	34,557
June	166,432	225,480	.....	59,048
July	123,318	173,536	.....	50,218
August	219,461	195,540	23,921	.....
September	153,772	253,846	.....	100,074
October	290,218	274,547	15,671	.....
November	354,720	326,522	28,198	.....
December	219,771	234,552	.....	14,781
Total	1,776,400	1,960,693	.....	184,293

The receipts of bituminous coal, with the States from which shipped, during the last three years are shown in the following table. It is interesting to note that Ohio coal seems to be slowly losing its hold on the Chicago markets, while the receipts from West Virginia and Kentucky are increasing. The amount of coal received from these two States in 1897 shows an increase of more than 60 per cent over 1896 and about 75 per cent over 1895. Illinois and Indiana mines contribute about 75 per cent of the bituminous coal supply of Chicago. The total receipts of bituminous coal in 1897 were 522,226 tons, or 11 per cent more than in 1896, and about three times the decrease in the receipts of anthracite coal. Coke receipts were 129,797 tons, or about 33 per cent more than the preceding year:

Receipts of bituminous coal and coke at Chicago for three years.

States from which received.	1895.	1896.	1897.	Increase in 1897.	Decrease in 1897.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Pennsylvania	182,169	184,655	211,158	26,503	.....
Ohio	350,156	330,837	313,632	.....	17,205
West Virginia and Kentucky	339,873	394,549	649,441	254,892	.....
Illinois	2,401,620	2,589,737	2,628,384	38,647	.....
Indiana	1,509,825	1,351,848	1,571,237	219,389	.....
Total bituminous coal	4,783,643	4,851,626	5,373,852	522,226	.....
Coke	279,874	397,811	527,608	129,797	.....

MILWAUKEE, WISCONSIN.

Mr. William J. Langson, secretary of the Chamber of Commerce at Milwaukee, has kindly allowed the use of the proof sheets of that portion of his report for 1897 bearing upon the coal trade of that city, in advance of its publication:

Owing to the protracted strike of the coal miners in 1897, the coal trade was restricted to some extent. Stocks of soft coal were nearly exhausted by the time business was fully resumed, and special efforts were made to replenish them before the close of navigation. The result was an increase in the receipts of this variety by lake during the fall months, to the exclusion of hard coal, of which stocks had not been so largely drawn upon during the strike. Under normal conditions the arrivals of all kinds of coal at this port would undoubtedly have shown a large increase over the receipts of 1896. As it was, the receipts of hard coal were 168,055 tons less than during the preceding season, while the receipts of soft coal by lake show an increase of 136,068 tons, and by rail a decrease of 38,032 tons, making a net

decrease in the supply from all sources for the year of 31,987 tons. The arrivals by lake of hard and soft coal together exceeded the total arrivals of the preceding season by 6,045 tons. During the last two months of navigation lake freights on coal advanced from 20 to 60 cents per ton to all upper lake ports under the congested state of business that succeeded the strike.

Compared with the two preceding years, the respective quantities of hard and soft coal received at Milwaukee were as follows:

Receipts of coal at Milwaukee, Wisconsin, in 1895, 1896, and 1897.

Kind.	1895.	1896.	1897.
	Tons.	*Tons.*	*Tons.*
Hard coal	853,680	813,487	645,432
Soft coal	592,743	774,308	910,376
Total	1,446,423	1,587,795	1,555,808

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 thirteen years:

Receipts of coal at Milwaukee for thirteen years.

	1885.	1886.	1887.	1888.	1889.	1890.	1891.
By lake from—	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Buffalo	392,003	395,971	464,972	631,263	542,167	510,598	659,388
Erie	50,915	41,847	61,222	74,610	47,862	46,378	55,202
Oswego	10,043	.....	1,153	1,348	.....	2,408	17,022
Cleveland	126,741	91,997	78,259	98,631	89,071	135,413	143,776
Ashtabula	35,360	11,096	38,881	23,105	48,599	24,671	22,726
Black River	5,549	.....	.....	.....	.....	.....	.....
Lorain	19,452	12,417	11,757	13,533	15,367	15,351	3,983
Sandusky	19,307	57,412	46,606	19,733	51,816	26,193	10,692
Toledo	31,875	69,079	14,115	38,452	71,516	59,305	53,644
Charlotte	19,491	31,744	2,781	14,292	22,526	6,120	10,013
Fairport	.....	.....	10,517	30,253	5,552	11,100	5,775
Ogdensburg	.....	.....	.....	7,700	4,953	7,026	5,179
Huron, Ohio	.....	.....	.....	8,244	7,726	9,720	12,537
Other ports	.....	2,679	4,331	.....	588	*a*49,375	*a*6,949
Total, lake	710,736	714,242	724,594	961,164	907,743	903,658	1,006,656
By railroad	65,014	45,439	118,385	161,079	72,935	92,999	149,377
Receipts	775,750	759,681	842,979	1,122,243	980,678	996,657	1,156,033

a Including cargoes from all ports not reported at the custom-house.

Receipts of coal at Milwaukee for thirteen years—Continued.

	1892.	1893.	1894.	1895.	1896.	1897.
By lake from—	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Buffalo	819,570	629,243	658,978	755,831	745,870	545,219
Erie	65,190	78,947	97,995	86,332	19,879	92,370
Oswego	26,177	46,065	41,891	33,364	60,309	38,319
Cleveland	132,051	189,539	105,800	105,469	232,689	305,435
Ashtabula	30,549	38,317	58,179	99,521	114,625	132,103
Lorain	.....	18,406	22,552	27,017	40,460	13,887
Sandusky	19,039	5,360	7,250	5,179	28,238	42,555
Toledo	12,229	64,548	90,357	74,603	114,501	216,318
Charlotte	55,909	763	.....	1,153	.....	.....
Fairport	5,359	16,483	122,573	126,955	97,532	44,621
Ogdensburg	18,134	1,635	2,065	.....	2,800	.....
Huron, Ohio	12,173	26,342	3,275	11,229	29,605	44,378
Other ports	19,485	1,800	18,395	9,950	975	18,323
Total, lake	1,210,865	1,117,448	1,229,310	1,336,603	1,487,483	1,493,528
By railroad	163,549	132,284	107,736	109,920	100,312	62,280
Receipts	1,374,414	1,249,732	1,337,046	1,446,423	1,587,795	1,555,808

Shipments of coal from Milwaukee by rail in 1897 were larger by 206,184 tons than in 1896. The following table will show the westward movement of coal from this point for a series of years and the roads by which it was carried:

Shipments of coal from Milwaukee for fifteen 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

Shipments of coal from Milwaukee for fifteen years—Continued.

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.	1897.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Chicago, Milwaukee and St. Paul Rwy	321,960	246,620	398,053	264,650	362,751
Chicago and Northwestern Rwy.	199,457	167,753	221,357	169,409	247,979
Wisconsin Central R. R.	10,967	12,377	17,990	12,318	42,017
Milwaukee, Lake Shore and Western Rwy. *a*	.....	.....	.....	.....	.....
Milwaukee and Northern R. R. *b*	.....	.....	.....	.....	.....
Lake	609	6,018	3,070	306	120
Total	532,993	432,768	640,470	446,683	652,867

a Absorbed by Chicago and Northwestern in 1893.
b Absorbed by Chicago, Milwaukee and St. Paul.

Receipts of coal at Milwaukee by lake and rail annually from 1862 to 1897, 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	1897	1,555,808

Yard prices per ton of coal at Milwaukee during the year 1897, reported by R. P. Elmore Company.

Month.	Lackawanna and Scranton.	Briar Hill.	Cannel.	Steam coal, Ohio and Erie.
January	$6.00	$6.00	$5.00 @ $7.00	$2.75 @ $3.00
February	6.00	6.00	5.00 @ 7.00	2.75 @ 3.00
March	6.00	6.00	5.00 @ 7.00	2.75 @ 3.00
April	6.00	6.00	5.00 @ 7.00	2.75 @ 3.00
May	6.00	6.00	5.00 @ 7.00	2.40 @ 2.55
June	6.25	6.00	5.00 @ 7.00	2.40 @ 2.55
July	6.00	6.00	5.00 @ 7.00	2.40 @ 2.55
August	5.75	6.00	5.00 @ 7.00	2.40 @ 2.55
September	5.75	6.00	5.00 @ 7.00	2.80 @ 3.00
October	5.50	6.00	5.00 @ 7.00	2.80 @ 3.00
November	5.50	6.00	5.00 @ 7.00	2.80 @ 3.00
December	5.50	6.00	5.00 @ 7.00	2.80 @ 3.00

Lake freights on coal from Buffalo to principal upper lake ports, during the season of 1897, were as follows:

Freight rates from Buffalo to upper lake ports in 1897.

Month.	Chicago.	Milwaukee.	Duluth and Superior.	Gladstone.
	Cents.	*Cents.*	*Cents.*	*Cents.*
April	25	25	20	.....
May	20 to 25	20 to 25	20	.....
June	20	20	20	.....
July	20	20	20	20
August	20	20	20	20
September	20	20	20	20
October	20 to 40	20 to 40	20 to 25	25
November	50 to 60	50 to 60	30 to 60	30 to 60
December to close	60	60	60	60

SUPERIOR, WISCONSIN.

Mr. John M. McCabe, secretary of the Superior Commercial Club, furnishes the following statement of the coal receipts at Superior since 1887: The receipts in 1897, in spite of the miners' strike which affected the trade at the lower lake ports, were the largest in the history of the city, and five and one-half times the amount received in 1887.

Coal receipts at Superior, Wisconsin, for eleven years.

Year.	Tons.	Year.	Tons.
1887	266,289	1893	1,196,919
1888	786,000	1894	1,456,400
1889	720,000	1895	1,371,340
1890	875,000	1896	1,440,000
1891	1,082,063	1897	1,471,200
1892	1,139,227		

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	.....	a 10,359,906	1,104,003
1872–73	24,962,373	.....	a 11,075,072	1,162,052
1873–74	24,014,681	.....	a 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

a Including Kanawha coal.

Receipts of coal at Cincinnati since September 1, 1871—Continued.

Year.	Pittsburg (Youghiogheny).	Kanawha.	Ohio River.	Canal.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*
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	.....
1897	35,040,790	17,941,769	60,217	.....

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
1888–89	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
1897	1,251,250	24,468,000	78,762,026

a Calendar years since 1892.

Receipts of coal at Cincinnati during the past seventeen years have been as follows:

Coal receipts at Cincinnati, Ohio.

Year.	Tons.	Year.	Tons.
1881	1,492,817	1890	2,452,253
1882	2,197,407	1891	2,608,923
1883	2,025,859	1892	2,718,809
1884	2,092,551	1893	2,905,071
1885	2,008,850	1894	2,755,137
1886	2,130,354	1895	2,530,061
1887	2,350,026	1896	2,873,492
1888	2,551,415	1897	2,840,437
1889	2,348,055		

The records of arrivals of coal at Cincinnati in 1897 show a reduction of about 1,000,000 bushels, or 1¼ per cent, in comparison with the large movement of the preceding year. From that year there was a surplus, with which and the current receipts free offerings were maintained, even under a curtailment in the river movement. The situation in September subsequently admitted of a strengthening of prices on local deliveries, so that the average for the three months, September to November, inclusive, was decidedly higher than for the first six months of the year, when the average was exceptionally low, the earlier part of the year representing $2 per ton for standard lump, delivered to consumers within usual distances, while the average in the later period mentioned was about $2.80.

The aggregate receipts of coal at Cincinnati in 1897 were 78,762,026 bushels, or 2,840,437 tons. Of this quantity, 1,251,250 bushels represented anthracite and the remainder bituminous coal, chiefly from the Pittsburg and Kanawha districts. The total receipts in 1896 were 79,689,109 bushels, or 2,873,492 tons. For five years ending with 1896 the annual average was 76,752,000 bushels, or 2,767,000 tons. The shipments of coal in 1897 were 19,173,000 bushels; in 1896, 14,934,000; in 1895, 18,795,000; in 1894, 17,029,000; in 1893, 18,867,000 bushels. The local consumption in recent years has been about 60,000,000 bushels annually.

Of the total receipts of coal for the year the arrivals by water were 53,042,876 bushels and by rail 25,719,250 bushels. For the preceding year the river receipts were 58,841,892 bushels and the receipts by rail 20,847,000 bushels. The changes in the transportation channels represented have been largely due to variable conditions of river navigation, but partly to interruptions occasioned by mining disputes. The river receipts in 1897 embraced 35,040,790 bushels from the Pittsburg district and 17,941,769 bushels from the Kanawha district. The quantity by rail from the Kanawha regions and Virginia was approximately 18,000,000 bushels. This implies that what is termed Kanawha

coal has amounted to one-half that from the Pittsburg districts for the year, and this has practically been the condition during the last half dozen years.

On the basis of sales reported by various dealers it is estimated that about half of the local consumption of coal is for industrial operations and half for household purposes. About 6 per cent of the local consumption is represented in the manufacture of gas, the local distribution of which is about 1,000,000,000 cubic feet annually for all purposes. The price of gas to consumers is $1 per 1,000 cubic feet. It is believed by some observers that the consumption of gas would be greatly enlarged in households and in industrial shops if a reduction in cost could be offered within such limitations as might admit of profitable returns to an aggregate extent not less than is now realized.

The average price of Pittsburg coal sold afloat in 1897 was $1.57 per ton, and of Kanawha, $1.64 per ton. The variation here shown is due to the fact that during much of the period of higher prices the transactions were mostly or entirely in the Kanawha product. The average price of coal delivered to consumers was $2.25 per ton for the Pittsburg product and $2.26 for Kanawha. For ten years ending with 1896 the annual average price of Pittsburg coal afloat was $1.99 per ton of 2,000 pounds, and for Kanawha $1.93. Delivered to consumers the annual average price for the ten years was $2.85 for Pittsburg and $2.81 for Kanawha. In 1897 Kanawha coal afloat sold as low as $1.10 to $1.25 per ton, to a considerable extent, and as low as $1.75 to $2 for lump delivered in ordinary lots to consumers.

The yearly range and average prices of Pittsburg coal, afloat and delivered, per bushel, based on weekly records, compare for twelve years as shown in the following compilation:

Yearly range and average prices of Pittsburg coal.

Year.	Afloat.			Delivered.		
	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
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.	8⅛	10¾	9.
1896	5½	6	5.73	8⅛	9	8.21
1897	5½	5¾	5.70	5¾	10¾	9.50

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 3,154,000 bushels and the quantity locally manufactured was 4,594,000 bushels, making a total of 7,748,000 bushels, compared with 6,916,000 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, $5.27 per ton.

ST. LOUIS, MISSOURI.

Mr. James Cox, secretary of the Business Men's League of St. Louis, furnishes the following review of the coal trade of St. Louis during the year 1897:

The coal trade of St. Louis was materially interfered with by the labor troubles at the mines during the year 1897. There were several predictions of coal famine during the year, and at times the supply on hand ran very low indeed. Some dealers were unable to keep up with orders for domestic purposes, while others found it expedient to fill orders in part only. Much anxiety was felt among manufacturers. Business was unusually good, and factories generally worked heavier forces than in any previous years. A complete shut off in the supply of coal for steam-producing purposes would have been disastrous in the extreme, and to avoid the possibility of this the Manufacturers' Association appointed a commission and endeavored to adjust some of the most serious differences between the miners and the operators. Matters righted themselves before the worst fears were realized, but the strike and the tedious delays which followed its nominal adjustment had a marked effect on the receipts of coal.

The falling off in the receipts of soft coal amounted to nearly 4,000,000 bushels, or a little less than 3 per cent. The manufactured output of the city during 1897 was much larger than during 1896, and this accounts for the fact that the drop in receipts for the entire year was below that anticipated. There was also a decrease in the receipts of anthracite, although more coke was handled than in 1896.

A large proportion of the coal came, as usual, from the southern Illinois coal fields, whose proximity to St. Louis guarantees that city a liberal supply of coal for manufacturing purposes at very low prices. The strike caused a singular upheaval in railroad circles, as some mines were closed down much longer than others. The Baltimore and Ohio Railroad, which hauled nearly 12,000,000 bushels into St. Louis in 1896, and also in 1895, only delivered 8,000,000 bushels in 1897. The "Big Four" deliveries showed a falling off of 60 per cent. The Vandalia, Wabash, and Peoria and Northern railroads lost between them the hauling of 13,000,000 bushels. On the other hand, the Louisville, Evansville and St. Louis Railroad practically doubled its coal business to this point, and the Illinois Central scored a substantial gain. Coal

received at St. Louis from mines on the west side of the Mississippi River continues to increase in quantity, but the total is still small. There was also an increase during 1897 in the receipts from Ohio River points.

Fluctuations in price were, of course, a very conspicuous feature of the coal trade of St. Louis during the year 1897. Under normal conditions coal suitable for factory use can be secured all the year round at about $1 per ton, a fact which accounts in large measure for the phenomenal growth of the manufacturing interests of the city. Last year the price fluctuated from $1 to the panic figure of $2.80. It may be explained that most of the factories have annual contracts for coal and also carry large stocks. Hence the number who paid nearly three times the established figure was not very large, nor were their purchases very heavy. High grade soft coal fluctuated from $1.50 to $3, and closed at $1.80. The average price for the year, as also the closing, shows a falling off as compared with 1896 quotations. Anthracite was cheaper all the year and closed nearly $1 lower than it opened.

The supreme court of Missouri has declared the smoke-abating ordinance of St. Louis unconstitutional on the ground that it declares smoke to be a nuisance. The general nuisance law is still operative and convictions can be secured where it can be proved that smoke complained of was a nuisance at the time the observation was taken. This complicates the situation so much that the effort to rid the city of smoke has been abandoned for the time being. Many factories which put in smoke abaters, in order to comply with the law, are continuing to use them, on the ground that they reduce the consumption of coal without reducing the production of steam. In many cases, however, especially where inexpensive abaters and steam jets were used, no special effort is being made to keep down the smoke. A new ordinance is being drafted which it is thought will hold good on appeal, and the smoke-abatement crusade may be recommenced this year.

The following quotations are for coal in carload lots, free on board at St. Louis during the year 1897:

Coal prices at St. Louis, Missouri, 1897.

Kind.	Highest.	Lowest.	Closing.
Standard Illinois lump coal	$2.80	$1.00	$1.50
High-grade Illinois lump coal	3.00	1.50	1.80
Anthracite, large	6.05	5.55	5.55
Anthracite, small	6.30	5.80	5.80
Connellsville coke, 72 hours, foundry	4.60	4.35	4.60
Connellsville coke, 48 hours, furnace	4.20	3.80	4.05
New River coke	4.15	3.90	4.15
Indiana coke	3.55	3.30	3.55
Kentucky coke	3.30	3.05	3.30
Gas coke	3.25	3.15	3.25

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
1897	83,730,980	172,933	5,671,350

MOBILE, ALABAMA.

Mr. Edward E. England, secretary of the chamber of commerce, estimates the receipts of coal at Mobile in 1897 at 176,760 tons, an increase of 8,760 tons over the previous year. Mr. England states that Mobile is expecting a large increase in the business of the port when the improvements of the waterway to the Alabama mines are completed. As it is, several barge loads, aggregating 3,000 tons, have already been received, the coal being loaded at the mines on the Tombigbee River, floated to Demopolis, and towed from there to Mobile. Three locks on the Warrior River have been completed. From this source of supply Mobile bunkers coal to vessels at $1.70 per ton—in bunkers and trimmed.

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
1897	*b*175,160	1,600	176,760

a This does not include the amount of coal used by the railroads on their locomotives and at their shops.
b Includes 3,000 tons received by barges via Tombigbee River.

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 coal trade at Lamberts Point was quiet in 1897, although shipments exceeded those of 1896. The competition of Canadian coal in New England and the fierce battle for trade with other domestic coal throughout the United States has depressed the trade generally, but the demand for Pocahontas coal has increased, as shown in the following table:

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	99,867	1,433,069	96,929	1,671,465
1897.....	44,103	104,966	1,473,710	115,079	1,737,858

SAN FRANCISCO, CALIFORNIA.

Mr. J. W. Harrison makes the following report to the coal trade of San Francisco:

The fuel consumption of California in 1897 was about 7 per cent greater than in 1896, which shows that the former year was a fairly profitable one for some of our manufacturing branches. Consumers were favored with low-priced coal the first half of the year, but the Dingley tariff, which went into effect in July, caused an advance on all grades equal to the increase of the duty; this change cuts a small figure with housekeepers and small consumers, but it is seriously felt in those industries where fuel is the principal factor in their expense account. Coal freights from Australia and Great Britain ruled high for the latter months of 1897, thus aiding to sustain full figures, as the coast colliery managers regulate their scale of prices by the import cost of colonial and English coal; hence the year has proved a very profitable one for our northern coal fields. It is a question as to how the local coal market will shape itself in 1898; there is no doubt as to the ability of British Columbia and Washington to fully supply us with all the fuel needed, in case foreign shipments should diminish, but there are indications of probable labor troubles when the Klondyke exodus

commences, and the writer predicts that all grades of laborers will catch the fever. Even if no trouble emanates from that source, there will certainly be a sparsity of vessels for transporting coal, as they will assuredly drift into the more profitable business of carrying freight and passengers toward the Alaskan gold fields. It is true this will last only for a few months, but it will be of sufficient duration materially to affect fuel values within that brief period.

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.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Australian (gas)	$5.25	$5.25	$5.15	$5.10	$5.15	$5.20	$5.25	$5.50	$5.75	$6.00	$6.10	$6.10
English steam	6.35	6.25	6.25	6.00	6.25	6.25	6.25	6.50	6.75	6.75	6.75	6.75
Scotch splint	6.50	6.50	6.25	6.25	6.25	6.25	6.50	6.75	7.00	7.00	7.00	7.00
West Hartley	7.00	7.00	6.75	6.75	6.75	7.00	7.00	7.25	7.25	7.25	7.25	7.25

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.	1897.
	Tons.	*Tons.*	*Tons.*	*Tons.*
British Columbia	647,110	651,295	551,852	558,372
Australia	211,733	268,960	273,851	281,666
English and Welsh	157,562	201,180	156,368	107,969
Scotch	18,636	4,098	8,356	4,081
Eastern (Cumberland and anthracite)	16,640	26,863	17,907	21,335
Seattle (Franklin, Green River, etc.)	153,199	150,888	128,919	220,175
Carbon Hill, South Prairie, etc	241,974	256,267	255,923	286,205
Mount Diablo and Coos Bay	65,263	84,954	110,237	115,150
Japan, Alaska, etc	15,637	9,015	2,247	6,587
Total	1,527,754	1,653,520	1,505,660	1,601,540

As it is necessary to include deliveries at Port Los Angeles and at San Diego to arrive at an accurate statement of the consumption of coal in the State, these are added in the above sources of supply. The total amount received by water at these two points aggregated 155,238 tons.

Coke.—The total deliveries of 1897 were 30,320 tons, 5,812 tons less than in 1896. Of the deliveries, 2,573 tons came from British Columbia and 1,889 tons from Australia, two new sources of supply for this market.

SEATTLE, WASHINGTON.

Mr. Lovett M. Wood, editor of the Trade Register, reports as follows regarding the coal trade of Seattle:

Seattle receives more, uses more, and distributes more coal than any other city in Washington. Besides the product of the mines in King County—Gilman, Newcastle, Franklin, Lawton, Renton, Cedar Mountain, Black Diamond, Danville, and small mines at one or two other places—Seattle handles much coal from other mines in the State, and the Carbon Hill mine in Pierce County has built bunkers in this city. The Pacific Coast Company, which is the successor of the Oregon Improvement Company, has improved the facilities on its own bunkers and has made its tracks broad instead of narrow gage, thus vastly increasing its means of quickly handling the product of the mines. As will be seen from the subjoined table, the receipts of coal from the King County mines for 1897 were 473,472 tons, against 425,103 tons in 1896,

an increase for the year of 48,369 tons, or over 11 per cent. To these receipts should be added the 6,910 tons received from mines outside of the county, which brings the total receipts of coal at Seattle to 480,382 tons. This, at the rate of $3 a ton, amounts to $1,441,146.

During the same period the exports of coal amounted to 295,180 tons, as against 194,771 tons the previous year, an increase of 100,409 tons, or about 52 per cent. This left 178,292 tons for local consumption, which was used by the manufacturers and families of the city and by the fleet of steamships, steamers, and tugs that sail from Seattle to all parts of Puget Sound, the coast, and many foreign ports. The significance of this local consumption can be better understood when it is known that more than two-thirds of the local fleet of steamers are wood burners, and that many of the mills and factories consume wood entirely. Yet the city is using 15,945 tons a month, or more than 524 tons every day of the year. Following are the receipts from King County mines, and the shipments:

Receipts and exports of coal at Seattle, Washington, in 1897, by months.

Month.	Receipts.	Exports.
	Tons.	*Tons.*
January	39,039	21,306
February	35,600	20,020
March	38,995	20,545
April	36,164	22,941
May	35,493	17,984
June	37,698	24,180
July	34,247	27,209
August	35,750	26,224
September	41,188	25,865
October	51,529	34,593
November	44,158	28,591
December	43,611	25,820
Total, 1897	473,472	295,180
Total, 1896	425,103	194,771
Increase in 1897	48,369	100,409

The increase in the receipts and shipments of coal bids fair during 1898 to be considerably enhanced, as the demand for fuel for the Yukon and Alaska steamers will be very great, and the supply will have to come mainly from Seattle.

PRODUCTION OF COAL BY STATES.

Among the thirty-two States and Territories in which coal is produced, Pennsylvania stands preeminent. The history of the coal mining industry since 1880, as recorded in the volumes of Mineral Resources, shows that in each year the combined output of anthracite and bituminous coal in Pennsylvania has exceeded 50 per cent of the total coal product of the United States. In the early days of coal mining, the Richmond basin held a comparatively important place, having an output in 1822 of 48,214 tons, whereas the production of anthracite coal in Pennsylvania in that year was only 3,720 tons, and the Pennsylvania bituminous fields were not then opened. In 1833, however, the production of Pennsylvania anthracite had increased to 487,749 tons, and the output from the Richmond basin was 142,587 tons. Since that time Pennsylvania has maintained her supremacy, and while the records of coal production are wanting for the intervening years, with the exception of Pennsylvania anthracite and Maryland "Cumberland" coal, there is no doubt that Pennsylvania's percentage of the product between 1833 and 1880 was more than it has been during the last eighteen years.

In 1880 Pennsylvania produced 65 per cent of the total; in 1881 63 per cent of the product was from this State, but at no time since has the proportion been so high as 60 per cent. The lowest was 52 per cent, in 1888, but this extreme has not been reached a second time. The average percentage contributed by Pennsylvania in eighteen years has been 55. Pennsylvania's total product in 1897 was over 3,000,000 short tons more than in 1896, but the percentage of the total fell off from 54 to 53, the decrease in percentage being due to larger proportionate increases in other States. In fact, the coal-producing record for the year 1897 was remarkable, in the fact that out of 32 States the output increased in 28 and decreased in but 4. In 3 out of the 4 the differences were slight, aggregating but little more than 60,000 tons loss. Ohio bore the brunt of the decrease with a loss of 678,260 short tons.

It is the opinion of many conversant with the coal-mining conditions that the maximum output of anthracite coal in Pennsylvania has about been reached. This state of affairs is not due to the exhaustion or limitation of the supply, but rather to the competition of other fuels—bituminous coal, coke, and gas. In the meantime bituminous coal production in other States, notably Illinois and West Virginia, is likely to continue to increase, and it is possible that the percentage product of Pennsylvania will fall off, but the close of the twentieth century will probably find that State still occupying first place in the rank of coal producers.

Illinois continues to occupy second place, with 10 per cent of the total output. West Virginia, in 1897, took firm hold of third place,

with 7 per cent of the total, and an output of more than 2,000,000 tons in excess of Ohio, which, though suffering a decrease of 678,260 tons in 1897, produced 6 per cent of the total, and had more than double the product of Alabama, the fifth in rank. It will be observed that all these five States are east of the Mississippi River. Iowa leads the States west of the Mississippi, supplanting Maryland for sixth place, and is the only one of the Western States producing as much as 2 per cent of the total. Iowa's percentage in 1897 was 2.3. Maryland yielded 2.2 per cent; Indiana, the eighth, contributed 2.07 per cent; Kentucky, the ninth, 1.8 per cent, and Colorado, the tenth, 1.7 per cent. Only two of the ten leading States, Iowa and Colorado, are west of the Mississippi River.

The details of the production in the various States are contained in the following pages:

ALABAMA.

Total product in 1897, 5,893,770 short tons; spot value, $5,192,085.

Compared with 1896, the production of coal in Alabama during 1897 shows an increase of 145,073 short tons, or a little less than 3 per cent. The value of the product in 1897 was only $17,950, or about 0.3 per cent, in excess of that of 1896, the average price per ton having declined from 90 cents to 88 cents.

In the following tables the figures indicate that the coal used in the production of coke decreased over 600,000 tons. This large decrease is only apparent, however, for while the output of coke was less than in 1896, the amount made in 1897 was larger than the amount of coal used, according to the table. The seeming discrepancy is due to the fact that in several instances the coke ovens are located at some distance from the mines, and the coal sent to these ovens is reported among the shipments. The total amount of coke produced in Alabama in 1897 was 1,443,017 short tons, involving the consumption of 2,451,475 short tons of coal.

The amount of coal mined by machines in Alabama was reported for the first time in 1897, the machine-mined product being 294,384 short tons. The amount of machine-mined coal for this State was not reported in 1896, and it is accordingly impossible to make any comparisons. The statistics of men employed and average working time for the two years show that the tonnage per day per man in 1897 was 2.38, against 2.34 in 1896. The number of men employed increased from 9,894 in 1896 to 10,597 in 1897, a gain of 703, but the average working time fell off from 248 days to 233 days.

Alabama coal operators were almost free from labor troubles throughout 1897. There were only eight mines affected by strikes during the year, and these were of short duration. At the Belle Ellen mine of the Bessemer Land and Improvement Company, Bibb County, 200 men were on strike twenty-one days, from August 3 to August 25; 200 men at the Blossburg mine and 500 men at Brookside and Brazil

mines of the Sloss Iron and Steel Company, all in Jefferson County, were on strike twenty-one days, from July 1 to 21; at the Montevallo Coal and Mining Company, Shelby County, 25 men were on strike one day, December 15; at the Santee mine of the Helena Coal Company, Shelby County, 40 men were on strike five days, November 21 to 26; at the America mine of the American Coal and Coke Company, Walker County, 160 men were on strike eleven days in April, and 50 men employed by the Mountain Valley Coal and Coke Company, Walker County, were on strike seven days in November.

The details of production, by counties, in 1896 and 1897 are shown in the following tables:

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

Coal product of Alabama in 1897, 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	637,230	1,950	21,165	10,732	671,077	$622,566	$0.93	183	1,425
Blount, Etowah	2	40,168	350	.....	.....	40,518	44,253	1.09	254	61
Jefferson	35	2,645,107	29,773	74,902	964,894	3,714,676	3,266,217	.88	250	6,026
St. Clair	2	63,104	693	3,787	.....	67,584	54,997	.81	270	166
Shelby	7	68,131	270	2,650	13,622	84,673	127,137	1.50	179	376
Tuscaloosa	5	126,525	5,772	4,243	97,948	234,488	218,545	.93	276	425
Walker	20	955,104	12,972	19,440	50,000	1,037,516	815,617	.79	219	2,089
Winston	2	8,228	10	.....	.....	8,238	7,753	.94	212	29
Small mines	.....	.....	35,000	.....	.....	35,000	35,000	1.00	.....	.....
Total	78	4,543,597	86,790	126,187	1,137,196	5,893,770	5,192,085	.88	233	10,597

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	4,090,409	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	5,748,697	5,174,135	.90	248	9,894
1897	5,893,770	5,192,085	.88	233	10,597

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 1897 as compared with 1896:

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.	1897.	Increase 1897.	Decrease 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bibb	401,061	653,732	710,842	671,077	.....	39,765
Blount	8,000	62,400	32,760	37,350	4,590	.....
Cullman	.....	.....	1,000	.....	.....	1,000
Dekalb	.....	.....	.....	.....	.....	.....
Etowah	.....	900	3,080	3,168	88	.....
Jackson	6,011	.....	.....	.....	.....	.....
Jefferson	2,766,302	3,726,325	3,729,719	3,714,676	.....	15,043
St. Clair	43,517	30,806	33,368	67,584	34,216	.....
Shelby	76,619	52,754	52,923	84,673	31,750	.....
Tuscaloosa	191,081	208,117	205,223	234,488	29,265	.....
Walker	891,953	946,241	952,642	1,037,516	84,874	.....
Winston	4,634	4,500	2,140	8,238	6,098	.....
Small mines	8,000	8,000	25,000	35,000	10,000	.....
Total	4,397,178	5,693,775	5,748,697	5,893,770	*a* 145,073	.....

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.	1897.
Bibb	$1.20	$1.10	$1.17	$1.08	$1.00	$1.00	$1.00	$0.89	$0.93
Blount	.....	.....	.....	.....	.....	.....	.80	1.00	1.10
Jefferson	1.07	1.00	1.04	1.03	.98	.90	.87	.89	.88
St. Clair	1.25	1.18	1.14	1.10	1.06	.96	.48	1.00	.81
Shelby	1.79	2.50	2.60	2.61	1.82½	1.44	1.73	1.75	1.50
Tuscaloosa	1.23	1.05	1.03	1.07	1.05	1.06	.97	1.13	.93
Walker	1.04	1.00	1.03	1.02	.98	.91	.90	.85	.79
General average	1.10	1.03	1.07	1.05	.99	.93	.90	.90	.88

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.		1897.	
	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	204	1,089	198	1,259	232	1,195	183	1,425
Blount	.....	.....	275	95	225	46	285	50
Jefferson	272	6,567	267	5,825	290	5,134	250	6,026
St. Clair	225	98	126	96	154	162	270	166
Shelby	114	405	169	198	139	302	179	376
Tuscaloosa	261	363	282	612	258	588	276	425
Walker	180	2,252	210	2,231	189	2,403	219	2,089
The State	238	10,859	244	10,346	248	9,894	233	10,597

ALASKA.

Coal production in Alaska on a commercial scale began in 1896 with an output of 15,232 short tons, valued at $54,400. The product in 1897 amounted to 17,920 short tons, valued at $64,000, an increase of 2,688 tons in quantity and $9,600 in value. About three-fourths of the product is shipped from the mines, for use principally on steamers engaged in coastwise traffic. Practically all of the output is mined by machines, of which there were six in use in both years. The details of production in the two years are as follows:

Coal product of Alaska in 1896 and 1897.

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.*				
1896	1	11,200	3,360	672	15,232	$54,400	$3.57	245	20
1897	1	12,880	4,480	560	17,920	64,000	3.57	275	18

ARKANSAS.

Total product in 1897, 856,190 short tons; spot value, $903,993.

Except for a decline of 6 cents per ton in the average price realized for the product, the coal-mining interests of Arkansas in 1897 were exceptionally favored. The product was the largest in the history of the State, exceeding that of 1896 by 180,816 short tons, or about 27 per cent. Compared with 1895, the product last year shows a gain of 43

per cent, and an increase of 67 per cent as compared with 1894. Notwithstanding the decline in price, the total value in 1897 was nearly $150,000 more than that received for the product of 1896. The decline in price was in part compensated for by an increase in machine-mined coal, which amounted to 87,532 short tons, or 10.3 per cent of the total product, in 1897, against 21,094 short tons, or 3.12 per cent of the total, in 1896. The tonnage per day per man increased from 2.66 in 1896 to 2.75 in 1897. The price per ton declined 5.4 per cent; the individual efficiency increased 3.4 per cent.

The Sebastian County mines of the Western Coal and Mining Company were the only ones at which a strike occurred in 1897. The men, 480 in all, at three mines in this county were on strike for one week in October, the strike, owing to its short duration, having no material effect upon the production.

In the following tables are shown the statistics of production in 1896 and 1897, by counties, with the distribution of the product for consumption:

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

Coal product of Arkansas in 1897, 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	162,307	260	1,730	164,297	$182,864	$1.11	154	380
Johnson, Pope	3	107,752	4,250	6,000	117,002	178,082	1.52	131	405
Sebastian	9	557,459	1,078	10,354	568,891	531,047	.93	165	1,205
Small mines	.....	.....	6,000	.....	6,000	12,000	2.00	.....	.....
Total	14	827,518	11,588	18,084	856,190	903,993	1.06	156	1,990

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 has 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
1897	856,190	903,993	1.06	156	1,990

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.*
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.	1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Franklin	.....	9,879	147,728	252,938	222,711	281,299
Johnson	91,960	97,733				
Pope	17,500	12,250	17,788			
Sebastian	420,098	448,901	341,110	339,384	446,663	568,891
Small mines	6,000	6,000	6,000	6,000	6,000	6,000
Total	535,558	574,763	512,626	598,322	675,374	856,190

a Product of Franklin County according to Eleventh Census.

CALIFORNIA.

Total product in 1897, 85,992 short tons; spot value, $201,236.

The coal production of California in 1897 exceeded that of any year since 1891. The increase is attributed to the increased duty on imported coal, the tariff of 1897 imposing 67 cents per ton, against 40 cents under the Wilson tariff. The increase in the average price per ton, from $2.12 in 1896 to $2.34 in 1897, is probably due to the same cause.

There were no strikes or other disturbing elements in the industry during 1897. All of the product is mined by hand, no machines having been introduced into California mines.

The following tables exhibit the details of production in 1896 and 1897:

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	2	21,600	3,139	800	25,539	37,914	1.48	284	35
San Diego									
Total	4	69,608	4,537	4,399	78,544	166,123	2.12	297	157

Coal product of California in 1897, 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.*				
Alameda	2	33,900	2,000	1,000	36,900	$77,870	$2.11	67	212
Amador									
Contra Costa	2	37,462	1,087	3,356	41,905	103,011	2.68	269	130
Kern	3	3,400	3,782	5	7,187	20,355	2.83	253	21
Orange									
San Diego									
Total	7	74,762	6,869	4,361	85,992	201,236	2.34	150	363

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 eight 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
1897	85,992	201,236	2.34	150	363

COLORADO.

Total product in 1897, 3,361,703 short tons; spot value, $3,947,186.

Although the output of coal in Colorado during 1897 was 249,303 short tons larger than the product of 1896, it did not reach the amount mined in 1891, 1892, or 1893. The latter year was the year of largest production, with a total output of 4,102,389 short tons, about 740,000 tons more than the yield in 1897. The product in both 1891 and 1892 was a little over 3,500,000 tons.

There was a slight increase in the use of mining machines in 1897. The number of machines used increased from 34 in 1896 to 37 in 1897, a gain of 3, while the amount of coal won by machines increased from 318,172 tons to 352,400 tons.

Three unimportant strikes occurred in 1897. The Longs Peak mine, in Boulder County, had 56 men out for eleven days; the Lister Coal Company, also in Boulder County, had 33 men idle for eleven days, and 14 men at the Champion Mine, in La Plata County, were on strike for six days.

The production, by counties, in 1896 and 1897 was as follows:

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	5,550	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

Coal product of Colorado in 1897, 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	18	441,417	16,573	19,800	.....	477,790	$619,122	$1.29	164	805
Delta	3	.....	5,262	500	.....	5,765	8,397	1.46	208	23
Fremont	5	289,061	2,186	13,342	.....	304,589	494,312	1.62	123	896
Garfield	6	173,512	1,276	8,096	.....	182,884	203,912	1.12	241	216
Gunnison	6	173,252	2,037	7,206	114,922	297,417	438,908	1.48	165	692
Huerfano	11	333,676	3,797	30,421	.....	367,894	432,773	1.18	150	724
La Plata	6	68,158	5,072	100	3,458	76,788	112,359	1.46	218	130
Las Animas	10	1,062,792	15,606	11,458	337,670	1,427,526	1,359,022	.95	215	1,971
Pitkin	3	82,203	904	1,874	86,130	171,111	202,258	1.18	208	238
Rio Blanco	4	.....	1,867	15	.....	1,882	3,220	1.71	129	9
Routt	9	262	683	.....	.....	945	1,548	1.64	47	17
Weld	4	3,360	4,600	350	.....	8,310	12,255	1.47	266	21
Arapahoe, El Paso	2	12,349	480	20	.....	12,849	15,062	1.17	188	24
Jefferson, Larimer	5	.....	14,845	600	.....	15,445	27,940	1.81	201	39
Mesa, Montrose, Montezuma	5	9,000	1,508	.....	.....	10,508	16,098	1.53	167	47
Total	97	2,649,042	76,699	93,782	542,180	3,361,703	3,947,186	1.17	180	5,852

In the table below is shown the total product of the State, by counties, since 1887, with the increases and decreases in 1897 as compared with 1896.

Coal product of Colorado since 1887, by counties.

[Short tons.]

County.	1887.	1888.	1889.	1890.
Arapahoe	16,000	1,700	823	700
Boulder	297,338	315,155	323.096	425,704
Dolores	1,000	200	.....	800
El Paso	47,517	44,114	54,212	25,617
Fremont	417,326	438,789	274,029	397,418
Garfield	30,000	115,000	239,292	183,884
Gunnison	243,122	258,374	252,442	229,212
Huerfano	131,810	159,610	333,717	427,132
Jefferson	12,000	9,000	10,790	10,984
Las Animas	506,540	706,455	993,534	1,154,668
La Plata	22,880	33,625	34,971	43,193
Mesa	.....	300	1,100	1,000
Park	23,421	46,588	41,823	49,594
Pitkin	4,000	28,113	.....	74,362
Weld	39,281	28,054	28,628	46,417
Routt	.....	.....	1,491	705
Larimer	.....	.....	100	1,500
Douglas	3,500	400	260	700
San Miguel	.....	.....	1,800	1,500
Delta	.....	.....	1,357	775
Montezuma	.....	.....	816	238
Montrose	.....	.....	.....	.....
Rio Blanco	.....	.....	2,900	200
Total	1,795,735	2,185,477	2,597,181	3,077,003

County.	1891.	1892.	1893.	1894.
Arapahoe	1,273	654	633	559
Boulder	498,494	545,563	663,220	419,734
Dolores	3,475	.....	.....	.....
El Paso	34,364	23,014	19,415	30,268
Fremont	545,789	538,887	536,787	245,616
Garfield	191,994	277,794	212,918	75,663
Gunnison	261,350	225,260	258,539	200,325
Huerfano	494,466	541,733	521,205	408,045
Jefferson	17,910	21,219	1,895	34,108
Las Animas	1,219,224	1,171,069	1,587,338	1,153,863
La Plata	72,471	81,500	104,992	53,571

Coal product of Colorado since 1887, by counties—Continued.

[Short tons.]

County.	1891.	1892.	1893.	1894.
Mesa	5,000	5,050	18,100	31,750
Park	52,626	76,022	39,095	28,943
Pitkin	91,642	.....	99,211	97,724
Weld	22,554	2,205	35,355	42,818
Routt	.....	330	816	2,710
Larimer	.....	.....	.....	.....
Douglas	.....	200	200	.....
San Miguel	.....	.....	.....	.....
Delta	.....	200	2,580	3,697
Montezuma	.....	30	90	235
Montrose	.....	.....	.....	100
Rio Blanco	.....	100	.....	1,680
Total	3,512,632	3,510,830	4,102,389	2,831,409

County.	1895.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Arapahoe	540	398	368	.....	30
Boulder	377,395	448,706	477,790	29,084	.....
Dolores	.....	.....	.....	.....	.....
El Paso	51,840	12,544	12,481	.....	63
Fremont	315,344	294,822	304,589	9,767	.....
Garfield	274,271	165,797	182,884	17,087	.....
Gunnison	239,182	260,596	297,417	36,821	.....
Huerfano	386,696	353,338	367,894	14,556	.....
Jefferson	.....	.....	10,445	10,445	.....
Las Animas	1,253,149	1,261,555	1,427,526	165,971	.....
La Plata	106,099	104,661	76,788	.....	27,873
Mesa	41,150	28,979	9,861	.....	19,118
Park	.....	.....	.....	.....	.....
Pitkin	.....	168,413	171,111	2,698	.....
Weld	27,934	4,300	8,310	4,010	.....
Routt, Larimer, Douglas, San Miguel, Delta, Montezuma, Montrose, Rio Blanco	9,382	8,291	14,239	5,948	.....
Total	3,082,982	3,112,400	3,361,703	a249,303	.....

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 eight 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.	1897.
Boulder	$1.53	$1.32	$1.36	$1.28	$1.28	$1.38	$1.32	$1.29
El Paso	1.27	1.10	1.25	1.20	1.17	1.02	.89	1.17
Fremont	2.12	1.54	1.92	1.60	1.67	1.67	1.58	1.62
Garfield	1.64	1.46	2.00	1.19	1.13	1.07	1.05	1.12
Gunnison	2.28	1.95	1.84	1.67	1.65	1.60	1.53	1.48
Huerfano	1.37	1.31	2.00	1.15	1.08	1.04	1.06	1.18
Jefferson	2.54	2.99	1.90	2.50	2.00	.....	.....	2.08
La Plata	1.91	2.76	1.76	1.45	1.63	1.42	1.46	1.46
Las Animas	1.16	1.16	1.22	1.01½	1.01	.97	.94	.95
Park	2.49	3.00	2.40	2.50	3.15	.....	.....	.....
Pitkin	.....	1.45	.....	1.12	1.13	.....	1.13	1.18
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	1.17

In the following table is shown the number of men employed during the past seven years, in counties producing 10,000 tons or over, together with the average working time for the last six 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

Statistics of labor employed and working time at Colorado coal mines—Continued.

County.	1894.		1895.		1896.		1897.	
	Average working days.	Average number employed.	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	164	805
El Paso	241	70	219	117	192	15	192	22
Fremont	104	1,580	150	1,016	110	1,407	123	896
Garfield	142	122	246	398	136	314	241	216
Gunnison	156	332	238	393	189	576	165	692
Huerfano	186	753	167	816	219	647	150	724
Jefferson	162	25	.....	.....	.....	.....	178	29
La Plata	46	349	80	502	215	179	218	130
Las Animas	199	1,699	214	1,839	192	2,578	215	1,971
Park	231	108	.....	.....	.....	.....	.....	.....
Pitkin	266	135	.....	.....	267	187	208	238
Weld	145	145	220	74	.....	.....	.....	.....
The State	155	6,507	182	6,125	172	6,704	180	5,852

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 for the years subsequent to 1878 by districts:

Coal product of Colorado from 1864 to 1897.

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

Coal product of Colorado from 1864 to 1897—Continued.

Year.	Locality.	Product.	
		Short tons.	
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	68,000	
	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
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

Coal product of Colorado from 1864 to 1897—Continued.

Year.	Locality.	Product.	
		Short tons.	
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
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

Coal product of Colorado from 1864 to 1897—Continued.

Year.	Locality.	Product.	
		Short tons.	
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	
			4,102,289
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
1897	Northern division	502,858	
	Central division	317,070	
	Southern division	1,872,208	
	Western division	669,567	
			3,361,703

GEORGIA.

Total product in 1897, 195,869 short tons; spot value, $140,466.

The entire product of Georgia continues to come from two counties, Dade and Walker, in the northwestern corner of the State, 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, while in 1897 the product was not quite 53 per cent.

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
1897	120,398	1,481	5,500	68,490	195,869	140,466	.72	304	*c* 469

a Includes 500 State convicts.
b Includes 360 State convicts.
c Includes 300 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	1897	195,869

IDAHO.

A product of 150 short tons, valued at $350, was reported from Canyon County, Idaho, in 1897. This is the only coal product reported from this State since 1888, when an output of 400 short tons was obtained.

ILLINOIS.[1]

Total product in 1897, 20,072,758 short tons; spot value, $14,472,529.

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 sixteen years. Following the usual custom, the Geological Survey has relied upon the report of the State bureau for the statistics of coal production in 1897. 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.

As compared with 1896, the output in 1897 shows an increase of 286,132 short tons, a gain of only 1.46 per cent, which is significant merely as showing a gain rather than a loss. The most noteworthy feature of the year was the decrease in the value of the product, this item showing a loss as compared with 1896 of $1,337,207. The general tendency toward lower prices which has been observed for the last four years continues, and is attended by lower wages paid to miners. The average price per ton for lump coal at the mine has fallen from $1.025 in 1893 to 85.2 cents in 1897; the average rate paid for hand mining in the same period has decreased from 71.4 cents per ton to 50.46 cents. This indicates that while the selling price has declined about 17 cents per ton, the miners' wages have fallen about 21 cents. The percentage decrease was 16.6 in the selling price and 29.3 in the mining rate.

The total number of mines operated in Illinois during 1897 was 853, of which 310 were reported as shipping mines and 543 as local mines. The general strike of 1897 affected 268 of the producing mines, and as there were only two of these in which less than ten men were employed, it is evident that the interruptions were almost entirely confined to the larger mines. The number of men on strike was 27,096, out of a total of 33,788, which is further evidence that the smaller or local mines were practically exempt. The State report on the strike says that 39 mines, having 2,370 employees, all but one employing more than 10 men, participated in the advanced mining rates, although the men continued to work.

The total tonnage won by machines in 1897 did not show much of an increase over 1896, the machine-mined product being 3,946,257 tons, as compared with 3,871,410 tons—a gain of 74,847 tons, or not quite 2 per cent. It is not possible, therefore, to attribute the increased individual efficiency shown by the statistics in 1897 to this cause. The number of employees of all kinds was less in 1897 than in 1896 by 3,244, and the average working days at shipping mines was 185 in 1897 against 186 in 1896; in spite of these facts, however, the total product for the State increased 286,132 short tons, only 74,847 tons of which increase was due to the use of machines.

[1] Abstract from the sixteenth annual report of the Bureau of Labor Statistics of Illinois.

The following table contains a brief summary of the items of chief interest in this industry for 1897 compared with 1896:

Comparative statement of coal production in Illinois in 1896 and 1897.

Subject of inquiry.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Number of counties in which coal is mined	51	50	.....	1
Number of mines and openings of all kinds	901	853	.....	48
Number of shipping mines	330	310	.....	20
Number of mines in local trade	571	543	.....	28
Number of tons of coal mined, all grades	19,786,626	20,072,758	286,132	.....
Number of tons of lump coal (2,000 pounds)	14,210,024	14,672,241	462,217	.....
Number of tons of other grades of coal	5,576,602	5,400,517	.....	176,085
Number of acres worked out (estimated)	3,292.49	.....	.....	.....
Number of employees of all kinds	37,032	33,788	.....	3,244
Number of boys over 14 years of age under ground	911	.....	.....	.....
Number of employees under ground	33,175	30,248	.....	2,927
Number of employees above ground	3,857	3,540	.....	317
Average number of days active operation—shipping mines	186	185	.....	1
Aggregate spot value of total product	$15,809,736	$14,472,529	.....	$1,337,207
Aggregate spot value of lump coal	$12,565,334	$12,500,750	.....	$64,584
Aggregate value of other grades of coal	$3,244,402	$1,971,189	.....	$1,273,213
Average value of lump coal per ton at the mine	$0.899	$0.852	.....	$0.047
Average value of other grades of coal at the mine	$0.585	$0.365	.....	$0.220
Average price paid for hand mining—the year	$0.530	$0.5046	.....	$0.0254
Number of mining machines in use	307	320	13	.....
Number of tons of coal, all grades, mined by machines	3,871,410	3,946,257	74,847	.....
Number of kegs of powder used	369,505	392,133	22,628	.....
Number of men killed	77	69	.....	8
Number of wives made widows	44	46	2	.....

Comparative statement of coal production in Illinois in 1896 and 1897—Continued.

Subject of inquiry.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Number of children left fatherless	155	147	.....	8
Number of men injured so as to lose time	672	518	.....	154
Number of tons of coal mined to each life lost	256,969	290,909	33,940	.....
Number of tons of coal mined to each man injured	29,444	38,750	9,306	.....
Number of employees to each life lost	481	489.7	8.7	.....
Number of employees to each man injured	55	65	10	.....
Number of new mines opened and old ones reopened	142	79	.....	63
Number of mines closed or abandoned	115	118	3	.....

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	17,862,276	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
1897	853	33,788	20,072,758	14,672,241	5,400,517

In the following table is shown a comparison between the value of the total product and that of lump coal together with the rate paid for mining and the ratio between the cost of mining and the selling price for a period of sixteen years. It will be observed that the selling price of coal has shown an almost steady decline since 1882, the total decline amounting to 66 cents, or about 44 per cent, an average drop per year of 4 cents a ton. The price paid for hand mining has fallen from 80 cents in 1883 to 50.5 cents in 1897, a decrease of 29.7 cents, or about 37 per cent, showing that the price paid for mining has not decreased during this period in as great a proportion as the selling price, although since 1893 the rate paid for mining has decreased in greater proportion than the selling price.

Values and mining prices for Illinois coal in sixteen years, 1882–1897.

Year.	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.
1897	$14,472,529	$12,500,750	$0.852	$0.658	12,552,099	$0.505	$0.297	59.3
1896	15,809,736	12,565,334	.899	.611	9,371,582	.530	.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 1897:

Output of coal in Illinois, by counties, for eleven 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 eleven 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 eleven years—Continued.

Districts and counties.	Lump coal.		All grades.
	1890.	1891.	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	90,008
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
Coles			

Output of coal in Illinois, by counties, for eleven years—Continued.

Districts and counties.	Lump coal.		All grades.
	1890.	1891.	1891.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*
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 eleven years—Continued.

Districts and counties.	All grades.			
	1892.	1893.	1894.	1895.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
First district	3,458,066	3,394,686	2,685,244	2,735,711
Counties:				
Grundy	1,108,419	1,186,919	1,130,420	1,261,838
Kankakee	92,158	88,700	57,883	83,513
Lasalle	1,544,311	1,494,826	1,134,097	1,084,552
Livingston	532,667	542,516	342,127	267,133
Will	113,846	81,725	20,717	38,675
Second district	1,733,608	2,000,664	1,703,623	1,995,298
Counties:				
Bureau	943,496	1,143,270	878,937	834,541
Hancock	5,380	5,060	10,315	10,274
Henry	156,736	156,261	111,640	135,967
Knox	43,137	49,808	51,530	58,330
Marshall	78,576	92,144	134,696	346,281
McDonough	91,127	102,926	53,367	53,387
Mercer	328,542	363,206	374,003	462,011
Rock Island	36,109	34,308	41,641	45,585
Schuyler	16,792	18,735	13,828	12,600
Stark	22,349	23,070	22,625	22,131
Warren	11,364	11,876	11,041	14,191
Third district	3,260,951	3,397,433	3,077,918	2,952,260
Counties:				
Cass	15,330	23,150	18,900	19,120
Fulton	666,473	772,497	557,703	468,792
Logan	187,356	189,319	186,300	181,975
McLean	222,372	204,827	167,294	164,140
Menard	285,695	281,635	295,852	277,738
Peoria	632,939	620,149	611,792	437,457
Tazewell	120,156	128,957	93,599	94,106
Vermilion	972,589	996,768	989,813	1,177,375
Woodford	158,041	180,131	156,665	131,557
Fourth district	5,117,600	5,784,866	5,173,303	5,612,764
Counties:				
Bond	121,812	78,600	79,591	93,515
Calhoun	4,637	4,584	3,478	9,200
Christian	767,354	839,650	1,005,500	735,361

Output of coal in Illinois, by counties, for eleven years—Continued.

Districts and counties.	All grades.			
	1892.	1893.	1894.	1895.
Counties—Continued.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Coles	.....	.....	.....	.....
Effingham	*a* 302	*a* 520	*a* 5,440	7,800
Greene	19,870	10,995	18,600	11,345
Jasper	(*b*)	(*b*)	.....	.....
Jersey	3,378	5,904	2,238	.....
Macon	227,020	280,233	227,820	231,000
Macoupin	1,823,136	1,988,069	1,575,045	1,948,992
Madison	873,770	951,894	889,768	978,161
Montgomery	147,870	175,712	178,040	197,842
Morgan	4,266	2,142	.....	.....
Pike	(*b*)	(*b*)	(*b*)	(*b*)
Richland	(*b*)	(*b*)	(*b*)	(*b*)
Sangamon	1,091,014	1,410,346	1,142,299	1,318,092
Scott	17,506	22,757	19,025	17,730
Shelby	15,665	13,460	26,450	63,726
Fifth district	4,292,051	5,371,915	4,473,488	4,439,831
Counties:				
Clinton	191,873	255,095	200,920	284,487
Franklin	200	120	.....	.....
Gallatin	14,502	17,457	155,351	20,330
Hardin	.....	.....	.....	.....
Hamilton	220	244	*c* 620	4,645
Johnson	2,200	.....	.....	.....
Jackson	869,514	926,242	766,514	739,661
Jefferson	100	90	.....	27,880
Marion	376,519	480,529	478,757	538,900
Perry	461,068	860,151	530,490	587,444
Randolph	168,979	171,055	193,247	194,481
Saline	61,602	36,436	36,913	45,202
St. Clair	1,759,822	2,133,870	1,623,684	1,479,106
Washington	62,966	72,200	49,835	56,220
Williamson	322,486	418,426	437,157	461,475
The State	17,862,276	19,949,564	17,113,576	17,735,864

a Includes Jasper, Pike, and Richland counties.
b Included in Effingham County.
c Includes Franklin and Jefferson counties.

Output of coal in Illinois, by counties, for eleven years—Continued.

Districts and counties.	All grades.	
	1896.	1897.
	Short tons.	*Short tons.*
First district	3,034,777	2,937,980
Counties:		
Grundy	1,247,394	1,077,576
Kankakee	72,395	180,683
Lasalle	1,409,085	1,508,833
Livingston	218,953	145,206
Will	86,950	25,682
Second district	2,690,220	2,738,408
Counties:		
Bureau	1,042,304	1,145,312
Henry	136,415	119,497
Marshall	389,429	339,820
Mercer	450,071	425,518
Peoria	457,061	504,309
Rock Island	34,065	35,651
Stark	18,085	19,472
Woodford	162,790	148,829
Third district	628,835	575,199
Counties:		
Brown	.....	1,760
Fulton	516,349	469,034
Hancock	4,497	4,160
Knox	39,557	41,773
McDonough	47,821	40,532
Schuyler	7,915	7,841
Warren	12,696	10,099
Fourth district	2,802,960	2,916,162
Counties:		
Cass	8,612	4,536
Logan	166,000	168,917
Macon	188,207	173,163
Menard	347,365	328,920
McLean	156,891	153,334
Tazewell	113,541	86,669
Vermilion	1,822,344	2,000,623

Output of coal in Illinois, by counties, for eleven years—Continued.

Districts and counties.	All grades.	
	1896.	1897.
	Short tons.	*Short tons.*
Fifth district	4,689,980	5,009,102
Counties:		
Calhoun	6,000	3,868
Christian	763,228	837,897
Greene	8,270	7,200
Macoupin	2,097,539	1,975,981
Montgomery	171,099	251,249
Sangamon	1,587,812	1,838,453
Scott	18,410	25,125
Shelby	35,297	69,329
Morgan and Jersey	2,325	.....
Sixth district	3,776,164	3,558,405
Counties:		
Bond	71,058	104,256
Clinton	309,504	328,184
Madison	1,080,718	780,921
Marion	643,561	626,850
St. Clair	1,671,323	1,718,194
Seventh district	2,163,690	2,337,502
Counties:		
Gallatin	26,350	19,945
Hamilton	1,000	760
Jackson	771,384	675,212
Jefferson	10,100	51,355
Johnson	1,250	2,778
Perry	626,507	689,921
Randolph	202,838	150,647
Saline	46,495	51,689
Washington	33,360	25,715
Williamson	444,406	669,480
The State	19,786,626	20,072,758

INDIANA.

Total product in 1897, 4,151,169 short tons; spot value, $3,472,348.

The coal output of Indiana in 1897 was the largest in the history of the State, exceeding that of 1896 by 245,390 short tons, or about 6 per cent. Prior to 1897 the largest production was obtained in 1895, when 3,995,892 short tons were won, and compared with which the product in 1897 shows a gain of 155,277 short tons. The value of the product in 1897 increased in about the same proportion as the quantity compared with 1896, there being no change in the average price. But while the value in 1897 was $210,611 more than that of 1896, it was $170,000 less than that of 1895 and $583,000 less than the value of the product in 1893, when only 3,791,851 tons were produced.

The number of tons of coal mined by machines in 1897 was 1,023,361, against 964,378 the previous year. In both years the machine-mined product was a little less than 25 per cent of the total, although the number of machines in use decreased from 186 in 1896 to 174 in 1897.

About 50 per cent of the mines of the State (57 out of 115) were affected by the general strike of 1897. The total number of men on strike was 5,923, and they were idle an average of seventy-three days. In spite of this, the average time made in 1897 was more than the previous year; the average working time, as will be seen by the following tables, was one hundred and seventy-six days as compared with one hundred and sixty-three in 1896.

Clay county bore the brunt of the labor troubles. Of the 28 mines in the county, 19 were idle by reason of the strike, and 2,295 men out of a total of 2,682 were idle an average of seventy-four days, involving a loss in working time of 169,036 days. One-third of the entire number of mines involved and more than that proportion of the men made idle were in Clay county, and the product of the county decreased 306,708 short tons, or nearly 25 per cent, as compared with 1896. The entire amount of time lost by the strike was 431,837 days, distributed as follows:

Strikes in the Indiana coal mines during 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Clay	19	2,295	74	169,036
Daviess	4	414	121	49,923
Fountain	2	160	78	12,520
Gibson	1	63	30	1,890
Greene	5	723	74	53,484
Knox	2	84	82	6,884
Parke	7	857	78	66,877
Pike	3	190	10	1,900
Sullivan	4	550	71	38,875
Vanderburg	1	90	12	1,080
Vigo	5	406	67	27,188
Warrick	4	91	24	2,180
The State	57	5,923	73	431,837

There were fifteen counties producing coal in 1897, the same as in 1896. The details of the production by counties in the last two years have been as follows:

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, Knox	4	31,700	20,255	3,320	.....	55,275	42,500	.77	165	105
Parke	16	924,451	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
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

Coal product of Indiana in 1897, 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	28	860,625	29,362	35,740	.....	925,727	$992,515	$1.07	169	2,682
Daviess	5	173,529	35,390	2,878	.....	211,797	192,532	.91	157	502
Fountain, Gibson	4	159,606	15,953	3,100	.....	178,659	158,507	.89	213	235
Greene	6	435,939	958	11,976	.....	448,873	333,926	.74	186	890
Knox	3	21,362	14,390	1,000	.....	36,752	29,997	.82	190	96
Parke	13	400,013	19,985	14,009	.....	434,007	379,886	.88	164	1,126
Perry	2	17,612	5,580	520	.....	23,712	23,782	1.00	163	80
Pike	5	235,393	764	4,862	7,023	248,043	183,967	.74	188	427
Spencer	6	.....	4,339	.....	.....	4,339	4,973	1.15	141	20
Sullivan	13	449,008	16,277	14,760	.....	480,045	307,123	.64	147	913
Vanderburg	5	66,763	109,677	6,360	.....	182,800	153,230	.84	222	361
Vermilion	3	251,000	62,720	7,840	.....	321,560	253,000	.79	213	550
Vigo	10	415,926	11,011	6,335	9,259	442,531	278,239	.63	173	767
Warrick	12	143,723	30,606	1,995	.....	176,324	144,671	.82	210	237
Small mines	.....	.....	36,000	.....	.....	36,000	36,000	.....	.....	.....
Total	115	3,630,499	393,012	111,376	16,282	4,151,169	3,472,348	.84	176	8,886

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 1897 as compared with 1896:

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

County.	1894.	1895.	1896.	1897.	Increase 1897.	Decrease 1897.
Clay	890,714	1,223,186	1,232,435	925,727	.....	306,708
Daviess	100,833	81,380	192,775	211,797	19,022	.....
Dubois	.....	.....	.....	.....	.....	.....
Fountain	18,931	.....	105,650	137,250	31,600	.....
Gibson	19,021	1,940	24,775	41,409	16,634	.....
Greene	300,474	409,080	290,046	448,873	158,827	.....
Knox	28,862	26,443	30,500	36,752	6,252	.....
Martin	.....	.....	.....	.....	.....	.....
Owen	7,575	.....	.....	.....	.....	.....
Parke	356,265	479,609	339,677	434,007	94,330	.....
Perry	30,696	18,960	26,227	23,712	.....	2,515
Pike	173,556	232,950	201,417	248,043	46,626	.....
Spencer	10,183	10,879	16,703	4,339	.....	12,364
Sullivan	537,077	453,167	515,285	480,045	.....	35,240
Vanderburg	175,881	192,710	170,755	182,800	12,045	.....
Vermilion	296,222	306,000	347,166	321,560	.....	25,606
Vigo	321,539	402,335	237,647	442,531	204,884	.....
Warren	.....	.....	.....	.....	.....	.....
Warrick	120,092	121,253	138,721	176,324	37,603	.....
Small mines	36,000	36,000	36,000	36,000	.....	.....
Total	3,423,921	3,995,892	3,905,779	4,151,169	*a* 245,390	.....

a Net increase.

The following table is of interest as showing the total amount and value of coal produced in the State from 1886 to 1897, 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
1897	4,151,169	3,472,348	.84	176	8,886

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 1897.

Year.	Short tons.	Year.	Short tons.
1873	1,000,000	1886	3,000,000
1874	812,000	1887	3,217,711
1875	800,000	1888	3,140,979
1876	950,000	1889	2,845,057
1877	1,000,000	1890	3,305,737
1878	1,000,000	1891	2,973,474
1879	1,196,490	1892	3,345,174
1880	1,500,000	1893	3,791,851
1881	1,771,536	1894	3,423,921
1882	1,976,470	1895	3,995,892
1883	2,560,000	1896	3,905,779
1884	2,260,000	1897	4,151,169
1885	2,375,000		

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

County.	1893.	1894.	1895.	1896.	1897.
Clay	$1.29	$1.13	$1.07	$0.96	$1.07
Daviess	.97	1.03	.94	.87	.91
Fountain	1.00	1.08	.....	.80	.93
Gibson	.....	.78	.....	.75	.75
Greene	.83	.96	.69	.77	.74
Knox	1.10	.84	.98	.78	.82
Parke	1.16	1.07	.98	.87	.88
Perry	1.13	1.12½	1.12	1.12	1.00
Pike	.76	.77	.77	.69	.74
Spencer	.84	1.03	1.01	1.34	1.15
Sullivan	.88	.82	.84	.67	.64
Vanderburg	1.08	.96	1.03	1.03	.84
Vermilion	.96	.82	.81	.75	.79
Vigo	.95	.95	.78	.70	.63
Warrick	.89	.72	.72	.66	.82
The State	1.07	.96	.91	.84	.84

Statistics of labor employed in Indiana coal mines.

County.	1889.	1890.		1891.	
	Average number employed.	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
Daviess	455	280	231	359	217
Fountain	41	48	260	252	40
Gibson	7	.....	.....	.....	.....
Greene	296	250	218	154	300
Knox	22	.....	.....	.....	.....
Parke	591	558	254	510	255
Perry	109	100	250	95	190
Pike	340	235	170	230	198½
Spencer	29	39	261	46	204
Sullivan	556	588	181	544	130½
Vanderburg	318	454	262	338	228½
Vermilion	276	307	244	380	147
Vigo	629	280	161	487	244
Warrick	85	131	222	161	199
The State	6,448	5,489	220	5,879	190

County.	1892.		1893.		1894.	
	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	2,797	239	2,976	196	3,114	131
Daviess	403	224	553	213	350	116
Fountain	30	315	18	150	75	160
Gibson	.....	.....	.....	.....	36	143
Greene	335	227	391	203	576	141
Knox	28	138	37	183	64	153
Parke	639	228	1,091	202	1,065	135
Perry	88	227	100	198	93	168
Pike	160	163	365	211	348	148
Spencer	13	310	29	170	40	170
Sullivan	522	242	460	221½	885	152
Vanderburg	282	262	357	250	330	215
Vermilion	545	164	507	158	710	165
Vigo	491	217	579	217	740	196
Warrick	171	141	136	129	147	199
The State	6,436	225	7,644	201	8,603	149

Statistics of labor employed in Indiana coal mines—Continued.

County.	1895.		1896.		1897.	
	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	3,319	195	3,290	171	2,682	169
Daviess	258	129	440	176	502	157
Fountain	.....	.....	122	240	175	220
Gibson	.....	.....	42	181	60	192
Greene	646	180	659	157	890	186
Knox	69	140	63	155	96	190
Parke	1,225	166	1,138	116	1,126	164
Perry	80	148	83	174	80	163
Pike	392	191	384	161	427	188
Spencer	61	129	50	157	20	141
Sullivan	607	185	724	186	913	147
Vanderburg	281	233	293	222	361	222
Vermilion	572	245	657	214	550	213
Vigo	869	187	674	116	767	173
Warrick	146	186	187	175	237	210
The State	8,530	189	8,806	163	8,886	176

INDIAN TERRITORY.

Total product in 1897, 1,336,380 short tons; spot value, $1,787,358.

The coal product of the Indian Territory in 1897 was 30,266 short tons less than that of 1896, but with this exception was larger than any preceding year. The mines of the Territory were not affected by any labor disturbances, and the small decrease in output was due principally to the inability of operators to obtain cars for shipping the coal during the spring of the year, when the railroads were taxed to their utmost capacity in hauling cattle. Most of the Territory coal is shipped into Texas, and as the cattle shipments were made from the State, it was a difficult matter to secure the return of the empty coal cars in opposition to well-paying cattle freight.

There are six mines in the Territory in which mining machines are in use. The total number of machines in use in 1897 was 54, against 56 in 1896. The tonnage won by machines in 1897 was 263,811, against 191,585 the preceding year, an increase of 72,226 tons, or 38 per cent. Of the 54 machines in use in 1897, 39 were operated by compressed air and 15 by electricity.

The first production of coal reported from the Indian Territory was 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 to 969,606 short tons, a decrease of 22 per cent. Production returned to about its normal proportions in 1895, but without a proportionate increase in value. The average selling price for Territory coal has shown a steadily declining tendency since 1893, when it was $1.79 per ton. In 1896 it had fallen to $1.40 per ton, and a further decline of 6 cents in 1897 brought it down to $1.34, a total decline in four years of 45 cents, or 25 per cent.

The following table exhibits the details of production during the past seven years:

Coal product of the Indian Territory since 1891.

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

Distribution.	1894.	1895.	1896.	1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Loaded at mines for shipment	923,581	1,173,399	1,295,742	1,250,066
Sold to local trade and used by employees	4,632	3,070	12,648	9,068
Used at mines for steam and heat	30,878	21,935	45,560	47,501
Made into coke	10,515	12,781	12,696	29,745
Total	969,606	1,211,185	1,366,646	1,336,380
Total value	$1,541,293	$1,737,254	$1,918,115	$1,787,358
Average number of employees	3,101	3,212	3,549	3,168
Average number of days worked	157	164	170	176

Since 1885 the annual production has been as follows:

Product of coal in the Indian Territory from 1885 to 1897, 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
1897	1,336,380	1,787,358	1.34	176	3,168

IOWA.

Total product in 1897 4,611,865 short tons; spot value, $5,219,503.

With one exception, the coal product of Iowa in 1897 was the largest ever obtained. The exception was in 1888, a year of extraordinary coal-mining activity, particularly in the Western States, when the output of Iowa reached a total of 4,952,440 short tons. The value of the product in 1888 exceeded that of 1897 by more than $1,200,000. Compared with 1896, the product in 1897 shows a gain of 657,837 short tons, or about 16⅔ per cent, with an increase in value of $591,481, or not quite 13 per cent. Iowa has participated in the falling prices of coal, the average for the State having declined steadily from $1.32 in 1892 to $1.13 in 1897, a loss in five years of about 15 per cent. As in other States, the use of mining machines compensates in part for this decline. In 1891 there were 9 machines in use in the State; in 1896, 45, and in 1897, 67. The machine-mined tonnage in the three years was 41,540, 84,556, and 181,209, respectively.

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	*a* 84,093	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	*b* 392,136	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	3,367,819	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.

Coal product of Iowa in 1897, 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	630,536	26,464	13,143	670,143	$793,254	$1.18	186	2,254
Boone	15	261,867	27,455	2,896	292,218	445,455	1.52	150	1,043
Greene	5	200	8,525	520	9,245	14,398	1.56	143	64
Jasper	4	172,580	2,732	4	175,316	201,530	1.15	205	256
Keokuk	8	280,732	6,011	2,735	289,478	304,316	1.05	196	572
Mahaska	16	a1,350,634	56,162	13,714	1,420,510	1,431,245	1.01	235	2,536
Marion	14	118,344	9,212	1,946	129,502	135,212	1.04	175	342
Monroe	6	479,226	5,723	12,882	497,831	498,557	1.00	229	986
Polk	20	314,558	161,528	13,050	489,136	604,041	1.23	204	1,221
Story	2	9,412	3,760	.....	13,172	20,649	1.57	163	56
Taylor	2	8,406	2,305	15	10,726	19,134	1.78	196	42
Wapello	7	188,168	34,413	6,889	229,470	232,471	1.01	167	552
Warren	4	.....	6,588	22	6,610	10,220	1.55	129	33
Wayne	2	48,348	8,054	594	56,996	74,570	1.31	194	191
Webster	12	152,915	14,370	1,614	168,899	238,819	1.41	211	520
Dallas Van Buren	2	8,018	3,125	1,470	12,613	20,632	1.64	255	35
Small mines	.....	.....	140,000	.....	140,000	175,000	.....	.....	.....
Total	162	a4,023,944	516,427	71,494	4,611,865	5,219,503	1.13	201	10,703

a Including 22,633 tons made into coke.

Strikes in the Iowa coal mines during 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Appanoose	14	839	27	22,329
Boone	4	490	90	44,180
Greene	1	10	30	300
Keokuk	2	55	4	230
Mahaska	2	365	14	5,065
Marion	1	30	8	240
Monroe	2	428	40	17,220
Polk	13	959	40½	38,848
Taylor	1	15	12	180
Wapello	2	163	34	5,505
Webster	2	102	15	1,489
The State	44	3,456	39	135,586

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 1897, 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.	1897.	Increase, 1897.	Decrease, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
First	1,681,927	1,371,967	1,607,038	235,071	.....
Second	1,438,724	1,425,825	1,885,304	459,479	.....
Third	895,423	1,016,236	979,523	.....	36,713
Small mines	140,000	140,000	140,000	.....	.....
Total	4,156,074	3,954,028	4,611,865	*a* 657,837	.....

a Net increase.

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 1897, 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 1897, 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.	1897.	Increase, 1897.	Decrease, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Appanoose	588,438	544,678	670,143	125,465	.....
Adams	(a)	(a)	(a)	.....	.....
Cass	(a)	(a)	(a)	.....	.....
Davis	(a)	(a)	(a)	.....	.....
Jefferson, Lucas	1,840	1,317	(a)	.....	1,317
Marion	193,768	93,023	129,502	36,479	.....
Monroe	559,982	433,520	497,831	64,311	.....
Montgomery	(a)	(a)	(a)	.....	.....
Page	(a)	(a)	(a)	.....	.....
Taylor	14,062	8,400	10,726	2,326	.....
Van Buren	9,896	8,396	5,760	.....	2,636
Wapello	261,510	227,077	229,470	2,393	.....
Warren	6,116	12,824	6,610	.....	6,214
Wayne	46,315	42,732	56,996	14,264	.....
Total	b 1,681,927	b 1,371,967	1,607,038	c 235,071	.....

a Included in product of small mines. b Exclusive of product of small mines. c Net increase.

Product of coal in the second inspection district of Iowa from 1883 to 1897.

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	*a* 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.	1897.	Increase, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Mahaska	1,016,623	1,047,241	1,420,510	373,269
Keokuk	266,394	214,474	289,478	75,004
Jasper	155,707	164,110	175,316	11,206
Scott	(*b*)	(*b*)	(*b*)	.....
Hardin	(*b*)	(*b*)	(*b*)	.....
Total	*c* 1,438,724	*c* 1,425,825	*c* 1,885,304	459,479

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.

Product of coal in the third inspection district of Iowa from 1883 to 1897.

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	*c* 641,073	*c* 713,474	*c* 592,358	*c* 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 1897—Continued.

County.	1895.	1896.	1897.	Increase, 1897.	Decrease, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Boone	268,422	316,756	292,218	.....	24,538
Dallas	6,061	9,624	16,098	6,474	.....
Greene	7,197				
Guthrie	1,600	.....	.....	.....	.....
Hamilton	.....	.....	.....	.....	.....
Polk	485,360	546,051	489,136	.....	56,915
Webster	123,882	134,704	168,899	34,195	.....
Story	2,901	9,101	13,172	4,071	.....
Total	a 895,423	a 1,016,236	a 979,523	.....	b 36,713

a Exclusive of product of small mines. b Net decrease.

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 nine years:

Product of coal in Iowa from 1860 to 1897, 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	3,825,495	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
1897	4,611,865	5,219,503	1.13	201	10,703

It will be seen from the above table that the greatest range in the average price per ton during the past twelve years has been 21 cents; the highest price being $1.34, in 1887, and the lowest $1.13, in 1897.

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 nine 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.	1897.
Appanoose	$1.32	$1.38	$1.39	$1.51	$1.51	$1.30	$1.25	$1.26	$1.18
Boone	1.86	1.82	1.86	1.80	1.87	1.60	1.67	1.49	1.52
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	1.15
Keokuk	1.25	1.31	1.32	1.28	1.21	1.14	1.04	1.02	1.05
Lucas	1.23	1.25	.....	.....	.....	.....	.....	.....	.....
Mahaska	1.16	1.06	1.06	1.15	1.11	1.18	1.12	1.08	1.01
Marion	1.28	1.26	1.16	1.17	1.21	1.05	1.01	.98	1.04
Monroe	1.16	1.21	1.21	1.26	1.12	1.09	1.02	1.01	1.00
Polk	1.59	1.49	1.50	1.57	1.73	1.50	1.40	1.28	1.23
Taylor	2.07	.....	2.15	2.00	2.02	1.85	1.89	.....	1.78
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	1.01
Warren	.....	.....	.....	.....	.....	.....	.....	1.45	.....
Wayne	1.47	1.25	1.52	1.49	1.47	1.50	1.31	1.27	1.31
Webster	1.63	1.54	1.71	1.61	1.67	1.64	1.32	1.40	1.41
The State	1.33	1.24	1.27	1.32	1.30	1.26	1.20	1.17	1.13

Statistics of labor employed and working time at Iowa 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.
Appanoose	1,080	165	1,419	207	1,213	184	1,793	151
Boone	465	191	484	196	534	189	577	208
Dallas	130	207	140	210	89	242	55	159
Greene	121	209	120	185	120	214	60	150
Jasper	335	246	416	256	426	274	284	253
Keokuk	1,018	184	795	204	610	285	528	155
Lucas	324	298	.....	.....	.....	.....	.....	.....
Mahaska	1,673	258	1,815	263	1,818	238	2,209	258
Marion	269	265	394	222	267	244	292	193
Monroe	735	197	806	203	1,112	233	1,103	214
Polk	700	243	779	239	938	268	697	211
Taylor	.....	.....	35	241	54	223	29	228
Van Buren	108	280	85	207	92	226	69	178
Wapello	773	159	421	214	445	260	603	174
Wayne	60	180	130	205	140	232	155	205
Webster	307	182	273	182	302	247	391	194
The State.	8,130	213	8,124	224	8,170	236	8,863	204

County.	1894.		1895.		1896.		1897.	
	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	2,254	153	2,323	141	1,768	158	2,254	186
Boone	842	169	977	191	953	183	1,043	150
Dallas	43	172	.....	.....	.....	.....	.....	.....
Greene	19	213	.....	.....	.....	.....	.....	.....
Jasper	177	204	278	242	254	258	256	205
Keokuk	551	128	563	167	551	172	572	196
Mahaska	2,396	199	2,144	208	2,121	191	2,536	235
Marion	329	121	471	200	305	146	342	175
Monroe	1,212	172	1,037	216	840	188	986	229
Polk	944	184	959	242	1,556	180	1,221	204
Taylor	52	212	38	236	.....	.....	42	196
Van Buren	78	174	31	193	.....	.....	.....	.....
Wapello	541	167	541	183	463	171	552	167
Warren	.....	.....	.....	.....	53	143	.....	.....
Wayne	140	121	155	126	182	153	191	194
Webster	378	155	444	173	452	190	520	211
The State.	9,995	170	10,066	189	9,672	178	10,703	201

KANSAS.

Total product in 1897, 3,054,012 short tons; spot value, $3,602,326.

Kansas ranks third among the coal-producing States west of the Mississippi River, Iowa being first and Colorado second. The product of the State in 1897 shows a gain over 1896 of 169,211 tons, and was the largest output ever won except that of 1894, when coal mining in Kansas received a stimulus from the general strike of that year, which cut off the supply from other States and enabled the operators in Kansas to increase their production to a total of 3,388,251 short tons.

The use of mining machines did not have any appreciable effect upon the tonnage, as only one machine was in use, by which 4,500 short tons were mined. This is the first machine-mined product reported in the State. There was only one insignificant attempt at striking among the coal miners in Kansas during 1897. This was at the mines of Arnott & Co., Crawford County, where 120 men were idle the last four days of November. Kansas was fortunate in another particular, being one of the seven States in which the average price of the product increased over the previous year. It is worthy of note that of these seven States five were west of the Mississippi River. Two of them were on the Pacific coast (California and Oregon), and two (Colorado and Montana) belong to the Rocky Mountain system. Kansas was the only State contained in the western field (embracing the coal-producing area on the western slope of the Mississippi River from Iowa to Texas), in which there was an advance in price. Of the States east of the Mississippi River, the average price in Georgia advanced 1 cent, and that of Kentucky 2 cents. The average price in Kansas advanced 3 cents, which meant a difference of about $90,000 in the receipts to the operators over and above the increase in value which would have been realized if the same price had obtained as in 1896. The total gain in value over 1896 was $307,294.

The details of production in 1896 and 1897 are shown in the following tables:

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

Coal product of Kansas in 1897, 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.*				
Atchison	2	.....	7,250	.....	.....	7,250	$18,175	$2.50	300	18
Cherokee	17	973,456	14,895	16,570	.....	1,004,921	1,216,788	1.21	196	1,941
Crawford	20	1,323,231	10,293	19,399	.....	1,352,923	1,453,625	1.07	198	2,520
Franklin	2	3,450	1,690	.....	.....	5,140	8,995	1.75	196	42
Leavenworth	3	262,920	84,747	18,447	248	366,362	485,202	1.32	243	1,067
Linn	2	25,486	1,946	.....	.....	27,432	29,244	1.07	218	72
Osage	23	156,558	12,523	314	.....	169,395	269,035	1.59	122	975
Douglas Labette	2	.....	589	.....	.....	589	1,262	2.14	130	4
Small mines	.....	.....	120,000	.....	.....	120,000	120,000	1.00	.....	.....
Total	71	2,745,101	253,933	54,730	248	3,054,012	3,602,326	1.18	194	6,639

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
1897	3,054,012	3,602,326	1.18	194	6,639

In the following table is shown the total product of the State since 1885, by counties, with the increases and decreases during 1897 as compared with 1896:

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

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.	1897.	Increase, 1897.	Decrease, 1897.
Atchison	1,200	4,592	7,250	2,658	.....
Cherokee	918,944	985,132	1,004,921	19,789	.....
Coffey	120	.....	.....	.....	.....
Crawford	1,354,614	1,271,434	1,352,923	81,489	.....
Douglas	.....	.....	339	339	.....
Franklin	17,047	12,861	5,140	.....	7,721
Labette	250	600	250	.....	350
Leavenworth	259,060	284,700	366,362	81,662	.....
Linn	14,051	14,534	27,432	12,898	.....
Osage	241,584	190,948	169,395	.....	21,553
Small mines	120,000	120,000	120,000	.....	.....
Total	2,926,870	2,884,801	3,054,012	*a* 169,211	.....

a Net increase.

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.	1897.
Cherokee	$1.20	$1.22	$1.19	$1.22	$1.15	$1.13	$1.22	$1.23	$1.21
Crawford	1.20	1.24	1.09	1.08	1.10	1.07	1.02	.97	1.07
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	1.32
Linn	1.32	1.34	1.23	1.27	1.22	1.20	1.10	.97	1.07
Osage	2.03	1.35	2.04	2.04	1.85	1.89	1.45	1.65	1.59
The State.	1.48	1.30	1.31	1.31½	1.27	1.23	1.20	1.15	1.18

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.		1897.	
	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	1,834	143	1,982	155	1,969	179	1,941	196
Crawford	2,723	167	3,098	161	2,966	144	2,520	198
Franklin	87	147	54	192	59	165	.....	.....
Leavenworth	1,406	197	1,019	182	1,054	242	1,067	243
Linn	132	91	71	115	54	113	72	218
Osage	1,129	159	1,231	145	992	141	975	122
The State.	7,339	164	7,482	159	7,127	168	6,639	194

KENTUCKY.

Total product in 1897, 3,602,097 short tons; spot value, $2,828,329.

An increase of 268,619 short tons in the product of 1897 as compared with that of 1896 makes the total output of the State last year the largest in its history. The increased production was due to the ability of Kentucky operators to supply a portion of the demand created by the miners' strike in the competitive fields of Pennsylvania, Ohio, Indiana, and Illinois. While Kentucky miners were somewhat disaffected, the strike was not general throughout the State, and in cases where the men went out the strike did not begin until August 1, so that the Kentucky operators had the benefit of nearly thirty days during which the strike was on in other States.

To this condition is also probably due the slight advance of 1 cent in the average price per ton obtained for the product, although there were a number of counties in which the price fell off, and had it not been for the increased demand for Kentucky coal created by the strike the value would probably have shown a considerable decrease.

Strikes in Kentucky coal mines in 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Bell	3	230	16	3,650
Carter	2	152	23	3,552
Hopkins	1	58	12	696
Knox	1	260	136	35,360
Laurel	10	658	41	26,808
Lee	2	35	51	1,770
McLean	1	40	26	1,040
Muhlenberg	2	155	30	4,670
Ohio	1	40	40	1,600
Pulaski	2	190	226	42,930
Whitley	8	1,000	188	187,575
The State	33	2,818	110	309,651

Kentucky is, comparatively, one of the most advanced States in the use of mining machines, 36 per cent of the product in 1897 being won in this way. Machine-mined coal amounted to 44 per cent of the product in Montana, but the amount was less than 60 per cent of that in Kentucky. Practically the entire output of Alaska is won by machines, but the entire product is only 18,000 tons, and with these two exceptions no other State in the Union has so large a percentage of machine-mined coal as Kentucky. Three States only produce more

coal by machines than Kentucky, and these are Pennsylvania, Illinois, and Ohio, three of the four most important producing States, while Kentucky is ninth in rank.

Kentucky stands alone in one particular among the coal-producing States. Two of the great fields, the Appalachian and the Central, contribute to the coal product of Kentucky, the eastern part of the State being embraced in the area covered by the former, and the southern extremity of the Central or Illinois field is found in the western counties. The counties whose product is included in that of the Appalachian system are Bell, Boyd, Breathitt, Carter, Greenup, Johnson, Knox, Laurel, Lawrence, Lee, Pulaski, Rockcastle, and Whitley, and the counties comprised in the Western field are Butler, Christian, Daviess, Hancock, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Union, and Webster. All of the increase in product in 1897 was from the Western field, the increased production in that portion of the State overcoming a loss of nearly 75,000 tons in the eastern counties and making a net gain of 268,619 short tons. Whitley County, the most important of the eastern counties, and usually the second in the State, had an independent strike of its own in 1897. Eight of the twelve mines in the county were idle from May until November, and 1,000 of the 1,298 men employed in the mines were idle an average of six months. The product of the county fell off in consequence 187,089 short tons, which was offset by an increase in Hopkins County, of the Western field, amounting to 199,230 short tons.

The total product of the eastern field in 1897 was 1,411,897 short tons, against 1,486,016 short tons in 1896, a loss of 74,119 short tons, while the product of the western field increased from 1,847,462 short tons to 2,190,200 short tons, a gain of 342,738, making, as previously stated, a net gain of 268,619 short tons.

The details of production in the last two years are as follows:

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	1,435	.....	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

Coal product of Kentucky in 1897, 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	7	99,720	2,075	1,466	.....	103,261	$146,409	$1.42	255	269
Boyd	2	89,522	101,596	1,420	.....	192,538	137,760	.72	264	325
Butler	2	11,355	10,452	40	.....	21,847	19,009	.87	143	85
Carter	7	94,377	28,414	1,555	.....	124,346	114,416	.92	221	406
Hancock	3	16,566	832	304	.....	17,702	26,818	1.51	161	97
Henderson	5	77,557	27,240	2,390	.....	107,187	93,884	.88	214	215
Hopkins	8	887,146	21,997	16,464	50,805	976,412	631,016	.65	208	1,414
Johnson	2	8,911	630	.....	.....	9,541	24,422	2.56	178	68
Knox	5	153,750	1,505	3,190	.....	158,445	118,004	.74	169	382
Laurel	14	346,967	15,254	2,086	.....	364,307	298,957	.82	195	879
Lee	3	34,556	1,055	100	.....	35,711	36,997	1.04	192	61
McLean	2	32,360	500	500	.....	33,360	23,720	.71	246	70
Muhlenberg	8	252,170	13,860	4,730	.....	270,760	183,841	.68	171	632
Ohio	8	452,001	6,930	7,364	.....	466,295	301,131	.65	192	745
Pulaski, Rockcastle	6	59,415	610	425	.....	60,450	60,130	.99	104	338
Union	5	110,885	10,003	1,980	4,028	126,896	89,909	.71	158	344
Webster	4	60,310	4,017	1,655	.....	65,982	46,622	.71	171	129
Whitley	12	235,272	3,645	2,974	.....	241,891	222,542	.92	104	1,298
Breathitt, Christian, Daviess	3	21,953	3,100	1,200	.....	26,253	27,743	1.06	125	97
Greenup, Lawrence	3	43,339	384	5,190	.....	48,913	37,499	.77	156	129
Small mines	.....	.....	150,000	.....	.....	150,000	187,500	.....	.....	.....
Total	109	3,088,132	404,099	55,033	54,833	3,602,097	2,828,329	.79	178	7,983

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	1886	1,550,000
1874	360,000	1887	1,933,185
1875	500,000	1888	2,570,000
1876	650,000	1889	2,399,755
1877	850,000	1890	2,701,496
1878	900,000	1891	2,916,069
1879	1,000,000	1892	3,025,313
1880	1,000,000	1893	3,007,179
1881	1,100,000	1894	3,111,192
1882	1,300,000	1895	3,357,770
1883	1,650,000	1896	3,333,478
1884	1,550,000	1897	3,602,097
1885	1,600,000		

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

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.	1897.	Increase, 1897.	Decrease, 1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Bell	63,022	79,374	89,534	103,261	13,727	.....
Boyd	111,659	170,443	121,022	192,538	71,516	.....
Breathitt	.....	.....	2,406	10,053	7,647	.....
Butler	19,982	24,501	28,444	21,847	.....	6,597
Carter	85,266	102,029	136,066	124,346	.....	11,720
Christian	38,836	22,159	13,124	13,000	.....	124
Daviess	10,353	12,898	3,232	3,200	.....	32
Greenup	1,573	1,403	854	852	.....	2
Hancock	35,571	30,569	17,842	17,702	.....	140
Henderson	80,074	79,113	119,540	107,187	.....	12,353
Hopkins	811,759	788,436	777,182	976,412	199,230	.....
Johnson	16,902	10,679	6,762	9,541	2,779	.....
Knox	72,858	185,734	217,040	158,445	.....	58,595
Laurel	261,177	233,638	288,494	364,307	75,813	.....
Lawrence	86,497	55,913	47,474	48,061	587	.....
Lee	49,527	43,313	9,847	35,711	25,864	.....
McLean	15,354	21,834	24,076	33,360	9,284	.....
Muhlenberg	269,580	267,353	256,268	270,760	14,492	.....
Ohio	348,937	386,903	368,094	466,295	98,201	.....
Pulaski	51,665	81,188	72,537	47,847	.....	24,690
Rockcastle	800	4,475	.....	12,603	12,603	.....
Union	134,585	100,616	104,122	126,896	22,774	.....
Webster	41,934	49,896	50,538	65,982	15,444	.....
Whitley	349,282	455,303	428,980	241,891	.....	187,089
Small mines	153,999	150,000	150,000	150,000	.....	.....
Total	3,111,192	3,357,770	3,333,478	3,602,097	[a]268,619	.....

[a] Net increase.

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.	1897.
Bell	$1.40	.....	$1.25	$1.50	$0.87	$1.27	$1.47	$1.45	$1.42
Boyd	1.10	$0.84	.81	.74	.82	.80	.84	.80	.72
Butler	1.24	.....	1.00	2.00	1.25	1.25	1.12	.94	.87
Carter	1.14	1.10	1.04	1.29	1.24	1.37	1.14	.85	.92
Christian	1.26	.86	1.16	.95	.97	1.25	1.18	1.25	1.23
Daviess	.....	.....	.....	.....	.....	.....	.53	.....	.....
Hancock	1.58	.....	1.84	2.50	2.50	1.00	.90	1.54	1.51
Henderson	1.26	.89	.92	.86	.85	.88	.89	.77	.88
Hopkins	.78	.76	.73	.70	.66	.75	.69	.67	.65
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	.74
Laurel	.90	.95	1.00	.94	.89	.80	.90	.81	.82
Lawrence	1.34	1.25	1.00	1.15	1.38	.98	.60	.78	.73
Lee	.....	.....	.....	.....	.....	1.17	1.04	.....	1.04
McLean	.....	.....	.....	.....	.....	.....	.....	.....	.71
Muhlenberg	.87	.80	.84	.89	.75	.76	.74	.70	.68
Ohio	.81	.78	.79	.83	.78	.70	.70	.61	.65
Pulaski	1.30	1.00	1.39	1.20	1.06	1.00	.97	.99	1.00
Union	1.13	1.08	1.26	1.01	.95	.87	.88	.83	.71
Webster	.80	.78	.88	.86	.74	.66	.76	.73	.71
Whitley	1.10	1.09	1.19	1.05	1.03	1.01	1.02	.93	.92
The State	.99	.92	.93	.92	.86	.86	.86	.78	.79

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

Statistics of labor employed and working time at Kentucky coal mines—Continued.

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.
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

County.	1894.		1895.		1896.		1897.	
	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	192	208	275	137	331	175	269	255
Boyd	287	183	306	253	232	249	325	264
Butler	64	195	82	155	86	199	85	143
Carter	516	110	328	162	360	221	406	221
Christian	88	194	77	142	75	94	56	95
Daviess	.....	.....	29	126	.....	.....	.....	.....
Hancock	111	129	82	106	99	178	97	161
Henderson	215	164	277	155	265	132	215	214
Hopkins	1,535	182	1,366	170	1,292	191	1,414	208
Johnson	98	284	50	242	.....	.....	.....	.....
Knox	255	113	388	159	436	247	382	169
Laurel	927	108	1,000	100	826	142	879	195
Lawrence	226	194	99	213	115	130	125	156
Lee	152	246	141	158	.....	.....	61	192
Muhlenberg	642	105	583	114	569	129	632	171
Ohio	673	147	724	160	721	163	745	192
Pulaski	339	90	317	138	270	118	292	105
Union	260	168	224	169	245	166	344	158
Webster	89	98	81	166	108	140	129	171
Whitley	1,287	125	1,218	158	1,196	145	1,298	104
The State	8,083	145	7,799	153	7,549	165	7,983	178

MARYLAND.

Total product in 1897, 4,442,128 short tons; spot value, $3,363,996.

Maryland was one of the States that was benefited by the miners' strike of 1897, so far as tonnage is concerned, but the benefit did not extend so far as to cause an improvement in the price, which, instead of advancing, fell off from 80 cents in 1896 to 76 cents in 1897. The tonnage won in 1897 was the maximum output of the State, being 298,192 short tons, or about 7 per cent in excess of the previous year, which was the largest up to that time. Maryland's production reached a total of 4,000,000 short tons for the first time in 1896, and amounted to nearly 4,500,000 short tons in 1897. The industry suffered from no labor disturbances in 1897, the managers of the strike being unable to induce the Maryland operatives to quit work. The miners in Maryland have not been called upon to compete with machines in winning their coal, except so far as machine-mined coal in other States competes with the pick-mined coal of this State. This competition, indirect as it is to the miners, is felt in a direct and very perceptible manner by the operators, who, in order to market their product have been obliged to lower the price until in ten years there has been a decline of 20 per cent—from 95 cents in 1887 to 76 cents in 1897.

The records of the shipments of coal from the Maryland field and that of the Piedmont region in West Virginia (all embraced in the "Cumberland coal field"), have been carefully preserved since 1842, a period of fifty-six years. Reports of the Cumberland coal trade are published annually, and are shown on a subsequent page. It appears from the report for 1897 that the shipments from the region since 1842 have aggregated 98,060,562 long tons, or 109,827,829 short tons, of which 84,938,217 long tons, or 95,130,803 short tons, has come from the Frostburg or Maryland portion of the field. The local trade and colliery consumption are unimportant factors in this field, aggregating about 2 per cent of the shipments. Adding for this factor, say, 2,000,000 tons, the total yield of the Maryland field to date is found to have been approximately 97,000,000 short tons.

Coal mining in Maryland is confined to two counties, Allegany and Garrett, the former being by far the more important. Of the product in 1897 Garrett County produced 79,924 short tons, or not quite 2 per cent of the total, as against 88,681 tons, or a little more than 2 per cent of the total in 1896.

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
1897	4,391,703	27,762	22,663	4,442,128	3,363,996	.76	262	4,719

The following table shows the annual output of coal in Maryland since 1883:

Product of coal in Maryland from 1883 to 1897.

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
1897	4,442,128	3,363,996	.76	262	4,719

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 1897.

[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	84,721	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

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

Shipments of coal from Maryland mines from 1883 to 1897—Continued.

[Long tons.]

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
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
Total	3,420,760	3,016,393	3,316,010	3,065,707

Company.	1895.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Consolidation Coal Co	923,655	1,151,816	1,265,682	113,866	.....
New Central Coal Co	201,726	188,453	206,262	17,809	.....
Georges Creek Coal and Iron Co	458,245	525,131	493,388	.....	31,743
Borden Mining Co	244,878	167,712	168,543	831	.....
Maryland Coal Co	449,234	359,625	371,234	11,609	.....
American Coal Co	524,079	461,215	475,965	14,750	.....
Potomac Coal Co	123,708	69,416	(*b*)	.....	.....
Swanton Mining Co	.....	4,605	27,153	22,548	.....
Union Mining Co. (*b*)	184,916	276,466	724,717	145,989	.....
Barton and Georges Creek Valley Co	190,826	232,846	(*b*)	.....	.....
Davis Coal and Coke Co	50,781	108,656	102,885	.....	5,771
Big Vein Coal Co	36,397	70,305	61,804	.....	8,501
Piedmont-Cumberland Coal Co	9,537	8,268	26,950	18,682	.....
Anthony Mining Co	10,062	.....	.....	.....	.....
Atlantic and Georges Creek Coal Co	4,714	37,750	7,346	.....	30,404
Midland Mining Co	240	.....	.....	.....	.....
Total	3,412,998	3,662,264	3,931,929	*c*269,665	.....

a Succeeded by Davis Coal and Coke Co. in 1894.
b Succeeded by Black, Sheridan, Wilson Co. in 1897. *c* 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	150,331	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	1,436,381	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
1897	1,790,813	96,536	169,679	2,057,028	586,592	166,691	753,283
Total	38,714,154	11,732,102	4,852,524	55,298,780	7,324,567	3,744,846	11,069,513

a Includes 118,680 tons used on line of Cumberland and Pennsylvania Railroad and its branches pany in locomotives, rolling mills, etc.

Maryland and West Virginia from 1842 to 1897.

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	.....	256,679
.....	.....	.....	.....	.....	.....	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	313,180	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	.....	2,807,161	364,474	1,689,795	4,861,430
.....	918,712	111,135	1,029,847	1,463,331	.....	[a]3,615,142	263,227	1,426,120	5,303,489
585,001	8,165,714	3,343,482	12,094,197	12,646,376	1,475,969	63,684,490	17,357,357	17,019,715	98,060,562

and at Cumberland and Piedmont; also 368,097 tons used by the Baltimore and Ohio Railroad Com-

MICHIGAN.

Total product in 1897, 223,592 short tons; spot value, $325,416.

Unusual activity was displayed in developing the coal resources of Michigan, in 1897, and the result is exhibited in an increase in output over 1896 of 130,710 short tons, or about 140 per cent. Compared with 1895 the product in 1897 shows an increase of nearly 100 per cent, and compared with 1882, which was the banner year in the history of the State, there was an increase of 65 per cent. It is probable that a good portion of the increased production in 1897 was due to the coal famine among some of the manufacturing cities, induced by the miners' strike in other States. However that may be, it has enabled Michigan operators to get their coal into the market, which is usually a harder task than to retain a hold once secured.

The production by counties in 1896 and 1897 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

Coal product of Michigan in 1897, 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	54,783	396	1,850	57,029	$87,327	$1.53	227	124
Eaton	3	952	2,770	65	3,787	6,750	1.78	188	26
Genesee, Huron	2	18,761	3,873	2,125	24,759	34,475	1.39	208	73
Jackson	4	58,050	12,681	5,230	75,961	101,921	1.34	223	181
Saginaw, Shiawassee	2	56,090	4,966	1,000	62,056	94,943	1.53	258	133
Total	13	188,636	24,686	10,270	223,592	325,416	1.46	230	537

The following tables show the details of production in Michigan for the past six years and the total output since 1877:

Coal product of Michigan for six 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
1897	188,636	24,686	10,270	223,592	325,416	1.46	230	537

Coal product of Michigan from 1877 to 1897.

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	1897	223,592

MISSOURI.

Total product in 1897, 2,665,626 short tons; spot value, $2,887,884.

Although the coal product of Missouri in 1897 was 334,084 short tons, or 14 per cent, larger than the output of 1896, it did not reach the amounts won in 1884, 1885, 1887, 1888, 1890, 1891, 1892, or 1893. The maximum product was obtained in 1888, which, as stated in connection with the statistics of production in Iowa, was a year of exceptional activity in coal mining throughout the West.

The Missouri coal fields are surrounded by formidable rivals, the most important of which are the more favorably situated and more extensively developed fields of Illinois on the east, from which the fuel supply of St. Louis and other cities in the eastern part of the State is

principally drawn. Iowa on the north, Kansas on the west, the Indian Territory on the southwest, and Arkansas on the south complete a barrier around the State through which the coal of local production is unable to break. Any substantial increase in the coal product of Missouri may therefore be taken as indicative of industrial development of a comparatively local nature, and variations in the production of the State as reflecting the conditions of local industries, except when strikes in other fields cause a temporary demand upon the Missouri mines.

What strikes there were in Missouri during 1897 were comparatively unimportant and were not connected with the general strike which paralyzed the industry in the Eastern States, and they had no appreciable effect upon the production in the State. At the Vandalia mine, in Audrain County, 60 men were out for ten days in August; at the Brush Creek mine, in Jackson County, 75 men were idle sixty-five days, beginning August 26; at the three mines of the Lexington Coal Mining Company, in Lafayette County, 225 men were idle the first two days of September; at the Wellington mine, in the same county, 8 men were on strike for five days in August; at No. 48 mine of the Kansas and Texas Coal Company, 83 men were out for fifty-seven days, beginning July 31; at the Blackbird mine, in Putnam County, 20 men were out during July; at the Mendota mine, in the same county, 300 men were on strike for twelve days in August; at the Emporia mine, same county, 42 men were out nineteen days from August 2; and at Jones & Davis' mine, in Randolph County, 70 men were out seventeen days in July and August.

The number of mining machines in use in 1897 was 3, a decrease of 1 from 1896, but the product won by machines increased from 47,827 short tons to 59,692 short tons during the year.

The production by counties, the distribution of the product for consumption, the selling value, and labor statistics for the last two years are shown in the following tables:

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.*				
Adair, Audrain	3	46,709	618	268	47,595	$57,979	$1.22	217	118
Bates	10	438,580	6,775	7,080	452,435	393,472	.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
Barton, Boone	4	24,324	4,111	47	28,482	32,763	1.08	144	118
Caldwell, Grundy	2	44,089	8,538	3,775	56,402	95,284	1.69	250	240
Johnson, Moniteau	2	.....	350	~100	450	675	1.50	107	4
Montgomery, Morgan	2	11,622	684	.....	12,306	14,422	1.17	151	39
Ralls, Saline, 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

Coal product of Missouri in 1897, 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	3	33,511	.....	300	33,811	$35,618	$1.05	150	135
Audrain Barton	3	93,673	5,161	1,538	100,372	118,582	1.18	272	250
Bates	9	324,276	5,087	6,415	335,778	297,166	.89	133	529
Boone	3	4,874	4,274	32	9,180	11,650	1.27	169	49
Callaway	7	4,000	24,960	158	29,118	48,597	1.67	219	87
Grundy	2	33,007	5,435	2,066	40,508	68,882	1.70	191	172
Henry	8	42,413	1,404	459	44,276	60,721	1.37	217	165
Lafayette	24	298,605	22,117	5,076	325,798	424,797	1.30	188	1,108
Linn	5	71,856	9,044	698	81,598	118,799	1.46	217	229
Macon	10	561,710	2,131	9,715	573,556	499,283	.87	182	1,283
Montgomery	2	18,000	1,505	360	19,865	22,956	1.16	214	49
Putnam	3	99,785	1,201	1,936	102,922	111,529	1.08	225	330
Randolph	8	296,421	12,151	2,527	311,099	309,164	.99	212	737
Ray	9	172,200	6,967	3,073	182,240	243,141	1.33	155	642
Vernon	3	273,232	1,209	4,590	279,031	263,065	.94	188	393
Caldwell Cole	2	32,200	10,500	600	43,300	71,820	1.66	258	113
Jackson Morgan	2	15,834	6,340	1,500	23,674	37,278	1.57	241	108
Pettis Ralls	2	9,200	200	100	9,500	11,836	1.25	191	35
Small mines	.....	.....	120,000	.....	120,000	140,000	.....	.....	.....
Total	105	2,384,797	239,686	41,143	2,665,626	2,887,884	1.08	168	6,414

The annual production since 1873 has been as follows:

Coal product of Missouri since 1873.

Year.	Short tons.	Year.	Short tons.
1873	784,000	1886	1,800,000
1874	789,680	1887	3,209,916
1875	840,000	1888	3,909,967
1876	1,008,000	1889	2,557,823
1877	1,008,000	1890	2,735,221
1878	1,008,000	1891	2,674,606
1879	1,008,000	1892	2,773,949
1880	1,680,000	1893	2,897,442
1881	1,960,000	1894	2,245,039
1882	2,240,000	1895	2,372,393
1883	2,520,000	1896	2,331,542
1884	2,800,000	1897	2,665,626
1885	3,080,000		

The following table contains the statistics of production, by counties, since 1889, with the increase and decrease in 1897 as compared with 1896:

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.	1897.	Increase, 1897.	Decrease, 1897.
Adair	10,150	23,038	25,738	33,811	8,073	.....
Audrain	14,921	38,386	21,857	45,972	24,115	.....
Barton	139,977	51,400	13,731	54,400	40,669	.....
Bates	279,706	354,741	452,435	335,778	.....	116,657
Boone	18,160	15,180	14,751	9,180	.....	5,571
Caldwell	26,304	16,980	21,800	40,800	19,000	.....
Callaway	18,687	19,169	40,709	29,118	.....	11,591
Chariton	100	.....	.....	.....	.....	.....
Cole	.....	.....	.....	2,500	2,500	.....
Cooper	2,243	225	.....	.....	.....	.....
Grundy	.....	29,340	34,602	40,508	5,906	.....
Henry	158,409	55,428	35,505	44,276	8,771	.....
Jackson	6,000	21,300	27,960	17,674	.....	10,286
Johnson	6,498	250	200	.....	.....	200
Lafayette	203,423	263,927	258,177	325,798	67,621	.....
Linn	77,272	99,035	64,504	81,598	17,094	.....
Livingston	.....	623	706	.....	.....	706
Macon	489,579	506,270	459,778	573,556	113,778	.....
Moniteau	364	425	250	.....	.....	250
Montgomery	8,871	10,881	12,106	19,865	7,759	.....
Morgan	745	1,720	200	6,000	5,800	.....
Pettis	.....	.....	.....	800	800	.....
Putnam	116,655	69,044	87,740	102,922	15,182	.....
Ralls	.....	9,800	10,628	8,700	.....	1,928
Randolph	201,397	228,097	255,713	311,099	55,386	.....
Ray	100,686	133,681	129,356	182,240	52,884	.....
Saline	.....	150	400	.....	.....	400
St. Clair	679	220	80	.....	.....	80
Vernon	244,213	303,083	242,616	279,031	36,415	.....
Other counties and small mines.	120,000	120,000	120,000	120,000	.....	.....
Total	2,245,039	2,372,393	2,331,542	2,665,626	*a* 334,084	.....

a Net increase.

Average prices for Missouri coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Adair	$1.66	$1.70	$1.75	$1.75	$1.49	$1.48	$1.24	$1.15	$1.05
Audrain	1.47	1.61	1.57	1.50	1.40	1.50	1.45	1.30	1.27
Barton	1.35	1.06	1.22	1.29	1.12	1.06	1.09	1.00	1.13
Bates	1.14	1.02	1.04	1.00	1.01	1.04	.91	.87	.89
Boone	1.54	1.50	1.50	1.53	1.62	1.55	1.28	1.29	1.27
Caldwell	1.97	1.98	2.15	2.20	1.98	1.76	1.39	1.52	1.65
Callaway	1.79	1.50	1.42	1.56	1.54	1.60	1.51	1.37	1.67
Grundy	2.05	2.05	2.05	2.05	2.05	.....	1.95	1.80	1.70
Henry	1.55	1.48	1.33	1.41	1.45	1.13	1.45	1.42	1.37
Jackson	.....	.....	.....	.....	.....	.....	.....	1.60	1.60
Lafayette	1.60	1.55	1.55	1.60	1.52	1.68	1.40	1.33	1.30
Linn	1.88	.....	1.19	1.56	1.62	1.59	1.53	1.52	1.46
Macon	1.23	1.11	1.02	1.04	1.06	.96	.93	.90	.87
Montgomery	1.42	1.35	1.35	1.36	1.35	1.25	1.25	1.15	1.16
Putnam	1.34	1.31	1.31	1.37	1.36	1.21	1.22	1.09	1.08
Randolph	1.29	1.14	1.06	1.07	1.10	1.09	1.06	1.09	.99
Ray	1.57	1.52	1.62	1.54	1.51	1.44	1.44	1.37	1.33
Vernon	1.18	1.20	1.04	1.02	1.01	.99	.85	.87	.94
The State	1.36	1.24	1.23	1.23	1.23	1.17	1.12	1.08	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	140	300	81	188
Audrain	70	205	33	180	60	224	101	184
Barton	90	231	263	221	49	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.		1897.	
	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	28	226	62	153	58	214	135	150
Audrain	59	186	72	238	60	220	105	246
Barton	412	195	150	172	50	80	145	290
Bates	919	83	683	168	662	189	529	133
Boone	50	200	57	202	68	191	49	169
Caldwell	115	228	115	243	100	250	105	262
Callaway	81	156	73	205	102	165	87	219
Grundy	.....	.....	105	222	140	250	172	191
Henry	327	156	173	115	195	144	165	217
Jackson	.....	.....	.....	.....	115	123	100	248
Lafayette	1,305	119	1,015	147	927	157	1,108	188
Linn	264	233	282	234	286	153	229	217
Macon	1,387	183	1,346	152	1,218	169	1,283	182
Montgomery	35	156	25	150	38	150	49	214
Putnam	486	146	301	148	330	168	330	225
Randolph	556	144	602	187	622	185	737	212
Ray	690	78	559	132	536	142	642	155
Vernon	666	90	542	149	437	146	393	188
The State	7,523	138	6,299	163	5,982	168	6,414	168

MONTANA.

Total product in 1897, 1,647,882 short tons; spot value, $2,897,408.

Coal production in Montana has shown an uninterrupted increase each year since 1887, the output in 1895 showing a phenomenal gain of over 62 per cent over 1894, with an increase of 50 per cent in value. The product in 1896 was only 2 per cent more than that of 1895, and this was accompanied by a sharp decline in value. The actual loss amounted to $571,234, the price per ton declining from $1.89 to $1.47. The conditions were more satisfactory in 1897; the product increased 104,437 short tons, and the value $617,736, the average price per ton showing an advance of 29 cents to $1.76.

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. All of the important counties increased their production in 1897, although Carbon County, with a gain of 10,433 tons in product, showed a loss of $63,387 in value. Cascade County gained 37,292 tons in amount and $525,572 in value; Park County gained 29,757 tons and $146,197; Gallatin County gained 23,953 tons, but only $8,489 in value. There were two firms using mining machines in 1897 against three in 1896. The number of machines in use was one less in 1897 than in 1896, notwithstanding which the product by machines increased from 579,414 short tons to 720,345 short tons. There were no strikes among Montana coal miners in 1897.

The details of production in 1896 and 1897 are shown in the following tables:

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, Park, Carbon	5	250	13,320	50	79,632	93,252	148,235	1.59	275	168
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

Coal product of Montana in 1897, 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	5	1,040,783	19,098	13,802	64,907	1,138,590	$1,999,104	$1.76	269	1,491
Choteau	4	2,495	2,350	.....	.....	4,845	12,340	2.55	193	30
Gallatin	2	130,913	1,250	250	.....	132,413	223,024	1.68	286	181
Park	6	21,189	1,700	.....	100,000	122,889	294,072	2.39	191	301
Carbon, Dawson, Meagher	5	239,478	5,309	4,358	.....	249,145	368,868	1.48	219	334
Total	22	1,434,858	29,707	18,410	164,907	1,647,882	2,897,408	1.76	252	2,337

The following table shows the total output of coal in Montana since 1883 and the value of the product for the last eight years:

Coal product of Montana since 1883.

Year.	Short tons.	Value.	Year.	Short tons.	Value.
1883	19,795	.....	1891	541,861	$1,228,630
1884	80,376	.....	1892	564,648	1,330,847
1885	86,440	.....	1893	892,309	1,772,116
1886	49,846	.....	1894	927,395	1,887,390
1887	10,202	.....	1895	1,504,193	2,850,906
1888	41,467	.....	1896	1,543,445	2,279,672
1889	363,301	.....	1897	1,647,882	2,897,408
1890	517,477	$1,252,492			

The following tables show the product and value, by counties, since 1889, 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

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

Coal product of Montana since 1889, by counties—Continued.

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

County.	1897.		Increase 1897.		Decrease 1897.	
	Product.	Value.	Product.	Value.	Product.	Value.
	Short tons.		*Short tons.*		*Short tons.*	
Carbon	245,761	$360,818	10,433	.....	.....	$63,387
Cascade	1,138,590	1,999,104	37,292	$525,572	.....	.....
Choteau	4,845	12,340	.....	.....	206	6,575
Dawson	2,800	6,250	2,800	6,250	.....	.....
Gallatin	132,413	223,024	23,953	8,489	.....	.....
Lewis and Clarke	.....	.....	.....	.....	56	250
Meagher	584	1,800	464	1,440	.....	.....
Park	122,889	294,072	29,757	146,197	.....	.....
Total	1,647,882	2,897,408	*a* 104,437	*a* 617,736	.....	.....

a Net increase.

Average prices for Montana coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Carbon	.....	.....	.....	.....	.....	.....	$2.11	$1.80	$1.47
Cascade	$2.04	$2.03	$2.00	$2.00	$1.76	$1.94	1.72	1.34	1.76
Gallatin	2.38	2.31	2.38	2.50	2.34	2.43	2.07	1.98	1.68
Park	2.86	2.73	2.43	2.64	2.31	2.16	2.01	1.58	2.39
The State.	2.42	2.42	2.27	2.36	1.99	2.04	1.89	1.47	1.76

Statistics of labor employed and working time at Montana 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.
Cascade	379	.....	401	.....	426	275	634	247
Gallatin	120	.....	139	.....	146	298	151	278
Park	705	.....	562	.....	565	241	568	240
The State.	1,251	.....	1,119	.....	1,158	258	1,401	242

County.	1894.		1895.		1896.		1897.	
	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	316	226
Cascade	1,165	184	1,341	235	1,505	247	1,491	269
Gallatin	153	265	235	245	306	180	181	286
Park	408	198	260	197	164	280	301	191
The State.	1,782	192	2,184	223	2,335	234	2,337	252

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. The product in 1897 fell off to 495 tons.

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 was 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 1897, 716,981 short tons; spot value, $991,611.

New Mexico's coal product in 1897 was 94,355 short tons, or 15 per cent larger than in 1896, but was 3,673 short tons less than the output of 1895. There were no particular features of interest affecting the industry in the Territory in 1897. Machine mining has not yet invaded New Mexico, and there have been no labor disturbances of any moment. The mines of the Cerrillos Coal Railroad Company, in Santa Fe County, were shut down for six days early in February, 275 men being on strike, and several short strikes occurred at the Willis mine, in Rio Arriba County, where 20 men are employed, the total time lost being about thirty days.

The details of production, by counties, in 1896 and 1897 are shown in the following tables:

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

Coal product of New Mexico in 1897, 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.*				
Bernalillo	6	329,470	1,188	1,830	332,488	$469,213	$1.41	220	808
Colfax	3	157,000	4,424	2,039	163,463	195,443	1.20	160	407
Santa Fe	3	192,923	892	14,840	208,655	311,355	1.49	228	420
Lincoln, Rio Arriba, San Juan	3	10,030	1,340	1,005	12,375	15,600	1.26	265	24
Total	15	689,423	7,844	19,714	716,981	991,611	1.38	208	1,659

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	1897	716,981	991,611

In the following table the product since 1882 is shown by counties, together with the increase and decrease in 1897 as compared with 1896:

Coal product of New Mexico since 1882, by counties.

[Short tons.]

County.	1882.	1883.	1884.	1885.	1886.	1887.
Bernalillo	33,373	42,000	62,802	97,755	106,530	275,952
Colfax	91,798	112,089	102,513	135,833	87,708	154,875
Rio Arriba	12,000	17,240	11,203	14,958	7,000	11,000
Santa Fe	3,600	3,000	3,000	1,000	1,000	7,500
Socorro	16,321	37,018	41,039	56,656	69,047	58,707
Total	157,092	211,347	220,557	306,202	271,285	508,034

Coal product of New Mexico since 1882, by counties—Continued.

[Short tons.]

County.	1888.	1889.	1890.	1891.	1892.	1893.
Bernalillo	300,000	233,059	181,647	76,515	248,911	278,691
Colfax	227,427	151,464	151,400	295,089	297,911	249,783
Lincoln	.....	1,255	1,175	1,000	3,145	1,962
Rio Arriba	12,000	13,650	12,175	7,350	20,600	15,500
Santa Fe	25,200	34,870	22,770	16,500	36,780	118,892
Socorro	62,038	52,205	.....	65,574	53,783	.....
Other counties	.....	440	6,610	300	200	266
Total	626,665	486,943	375,777	462,328	661,330	665,094

County.	1894.	1895.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Bernalillo	270,413	308,676	271,137	332,488	61,351	.....
Colfax	114,985	187,102	179,415	163,463	.....	15,952
Lincoln	2,655	3,125	2,535	75	.....	2,460
Rio Arriba	*a* 21,020	32,000	8,200	*b* 12,300	4,100	.....
Santa Fe	187,923	*b*189,751	*b*161,339	208,655	47,316	.....
Socorro	.....	.....	.....	.....	.....	.....
Other counties	200	.....	.....	.....	.....	.....
Total	597,196	720,654	622,626	716,981	*c* 94,355	.....

a Including Union County. *b* Including San Juan County. *c* Net increase.

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 tables:

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.	1897.
Bernalillo	$1.70	$1.14	$1.47	$1.45	$1.42	$1.44	$1.43	$1.50	$1.41
Colfax	1.33	1.31	1.35	1.33	1.31	1.25	1.20	1.18	1.20
Rio Arriba	1.82	1.72	1.95	1.50	1.30	1.25	1.53	.....	1.25
Santa Fe	2.14	2.29	2.13	2.63	2.13	1.96	1.83	1.82	1.49
Socorro	3.29	.....	3.22	3.43	.....	.....	.....	.....	.....
Territory	1.79	1.34	1.68	1.62	1.47	1.57	1.49	1.49	1.38

Statistics of labor employed and working time at New Mexico 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.
Bernalillo	375	.....	187	.....	449	179	370	196
Colfax	360	.....	384	.....	370	261	272	248
Rio Arriba	20	.....	20	.....	35	270	25	250
Santa Fe	55	.....	36	.....	30	267	328	257
Socorro	.....	.....	175	.....	180	253	.....	.....
Territory	827	.....	806	.....	1,083	223	1,011	229

County.	1894.		1895.		1896.		1897.	
	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	460	192	549	183	588	164	808	220
Colfax	136	111	332	154	375	180	407	160
Rio Arriba	25	300	40	284	.....	.....	20	310
Santa Fe	343	193	455	218	576	170	420	228
Territory	985	182	1,383	190	1,559	172	1,659	208

NORTH CAROLINA.

Total product in 1897, 21,280 short tons; spot value, $27,000.

The only product reported in 1897 was from the Cumnock mine in Chatham County. The product of 21,280 tons shows that the mine has recovered from the effects of the disastrous explosion in December, 1895, although the property is still in the hands of a receiver. The necessity for the receivership arose from the suits for damages instituted by those injured and by the heirs of those killed at the time of the accident.

The history of coal mining in the State dates from 1889. The Egypt mines, now called the Cumnock, 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	1894	16,900	$29,675
1890	10,262	17,864	1895	24,900	41,350
1891	20,355	39,635	1896	7,813	11,720
1892	6,679	9,599	1897	21,280	27,000
1893	17,000	25,500			

Coal product of North Carolina for seven 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
1897	1	21,280	.....	.....	21,280	27,000	1.34	215	51

NORTH DAKOTA.

Total product in 1897, 77,246 short tons; spot value, $83,803.

The coal product of North Dakota in 1897 was not materially different from that of the year before, a slight decrease of 800 tons being noted. There were no strikes, and the conditions were about the same as in 1896, except that there were two mining machines in use in 1897 and only one in 1896, and the machine-mined product increased from 15,000 to 20,000 tons.

Some complaint was made in 1897 that the reports of the Survey neglected to record the "important" production of lignite coal in Burleigh County. In order to correct this omission an exhaustive investigation by correspondence was inaugurated. The result showed that there were a few small banks in the county from which farmers in the vicinity drew their winter supply of fuel. Little, if any, account was kept of the amount so mined, and as far as diligent inquiry could ascertain the total product amounted to about 2,800 tons, which is included in the table for 1897 shown on the following page:

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 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.*				
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, 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 in 1897, 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.*				
Burleigh	4		2,750	115	2,865	$2,488	$0.87	101	15
Emmons	2		800	20	820	2,116	2.52	130	6
McLean, Ward	6	14,500	3,525	65	18,090	24,045	1.33	177	54
Morton	5	28,532	683	56	29,271	29,410	1.00	154	69
Stark	3	22,000	2,700	1,500	26,200	25,744	.98	233	26
Total	20	65,032	10,458	1,756	77,246	83,803	1.08	168	170

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	1897	77,246

OHIO.

Total product in 1897, 12,196,942 short tons; spot value, $9,535,409.

Ohio was the principal sufferer by the miners' strike during the summer of 1897. More than 80 per cent of the total number of men employed in Ohio coal mines were out of work, on account of the strike, an average of seventy-eight days. It must not be considered, however, that all of this time would have been made if the strike had not occurred. Many of the men would have been idle part of the time on account of the usual light summer demand for fuel. This is shown by the fact that while 21,685 men out of a total of 26,410 were on strike an average of seventy-eight days each, the average working time made in the State was only thirteen days less than in 1896. The working time in 1896 was the equivalent of 4,105,500 working days for one man; in 1897 the total amount of working time was 3,908,680 days, showing a loss of 196,820 days, or not quite 5 per cent. The loss in tonnage was 678,260, or a little more than 5 per cent. This shows a slight decrease in the individual capacity of the operatives, notwithstanding the increase of about 475,000 tons in the product mined by machines.

If the comparison of the total working time in the two years be neglected, and only the statistics of the strike be considered, it appears that the total time lost was 1,690,549 working days, practically 40 per cent of the entire working time in 1896.

In the tonnage lost by Ohio in 1897, the State is made responsible for 90 per cent of the decrease in production among the bituminous coal producing States. There were only two other States and one Territory in which the production was less in 1897 than in 1896—Georgia, Indian Territory, and North Dakota—their total losses aggregating 73,447 short tons.

The labor troubles in 1897 were distributed among the coal producing counties as follows:

Strikes in Ohio coal mines in 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Athens	23	2,249	73½	165,351
Belmont	22	1,375	69	94,701
Carroll	2	275	72	19,895
Columbiana	13	1,393	68	94,330
Coshocton	7	458	63	28,880
Guernsey	9	1,208	66	79,620
Hocking	13	2,389	70	167,679
Jackson	29	3,840	81½	313,028
Jefferson	6	1,204	73	87,380
Lawrence	1	65	47	3,055
Mahoning	4	90	58	5,233
Medina	6	321	57	18,159
Meigs	5	320	130	41,695
Morgan	1	40	60	2,400
Muskingum	4	119	57	6,875
Noble	1	58	76	4,408
Perry	36	2,774	81	224,687
Portage	3	239	122	29,158
Stark	20	1,771	110	194,372
Summit	1	106	78	8,268
Tuscarawas	16	1,074	71	76,124
Vinton	4	164	71	11,616
Wayne	2	153	89	13,635
The State	228	21,685	78	1,690,549

It appears from the foregoing statement that Jackson County was the one suffering the greatest loss in working time. The production in this county was 66,575 tons less than in 1896. Perry County lost 224,687

working days on account of the strike, and the production of the county decreased 127,373 short tons. Stark County lost 194,372 working days and 323,553 short tons in production. Hocking County lost 167,679 working days, but the output fell off only 3,561 tons, due to the fact that the mines in that county are all large ones, having an average production of about 80,000 tons, and the effects of the strike were readily overcome. Athens County miners lost 165,351 days of working time, and the production of the county decreased 244,499 short tons.

The number of mining machines in use increased from 209 in 1896 to 224 in 1897, eight firms adding this equipment to their properties during the year, and increasing the number of firms using machines from thirty-one to thirty-nine. The amount of coal mined with machines in 1897 was 3,843,345 short tons against 3,368,349 in 1896.

PRODUCTION BY COUNTIES.

There are four counties in the State whose annual product has exceeded 1,000,000 tons for the past six years, while in the five years 1892 to 1896, inclusive, their average annual product exceeded 1,500,000 tons. These counties are Athens, Hocking, Jackson, and Perry. The product of each decreased in 1897. Athens experienced the heaviest loss, amounting to 244,499 tons, or about 20 per cent, and the product of Perry County fell off 127,373 tons, or 7.4 per cent. The combined product of the four counties decreased from 6,165,407 short tons to 5,723,399 short tons. Three of these counties, Athens, Hocking, and Perry, comprise what is known as the Hocking Valley region. The product of this region in 1897 was 375,000 tons less than in 1896.

Perry County continued in first place during 1897, having superseded Jackson County in 1896. Jackson County remains in second place and Hocking, Athens, Guernsey, Belmont, Columbiana, and Jefferson follow in the order named, Guernsey, Belmont, Columbiana, and Jefferson all outranking Stark, which occupied fifth place in 1896, and dropped, with a decrease of 33 per cent in tonnage, to ninth place in 1897. Twenty mines, employing 1,771 men, out of a total of 27 mines with 2,234 men in that county were idle for one hundred and ten days on account of the strike in 1897, and the average working time fell off from two hundred and six days in 1896 to one hundred and thirty-one days in 1897. As there was a difference of only 107 in the number of men employed in the two years the cause of decrease is readily discernible.

The details of production in 1896 and 1897, by counties, are shown in the following tables:

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

Coal product of Ohio in 1897, 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	26	1,077,711	19,041	38,737	18,153	1,153,642	$776,155	$0.67	140	2,472
Belmont	30	734,566	87,742	5,112	.....	827,420	586,812	.71	161	1,818
Carroll	7	135,048	11,683	700	500	147,931	111,385	.75	155	384
Columbiana	20	691,498	78,976	4,262	.....	774,736	555,127	.72	206	1,413
Coshocton	9	322,331	20,458	800	.....	343,589	256,791	.75	192	487
Guernsey	11	891,880	6,836	11,838	.....	910,554	558,362	.61	180	1,401
Hocking	15	1,376,365	12,097	23,445	.....	1,411,907	942,063	.67	133	2,461
Jackson	34	1,461,592	71,032	30,027	.....	1,562,651	1,389,205	.89	137	4,308
Jefferson	21	625,843	122,077	2,731	1,197	751,848	582,148	.77	161	1,500
Lawrence	7	77,771	9,444	125	.....	87,340	66,699	.76	173	297
Mahoning	9	29,281	7,303	703	.....	37,287	28,181	.76	177	117
Medina	7	159,816	4,566	6,030	.....	170,412	181,173	1.06	154	396
Meigs	11	72,543	103,631	8,023	.....	184,197	159,058	.86	185	501
Morgan	2	21,965	.....	.....	.....	21,965	16,909	.77	109	145
Muskingum	11	84,945	46,361	300	.....	131,606	120,334	.91	145	394
Perry	49	1,525,191	39,208	30,800	.....	1,595,199	1,132,510	.71	128	3,624
Portage	4	55,975	21,232	2,030	.....	79,237	107,889	1.36	129	306
Stark	27	595,507	27,258	16,300	.....	639,065	677,607	1.06	131	2,234
Summit	4	42,594	6,569	3,010	.....	52,173	60,760	1.16	132	156
Trumbull	3	11,000	1,407	200	.....	12,607	20,700	1.64	153	40
Tuscarawas	29	582,317	41,808	2,847	.....	626,972	450,522	.72	140	1,478
Vinton	5	52,054	951	1,000	.....	54,005	51,224	.95	173	175
Washington	3	1,120	1,010	.....	.....	2,130	2,088	.98	82	22
Wayne	2	58,473	300	3,000	.....	61,773	63,624	1.03	149	159
Gallia, Scioto	2	.....	17,872	.....	.....	17,872	12,260	.69	214	44
Harrison, Noble	2	37,661	428	735	.....	38,824	25,823	.67	191	78
Small mines	.....	.....	500,000	.....	.....	500,000	600,000	.....	.....	.....
Total	350	10,725,047	1,259,290	192,755	19,850	12,196,942	9,535,409	.78	148	26,410

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	5,509	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	1,786,303	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.	1897.	Increase, 1897.	Decrease, 1897.
Athens	1,508,900	1,433,226	1,398,141	1,153,642	.....	244,499
Belmont	906,284	846,643	919,076	827,420	.....	91,656
Carroll	263,293	260,879	289,117	147,931	.....	141,186
Columbiana	558,280	617,654	534,697	774,736	240,039	.....
Coshocton	166,427	207,620	359,379	343,589	.....	15,790
Gallia	12,894	12,900	2,080	13,802	11,722	.....
Guernsey	891,859	886,581	955,457	910,554	.....	44,903
Harrison	1,701	3,472	2,504	5,886	3,382	.....
Hocking	1,520,868	1,587,985	1,415,468	1,411,907	.....	3,561
Jackson	1,511,950	2,005,384	1,629,226	1,562,651	.....	66,575
Jefferson	851,200	885,322	687,912	751,848	63,936	.....
Lawrence	57,179	88,502	51,597	87,340	35,743	.....
Mahoning	42,748	42,482	24,693	37,287	12,594	.....
Medina	110,787	264,171	194,104	170,412	.....	23,692
Meigs	170,593	184,076	259,386	184,197	.....	75,189
Morgan	8,236	16,000	16,294	21,965	5,671	.....
Muskingum	109,334	103,860	112,333	131,606	19,273	.....
Perry	1,599,025	1,711,944	1,722,572	1,595,199	.....	127,373
Portage	90,094	86,576	48,377	79,237	30,860	.....
Stark	452,950	779,733	962,618	639,065	.....	323,553
Summit	14,510	25,606	23,470	52,173	28,703	.....
Trumbull	2,278	15,801	2,280	12,607	10,327	.....
Tuscarawas	485,024	657,094	641,087	626,972	.....	14,115
Vinton	43,400	18,005	39,439	54,005	14,566	.....
Washington	.....	3,489	3,320	2,130	.....	1,190
Wayne	30,042	110,801	55,438	61,773	6,335	.....
Noble Scioto	.....	.....	25,137	37,008	11,871	.....
Small mines	500,000	500,000	500,000	500,000	.....	.....
Total.	11,909,856	13,355,806	12,875,202	12,196,942	.....	*a*678,260

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	1897	12,196,942

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.	1897.
Athens	$0.81	$0.83	$0.85	$0.85	$0.83	$0.74	$0.68	$0.69	$0.67
Belmont	.87	.78	.84	.84	.81	.71	.72	.70	.71
Carroll	.74	.85	.81	.83	.87	.78	.74	.76	.75
Columbiana	.79	.91	.96	.90	.88	.77	.78	.82	.72
Coshocton	.98	.90	1.00	1.01	1.00	.91	.83	.78	.75
Gallia	1.04	.90	.92	.92	.91	.85	.80	.....	.69
Guernsey	.87	.68	.79	.72	.71	.63	.58	.65	.61
Hocking	.80	.81	.81	.85	.82	.77	.66	.68	.67
Jackson	1.03	1.00	1.06	.99	1.06	.97	.90	.89	.89
Jefferson	1.00	.83	.85	.92	.79	.71	.70	.79	.77
Lawrence	1.04	1.08	1.04	1.06	.94	1.03	.92	.81	.76
Mahoning	1.12	1.20	1.25	1.41	1.44	1.40	1.28	1.18	.76
Medina	1.16	1.20	1.16	1.23	1.25	1.13	1.06	1.00	1.06
Meigs	1.02	1.24	.96	1.13	1.10	1.05	.94	.84	.86
Morgan	.....	.....	.....	.....	.....	.....	.80	.73	.77
Muskingum	.99	.86	.82	.91	.83	.89	.83	.72	.91
Noble	.....	.....	.....	.....	.....	.....	.....	.58	.65
Perry	.84	.85	.84	.85	.85	.78	.77	.71	.71

Average prices paid for Ohio coal since 1889, etc.—Continued.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Portage	1.27	1.59	1.52	1.52	1.55	1.52	1.32	1.33	1.36
Stark	1.26	1.30	1.25	1.22	1.24	1.19	1.02	1.08	1.06
Summit	1.83	1.50	1.38	1.43	1.73	1.67	1.41	1.61	1.16
Trumbull	1.64	1.20	1.41	1.54	1.54	1.87	1.31	.....	1.64
Tuscarawas	.80	.85	.79	.85	.84	.66	.71	.78	.72
Vinton	1.03	1.07	1.05	1.02	.97	.94	.83	.93	.95
Wayne	1.23	1.07	1.15	1.30	1.27	1.22	1.09	.85	1.03
The State.	.94	.94	.94	.94	.92	.83	.79	.79	.78

Statistics of labor employed and working time at Ohio 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.
Athens	2,122	198	2,702	193	2,536	193	3,203	162
Belmont	1,401	201	1,276	238½	1,713	224	1,684	199
Carroll	642	188	589	200	595	214	652	166
Columbiana	987	219	1,031	251	932	223	964	210
Coshocton	327	237	284	265	386	229	398	233
Gallia	33	205	35	218	38	220	36	176
Guernsey	788	225	810	188	800	229	993	176
Hocking	1,625	240	1,674	241	2,099	216	2,072	193
Jackson	2,654	180	3,097	189	3,347	214	3,188	201
Jefferson	944	203	1,237	235	1,544	208	2,033	194
Lawrence	242	198	232	223	247	263	142	143
Mahoning	537	220	525	233½	484	206	419	196
Medina	310	219	314	221	175	255	349	228
Meigs	616	202	623	190	636	190	601	142
Muskingum	366	250	338	213	356	192	388	214
Perry	2,977	188	3,284	170	2,380	187	2,585	178
Portage	155	236	149	225	204	207	252	217
Stark	1,930	182	1,952	190	1,776	199	2,105	161
Summit	389	173	376	194	406	221	90	256
Trumbull	102	243	176	226	86	205	53	128
Tuscarawas	1,082	196	1,161	232	1,300	224	1,329	234
Vinton	186	241	197	206	197	198	179	200
Wayne	87	178	65	200	196	166	168	167
The State.	20,576	201	22,182	206	22,576	212	23,931	188

Statistics of labor employed and working time at Ohio coal mines—Continued.

County.	1894.		1895.		1896.		1897.	
	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	3,445	124	2,556	155	2,705	163	2,472	140
Belmont	1,947	157	1,302	197	1,701	152	1,818	161
Carroll	466	133	482	148	729	172	384	155
Columbiana	1,417	161	1,204	228	1,460	181	1,413	206
Coshocton	451	168	395	175	557	202	487	192
Gallia	40	160	9	200	.....	.....	36	198
Guernsey	1,880	165	1,218	194	1,357	193	1,401	180
Hocking	2,549	122	2,501	198	2,431	131	2,461	133
Jackson	3,803	142	4,061	184	3,972	145	4,308	137
Jefferson	2,093	153	1,989	136	1,499	138	1,500	161
Lawrence	198	134	284	184	171	125	297	173
Mahoning	206	138	186	145	153	106	117	177
Medina	351	150	489	209	431	181	396	154
Meigs	584	146	612	151	587	176	501	185
Morgan	.....	.....	60	190	77	141	145	109
Muskingum	458	112	279	194	216	193	394	145
Noble	.....	.....	.....	.....	41	220	63	209
Perry	3,597	139	2,732	169	3,091	161	3,624	128
Portage	249	182	263	183	301	118	306	129
Stark	2,250	81	2,074	149	2,127	206	2,234	131
Summit	80	126	95	178	92	197	156	132
Trumbull	14	76	38	242	.....	.....	40	153
Tuscarawas	646	120	1,354	180	1,412	148	1,478	140
Vinton	155	115	38	226	182	128	175	173
Wayne	184	83	392	174	119	151	159	149
The State.	27,105	136	24,644	176	25,500	161	26,410	148

OREGON.

Total production in 1897, 107,289 short tons; spot value, $291,772.

Coal production in Oregon in 1897 was not materially different from that in 1896, there being an increase in output of 5,568 short tons, or about 5.5 per cent. The most notable feature was a loss in value of $2,792, the average price declining from $2.90 to $2.72. Compared with the price of $3.36 per ton in 1895, there has been a decline in two years of 64 cents, or nearly 20 per cent.

The following tables show the statistics of production for the past six years and the total output since 1885:

Coal product in Oregon since 1892.

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 number of employees.	Average number of days worked.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*			
1892	31,760	2,353	548	34,661	$148,546	90	120
1893	37,835	3,594	254	41,683	164,500	110	192
1894	45,068	2,171	282	47,521	183,914	88	243
1895	68,108	5,294	283	73,685	247,901	414	*a* 69
1896	88,116	12,951	654	101,721	294,564	254	191
1897	92,921	5,207	9,161	107,289	291,772	375	200

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 1897.

Year.	Short tons.	Year.	Short tons.
1885	50,000	1892	34,661
1886	45,000	1893	41,683
1887	37,696	1894	47,521
1888	75,000	1895	73,685
1889	64,359	1896	101,721
1890	61,514	1897	107,289
1891	51,826		

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 1897, 95,562,191 long tons, or 107,029,654 short tons; spot value, $116,765,473. Anthracite: Total product, 46,814,074 long tons, or 52,431,763 short tons; spot value, $79,129,126. Bituminous: Total product, 48,748,117 long tons, or 54,597,891 short tons; spot value, $37,636,347.

Compared with 1896 the production of anthracite coal in Pennsylvania in 1897 shows a decrease of 1,709,213 long tons, or 1,914,319 short

tons, and a decrease in value of $2,619,525. The bituminous product increased 4,500,391 long tons, or 5,040,438 short tons, so that the total product of the State shows a net increase of 2,791,178 long tons, or 3,126,119 short tons. Owing to the decrease in the more valuable anthracite product, and a decline of 2 cents in the average price of the bituminous product, the total value of the product in 1897 was only $351,427 more than that of 1896, in spite of a net increase of over 3,000,000 tons in the output.

The production of anthracite reached its maximum figure in 1895, with a total of 51,785,122 long tons. The statistics of 1897 show that the output has fallen off nearly 10 per cent. Mr. William W. Ruley, the author of the anthracite section of this report, attributes the decrease in anthracite production to two causes, (1) the increasing use of bituminous coal for steaming purposes in competition with the small sizes of anthracite, and (2) the introduction of gas for domestic use. To the second reason may also be added the increased use of coke, which is now prepared in sizes suitable for kitchen use, and, as it makes a quick, hot fire, its use for cooking during the summer months is growing. Still a fourth cause is to be assigned, which is the decreasing production of pig iron with anthracite coal or a mixture of anthracite and coke. The output of all kinds of pig iron in 1897 was more than 1,000,000 long tons ahead of 1896, but the anthracite pig dropped off 213,635 long tons. Assuming that on an average anthracite furnaces use a mixture of one-third coke and two thirds anthracite coal, and that 2,000 pounds of coke or 2,500 pounds of anthracite are used per ton of pig, the decrease in the anthracite pig-iron product in 1897 was responsible for about 160,000 tons, or nearly 10 per cent, of the decrease in anthracite coal production.

Pennsylvania, as is well known, is by far the most important of the coal-producing States. It so completely outranks every other producing State, having in the combined product of anthracite and bituminous coal in 1897 more than five times the output of Illinois, which stands 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 eighteen years from 1880 to 1897, 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
1897	200,064,730	107,029,654	53
Total	2,583,108,275	1,428,216,354	55

PENNSYLVANIA ANTHRACITE.[1]

The anthracite coal trade for the year 1897 was far from satisfactory both in respect to the amount of coal sold and the prices received for it.

The falling off in production amounted to 1,709,213 long tons as compared with 1896, and even with this large decrease a very considerable amount of unsold coal was in stock at the close of the year, which will have an unfavorable effect upon the production for the current year.

When compared with the large production of 1895, the decrease in production for 1897 is even more noticeable, amounting to 4,971,048 long tons. In fact the amount of anthracite coal mined in the year 1897 was, with the exception of the year 1894, the smallest production

[1] By William W. Ruley, chief of Bureau of Anthracite Coal Statistics.

in the last six years. A glance at the figures for these years as given below will show the fluctuations in mining for the period named:

Production of anthracite coal in Pennsylvania from 1892 to 1897.

Year.	Long tons.	Year.	Long tons.
1892	46,850,450	1895	51,785,122
1893	48,185,306	1896	48,523,287
1894	46,358,144	1897	46,814,074

Of the total product of 46,814,074 long tons in 1897, 41,637,864 tons were shipped to market via the several railroads entering the anthracite regions, 1,134,637 tons were sold at or in the vicinity of the mines for local trade, and the balance, 4,041,573 tons, was used at the mines for steam and heat. This last item consists of small sizes, and from year to year smaller sizes have been used, until now it is largely made up of refuse coal and dirt, which would have little value as a marketable product, and, as in many cases the tonnage is approximated, this item has never been taken into account in making up the total value of coal at the mines, and the values given in the table represent only the coal shipped and sold locally at the mines.

The following table will show the total product, with its value and other details, for the years 1896 and 1897:

Total product of anthracite coal in 1896 and 1897.

Year.	Total product.	Value at mines.	Average price per ton.	Number of persons employed.	Number of days worked.
	Long tons.				
1896	48,523,287	$81,748,651	$1.85	148,991	174
1897	46,814,074	79,129,126	1.85	149,557	150

From the above table it will be noted that the average price received for coal in 1897 was the same as for 1896. With the largely decreased tonnage, however, the total value of the coal at the mines was considerably less than in the previous year.

It will also be seen that in spite of the falling off in tonnage there was a slight increase in the number of men employed. The most noticeable feature, however, is the less number of days worked during the year, for while the product fell off only about 3.5 per cent, the working time was curtailed nearly 14 per cent. This would indicate a considerably greater efficiency in getting out coal, and should mean a decrease in the cost of production. The tonnage per man per day in 1897 was 2.09, against 1.87 in 1896.

As the statistics of production are compiled by counties, the following tables are given, showing the division of the total product according to shipments, coal sold to local trade, and used for steam in each anthracite producing county.

Anthracite coal product in 1896, by counties.

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	15,952,297	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

Anthracite coal product in 1897, by counties.

County.	Total product.	Shipments.	Local trade.	Used at mines.
	Long tons.	*Long tons.*	*Long tons.*	*Long tons.*
Susquehanna.....	430,515	393,002	7,513	30,000
Lackawanna	11,925,360	10,894,558	274,921	755,881
Luzerne.....	17,024,539	15,218,196	424,757	1,381,586
Carbon.....	1,467,965	1,263,245	31,182	173,538
Schuylkill	11,357,343	9,910,043	225,119	1,222,181
Columbia	306,388	264,998	6,499	34,891
Northumberland .	3,639,122	3,195,160	104,646	339,316
Dauphin	662,842	498,662	60,000	104,180
Total	46,814,074	41,637,864	1,134,637	4,041,573

Below is given a table showing the shipments of coal from the three trade regions from the beginning of the industry in 1820 to the end of 1897. It must be borne in mind, however, that these figures do not include coal sold at the mines to local trade nor that used for steam at the mines, but only such coal as is loaded into cars for shipment.

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1897.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.	Per cent.	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
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

Annual shipments from the Schuylkill, Lehigh, and Wyoming regions, etc.—Continued.

Year.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.	Per cent.	Long tons.
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
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
1897...	12,181,061	29.26	6,249,540	15.00	23,207,263	55.74	41,637,864
Total	353,672,751	34.16	181,297,199	17.47	502,370,259	48.42	1,037,340,209

a Includes Loyalsock field.

As noted in the report for 1896, the exceptionally large tonnage of 1895 was far beyond the consumptive demand for that year, and the effects of the excess, so manifest in the market during 1896, continued to exert their influence in a lessened degree throughout 1897.

Note is made in the beginning of this report of the falling off in tonnage for the year 1897 as compared with 1896, and the significance of the reduced production is accentuated when comparison is made with the bituminous-coal production in 1897. With very few exceptions the coal-producing States show an increase over 1896, which in some cases is large. In Pennsylvania this increase amounted to 4,500,391 long tons, while the increase of bituminous-coal production in the United States for the year 1897 over 1896 was 9,062,000 tons, compared with a decrease of 1,709,213 tons in the production of anthracite.

What conclusion is to be drawn from these facts and figures? It has been persistently contended, by those who think they see the ultimate doom of the anthracite industry, that this decrease in production indicates the encroachment of two competitive forces which will ultimately result in the undoing of anthracite. The first of these is the competition of bituminous coal with the small sizes of anthracite for steam purposes. That such competition exists, and that the bituminous often has the better of it, can not be doubted; but that bituminous will completely displace the small sizes of anthracite in the steam-coal market seems improbable, since the latter is used in thousands of places where the former coal would be altogether undesirable. The second of these factors is the growing use of gas as a substitute for coal in domestic uses. Unquestionably the use of gas for cooking and heating purposes in private houses is increasing; but that the domestic market for anthracite coal will be destroyed by it is altogether a different proposition. Those who contend that these factors will permanently narrow the market for anthracite seem to forget that the market for fuel is continually expanding and demanding more and more varied means of supply. It has been the almost universal experience that in a broad field the introduction of new methods and new materials has resulted, not in doing away entirely with the old, but in modifying and sometimes actually increasing their use, and at the same time in providing for the new by opening up new avenues of demand. When gas was introduced the prediction was made that it would altogether supersede oil, but the oil industry continued to grow; when electric light was first introduced it was to do away with gas, but the gas companies were never so prosperous as they are to-day.

So it is with anthracite coal. It has a place in the economy of the world to-day, and while, of course, its market will not grow to the same extent as if it had no competition, one would not be judging the present by past experience if he predicted any great contraction of the anthracite market, but should rather expect a reasonable expansion as the business of the country gradually regains its normal condition. In

fact, it would not be fair to judge of the future market of any commodity by the experience of the last few years, which have been years of universal business depression, but it would be more logical to infer that with the natural expansion and growth of trade under healthful conditions, the anthracite trade will come in for a share at least of the improvement and increase.

The prices received during the year have about equaled those of 1896. There was, however, considerable irregularity in the maintenance of the circular rates throughout the year. During the first six months rates were much better maintained than during the latter half of the year.

To give the reader an idea of the anthracite territory, a tabular arrangement of the fields and a short description is given below, together with the names of the railroads reaching the territory:

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 Railway 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 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	N. Y., O. and W. Rwy	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	Scranton.
25	Sterrick Creek	do	1	do	do	do	Winton	Sterrick Creek Coal Co	Do.
36	Johnson No. 1	do	1	do	do	N. Y., S. and W. R. R.	Dickson	Johnson Coal Co	Do.
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 & Brown	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. Rwy.	do	Mount Jessup Coal Co., Limited.	Winton.
33	Olyphant	do	1	do	do	D. and H. C. Co. R. R.	Olyphant	D. and 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. Rwy	Carbondale	Russell B. Coal Co	Scranton.
	New Elk Creek	do	1	do	do	Erie R. R	do	Franklin Coal Co	Carbondale.
	Nay Aug	do	2	Dunmore Twp	do	L. V. R. R	Dunmore	Nay Aug Coal Co	Scranton.
10	Racket Brook	do	1	Carbondale Twp	do	D. and H. C. Co. R. R	Carbondale	D. and H. Canal Co	Providence.
14	Powderly	do	1	do	do	do	do	do	Do.
3	Clinton	do	1	Fell Twp	do	do	Forest 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. Rwy	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	2	do	Lackawanna	N. Y., O. and W. Rwy	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.

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.
73	Pyne	Scranton	2	Lackawanna Twp	Lackawanna	D., L. and W. R. R	Taylorville	D., L. and W. R. R. Co	Scranton.
	Columbus	do	2	Scranton	do	N. Y., O. and W. Rwy	Scranton	Columbus Colliery Co	Do.
70	Sloan	do	2	Lackawanna Twp	do	D., L. and W. R. R	do	D., L. and W. R. R. Co	Do.
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.
30	Blue Ridge	do	1	do	do	N. Y., O. and W. Rwy	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 S. 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.

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.
42	Spencer	Scranton	2	Dunmore Twp	Lackawanna	L. V. R. R	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.
75	National	do	2	do	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. Rwy	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	Erie R. R	Moosic	Robertson & Co	Moosic.
87	Central No. 13	do	3	do	do	E. and W. V. R. R	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	L. V. R. R.	Laflin	Laflin Coal Co	Laflin.
	Crescent	do	3	do	do	do	Pittston	Crescent Coal Co	Wilkesbarre.
	Miner	do	3	do	do	do	Miners Mills	Wm. B. Miner	Do.
91	Avoca	do	3	Pittston Twp	do	do	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.
	Chapman	do	3	do	do	do	do	do	Do.
	Fernwood	do	3	do	do	N. Y., S. and W. R. R.	do	do	Do.
106	Schooley	do	3	Exeter Twp	do	L. V. R. R.	West Pittston	Pennsylvania Coal Co	Dunmore.
84	Columbia	do	3	Marcy Twp	do	D., L. and W. R. R. and L. V. R. R.	Duryea	Old Forge C. Mng. Co	Pittston.
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	Erie 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.

Directory af 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.
	Louise	Pittston	3	West Pittston	Luzerne	L. V. R. R.	West Pittston	Raub Coal Co	Luzerne.
94	Elmwood	do	3	Pittston Twp	do	do	Avoca	Florence Coal Co., Limited	Dupont.
113	Ridgewood	do	3	Plains Twp	do	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.

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.
131	Red Ash No. 2	Wilkesbarre	4	Wilkesbarre Twp	Luzerne	C. R. R. of New Jersey	Ashley	Red Ash Coal Co	Wilkesbarre.
144	Colliery No. 1	do	4	Hanover Twp	do	P. R. R.	Nanticoke	Susquehanna Coal Co	Do.
145	Colliery No. 2	do	4	do	do	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.
	Wyoming	do	4	Hanover Twp	do	C. R. R. of New Jersey	Sugar Notch	Wyoming Coal Co	Sugar Notch.
117	Bennett	do	3	Plains Twp	do	do	Mill Creek	Thomas Waddell, est. of	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.
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	4	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. Co. 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.

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.
114	Delaware	Wilkesbarre	3	Plains Twp	Luzerne	D. and H. C. Co. R. R.	Mill Creek	D. and H. Canal Co	Providence.
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.
	Reynolds	do	4	do	do	D., L. and W. R. R	do	Reynolds & Moyer Coal Co.	Kingston.
	Chauncey	do	4	do	do	do	do	do	Do.
170	Reynolds No. 16	do	4	do	do	C. R. R. of New Jersey	do	L. and W. Coal Co	Wilkesbarre.
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	Plymouth Coal Co	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	P. R. R.	West Nanticoke	Susquehanna Coal Co	Wilkesbarre.
	Salem	do	4	Shickshinny	do	D., L. and W. R. R	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.

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.
159	Pettebone	Kingston	3	Kingston	Luzerne	D., L. and W. R. R	Plymouth	D., L. and W. R. R. Co	Providence.
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.
152	Harry E	do	3	Kingston Twp	do	do	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	Plymouth Coal Co	Do.
153	Mill Hollow	do	3	do	do	do	Bennett	Thomas Waddell, Est. of	Pittston.
150	Maltby	do	3	do	do	L. V. R. R.	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	P. R. R.	Hazleton	A. S. Van Wickle & Co	Milnesville.
188	Lattimer No. 1	do	5	do	do	L. V. R. R. and D. S. and S. R. R.	do	Calvin Pardee & Co	Lattimer Mines.
189	Lattimer No. 2								
190	Lattimer No. 3								

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.
192	Hollywood	Black Creek	5	Hazle Twp	Luzerne	L. V. R. R.	Hazleton	Calvin Pardee & Co	Lattimer Mines.
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.	Highlands	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.
195	Derringer	do	5	Black Creek Twp	do	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 and Co	Lattimer Mines.
	Ebervale	do	5	do	do	L. V. R. R.	Ebervale	New Ebervale Coal Co	Ebervale.
198	Stockton	do	5	do	do	D., S. and S. R. R.	Stockton	Cross Creek Coal Co	Drifton.
207	Cranberry	do	5	do	do	L. V. R. R.	Hazleton	A. Pardee & Co	Hazleton.

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.
	East Crystal Ridge.	Hazleton	5	Hazle Twp	Luzerne	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.
219	Honeybrook No. 4.	do	6	Klein Twp	Schuylkill	do	Audenried	do	Do.
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	Hazleton.
210	Evans	do	5	do	do	do	do	do	Do.
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.

Directory of anthracite coal mines in Pennsylvania—Continued.

WESTERN MIDDLE COAL FIELD.

Map No.	Name of mine.	Location.						Operator.	
		Local district.	Inspectors' district.	Township, etc.	County.	Railroad.	Nearest shipping station.	Name.	Post-office address.
235	Ellangowan	East Mahanoy	6	Mahanoy Twp.	Schuylkill	P. and R. Rwy	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.
231	Tunnel Ridge	do	6	do	do	do	Mahanoy City	do	Do.
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. Rwy.	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.

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.
276	Mount Carmel	West Mahanoy	7	Mount Carmel Twp.	Northum'l'd	P. and R. Rwy., N. C. R. R., and L. V. R. R.	Mount Carmel	Thomas M. Righter & Co.	Pottsville.
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.
268	North Ashland	do	7	do	do	P. and R. Rwy.	Continental	P. and R. Coal and Iron Co.	Pottsville.
278	Potts	do	7	do	do	do	Locust Dale	do	Do.
	Scotch Valley	Black Creek	7	Beaver	do	P. R. R.	Scotch Valley	Scotch Valley C. Co	Glen City.
267	Bast	West Mahanoy	7	Butler Twp	Schuylkill	P. and R. Rwy	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	6	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.

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.
265	Preston No. 3	West Mananoy	7	Butler Twp.	Schuylkill	P. and R. Rwy	Girardville	P. and R. Coal and Iron Co.	Pottsville.
269	Big Mine Run	do	7	do	do	do	Ashland	Lehigh Valley Coal Co	Wilkesbarre.
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.
258	Packer No. 2	do	6	do	do	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'l'd	P. and R. Rwy.	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.

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.
287	Enterprise	Shamokin	7	Coal Twp	Northum'l'd	P. and R. Rwy	Excelsior	Enterprise Coal Co	Excelsior.
288	Excelsior	do	7	do	do	do	do	Excelsior Coal Co	Do.
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. Rwy	Shamokin	J. Langdon & Co	Elmira, N. Y.
	Natalie	do	7	do	do	P. and R. Rwy	do	Natalie Anthracite Coal Co.	Mount Carmel.
	Royal Oak	do	7	do	Schuylkill	do	do	Royal Oak Coal Co	Shamokin.
275	Midvalley	do	7	Mount Carmel Twp.	Northum'l'd	L. V. R. R.	Mount Carmel	Midvalley Coal Co	Wilburton.
	Girard	do	7	do	do	P. R. R.	do	Girard Coal Co	Mount Carmel.

SOUTHERN COAL FIELD.

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.

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.
	Sharp Mountain	Panther Creek	8	Rahn Twp	Schuylkill	P. and R. Rwy	Tamaqua	Dunkelburger & Co	Tamaqua.
	Marion	E. Schuylkill	8	East Norwegian Twp	do	do	St. Clair	Marion Coal Co	St. Clair.
324	Eagle Hill	do	8	Blythe Twp	do	do	Cumbola	P. and R. Coal and Iron Co.	Pottsville.
316	East Lehigh	do	8	Tamaqua	do	do	Tamaqua	Mitchell & Shepp	Tamaqua.
336	Vulcan	do	8	Newcastle Twp	do	do	St. Clair	Mill Creek Coal Co	New Boston.
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	Tyler & McTurk	Philadelphia.
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.
	St. Clair	E. Schuylkill	8	East Norwegian Twp	do	do	St. Clair	St. Clair Coal Co	St. Clair.
	Little Diamond	W. Schuylkill	8	Cass Twp	do	do	Minersville	Little Diamond Coal Co	Schuylkill Haven.
342	Thomaston	do	8	do	do	do	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	St. Clair.
	Herbine	do	8	Cass Twp	do	do	Minersville	Forestville Coal Co	Forestville.
	Jugular	do	8	Newcastle Twp	do	do	Broad Mountain	Hefner & Whims	Broad Mt.
	Albright	do	8	Cass Twp	do	do	Llewellyn	Albright Coal Co	Pottsville.

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.
	Stoddart	W. Schuylkill	6	Cass Twp	Schuylkill	P. and R. Rwy	Gilberton	Stoddart Coal Co	Gilberton.
	Wolf Creek	do	8	do	do	do	Minersville	do	Do.
	Rolfe	do	8	do	do	do	Llewellyn	Fernwood Coal Co	Minersville.
345	Oak Hill	do	8	do	do	do	Minersville	Leisenring & Co	Do.
	Pine Hill	do	8	do	do	do	do	Pine Hill Coal Co	Pottsville.
352	Blackwood	do	8	do	do	L. V. R. R.	Blackwood	Lehigh Valley Coal Co	Wilkesbarre.
353	Middle Creek	Lykens Valley	8	Frailey Twp	do	P. and R. Rwy	Swatara Switch	P. and R. Coal and Iron Co	Pottsville.
359	West Brookside	do	8	Porter Twp	do	do	Brookside	do	Do.
355	Lincoln	do	8	Tremont Twp	do	do	Lorberry Junc	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.
	Mountain	do	8	Cass Twp	Schuylkill	P. and R. Rwy	Thomaston	Lamb, Davis & Co	Shenandoah.
	Lorberry	do	8	Tremont Twp	do	do	Tremont	Losch, Moore & Co	Tremont.
	Lytle	do	8	Cass Twp	do	do	Minersville	Lytle Coal Co	Minersville.
	East Ridge	do	8	do	do	do	Heckscherville	East Ridge 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 Brothers & Co., No. 143 Liberty street, New York.
Philadelphia and Reading Coal and Iron Company, Reading Terminal, Philadelphia.
Lehigh Valley Coal Company, No. 26 Cortlandt street, New York.
Lehigh Coal and Navigation Company, No. 108 South Fourth 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, Pennsylvania.
New York, Ontario and Western Railway Company, 56 Beaver street, New York.
Delaware, Susquehanna and Schuylkill Railroad Company, 143 Liberty street, New York.

PENNSYLVANIA BITUMINOUS COAL.

Total product in 1897, 54,597,891 short tons; spot value, $37,636,347.

Notwithstanding the miners' strike which partially paralyzed the coal-mining industry in the western counties of Pennsylvania in 1897, the total product for the State shows an increase of 5,040,438 short tons as compared with the output of 1896. The value of the product increased only $2,268,098, and the average price per ton declined from 71 cents to 69 cents. This was a slight decline in itself, but it is the continuation of a steadily declining tendency since 1891, when an average of 87 cents was realized. In six years the price has fallen 18 cents per ton, or nearly 21 per cent. The decline of 2 cents in 1897 means a difference of over $1,000,000 in the operators' receipts.

The miners' strike of 1897 was effective principally in the western counties of Pennsylvania. Allegheny County suffered most severely; 72 mines were affected, and 12,410 men on strike for an average of eighty-five days. The total average working time for this county fell from one hundred and eighty-eight days in 1896 to one hundred and sixty-four days in 1897 and the product declined 640,828 short tons. Washington County lost 177,315 short tons of product; 5,506 men were on strike an average of eighty-two days, and the average working time was curtailed from one hundred and eighty-five days in 1896 to one hundred and fifty-seven days in 1897. The product in Mercer County decreased 143,297 short tons; the average working time fell from two hundred and seventeen days to one hundred and sixty days, and 963 men were on strike sixty days.

The counties which seemed to secure benefit from the strike were Clearfield, whose product increased 667,030 tons; Cambria, 767,131

tons; Fayette, 1,625,491 tons, and Westmoreland, 1,364,736 tons. A large part of the increase in Fayette and Westmoreland counties, however, was due to the increased activity in the iron trade, creating an improved demand for Connellsville coke. The amount of coal made into coke at the mines in Fayette County increased from 5,434,716 tons in 1896 to 6,812,530 tons in 1897, so that not more than 150,000 tons could have gone to supply the demand created by the cutting off of the product of Allegheny County. Similarly about 650,000 tons of the increase in Westmoreland County consisted in the amount of coal made into coke at the mines, leaving an increase of about 700,000 tons in the coal marketed.

The time lost in the counties affected by the strike did not materially influence the total average working time for the State, which amounted to two hundred and five days in 1897 against two hundred and six days in 1896. Altogether there were 188 mines at which strikes occurred; 29,112 men were rendered nonsupporting for an average of seventy-two days, and the total time lost in the State by reason of the strikes was 2,102,336 working days. The statistics of the strikes in 1897 were as follows:

Strikes in Pennsylvania bituminous coal mines in 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Allegheny	72	12,410	85	1,052,386
Armstrong	4	347	53	18,250
Beaver	4	193	83	16,070
Butler	7	394	42	16,914
Cambria	10	1,647	29	47,244
Clarion	2	118	12	1,410
Clinton	1	140	50	770
Clearfield	1	795	21	16,695
Fayette	14	2,313	76	176,184
Huntingdon	6	175	50	8,794
Indiana	1	22	6	132
Jefferson	2	1,021	26	26,294
Lawrence	4	487	75	36,592
Mercer	9	963	60	57,475
Somerset	3	134	34	4,574
Washington	32	5,506	82	450,110
Westmoreland	16	2,447	70	172,442
The State	188	29,112	72	2,102,336

The number of firms using machines for mining and the number of mining machines in use both increased over 50 per cent in 1897, the former from 41 to 64, the latter from 454 to 690. The tonnage won by machines increased from 6,092,644 to 8,925,293, a gain of 2,832,649 tons, or about 46 per cent. The percentage of machine-mined coal to the total product in 1897 was 16.3 against 12.3 in 1896.

PRODUCTION BY COUNTIES.

There are two bituminous coal-producing counties, the product of each of which approached a total of 10,000,000 tons in 1897. These are Westmoreland, with an output of 9,923,812 short tons, and Fayette, with a product of 9,701,691 short tons. The exceptional activity in the iron trade during the year created a large demand for Connellsville coke, and these two counties furnish the supply. Fayette County increased its output 1,625,491 tons, of which increase 1,375,000 was in the amount of coal made into coke at the mines. Westmoreland County increased its output 1,364,736 tons, of which 650,000 went into coke. Allegheny County lost 640,828 tons on account of the strike, but retains third rank. Clearfield and Cambria County both had large gains in 1897, each falling but little short of 5,500,000 tons. Jefferson County, with an increase of 188,982 tons, yielded a total of 4,697,059 tons, while Washington County, another victim of the strike, lost 177,315 tons, the product amounting to 3,862,661 short tons in 1897. No other county had a product of 1,000,000 tons, although three—Elk, Somerset, and Tioga—each came within less than 8 per cent of reaching that figure, and Armstrong County, with a 40 per cent increase, reached 857,637 tons.

It may be noted that three different counties in Pennsylvania have an annual product of bituminous coal exceeding that of any other coal-producing State, except Illinois, West Virginia, and Ohio, and, if Alabama also be excepted, there are six counties which are entitled to that distinction.

In the following tables are shown the details of production by counties in 1896 and 1897, 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 1897 as compared with 1896:

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	72,730	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

Bituminous coal product of Pennsylvania in 1897, 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	6,818,256	322,818	62,756	12,209	7,216,039	$4,848,096	$0.67	164	14,039
Armstrong	13	853,945	666	3,026	.....	857,637	601,561	.70	245	1,340
Beaver	6	92,619	6,340	587	.....	99,546	93,813	.94	191	242
Bedford	11	299,023	94,487	5,056	38,053	436,619	290,269	.66	206	862
Blair	5	409,965	3,305	6,602	73,103	492,975	345,023	.70	242	761
Butler	11	228,969	2,940	1,780	.....	233,689	146,610	.63	162	565
Cambria	69	4,929,522	182,665	42,283	262,480	5,416,950	3,582,044	.66	225	7,997
Center	13	510,791	9,948	361	.....	521,100	315,690	.61	218	734
Clarion	12	246,908	734	197	.....	247,839	164,692	.66	180	606
Clearfield	88	5,140,873	42,376	36,280	259,518	5,479,047	3,430,258	.63	217	8,505
Elk	7	961,629	3,756	4,118	.....	969,503	685,132	.70	249	1,574
Fayette	57	2,576,161	174,503	138,497	6,812,530	9,701,691	5,797,323	.60	224	9,097
Huntingdon	8	290,009	7,593	6,337	.....	303,939	209,381	.69	157	605
Indiana	11	513,565	3,597	310	24,495	541,967	371,448	.69	195	623
Jefferson	15	3,938,364	5,207	31,510	721,978	4,697,059	2,892,309	.62	240	5,321
Lawrence	5	194,386	446	454	.....	195,286	180,925	.93	199	560
Mercer	10	408,613	7,349	19,810	.....	435,772	317,964	.73	160	1,033
Somerset	24	892,161	13,118	2,292	17,036	924,607	572,163	.62	226	1,234
Tioga	9	914,040	17,389	5,283	1,341	938,053	1,118,451	1.19	203	2,069
Washington	40	3,807,605	26,491	28,565	.....	3,862,661	2,127,939	.55	157	6,624
Westmoreland	73	5,900,618	119,612	157,933	3,745,649	9,923,812	8,413,966	.85	220	12,295
Bradford, Clinton	2	198,048	611	262	.....	198,921	215,556	1.08	235	326
Lycoming, McKean, Sullivan	3	293,776	7,098	2,305	.....	303,179	315,734	1.55	226	587
Small mines	.....	.....	600,000	.....	.....	600,000	600,000	.....	.....	.....
Total	575	40,419,846	1,653,049	556,604	11,968,392	54,597,891	37,636,347	.69	205	77,599

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	1886	27,094,501
1874	12,320,000	1887	31,516,856
1875	11,760,000	1888	33,796,727
1876	12,880,000	1889	36,174,089
1877	14,000,000	1890	42,302,173
1878	15,120,000	1891	42,788,490
1879	16,240,000	1892	46,694,576
1880	21,280,000	1893	44,070,724
1881	22,400,000	1894	39,912,463
1882	24,640,000	1895	50,217,228
1883	26,880,000	1896	49,557,453
1884	28,000,000	1897	54,597,891
1885	26,000,000		

The production by counties was not ascertained accurately 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 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.	1894.
Allegheny	4,894,372	5,640,669	6,399,199	6,663,095	6,354,559
Armstrong	380,554	484,000	583,519	561,039	580,030
Beaver	139,117	129,961	140,835	150,095	103,765
Bedford	445,192	389,257	552,461	501,507	313,095
Blair	298,196	237,626	259,224	177,902	256,157
Bradford	126,687	68,697	57,708	42,739	28,027
Butler	167,578	211,647	145,729	156,016	137,593
Cambria	2,790,954	2,932,973	3,086,554	3,282,467	2,978,927
Center	452,114	526,753	496,521	458,056	307,806
Clarion	512,387	479,887	569,333	551,158	401,004
Clearfield	6,651,587	7,143,382	6,876,785	6,148,758	4,148,464
Clinton	159,000	130,802	98,242	94,582	100,000
Elk	1,121,534	973,600	731,575	634,165	399,023
Fayette	6,413,081	5,782,573	7,260,044	6,261,146	6,440,989
Forest	.....	.....	.....	.....	123
Huntingdon	322,630	269,021	333,855	303,547	200,032
Indiana	357,580	456,077	514,463	380,666	398,548
Jefferson	2,850,799	3,160,614	3,706,329	3,885,196	3,248,154
Lawrence	140,528	164,669	216,561	196,736	132,422
Lycoming	.....	.....	20,515	53,192	80,160
McKean	(*a*)	15,345	21,282	19,169	19,844
Mercer	524,319	526,220	420,145	499,651	331,594
Somerset	522,796	480,194	509,610	532,688	418,195
Tioga	903,997	1,010,872	999,784	962,248	704,560
Washington	2,836,667	2,606,158	2,903,235	3,315,146	3,461,428
Westmoreland	8,290,504	7,967,493	8,791,068	7,439,760	7,767,964
Small mines	1,000,000	1,000,000	1,000,000	800,000	600,000
Total	42,302,173	42,788,490	46,694,576	44,070,724	39,912,463
Net increase	6,128,084	486,317	3,906,086	*b*2,623,852	*b*4,158,261

a Included in product of small mines.

b Net decrease.

Bituminous coal product of Pennsylvania since 1886, by counties—Continued.

[Short tons.]

County.	1895.	1896.	1897.	Increase, 1897.	Decrease, 1897.
Allegheny	6,615,974	7,856,867	7,216,039	.....	640,828
Armstrong	642,809	614,932	857,637	242,705	.....
Beaver	184,096	127,290	99,546	.....	27,744
Bedford	417,988	237,414	436,619	199,205	.....
Blair	374,157	360,987	492,975	131,988	.....
Bradford	52,711	53,519	41,588	.....	11,931
Butler	233,104	230,336	233,689	3,353	.....
Cambria	4,289,257	4,649,819	5,416,950	767,131	.....
Center	273,647	251,665	521,100	269,435	.....
Clarion	389,850	371,749	247,839	.....	123,910
Clearfield	5,215,527	4,812,017	5,479,047	667,030	.....
Clinton	95,291	134,569	157,333	22,764	.....
Elk	642,143	807,886	969,503	161,617	.....
Fayette	9,665,369	8,076,200	9,701,691	1,625,491	.....
Forest	.....	.....	.....	.....	.....
Huntingdon	327,770	339,597	303,939	.....	35,658
Indiana	513,075	418,642	541,967	123,325	.....
Jefferson	4,248,329	4,508,077	4,697,059	188,982	.....
Lawrence	269,779	198,666	195,286	.....	3,380
Lycoming	84,050	83,230	91,735	8,505	.....
McKean	38,000	33,133	31,527	.....	1,606
Mercer	535,042	579,069	435,772	.....	143,297
Somerset	524,755	787,050	924,607	137,557	.....
Sullivan	.....	.....	179,917	179,917	.....
Tioga	801,091	825,687	938,053	112,366	.....
Washington	3,577,260	4,039,976	3,862,661	.....	177,315
Westmoreland	9,606,154	8,559,076	9,923,812	1,364,736	.....
Small mines	600,000	600,000	600,000	.....	.....
Total	50,217,228	49,557,453	54,597,891	6,206,107	1,165,669
Net increase	10,304,765	*a* 659,775	5,040,438	5,040,438	.....

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.	1897.
Allegheny	$0.85	$0.93	$1.03	$0.91	$0.82	$0.88	$0.74	$0.70	$0.67
Armstrong	.73	.72	.76	.76	.76	.72	.70	.73	.70
Beaver	1.18	1.05	1.00	1.01	.98	.91	.77	.86	.94
Bedford	.80	.80	.86	.82	.74	.69	.63	.72	.66
Blair	.98	.81	.87	.85	.77	.75	.71	.70	.70
Bradford	1.33	1.28	1.34	1.42	1.30	1.53	1.25	1.30	1.40
Butler	.97	.87	.89	.93	.81	.76	.69	.71	.63
Cambria	.77	.83	.80	.82	.79	.73	.67	.81	.66
Center	.79	.79	.75	.79	.75	.68	.63	.71	.61
Clarion	.72	.75	.75	.75	.72	.70	.65	.63	.66
Clearfield	.84	.85	.84	.81	.80	.72	.67	.66	.63
Clinton	.....	.78	1.15	1.01	.76	.81½	.75	.88	1.00
Elk	.81	.84	.83	.83	.79	.86	1.14	.75	.70
Fayette	.63	.77	.82	.77	.73	.69	.67	.67	.60
Huntingdon	.75	.77	.78	.75	.75	.74	.76	.69	.69
Indiana	.71	.82	.76	.77	.77	.70	.64	.68	.69
Jefferson	.73	.85	.88	.81	.74	.71	.65	.60	.62
Lawrence	1.05	1.02	1.02	1.02	1.03	.92	.78	.84	.93
Lycoming	.....	.....	.....	1.12	1.22	1.23	1.20	1.22	1.20
McKean	.....	.....	1.05	1.10	1.10	.95	.95	1.05	1.04
Mercer	.89	.85	.90	.88	.89	.82	.74	.73	.73
Somerset	.70	.65	.71	.66	.63	.63	.59	.62	.62
Sullivan	.....	.....	.....	.....	.....	.....	.....	.....	.96
Tioga	1.22	1.10	1.14	1.44	1.21	1.36	1.16	1.15	1.19
Washington	.66	.93	.87	.87	.78	.62	.66	.59	.55
Westmoreland	.74	.80	.87	.81	.82	.77	.77	.80	.85
The State	.77	.84	.87	.84	.80	.74	.72	.71	.69

Statistics of labor employed and working time at Pennsylvania 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.
Allegheny	9,036	198	11,194	199	11,223	225	14,328	161
Armstrong	661	251	805	230	964	216	1,080	214
Beaver	205	251	228	201½	323	210	318	215
Bedford	662	288	605	230	975	265	806	185
Blair	595	284	503	249	848	203	632	166
Bradford	292	196	169	228	122	206	83	167
Butler	314	237	342	240	358	169	276	208
Cambria	4,140	361	4,284	258	4,913	228	6,073	199
Center	623	230	823	200	767	181	743	193
Clarion	938	237	895	221	985	235	1,224	231
Clearfield	9,324	336	10,067	227	10,225	212	10,455	186
Clinton	200	265	181	291	175	175	175	163
Elk	1,181	255	1,622	229	1,265	230	1,244	195
Fayette	6,503	247	7,545	216½	7,952	239	6,780	195
Huntingdon	611	237	595	246	560	244	487	182
Indiana	668	245	561	227	656	191	605	186
Jefferson	3,971	245	4,172	237	4,567	232	5,537	210
Lawrence	307	232	327	236	368	250	430	218
Lycoming	.....	.....	.....	.....	60	252	117	279
McKean	.....	.....	42	230	28	304	19	285
Mercer	1,023	231	972	241	876	181	981	187
Somerset	646	225	531	266	577	238	695	214
Tioga	2,019	192	1,980	241	2,249	223	2,425	214
Washington	4,644	227	4,135	222	4,895	202	6,058	184
Westmoreland	12,080	228	11,083	221	10,724	234	10,270	205
The State	61,333	232	63,661	223	66,655	223	71,931	190

Statistics of labor employed and working time at Pennsylvania coal mines—Continued.

County.	1894.		1895.		1896.		1897.	
	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	14,107	154	13,094	176	13,733	188	14,039	164
Armstrong	1,153	168	1,128	233	1,116	185	1,340	245
Beaver	312	148	325	227	288	157	242	191
Bedford	855	144	658	200	709	135	862	206
Blair	730	142	650	248	644	257	761	242
Bradford	90	134	109	299	115	259	126	209
Butler	497	111	511	166	477	200	565	162
Cambria	6,230	165	6,270	222	7,345	213	7,997	225
Center	855	111	579	161	476	201	734	218
Clarion	926	201	665	230	718	202	606	180
Clearfield	9,654	134	8,604	190	8,681	190	8,505	217
Clinton	190	153	175	140	180	222	200	251
Elk	1,107	147	1,024	247	1,441	229	1,574	249
Fayette	8,847	198	7,745	256	8,481	221	9,097	224
Huntingdon	478	133	606	230	678	197	605	157
Indiana	724	164	672	181	836	173	623	195
Jefferson	5,184	164	5,637	201	4,859	230	5,321	240
Lawrence	490	165	568	233	409	208	560	199
Lycoming	166	231	165	277	168	236	190	244
McKean	50	200	75	225	70	250	70	258
Mercer	1,014	121	1,173	190	1,158	217	1,033	160
Somerset	731	150	682	248	908	222	1,234	226
Sullivan	.....	.....	.....	.....	.....	.....	327	209
Tioga	2,213	149	2,128	173	1,910	203	2,069	203
Washington	6,889	159	6,432	175	6,506	185	6,624	157
Westmoreland	11,517	202	11,455	203	10,719	224	12,295	220
The State	75,010	165	71,130	206	72,625	206	77,599	205

TENNESSEE.

Total product in 1897, 2,888,849 short tons; spot value, $2,329,534.

Coal production in Tennessee has shown an increase each year since 1893, the output in 1897 being 225,743 short tons, or 8 per cent more than in 1896 and a little over 50 per cent more than in 1893. The tendency toward lower prices which has been noted in connection with the statistics of other States is also observed in Tennessee, the selling price having fallen steadily from $1.13 in 1892 to 81 cents in 1897, 5 cents lower than that of 1896. In order to defend themselves against this condition two companies introduced eight mining machines during

the year by which 47,207 tons were extracted. Another company put in three machines in December, and a new mine starting the first of 1898 will be equipped with machines.

Although the general strike did not extend to Tennessee, the State had labor troubles of its own to contend with, as the following list will show.

Strikes in Tennessee coal mines during 1897.

County and mine.	Number of men on strike.	Number of days idle.	Period.
ANDERSON COUNTY.			
Cross Mountain Mine	150	45	Nov. 15 to Dec. 31.
CAMPBELL COUNTY.			
Jellico B. G. Mine	70	156	May 1 to Nov. 1.
Indian Mountain Mine	80	130	May 1 to Oct. 1
Price Mountain Mine	25	30	June 1 to July 1.
Standard Mine	132	156	May 1 to Nov. 1.
Falls Branch Mine	120	156	Do.
Wooldridge Mine	200	156	Do.
New Pioneer Mine	100	30	Jan. 1 to Feb. 1.
CLAIBORNE COUNTY.			
Mingo Mine	247	25	Sept. 18 to Oct. 13.
Bryson Mountain Mine	40	22	Sept. 20 to Oct. 12.
Fork Ridge Mine	100	30	Sept. 12 to Oct. 12.
GRUNDY COUNTY.			
Tracy City Mine	579	26	Jan. 1 to Feb. 1.
PUTNAM COUNTY.			
Monterey Mine	30	20	Aug. 20 to Sept. 10.
RHEA COUNTY.			
Richland Mine	250	8	Dec. 20 to 28.
SCOTT COUNTY.			
Paint Rock Mine	155	170	May 1 to Nov. 15.
Paving Brick Mine	60	60	Apr. 1 to June 1.
		100	Aug. 3 to Dec. 1.

The details of production during 1896 and 1897 are shown in the following tables:

Coal product of Tennesse 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

Coal product of Tennessee in 1897, 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	7	551,065	2,597	4,034	.....	557,696	$453,112	$0.80	245	1,177
Campbell	11	303,010	10,369	3,115	12,000	328,494	306,481	.93	142	1,108
Claiborne	4	229,189	1,200	.....	40,538	270,927	199,559	.74	219	544
Hamilton	2	139,967	1,381	1,630	68,981	211,959	167,243	.79	253	477
Marion	3	201,775	2,363	977	107,126	312,241	281,300	.90	252	543
Morgan	6	288,119	1,275	500	11,800	301,694	210,095	.70	279	532
Rhea	3	9,149	.....	9,747	120,176	139,072	97,349	.70	266	325
Scott	4	66,385	8,834	1,800	11,293	88,312	80,311	.91	121	425
Grundy, Putnam	3	194,398	988	4,323	129,031	328,740	226,994	.69	229	611
Roane, White	2	167,122	4,113	13,149	160,830	345,214	302,590	.88	256	595
Small mines	.....	.....	4,500	.....	.....	4,500	4,500	.....	.....	.....
Total	45	2,150,179	37,620	39,275	661,775	2,888,849	2,329,534	.81	221	6,337

In the following table is shown the total production, by counties, since 1889, with the increase and decrease in each county during 1897, 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.	1897.	Increase, 1897.	Decrease, 1897.
Anderson	544,222	431,368	456,510	557,696	101,186	.....
Campbell	183,288	340,395	384,337	328,494	.....	55,843
Claiborne	167,153	179,663	203,926	270,927	67,001	.....
Cumberland	.....	.....	120	(*d*)	.....	120
Franklin	3,000	.....	.....	.....	.....	.....
Grundy	365,989	446,386	330,648	317,924	.....	12,724
Hamilton	156,301	174,306	163,810	211,959	48,149	.....
Marion	184,597	368,963	294,895	312,241	17,346	.....
Morgan	64,601	61,515	217,948	301,694	83,746	.....
Putnam	659	8,075	10,900	10,816	.....	84
Rhea	124,115	109,817	91,615	139,072	47,457	.....
Roane	118,887	129,744	169,255	173,383	4,128	.....
Scott	149,413	140,856	188,476	88,312	.....	100,164
White	114,154	140,056	146,166	171,831	25,665	.....
Other counties and small mines	4,500	4,500	4,500	4,500	.....	.....
Total	2,180,879	2,535,644	2,663,106	2,888,849	394,678	168,935
Net increase	278,621	354,765	127,462	225,743	225,743	.....

a Developing.
b Included in Roane County.
c Includes Franklin and White counties.
d Included in other counties.

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 eight 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.	1897.
Anderson	$1.16	$1.17	$1.15	$1.11	$1.02	$0.97	$0.91	$0.80	$0.80
Campbell	1.15	1.22	1.27	1.19	1.25	1.05	1.03	.98	.93
Claiborne	.....	.....	1.19	1.04	.90	.94	.82	.79	.74
Grundy	.99	.94	.89	1.11	1.04	.80	.90	.95	.68
Hamilton	1.30	1.15	1.12	1.11	1.02	.90	.84	.85	.79
Marion	1.13	1.06	1.11	1.08	.98	1.14	1.02	.89	.90
Morgan	1.34	1.10	1.09	1.36	1.07	.98	.86	.62	.70
Putnam	.....	.....	.....	.....	.....	.....	.....	.92	1.22
Rhea	1.10	1.00	1.00	1.00	.89	1.01	.70	.65	.70
Roane	.....	.....	1.15	1.05	1.46	1.00	.80	.75	.73
Scott	1.34	1.29	1.25	1.24	1.40	1.09	1.09	.96	.91
White	.....	.....	1.31	1.25	1.03	1.03	.95	1.03	1.02
The State..	1.21	1.10	1.10½	1.13	1.08	.97	.93	.86	.81

Statistics of labor employed and working time at Tennessee 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.
Anderson	1,325	291	1,350	242	1,072	218	665	247
Campbell	251	212	451	145	732	213	936	175
Claiborne	.....	.....	165	172	276	207	280	142
Grundy	880	310	515	311	800	309	548	247
Hamilton	500	285	475	213	365	192	670	260
Marion	523	226	615	220	375	286	480	262
Morgan	363	258	363	250	156	148	272	224
Rhea	450	200	350	250	175	307	245	295
Roane	.....	.....	210	277	207	282	160	203
Scott	475	241	347	182	448	243	414	222
White	.....	.....	246	228	300	232	300	307
The State..	5,082	263	5,097	230	4,926	240	4,976	232

Statistics of labor employed and working time at Tennessee coal mines—Continued.

County.	1894.		1895.		1896.		1897.	
	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	1,217	256	1,118	248	1,015	230	1,177	245
Campbell	698	140	1,128	174	1,718	164	1,108	142
Claiborne	277	169	284	179	368	220	544	219
Grundy	904	238	424	312	475	272	579	232
Hamilton	441	218	335	220	517	183	477	253
Marion	522	183	581	249	628	223	543	252
Morgan	373	145	209	134	509	265	532	279
Putnam	.....	.....	.....	.....	20	250	30	188
Rhea	209	253	165	240	270	186	325	266
Roane	210	307	200	225	200	286	220	286
Scott	366	194	331	193	453	178	425	121
White	300	196	325	283	357	250	375	238
The State	5,542	210	5,120	224	6,531	211	6,337	221

The annual output of the State since 1873 has been as follows:

Coal product of Tennessee from 1873 to 1897.

Year.	Short tons.	Year.	Short tons.
1873	350,000	1886	1,714,290
1874	350,000	1887	1,900,000
1875	360,000	1888	1,967,297
1876	550,000	1889	1,925,689
1877	450,000	1890	2,169,585
1878	375,000	1891	2,413,678
1879	450,000	1892	2,092,064
1880	641,042	1893	1,902,258
1881	750,000	1894	2,180,879
1882	850,000	1895	2,535,644
1883	1,000,000	1896	2,663,106
1884	1,200,000	1897	2,888,849
1885	1,440,957		

TEXAS.

Total product in 1897, 639,341 short tons; spot value, $972,323.

Coal production in Texas has exhibited a regular increase each year since 1891. The output in 1897 was 95,326 short tons, or 17.5 per cent, larger than that of 1896; 154,382 short tons, or 32 per cent, more than that of 1895; three and three-fourths times the product in 1891, and more than five times the output of 1889. Much of the increase in the

last few years has been due to the development of the lignite fields in Medina, Milam, and Robertson counties. Work at Rockdale, Milam County, and at Calvert, in Robertson County, has been particularly active, the aggregate product of these two counties being over 160,000 tons in 1897. Lignite mines were opened in Burleson County during 1897, the initial product amounting to 5,100 tons. A small amount of lignite was produced in Shelby County, and the total lignite production in the State amounted to one-third the entire output. Bituminous coal is produced in Erath, Montague, Palo Pinto, Parker, Webb, and Wise counties, the total bituminous product in 1897 amounting to 422,727 short tons, as compared with 376,076 short tons in 1896, showing an increase in 1897 over the preceding year of 46,651 short tons. The increase in the production of lignite was 68,235 short tons.

There was only one mine at which any labor disturbance occurred in 1897. Ten men at the mines of the Aransas Pass Lignite Company, Milam County, were on a strike for four days. The striking miners were then discharged, and no further trouble occurred. Texas, notwithstanding the State's comparatively remote situation, has not escaped the effects of the tendency to lower prices. Since 1894, when the average price was $2.32 per ton, there has been a decline of 80 cents to $1.52 per ton in 1897, a loss of 34 per cent. Much of this decrease has been due not only to the increased production of lignite but also to a war of competition among the lignite producers, which has resulted in bringing prices much below what conservative operators would consider legitimate figures.

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 employes	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.	1897.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Loaded at mines for shipment	300,064	417,281	475,157	522,177	621,635
Sold to local trade and used by employees	462	2,412	7,705	12,846	8,357
Used at mines for steam and heat	1,680	1,155	2,097	8,992	9,349
Total	302,206	420,848	484,959	544,015	639,341
Total value	$688,407	$976,458	$913,138	$896,251	$972,323

The statistics of the production in 1896 and 1897 in somewhat greater detail are shown in the following tables:

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.
Bituminous:		*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
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

Coal product of Texas in 1897, 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.
Bituminous:		*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
Erath, Montague, Palo Pinto, Parker, Wise	5	339,999	847	2,034	342,880	$658,824	$1.92	201	1,053
Webb	2	79,847	.....	.....	79,847	134,014	1.68	300	325
Lignite:									
Burleson, Medina, Milam, Robertson, Shelby	9	201,789	7,510	7,315	216,614	179,485	.85	204	388
Total	16	621,635	8,357	9,349	639,341	972,323	1.52	220	1,766

UTAH.

Total product in 1897, 521,560 short tons; spot value, $618,230.

Utah's product of coal in 1897 was 102,933 short tons, or nearly 25 per cent larger than that of 1896, passing the half million ton mark for

the first time. The value increased in almost equal proportion to the tonnage, showing an actual gain of $117,683, and a percentage gain of 23.5. The average price per ton realized in 1897 was $1.19, against $1.20 in 1896. Prior to 1897 there had been a decided falling off in price each year since 1891. In that year $1.80 was obtained; in 1892 it dropped to $1.56; in 1893 it was $1.48; in 1894, $1.40; in 1895, $1.31, and in 1896, $1.20, a decline in five years of 33⅓ per cent.

The details of production in 1896 and 1897 are shown in the following tables:

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
Uinta Utah	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

Coal product of Utah in 1897, 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	396,523	2,033	5,400	64,925	468,881	$549,109	$1.17	211	588
Summit	4	28,247	17,594	3,795	.....	49,636	63,114	1.27	171	104
Iron Sanpete Uinta	3	.....	3,040	3	.....	3,043	6,007	1.97	144	12
Total	11	424,770	22,667	9,198	64,925	521,560	618,230	1.19	204	704

For comparison with previous years, the following table showing the distribution and value of the production since 1891, together with the statistics of labor employed and average working time is given:

Distribution of the coal product of Utah since 1891.

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 active.	Average number of employees.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*				
1891	315,711	8,233	21,650	25,451	371,045	$666,646	$1.80	.....	621
1892	321,431	6,775	6,509	26,298	361,013	562,625	1.56	230	646
1893	350,423	7,649	4,258	50,875	413,205	611,092	1.48	226	576
1894	364,675	11,173	6,892	48,810	431,550	603.479	1.40	199	671
1895	376,479	25,097	7,253	63,027	471,836	617.349	1.31	203	670
1896	340,338	9,171	7,411	61,707	418,627	500,547	1.20	202	679
1897	424,770	22,667	9,198	64,925	521,560	618,230	1.19	204	704

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	1892	361,013
1886	200,000	1893	413,205
1887	180,021	1894	431,550
1888	258,961	1895	471,836
1889	236,651	1896	418,627
1890	318,159	1897	521,560
1891	371,045		

VIRGINIA.

Total product in 1897, 1,528,302 short tons; spot value, $1,021,918.

Virginia profited by the miners' strikes in other States to the extent of increasing her coal production 273,579 short tons, or 22 per cent, over the product in 1896, and reaching the largest total in her history. All of the increased production was in the Clinch Valley field, in Wise County. The output in Tazewell County fell off 10 per cent, while that from the Richmond basin was about the same as in 1896. The product in Montgomery County, which is not large at any time, decreased about 45 per cent, while the output of Pulaski County was practically unchanged.

The only strikes which occurred in Virginia were two at the Toms Creek Coal Company's mines, in Wise County. The two strikes were each of fifteen days' duration, one from April 1 to April 15, the other from July 10 to July 25, 300 men being involved in each case.

The following tables exhibit the details of production in 1896 and 1897:

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

Coal product of Virginia in 1897, 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.*				
Chesterfield, Henrico, Montgomery, and Pulaski....	11	74,012	4,101	28,469	1,400	107,953	$136,503	$1.26	123	866
Tazewell	2	524,028	5,652	7,840	170,818	708,338	415,778	.59	289	660
Wise	8	371,933	19,264	6,778	314,007	712,011	469,637	.66	249	818
Total ..	21	969,973	29,017	43,087	486,225	1,528,302	1,021,918	.67	213	2,344

The total production of coal in Virginia since 1880 has been as follows:

Coal product of Virginia since 1880.

Year.	Short tons.	Value.	Average price per ton.	Average number of days active.	Average number of employees.
1880	112,000				
1881	112,000				
1882	112,000				
1883	252,000				
1884	336,000				
1885	567,000				
1886	684,951				
1887	825,263				
1888	1,073,000				
1889	865,786				
1890	784,011				
1891	736,399	$611,654	$0.83	246	820
1892	675,205	578,429	.86	192	836
1893	820,339	692,748	.84	253	961
1894	1,229,083	933,576	.76	234	1,635
1895	1,368,324	869,873	.63	225	2,158
1896	1,254,723	848,851	.68	198	2,510
1897	1,528,302	1,021,918	.67	213	2,344

WASHINGTON.

Total product in 1897, 1,434,112 short tons; spot value, $2,777,687.

The amount of coal produced in the State of Washington during 1897 exceeded that of any previous year, although there were three years—1888, 1890, and 1893—when the value of the product was greater than that of 1897. Compared with 1896, the product for 1897 shows an increase of 238,608 short tons, or 20 per cent in quantity, and of $381,609, or 16 per cent in value.

Washington coal mines were comparatively free from strikes in 1897, the only strike reported being at the Issaquah mines of the Seattle Coal and Iron Company, in King County, where 200 men were out for twenty-four days, from August 7 to August 31.

An interesting report on the coal fields of Puget Sound, by Mr. Bailey Willis, is contained in Part III of the Eighteeth Annual Report of the Survey.

The details of production in 1896 and 1897 are shown in the following tables.

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

Coal product of Washington in 1897, 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	3	612	442	194	.....	1,248	$4,102	$3.29	74	25
King	11	552,461	3,759	27,246	22	583,488	1,180.572	2.02	230	1,261
Kittitas	4	369,151	1,078	428	.....	370,657	650,318	1.75	217	609
Pierce	3	420,132	1,825	10,813	25,624	458,394	892,155	1.95	261	769
Skagit, Whatcom	2	5,559	45	1,221	13,500	20,325	50,540	2.49	300	75
Total	23	1,347,915	7,149	39,902	39,146	1,434,112	2,777,687	1.94	236	2,739

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
1897	1,434,112	2,777,687	1.94	2,739	236

The total output of the State since 1887, by counties, with the increases and decreases in 1897, as compared with 1896, 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.	1897.	Increase, 1897.	Decrease, 1897.
Cowlitz	.....	.....	.....	1,263	1,248	.....	15
King	577,731	422,676	435,971	481,710	583,488	101,778	.....
Kittitas	253,467	232,580	281,534	265,953	370,657	104,704	.....
Okanogan	.....	50	.....	.....	.....	.....	.....
Pierce	408,074	406,831	437,029	419,568	458,394	38,826	.....
Skagit	2,905	7,537	20,326	18,548	13,825	.....	4,723
Thurston	.....	26,880	16,550	.....	6,500	.....	1,962
Whatcom	22,700	9,916		8,462			
Total	1,264,877	1,106,470	1,191,410	1,195,504	1,434,112	*a* 238,608	.....

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.	1897.
King	$2.55	$2.61	$2.35	$2.42	$2.22	$2.62	$2.47	$2.13	$2.02
Kittitas	2.64	2.76	2.22	2.11	2.71	2.11	1.72	1.88	1.75
Pierce	2.12	2.86	2.34	2.26	2.25	2.15	2.13	1.85	1.95
Skagit	.....	.....	.....	.....	.....	.....	2.33	3.71	2.50
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	1.94

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.		1897.	
	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	919	244	1,045	218	1,101	208	1,261	230
Kittitas	809	125	877	182	662	198	609	217
Pierce	818	237	773	268	740	252	769	261
Skagit	.....	.....	73	301	75	312	50	300
Thurston	38	245	72	280	.....	.....	.....	.....
Whatcom	43	328						
The State	2,662	207	2,840	224	2,622	221	2,739	236

WEST VIRGINIA.

Total product in 1897, 14,248,159 short tons; spot value, $8,987,393.

With an increase of 1,371,863 short tons in the production of coal in 1897 as compared with 1896, West Virginia attains a total output more than 2,000,000 tons larger than her rival State, Ohio, and acquires indisputable title to third place in the rank of coal-producing States. In Mineral Resources for 1894 the prediction was hazarded that West Virginia would supplant Ohio in the list of coal producers before the close of the Century. It has been accomplished in half the time stated in the prediction.

There has been but one break in an otherwise steadily increasing production during nineteen years of West Virginia's history. In 1877 the product of the State was only 1,120,000 short tons, less than 8 per cent of the product in 1897. In 1887 the product had quadrupled, reaching 4,881,620 short tons, a little more than one-third of the output ten years later. It is not to be supposed that the production will increase in the same proportion during the next decade, but it is possible, if not probable, that by the time the next century is ten years old, West Virginia will be the second coal-producing State in the country.

While the miners' strike of 1897 was on the whole beneficial in its effect upon the coal-mining industry of West Virginia, its influence was adversely felt in at least one county. Taking the labor statistics for the entire State during the year, it is seen that the average working time increased from two hundred and one days in 1896 to two hundred and five days in 1897, and that the number of employees increased 1,426, many miners from Ohio and Pennsylvania crossing into West Virginia to seek employment. The most effective work of the strikers was accomplished in the New and Kanawha rivers region. In Kanawha County 19 mines were affected, and 1,820 men out of 2,612 were idle on account of the strike, an average of seventy days. The total amount of working time lost was 127,172 days, and the product of the county decreased 196,722 short tons, about 1½ tons for each day lost. In Fayette County 1,931 men, employed at 20 mines, were on strike, an average of fifty-seven days, entailing a total loss of 110,715 days of working time, but in this county the effects of the strike on the production were not manifest. The output increased 467,968 short tons, or over 13 per cent, and the average working time increased from one hundred and eighty-five to one hundred and ninety days. Only 40 per cent of the Fayette County mines, and less than one-third of the miners were affected by the strike, whereas in Kanawha County about two-thirds of both were affected. Moreover, the mines of Fayette County, where the men did not strike, increased their production to such an extent that they not only made up for the loss at the striking mines in the same county, but shipped nearly 500,000 tons more than in 1896 to

markets made by the cutting off of the supply from Pennsylvania and Ohio.

The Pocahontas region was practically exempt from strikes, 291 men in McDowell County and 250 men in Mercer County being on strike for an average of only eight and twelve days, respectively.

Altogether 70 mines out of 198 in the State were shut down at some time during the year by strikes. The total number of men involved was 6,136, who were idle for an average of fifty-three and one-half days, and caused a total loss in working time of 328,000 days, distributed among the following counties:

Strikes in West Virginia coal mines during 1897.

County.	Number of mines where strikes occurred.	Number of men on strike.	Average number of days idle.	Total number of working days lost.
Barbour	1	65	25	1,625
Brooke	1	15	26	390
Fayette	20	1,931	57	110,715
Harrison	4	233	47	11,034
Kanawha	19	1,820	70	127,172
Marion	3	665	55	36,615
Marshall	3	265	35	9,280
Mason	2	65	25	1,650
McDowell	6	291	8	2,317
Mercer	2	250	12	3,075
Mingo	2	135	23	3,160
Ohio	3	118	82	9,663
Preston	2	90	25	2,280
Raleigh	1	118	18	2,124
Taylor	1	75	92	6,900
The State	70	6,136	53½	328,000

But a small proportion, comparatively, of West Virginia's coal product is won by machines, though their use is on the increase. In 1891 2.23 per cent of the total output was machine mined; in 1896 the percentage was 3.35, and in 1897 4.73 per cent, or a total of 673,523 short tons was won by machines.

The following tables exhibit the details of production in the last two years:

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

Coal product of West Virginia in 1897, 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	55,494	560	.....	.....	56,054	$31,528	$0.56	253	83
Brooke	3	35,486	13,917	50	.....	49,453	37,225	.75	218	76
Fayette	52	3,355,840	67,761	10,976	566,963	4,001,540	2,699,056	.67	190	6,293
Harrison	13	304,521	16,847	9,358	4,091	334,817	202,777	.61	188	637
Kanawha	27	814,614	54,000	6,457	45,090	920,161	655,882	.71	170	2,612
Marion	13	1,472,510	10,506	11,094	245,736	1,739,846	970,093	.56	258	2,206
Marshall	4	132,530	13,452	1,550	.....	147,532	106,959	.72	218	272
Mason	4	54,892	64,117	1,936	.....	120,945	98,581	.82	254	214
McDowell	30	2,240,348	21,595	9,308	964,093	3,235,344	1,812,907	.56	199	3,844
Mercer	8	709,287	5,694	3,337	197,373	915,691	531,726	.58	211	969
Mineral	4	574,537	5,743	240	.....	580,520	396,688	.68	289	436
Mingo	10	366,616	1,904	.....	.....	368,520	232,046	.63	220	646
Ohio	7	74,105	37,155	649	.....	111,909	72,190	.65	161	229
Preston	4	121,067	1,141	657	46,745	169,610	101,546	.60	264	213
Putnam	3	110,813	158	.....	.....	110,971	94,370	.85	126	413
Raleigh, Taylor	5	337,224	1,456	560	25,165	364,405	209,914	.58	178	390
Tucker	6	516,449	5,677	2,438	319,942	844,506	574,816	.68	284	1,070
Grant, Monongalia	3	36,075	112	84	15,064	51,335	34,089	.66	204	81
Small mines	.....	.....	125,000	.....	.....	125,000	125,000	.....	.....	.....
Total	198	11,312,408	446,795	58,694	2,430,262	14,248,159	8,987,393	.63	205	20,504

In the following table will be found the total product of the State, by counties, since 1886, with the increases and decreases in 1897, as compared with 1896:

Coal product of West Virginia from 1886 to 1897, 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	1,062,324	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 1897, 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.	1897.	Increase, 1897.	Decrease, 1897.
Barbour	13,306	24,064	56,054	31,990	.....
Brooke	74,841	43,424	49,453	6,029	.....
Fayette	3,264,825	3,533,572	4,001,540	467,968	.....
Grant	392	8,720	28	.....	8,692
Harrison	292,693	231,687	334,817	103,130	.....
Kanawha	1,134,798	1,116,883	920,161	.....	196,722
Logan	24,648	.....	.....	.....	.....
McDowell	2,395,365	2,883,686	3,235,344	351,658	.....
Marion	1,257,563	1,511,903	1,739,846	227,943	.....
Marshall	194,077	181,610	147,532	.....	34,078
Mason	120,766	100,136	120,945	20,809	.....
Mercer	687,364	939,082	915,691	.....	23,391
Mineral	675,610	556,586	580,520	23,934	.....
Mingo	26,370	211,593	368,520	156,927	.....
Monongalia	67,510	43,297	51,307	8,010	.....
Ohio	169,834	133,525	111,909	.....	21,616
Preston	107,053	139,759	169,610	29,851	.....
Putnam	120,482	185,953	110,971	.....	74,982
Raleigh	88,188	92,136	83,178	.....	8,958
Randolph	200	.....	.....	.....	.....
Taylor	93,252	123,354	281,227	157,873	.....
Tucker	449,991	688,426	844,506	156,080	.....
Wayne	3,833	1,900	.....	.....	1,900
Other counties and small mines	125,000	125,000	125,000	.....	.....
Total	11,387,961	12,876,296	14,248,159	a1,371,863	.....

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	1886	4,005,796
1874	1,120,000	1887	4,881,620
1875	1,120,000	1888	5,498,800
1876	896,000	1889	6,231,880
1877	1,120,000	1890	7,394,654
1878	1,120,000	1891	9,220,665
1879	1,400,000	1892	9,738,755
1880	1,568,000	1893	10,708,578
1881	1,680,000	1894	11,627,757
1882	2,240,000	1895	11,387,961
1883	2,335,833	1896	12,876,296
1884	3,360,000	1897	14,248,159
1885	3,369,062		

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 per year. 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 and 1897 makes the total increase in seventeen years 12,680,159 short tons—a yearly average increase of 745,892 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		
1883 over 1882	95,833	Total increase in fourteen years.	10,059,757
1884 over 1883	1,024,167	Decrease in 1895	239,796
1885 over 1884	9,062		
1886 over 1885	636,734	Total increase in fifteen years	9,819,961
1887 over 1886	875,824	1896 over 1895	1,488,335
1888 over 1887	617,180	1897 over 1896	1,371,863
1889 over 1888	733,080		
1890 over 1889	1,162,774	Total increase in seventeen years.	12,680,159
1891 over 1890	1,826,011		
1892 over 1891	518,090	Average annual increase	745,892
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.	1897.
Barbour	.....	.....	.....	.....	.....	.....	$0.80	$0.67	$0.56
Brooke	$0.73	$0.78	$0.83	$0.94	$0.88	$0.77	.72	.73	.75
Fayette	.90	.90	.85	.84	.80	.72	.72	.68	.67
Harrison	.66	.70	.72	.77	.67	.71	.67	.58	.61
Kanawha	.96	.96	.97	.92	.86	.87	.79	.71	.71
Logan	.....	.....	.....	.....	.....	.65	.60	.....	.....
Marion	.71	.69	.70	.74	.70	.86	.64	.57	.56
Marshall	.75	.82	.80	.79	.78	.73	.67	.67	.72
Mason	.91	.93	.90	.96	.93	.86	.85	.83	.82
McDowell	.68	.71	.68	.73	.70	.67	.55	.60	.56
Mercer	.65	.75	.74	.76	.69	.71	.56	.59	.58
Mineral	.80	.88	.84	.77	.82	.77	.63	.68	.68
Mingo	.....	.....	.....	.....	.....	.....	.....	.65	.63
Monongalia	.72	.64	.65	.72	.72	.87	.77	.45	.65
Ohio	.89	.97	.78	.99	.82	.84	.76	.70	.65
Preston	.66	.72	.64	.67	.69	.68	.65	.60	.60
Putnam	1.12	.97	1.19	1.11	1.01	1.12	.95	1.04	.85
Raleigh	.....	.....	.....	.89	1.00	.79	.79	.78	.79
Randolph	.....	.....	.....	.....	1.00	.90	.....	.....	.....
Taylor	.64	.76	.61	.61	.58	.62	.55	.51	.58
Tucker	.70	.76	.65	.70	.71	.62	.68	.66	.68
Wayne	.....	.....	.....	.....	.....	.76	.....	.....	.....
The State	.82	.84	.80	.80	.77	.75	.68	.65	.63

Statistics of labor employed and working time at West Virginia 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.
Barbour	.....	.....	.....	.....	.....	.....	.....	.....
Brooke	50	202	59	274	51	226	79	260
Fayette	2,824	225	3,823	245	4,102	252	4,487	224
Harrison	305	194	285	214	473	148	298	211
Kanawha	2,756	230	2,802	217	2,677	217	2,306	276
Marion	865	218	1,408	279	1,114	275	1,536	203
Marshall	175	265	190	257	210	199	245	194
Mason	480	229	311	236	338	215	376	194
McDowell	1,315	183	1,536	227	2,061	195	3,375	185
Mercer	1,465	217	1,510	244	1,621	211	1,281	209
Mineral	620	279	624	259½	500	244	666	229
Monongalia	55	260	50	260	72	308	60	225
Ohio	153	268	131	276	222	243	135	221
Preston	337	282	304	221	170	209	200	140
Putnam	375	194	526	143	483	180	520	204
Raleigh	.....	.....	.....	.....	120	167	145	165
Randolph	.....	.....	.....	.....	.....	.....	8	100
Taylor	108	256	118	287	128	282	105	260
Tucker	353	309	550	306	525	306	675	267
The State	12,236	227	14,227	237	14,867	228	16,524	219

County.	1894.		1895.		1896.		1897.	
	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	83	253
Brooke	100	205	126	212	105	151	76	218
Fayette	4,594	164	5,537	201	5,947	185	6,293	190
Harrison	439	178	513	212	467	201	637	188
Kanawha	2,706	155	2,738	161	2,314	175	2,612	170
Logan	150	70	65	160	.....	.....	.....	.....
Marion	1,479	274	1,812	238	1,899	248	2,026	258
Marshall	220	177	336	232	254	224	272	218
Mason	391	177	367	167	249	228	214	254
McDowell	3,891	207	3,955	199	3,557	221	3,844	199
Mercer	1,274	211	1,148	169	1,110	202	969	211
Mineral	564	189	656	229	644	188	436	289

Statistics of labor employed and working time at West Virginia coal mines—Continued.

County.	1894.		1895.		1896.		1897.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.
Mingo	.....	.....	.....	.....	350	199	646	220
Monongalia	164	181	135	200	74	128	80	207
Ohio	249	166	221	227	204	180	229	161
Preston	105	152	208	225	180	266	213	264
Putnam	530	158	438	112	384	201	413	126
Raleigh	142	146	133	166	137	186	118	184
Randolph	120	93	.....	.....	.....	.....	.....	.....
Taylor	158	204	180	159	310	83	272	176
Tucker	390	179	488	188	812	234	1,070	284
Wayne	35	210	.....	.....	.....	.....	.....	.....
The State	17,824	186	19,159	195	19,078	201	20,504	205

WYOMING.

Total product in 1897, 2,597,886 short tons; spot value $3,136,694.

Wyoming was one of 16 States whose product in 1897 was the largest in their history, but, as in the case of a number of other States, the decline in prices puts the value of the product below that for some of the earlier years. Compared with 1896 the production in 1897 exhibits an increase of 258,262 short tons or 11.6 per cent, and records the first recovery from a steadily decreasing tendency since 1892. The increase in value over 1896 was $232,509, or 8 per cent. The price per ton has declined from $1.33 in 1895 to $1.30 in 1896 and to $1.21 in 1897. In 1887 Wyoming coal was worth $3 at the mines, nearly 2½ times what it brought in 1897.

There are only six States in the country whose percentage of machine-mined coal to the total product exceed that of Wyoming. Forty-five machines were in use in the State during 1897 against 39 in 1896, and the product won by machines increased from 419,647 short tons, or 18.82 per cent of the total, in 1896 to 555,526 tons, or 21.38 per cent of the total, in 1897.

Two unimportant strikes occurred among Wyoming coal miners in 1897, one at the Black Butte mine, Sweetwater County, where 18 men were out eight days in the latter part of December, and the other at Diamond No. 1 mine, Uinta County, where 275 men were idle twenty-three days, from September 13 to October 6.

The production, by counties, in 1896 and 1897, with the distribution of the product for consumption, and the statistics of labor employed are shown in the following tables:

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

Coal product of Wyoming in 1897, 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	382,803	4,746	16,342	.....	403,891	$488,307	$1.21	198	513
Sweetwater	8	1,086,719	4,755	41,960	.....	1,133,434	1,232,686	1.09	214	1,362
Uintah	3	406,002	3,661	8,321	.....	417,984	474,590	1.14	215	541
Converse, Weston	3	497,029	2,641	27,351	50,976	577,997	866,995	1.50	253	596
Johnson, Sheridan	2	62,538	2,042	.....	.....	64,580	74,116	1.15	223	125
Total	20	2,435,091	17,845	93,974	50,976	2,597,886	3,136,694	1.21	219	3,137

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
1897	403,891	1,133,434	417,984	498,997

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
1897	79,000	64,580	2,597,886	3,136,694

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 eight years:

Average prices for Wyoming coal since 1889 in counties producing 10,000 tons or over.

County.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Carbon	$0.98	$1.75	$1.50	$1.11	$1.53	$1.26	$1.25	$1.29	$1.21
Converse	1.78	1.74	1.77	1.63	1.58	1.50	1.67	1.50	1.50
Sheridan	1.50	1.50	1.00	.....	1.67	1.53	1.08	1.04	1.12
Sweetwater	1.20	1.70	1.48	1.16	1.14	1.23	1.27	1.22	1.09
Uinta	1.56	1.78	1.71	1.56	1.74	1.61	1.39	1.36	1.14
Weston	.....	1.45	1.50	1.50	1.50	1.50	1.51	1.50	1.50
The State	1.26	1.70	1.53	1.27	1.35	1.31	1.33	1.30	1.21

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.		1897.	
	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	539	179	534	164	561	169	513	198
Converse	140	229	149	245	90	300	115	228
Sheridan	90	269	125	257	69	210	95	300
Sweetwater	1,622	182	1,769	158	1,339	189	1,362	214
Uinta	245	108	384	187	432	221	541	215
Weston	377	261	445	264	440	280	481	259
The State	3,032	190	3,449	184	2,949	209	3,137	219

COKE.

By EDWARD W. PARKER.

[The ton used in this report is uniformly the short ton of 2,000 pounds.]

INTRODUCTION.

The report presented herewith is of a character uniform, as far as possible, with the chapters on coke production in preceding volumes of Mineral Resources. Previous to the report for 1896 this chapter was prepared by the late Joseph D. Weeks, of Pittsburg, Pa., and the lines laid down by Mr. Weeks have been generally followed in the report for 1896 and the present one. The plan adopted by Mr. Weeks was to limit the use of the word "coke" to the product obtained from bituminous coal by distilling or burning it in retorts, ovens, or pits, and which may be termed "oven coke." The statistics in no way refer to the coke obtained as a by-product in the manufacture of illuminating gas, where no attention is given to the quality of the coke product. Recent developments, however, in the construction of by-product ovens where the by-products of gas, tar, and ammonia are given equal importance with the coke, render a slight departure from this rule necessary. So long as the coke is the primary product, and particularly when the coke is used for metallurgical purposes, its comprehension in these reports is necessary and proper. The increasing use of coke for domestic purposes and the building of large plants for making by-product coke make a deviation from the previous reports advisable. There is now in course of construction at Everett, near Boston, Mass., a bank of 400 by-product ovens, whose production will be included in these reports. It can not properly be classed as gas coke, although it is proposed to use the gas distilled from the coal for domestic purposes, and as the output for similar plants is elsewhere included in the product of oven coke, it can only be considered as belonging to that class.

Another deviation from the rules adopted by Mr. Weeks is in the application of the term "establishments." In Mr. Weeks' reports an "establishment" was usually considered to cover all ovens or banks of ovens operated under one general management. In the reports for 1896 and 1897 any oven or bank of ovens included in one statement is considered a separate establishment.

The coal used in coking in the United States is drawn from all five of its great bituminous coal fields: (1) The Appalachian; (2) the Central; (3) the Western; (4) the Rocky Mountain, and (5) the Pacific coast. The Triassic fields in North Carolina and near Richmond, Va., and the northern field of Michigan do not produce any coke. The Appalachian field is the great source of supply, for while there are 13 coke-producing States outside of the Appalachian field to 9 within it, the output outside of the field in 1897 was only 546,954 short tons out of a total product of 13,288,984 short tons. In 1896 the total output of coke was 11,788,773 short tons, of which 553,863 tons were made outside of the Appalachian field, and in 1895 only 445,473 short tons out of a total of 13,333,714 tons were made outside the great field. The product of Wisconsin is included in that of the 13 States outside the Appalachian field, although the coal from which it is made is drawn from the mines of Pennsylvania.

The writer desires to renew his acknowledgments of the services rendered by Miss Belle Hill, of Pittsburg, Pa. Miss Hill was associated with Mr. Weeks for several years and is thoroughly familiar with his methods and with the details of the work. The knowledge and experience acquired by Miss Hill through her association with Mr. Weeks have been of invaluable assistance in the preparation of this report. The tabulated statements presented herewith have all been prepared by Miss Hill. They are complete and accurate, no revision of the figures having been found necessary.

PRODUCTION OF COKE IN THE UNITED STATES.

As shown in the following table the amount of coke produced in the United States in 1897 was 13,288,984 short tons, against 11,788,773 short tons in 1896. While the output in 1897 was 1,500,211 short tons more than that of 1896, it was still about 45,000 tons below the product in 1895, when the coke made in the United States reached a total of 13,333,714 short tons. The year 1895 was one of excessive production, and prices were very low—lower than at any period in the history of coke making, except those of 1894, when the general depression in values, following the panic of 1893, brought the average for the year down to $1.34 per ton. More conservative management marked the industry in 1896. Manufacturers of Connellsville coke put the prices of this product at $1.75 to $2 for furnace, $2.30 for foundry, and $2.35 for crushed, maintaining these prices throughout the year. In doing this tonnage was sacrificed to prices, the output for the region showing a loss of over 2,700,000 tons, whereas the total decrease during the year was only 1,544,941 tons, part of the loss in the Connellsville region being made up by increases in other parts of Pennsylvania, in West Virginia, Ohio, and other less important States. The results in value to the Connellsville producers are exhibited in the fact that an output of 5,462,490 tons in 1896 was worth $10,018,946, only $100,000

less than the value of 8,181,179 tons produced in 1895, and that the total output of 11,788,773 tons in 1896 was worth nearly $2,500,000 more than the 13,333,714 tons produced in 1895.

Prices were not so strongly maintained in 1897 as in 1896, but they show a great improvement over those of 1894 and 1895. Consumptive demand was in good proportion to the supply, prices were remunerative, and the total value was nearly $3,000,000 more than that of the slightly larger output in 1895.

Pennsylvania's product in 1897 was 1,610,422 tons larger than in 1896, and 437,291 tons less than it was in 1895, the output of the Connellsville region not having regained all the tonnage lost through maintaining the higher prices in 1896. The product of the State was 67.5 per cent of the total output; in 1896, Pennsylvania produced only 62.4 per cent, the lowest percentage ever recorded; in 1895 the State produced 70.5 per cent; in 1894, 65.9 per cent. West Virginia's product decreased 177,089 tons in 1897, and was less than the output of Alabama in 1896, but as the latter also fell off in production in 1897, West Virginia remains in second place with 11.1 per cent of the total, against 14 per cent in 1896, 9.6 per cent in 1895, and 13 per cent in 1894. Alabama produced 10.9 per cent of the total in 1897, 12.5 per cent in 1896, 10.9 per cent in 1895, and 10 per cent in 1894. Tennessee succeeds Colorado in fourth place, Virginia takes fifth place, and Colorado drops back to sixth place, after having held either fourth or fifth place since 1882. Tennessee produced 2.8 per cent of the total product in 1897, Virginia 2.7 per cent, and Colorado 2.6 per cent.

The number of coking establishments in 1897 was 336, a decrease of 5 from 1896, but the total number of ovens increased from 46,944 to 47,788. There were 575 ovens in course of construction at the close of 1897 against 383 at the close of 1896.

In the following table will be found a statement of the production of coke in the United States in 1897, by States, followed, for purposes of comparison, by similar tables for 1896 and 1895:

Manufacture of coke in the United States, by States and Territories, in 1897.

State or Territory.	Establishments.	Ovens.		Coal used.	Yield of coal in coke.	Coke produced.	Total value of coke.	Value of coke per ton.
		Built.	Building.					
				Short tons.	*Per ct.*	*Short tons.*		
Alabama	25	5,365	*a*120	2,451,475	58.8	1,443,017	$3,094,461	$2.14
Colorado (*b*)	12	*c*1,273	0	616,592	55.6	342,653	999,216	2.916
Georgia	1	300	0	67,000	49.3	33,000	42,240	1.28
Illinois	2	126	0	3,591	43	1,549	2,895	1.87
Indiana	2	94	0	7,022	41.4	2,904	5,795	1.995
Indian Territory	2	130	0	68,495	44.3	30,364	104,725	3.45
Kansas	4	57	0	11,772	52.5	6,181	9,272	1.50
Kentucky	5	268	0	64,234	50	32,117	45,454	1.41
Missouri	3	15	0	4,627	56	2,593	3,890	1.50
Montana	3	303	0	139,907	48.5	67,849	467,481	6.89
New Mexico	2	126	0	2,585	55.6	1,438	3,232	2.25
New York(*d*)	1	25	0	.....	.....	.....	.....	.....
Ohio	9	433	0	151,545	62.7	95,087	235,784	2.48
Pennsylvania (*e*)	153	26,910	307	13,538,646	66.2	8,966,924	13,727,966	1.53
Tennessee	15	1,948	0	667,996	55	368,769	667,656	1.81
Texas	1	20	0	700	56.3	394	.....	.....
Utah (*f*)	1	104	0	.....	.....	.....	.....	.....
Virginia	6	1,453	110	574,542	61.6	354,067	495,864	1.40
Washington	3	120	0	39,124	67	26,189	115,754	4.42
West Virginia	84	8,404	38	2,413,283	61	1,472,666	1,933,808	1.31
Wisconsin	1	120	0	29,207	59	17,216	75,000	4.36
Wyoming	1	74	0	54,976	43.7	24,007	72,021	3.00
Total	336	47,668	575	20,907,319	63.5	13,288,984	22,102,514	1.663

a Semet-Solvay ovens.
b Includes coal used, coke produced, and its value in Utah.
c Includes 36 gas retorts.
d Production included with Pennsylvania.
e Includes coal used, coke produced, and its value in New York.
f Production included with Colorado.

In the following tables are given, by States, a statement of the production of coke in the United States in 1896 and 1895:

Manufacture of coke in the United States, by States and Territories, in 1896.

State or Territory.	Establishments.	Ovens.		Coal used.	Yield of coal in coke.	Coke produced.	Total value of coke.	Value of coke per ton.
		Built.	Building.					
				Short tons.	*Per ct.*	*Short tons.*		
Alabama	24	5,363	0	2,573,713	57.5	1,479,437	$3,064,960	$2.07
Colorado (*a*)	11	*b* 1,275	0	639,238	56.9	363,760	1,046,306	2.88
Georgia	1	334	0	109,655	49	53,673	68,486	1.276
Illinois	3	127	0	3,900	66.7	2,600	5,200	2.00
Indiana	2	94	0	8,956	49	4,353	8,647	1.99
Indian Territory	2	130	0	53,028	40	21,021	73,574	3.50
Kansas	6	55	0	8,940	53.5	4,785	8,676	1.813
Kentucky	4	264	0	55,719	48.6	27,107	42,062	1.55
Missouri	3	7	0	4,471	55.9	2,500	4,131	1.65
Montana	3	303	0	113,165	53	60,078	425,483	7.08
New Mexico	1	50	0	39,286	61.7	24,228	48,453	2.00
New York (*c*)	1	25	0	.....	.....	.....	.....	.....
Ohio	9	431	0	128,923	62.7	80,868	208,789	2.58
Pennsylvania (*d*)	158	26,658	154	11,124,610	66.1	7,356,502	13,182,859	1.792
Tennessee	15	1,861	100	600,379	56.5	339,202	624,011	1.84
Texas	1	60	0	0	0	0	0	0
Utah (*e*)	1	104	0	.....	.....	.....	.....	.....
Virginia	7	1,138	101	454,964	58.9	268,081	404,573	1.509
Washington	3	120	0	38,685	67	25,949	104,894	4.04
West Virginia	84	8,351	28	2,687,104	61.4	1,649,755	2,259,999	1.37
Wisconsin	1	120	0	8,648	62	5,332	21,000	3.94
Wyoming	1	74	0	41,038	47.6	19,542	58,626	3.00
Total	341	46,944	383	18,694,422	63	11,788,773	21,660,729	1.837

a Includes coal used, coke produced, and its value in Utah.
b Includes 36 gas retorts.
c Production included with Pennsylvania.
d Includes coal used, coke produced, and its value in New York.
e Production included with Colorado.

Manufacture of coke in the United States, by States and Territories, in 1895.

State or Territory.	Establishments.	Ovens.		Coal used.	Yield of coal in coke.	Coke produced.	Total value of coke.	Value of coke per ton.
		Built.	Building.					
				Short tons.	*Per ct.*	*Short tons.*		
Alabama	22	5,658	50	2,459,465	58.7	1,444,339	$3,033,521	$2.10
Colorado (*a*)	9	*b* 1,169	0	580,584	58.6	340,357	940,987	2.76
Georgia	1	330	0	118,900	50.6	60,212	70,580	1.17
Illinois	3	129	0	3,600	62.5	2,250	4,500	2.00
Indiana	2	94	0	9,898	48.5	4,804	9,333	1.94
Indian Territory	1	80	0	11,825	43.8	5,175	17,657	3.41
Kansas	5	55	0	8,424	62.8	5,287	11,289	2.14
Kentucky	5	293	0	63,419	40.1	25,460	37,249	1.46
Missouri	3	10	0	3,120	65	2,028	2,442	1.20
Montana	3	303	0	55,770	45.4	25,337	189,856	7.49
New Mexico	1	50	0	22,385	65.5	14,663	29,491	2.01
New York	1	12	13	22,207	83.4	18,521	.....	.....
Ohio	8	377	0	51,921	56	29,050	69,655	2.40
Pennsylvania	99	26,042	170	14,211,567	66.2	9,404,215	11,908,162	1.266
Tennessee	12	1,903	0	684,655	57.9	396,790	754,926	1.90
Texas	1	6	0	530	54	286	.....	.....
Utah (*c*)	1	84	0	.....	.....	.....	.....	.....
Virginia	5	832	350	410,737	59.6	244,738	322,564	1.32
Washington	3	110	0	22,973	65.9	15,129	64,632	4.27
West Virginia	78	7,834	55	2,087,816	61.6	1,285,206	1,724,239	1.34
Wisconsin	1	120	0	8,287	60	4,972	26,103	5.25
Wyoming	1	74	0	10,240	47.8	4,895	17,133	3.50
Total	265	45,565	638	20,848,323	64	13,333,714	19,234,319	1.44

a Includes Utah's production of coal and coke and value of same.
b Includes 36 gas retorts.
c Included with Colorado's coke production.

The increases and decreases in the several States during 1897, as compared with 1896, are shown in the following table:

Increases and decreases in coke production, by States, in 1897 as compared with 1896.

State or Territory.	Increase.		Decrease.	
	Amount of increase.	Per cent of increase.	Amount of decrease.	Per cent of decrease.
	Short tons.		*Short tons.*	
Alabama	.....	.....	36,420	2.5
Colorado (*a*)	.....	.....	21,107	6
Georgia	.....	.....	20,673	38.5
Illinois	.....	.....	1,051	40.4
Indiana	.....	.....	1,449	33.3
Indian Territory	9,343	44.4	.....	.....
Kansas	1,396	29.2	.....	.....
Kentucky	5,010	18.5	.....	.....
Missouri	93	3.7	.....	.....
Montana	7,771	12.9	.....	.....
New Mexico	.....	.....	22,790	94
Ohio	14,219	17.6	.....	.....
Pennsylvania and New York	1,610,422	21.9	.....	.....
Tennessee	29,567	8.7	.....	.....
Texas	394	100	.....	.....
Virginia	85,986	32.1	.....	.....
Washington	240	.9	.....	.....
West Virginia	.....	.....	177,089	10.7
Wisconsin	11,884	222.9	.....	.....
Wyoming	4,465	22.8	.....	.....
Total	1,500,211	12.7	.....	.....

a Including Utah.

The above table shows that the net increase in the production of coke in 1897 was 1,500,211 short tons. The net decrease in 1896 was 1,544,941 short tons, so that the product in 1897 was still 44,730 short tons less than that of 1895.

In the following table are consolidated the statistics of the manufacture of coke in the United States from 1880 to 1897 inclusive:

Statistics of the manufacture of coke in the United States, 1880 to 1897, inclusive.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per ct.*
1880..	186	12,372	1,159	5,237,741	3,338,300	$6,631,267	$1.99	63
1881..	197	14,119	1,005	6,546,662	4,113,760	7,725,175	1.88	63
1882..	215	16,356	712	7,577,648	4,793,321	8,462,167	1.77	63
1883..	231	18,304	407	8,516,670	5,464,721	8,121,607	1.49	64
1884..	250	19,557	812	7,951,974	4,873,805	7,242,878	1.49	61
1885..	233	20,116	432	8,071,126	5,106,696	7,629,118	1.49	63
1886..	222	22,597	4,154	10,688,972	6,845,369	11,153,366	1.63	64
1887..	270	26,001	3,584	11,859,752	7,611,705	15,321,116	2.01	64
1888..	261	30,059	2,587	12,945,350	8,540,030	12,445,963	1.46	66
1889..	252	34,165	2,115	15,960,973	10,258,022	16,630,301	1.62	64
1890..	253	37,158	1,547	18,005,209	11,508,021	23,215,302	2.02	64
1891..	243	40,245	911	16,344,540	10,352,688	20,323,216	1.97	63
1892..	261	42,002	1,893	18,813,337	12,010,829	23,536,141	1.96	64
1893..	258	44,201	717	14,917,146	9,477,580	16,523,714	1.74	63.5
1894..	260	44,772	591	[a]14,348,750	9,203,632	[a]12,328,856	1.34	64
1895..	265	45,565	638	20,848,323	13,333,714	[b]19,234,319	1.44	64
1896..	341	46,944	383	18,694,422	11,788,773	21,660,729	1.837	63
1897..	336	47,668	575	20,907,319	13,288,984	22,102,514	1.663	63.5

[a] Excluding New York. [b] Excluding New York and Texas.

TOTAL NUMBER OF COKE WORKS IN THE UNITED STATES.

The following table gives the number of establishments manufacturing coke in the United States at the close of each year from 1880 to 1896, by States. According to this table the number of establishments in the last two years has largely increased. The increase is only apparent. In previous reports it has been customary to include under one establishment all coke works reported from one general office, and to consider them separate establishments when reported individually from the central office. In the statistics for 1896 the word establishment is used to designate the number of ovens or banks of ovens which were in operation, whether reported from one office or not. When one company reported production at two or more banks of ovens, each is considered a separate establishment.

Number of establishments in the United States manufacturing coke on December 31 of each year from 1880 to 1897.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Alabama	4	4	5	6	8	11	14	15	18
Colorado	1	2	5	7	8	7	7	7	7
Georgia	1	1	1	1	1	2	2	2	1
Illinois	6	6	7	7	9	9	9	8	8
Indiana	2	2	2	2	2	2	4	4	3
Indian Territory	1	1	1	1	1	1	1	1	1
Kansas	2	3	3	4	4	4	4	4	6
Kentucky	5	5	5	5	5	5	6	6	10
Missouri	0	0	0	0	0	0	0	1	1
Montana	0	0	0	1	3	2	4	2	1
New Mexico	0	0	2	2	2	2	2	1	1
Ohio	15	15	16	18	19	13	15	15	15
Pennsylvania	124	132	137	140	145	133	108	151	120
Tennessee	6	6	8	11	13	12	12	11	11
Texas	0	0	0	0	0	0	1	0	0
Utah	1	1	1	1	1	1	1	0	0
Virginia	0	0	0	1	1	1	2	2	2
Washington	0	0	0	0	1	1	1	1	3
West Virginia	18	19	22	24	27	27	29	39	52
Wisconsin	0	0	0	0	0	0	0	0	1
Wyoming	0	0	0	0	0	0	0	0	0
Total	186	197	215	231	250	233	222	270	261

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	19	20	21	20	23	22	22	24	25
Colorado	9	8	7	9	8	8	9	11	12
Georgia	1	1	1	1	1	1	1	1	1
Illinois	4	4	1	1	1	1	3	3	2
Indiana	4	4	2	2	2	2	2	2	2
Indian Territory	1	1	1	1	1	1	1	2	2
Kansas	6	7	6	6	6	6	5	6	4
Kentucky	9	9	7	5	4	6	5	4	5
Missouri	3	3	3	3	3	3	3	3	3
Montana	2	2	2	2	2	2	3	3	3
New Mexico	2	2	1	1	1	1	1	1	2
New York	0	0	0	0	1	1	1	1	1
Ohio	13	13	9	10	9	8	8	9	9
Pennsylvania	109	106	109	109	102	101	99	158	153
Tennessee	12	11	11	11	11	11	12	15	15
Texas	0	0	0	0	0	0	1	1	1
Utah	1	1	1	1	1	1	1	1	1
Virginia	2	2	2	2	2	2	5	7	6
Washington	1	5	2	3	3	3	3	3	3
West Virginia	53	55	55	72	75	78	78	84	84
Wisconsin	1	1	1	1	1	1	1	1	1
Wyoming	1	1	1	1	1	1	1	1	1
Total	253	253	243	261	258	260	265	341	336

The number of establishments in the country for each year since 1850 for which there are any returns is as follows:

Number of coke establishments in the United States since 1850.

Year.	Number.	Year.	Number.
1850 (census year)	4	1887, December 31	270
1860 (census year)	21	1888, December 31	261
1870 (census year)	25	1889, December 31	253
1880 (census year)	149	1890, December 31	253
1880, December 31	186	1891, December 31	243
1881, December 31	197	1892, December 31	261
1882, December 31	215	1893, December 31	258
1883, December 31	231	1894, December 31	260
1884, December 31	250	1895, December 31	265
1885, December 31	233	1896, December 31	341
1886, December 31	222	1897, December 31	336

The foregoing table, taken in connection with the statistics presented in the succeeding paragraph giving the number of coke ovens in the United States, presents some interesting facts. From them it appears that on December 31, 1880, the number of coke establishments in the United States was 186 and the number of coke ovens 12,372, being equivalent to an average of 66.5 ovens to each establishment. Five years later, in 1885, there were 233 establishments and 20,116 ovens, an average of 86.3 to each establishment. In 1890 there were 253 establishments with a total of 37,158 ovens, an average of 147 ovens to an establishment. In 1895 there were 265 establishments and 45,565 ovens, an average of 172 ovens to an establishment, while in 1897, if we take the number of establishments upon the same basis as obtained prior to 1896, there were 264 establishments with a total of 47,788 ovens, an average of 181 ovens to each establishment. This statement presents another illustration of the tendency toward consolidation of large industries under one management. In the eighteen years from 1880 to 1897 inclusive the number of establishments has increased from 186 to 264, an increase of 42 per cent. The number of coke ovens has increased from 12, 372 to 47,788, a gain of 35,416 ovens, or 286 per cent, and the average number of ovens to an establishment has increased from 66.5 to 181, a gain of 172 per cent.

Considering each bank of ovens as a separate establishment, as has been done in the reports for 1896 and 1897, the number of establishments has decreased from 341 to 336, while the total number of coke ovens has increased from 46,944 to 47,788, the average number of ovens to an establishment being 138 in 1896 and 142 in 1897.

NUMBER OF COKE OVENS IN THE UNITED STATES.

The following table shows the number of coke ovens in each State and Territory on December 31 of each year from 1880 to 1897, together with the total number of ovens in the United States at the close of each of these years. In the earlier years covered by this table some coke was made in pits and on the ground, and in testing the adaptability of certain coals to the manufacture of coke this is still customary, though in the latter years but little of the coke reported as produced in the United States was made by any other method than in ovens. The statistics for 1896 show an interesting increase in the number of by-product ovens built. The first by-product ovens to be used in the United States were 12 Semet-Solvay ovens erected in New York. Two years later 60 Otto-Hoffmann ovens were built in Pennsylvania. The returns for 1896 show 13 Semet-Solvay ovens added to the plant in New York; 75 of the same design were built in Pennsylvania, and the latter State has also added 30 Newton-Chambers ovens and 3 Slocum ovens to her coke-making plants.

In 1897 120 Otto-Hoffmann ovens have been added to those already built in Pennsylvania, and 400 more of the same ovens were in course of construction near Boston, Mass., at the time of writing this report, with 800 more contemplated. The close of 1897 finds also 120 Semet-Solvay ovens in course of construction in Alabama.

Number of coke ovens in the United States on December 31 of each year from 1880 to 1897.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Alabama	316	416	536	767	976	1,075	1,301	1,555	2,475
Colorado	200	267	344	352	409	434	483	532	602
Georgia	140	180	220	264	300	300	300	300	290
Illinois	176	176	304	316	325	320	335	278	221
Indiana	45	45	37	37	37	37	100	119	103
Indian Ter	20	20	20	20	20	40	40	80	80
Kansas	6	15	20	23	23	23	36	39	58
Kentucky	45	45	45	45	45	33	76	98	132
Missouri	0	0	0	0	0	0	0	4	4
Montana	0	0	0	2	5	2	16	27	40
New Mexico	0	0	0	12	70	70	70	70	70
New York	0	0	0	0	0	0	0	0	0
Ohio	616	641	647	682	732	642	560	585	547
Pennsylvania	9,501	10,881	12,424	13,610	14,285	14,553	16,314	18,294	20,381
Tennessee	656	724	861	992	1,105	1,387	1,485	1,560	1,634
Texas	0	0	0	0	0	0	0	0	0
Utah	20	20	20	20	20	20	20	0	0
Virginia	0	0	0	200	200	200	350	350	550
Washington	0	0	0	0	0	2	11	30	30
West Virginia	631	689	878	962	1,005	978	1,100	2,080	2,792
Wisconsin	0	0	0	0	0	0	0	0	50
Wyoming	0	0	0	0	0	0	0	0	0
Total	12,372	14,119	16,356	18,304	19,557	20,116	22,597	26,001	30,059

Number of coke ovens in the United States on December 31 of each year from 1880 to 1897—Continued.

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	3,944	4,805	5,068	5,320	5,548	5,551	5,658	5,363	5,365
Colorado	834	916	948	*a*1,128	*a*1,154	*a*1,154	*a*1,169	*a*1,275	*a*1,273
Georgia	300	300	300	300	338	338	330	334	300
Illinois	149	148	25	24	24	24	129	127	126
Indiana	111	101	84	84	94	94	94	94	94
Indian Ter	78	78	80	80	80	80	80	130	130
Kansas	68	68	72	75	75	61	55	55	57
Kentucky	166	175	115	287	283	293	293	264	268
Missouri	9	10	10	10	10	10	10	7	15
Montana	90	140	140	153	153	153	303	303	303
New Mexico	70	70	*b*0	50	50	50	50	50	126
New York	0	0	0	0	*c*12	*c*12	*c*12	*c*25	*c*25
Ohio	462	443	421	436	435	363	377	431	433
Pennsylvania	22,143	23,430	25,324	25,366	25,744	25,824	*d*26,042	*d*26,658	*e*26,910
Tennessee	1,639	1,664	1,995	1,941	1,942	1,860	1,903	1,861	1,948
Texas	0	0	0	0	0	0	6	60	20
Utah	34	80	80	83	83	83	84	104	104
Virginia	550	550	550	594	594	736	832	1,138	1,453
Washington	30	30	80	84	84	84	110	120	120
West Virginia	3,438	4,060	4,621	5,843	7,354	7,858	7,834	8,351	8,404
Wisconsin	50	70	120	120	120	120	120	120	120
Wyoming	0	20	24	24	24	24	74	74	74
Total	34,165	37,158	40,057	42,002	44,201	44,772	45,565	46,944	47,668

a Includes 36 gas retorts.
b Coke was made in pits.
c Semet-Solvay ovens.
d Includes 60 Otto-Hoffmann ovens, 75 Semet-Solvay ovens, 30 Newton-Chambers ovens, and 3 Slocum ovens.
e Includes 180 Otto-Hoffmann ovens, 75 Semet-Solvay ovens, 30 Newton-Chambers ovens, and 3 Slocum ovens.

From the above table it will be seen that the number of coke ovens in existence at the close of 1897 was 47,668, against 46,944 at the close of 1896. While this shows a substantial increase, it was not in proportion to the increase in the production of coke, as is shown by the fact that in 1896 the average output per oven was 251 short tons, while in 1897 it was 279 tons. The average production per oven in 1895 was 292 tons; so that while the capacity per oven in 1897 was about 10 per cent greater than it was in 1896, it was 5 per cent less than in 1895. Among the more important producing States the greatest amount of activity was at the coke ovens of Pennsylvania, where the average production of coke per oven in 1897 was 333 tons, against 275 tons in 1896 and 361 tons in 1895. The number of coke ovens in existence in Pennsylvania during 1897 was 26,910, equivalent to 56.6 per

cent of the total number of ovens in the United States, while the production of coke in the State was 67.5 per cent of the total output. West Virginia had 8,404 ovens in existence in 1897, an increase of 53 over 1896. The output of coke was 1,472,666 tons, an average annual production per oven of 175 tons—a decrease from an average of 199 tons in 1896. Alabama, with 5,365 ovens, produced 1,443,017 tons, an average of 269 tons per oven, against 275 tons in 1896 and 255 tons in 1895. Tennessee, with a total of 1,948 ovens, produced 368,769 tons of coke, an average per oven of 189, against 182 tons in 1896. The average output per oven in Virginia was 244 tons in 1897 and 240 tons in 1896. Colorado had an average of 269 tons in 1897, against 285 tons in 1896. It will be seen from this that, in addition to Pennsylvania, there was an increased activity during 1897 in Tennessee and Virginia and a decreased activity in West Virginia, Alabama, and Colorado.

Most of the coke ovens in the United States are of the solid-wall type, in which coal is coked by heat generated in the oven itself. Most of these ovens are of the regular beehive shape. A few are somewhat modified in form, the oven being long and shaped like a muffle. Other ovens, while they retain the beehive form, have hollow tiles near the top, into which the air, previously heated, enters for combustion. As stated before, the use of by-product ovens is increasing, and it may not be very long before coke manufacturers will become convinced that the greatest economy in coke making is not to be accomplished by saving on the first cost. One hundred and eight by-product ovens were built in 1896, and 120 more were added to the total number in 1897, while on December 31, 1897, 120 by-product ovens of the Semet-Solvay type were building in Alabama and plans for building 400 Otto-Hoffmann ovens near Boston, Mass., were completed. These 400 ovens will probably be in operation before the close of 1898.

NUMBER OF OVENS BUILDING IN THE UNITED STATES.

The following table gives the number of ovens actually in course of construction at the close of each year from 1880 to 1897. It should be understood that this table does not include the increase in the number of ovens during the year. It only gives the number of ovens actually in course of construction at the close of each year. It will be noted that the number in course of erection at the close of 1897 was 575.

Number of coke ovens building in the United States at the close of each year from 1880 to 1897.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Alabama	100	120	0	122	242	16	1,012	1,362	406
Colorado	50	0	0	0	24	0	0	0	100
Georgia	40	40	44	36	0	0	0	0	0
Illinois	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	18	0	0
Indian Territory	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	2	0	2
Missouri	0	0	0	0	0	0	0	0	0
Montana	0	0	0	0	12	0	0	0	0
New Mexico	0	0	12	28	0	0	0	0	0
New York	0	0	0	0	0	0	0	0	0
Ohio	25	0	0	0	0	0	0	223	12
Pennsylvania	836	761	642	211	232	317	2,558	802	1,565
Tennessee	68	84	14	10	175	36	126	165	84
Texas	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	100	300	0
Washington	0	0	0	0	0	0	21	0	100
West Virginia	40	0	0	0	127	63	317	742	318
Wisconsin	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0
Total	1,159	1,005	712	407	812	432	4,154	3,594	2,587

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	427	371	50	90	60	50	50	0	*a* 120
Colorado	50	30	21	220	200	250	0	0	0
Georgia	0	0	0	0	0	0	0	0	0
Illinois	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	0	0	0
Indian Territory	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0
Kentucky	100	303	24	100	100	0	0	0	0
Missouri	0	0	0	0	0	0	0	0	0
Montana	50	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0	0
New York	0	0	0	0	0	*a* 13	*a* 13	0	0
Ohio	0	1	0	0	0	0	0	0	0
Pennsylvania	567	74	11	269	19	118	*b* 170	*c* 154	307
Tennessee	40	292	0	0	0	0	0	100	0
Texas	0	0	0	0	0	0	0	0	0
Virginia	250	250	250	206	206	100	350	101	110
Washington	0	80	0	30	0	0	0	0	0
West Virginia	631	334	555	978	132	60	55	28	38
Wisconsin	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0
Total	2,115	1,735	911	1,893	717	591	638	383	575

a Semet-Solvay.
b Includes 60 Otto-Hoffmann and 50 Semet-Solvay ovens.
c Includes 120 Otto-Hoffmann ovens.

PRODUCTION OF COKE FROM 1880 TO 1897.

The production of coke in the several States and Territories from 1880 to 1897 is shown in the following table:

Amount of coke produced, in short tons, in the United States from 1880 to 1897, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.
Alabama	60,781	109,033	152,940	217,531	244,009	301,180
Colorado	25,568	48,587	102,105	133,997	115,719	131,960
Georgia	38,041	41,376	46,602	67,012	79,268	70,669
Illinois	12,700	14,800	11,400	13,400	13,095	10,350
Indiana	0	0	0	0	0	0
Indian Territory	1,546	1,768	2,025	2,573	1,912	3,584
Kansas	3,070	5,670	6,080	8,430	7,190	8,050
Kentucky	4,250	4,370	4,070	5,025	2,223	2,704
Missouri	0	0	0	0	0	0
Montana	0	0	0	0	75	175
New Mexico	0	0	1,000	3,905	18,282	17,940
New York	0	0	0	0	0	0
Ohio	100,596	119,469	103,722	87,834	62,709	39,416
Pennsylvania	2,821,384	3,437,708	3,945,034	4,438,464	3,822,128	3,991,805
Tennessee	130,609	143,853	187,695	203,691	219,723	218,842
Texas	0	0	0	0	0	0
Utah	1,000	0	250	0	0	0
Virginia	0	0	0	25,340	63,600	49,139
Washington	0	0	0	.....	400	311
West Virginia	138,755	187,126	230,398	257,519	223,472	260,571
Wisconsin	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0
Total	3,338,300	4,113,760	4,793,321	5,464,721	4,873,805	5,106,696

State or Territory.	1886.	1887.	1888.	1889.	1890.	1891.
Alabama	375,054	325,020	508,511	1,030,510	1,072,942	1,282,496
Colorado	142,797	170,698	179,682	187,638	245,756	277,074
Georgia	82,680	79,241	83,721	94,727	102,233	103,057
Illinois	8,103	9,198	7,410	11,583	5,000	5,200
Indiana	6,124	17,658	11,956	8,301	6,013	3,798
Indian Territory	6,351	10,060	7,502	6,639	6,639	9,464
Kansas	12,493	14,950	14,831	13,910	12,311	14,174
Kentucky	4,528	14,565	23,150	13,021	12,343	33,777
Missouri	0	2,970	2,600	5,275	6,136	6,872
Montana	0	7,200	12,000	14,043	14,427	29,009
New Mexico	10,236	13,710	8,540	3,460	2,050	2,300

Amount of coke produced, in short tons, in the United States, etc.—Continued.

State or Territory.	1886.	1887.	1888.	1889.	1890.	1891.
New York	0	0	0	0	0	0
Ohio	34,932	93,004	67,194	75,124	74,633	38,718
Pennsylvania	5,406,597	5,832,849	6,545,779	7,659,055	8,560,245	6,954,846
Tennessee	368,139	396,979	385,693	359,710	348,728	364,318
Texas	0	0	0	0	0	0
Utah	0	0	0	761	8,528	7,949
Virginia	122,352	166,947	149,199	146,528	165,847	167,516
Washington	825	14,625	0	3,841	5,837	6,000
West Virginia	264,158	442,031	531,762	607,880	833,377	1,009,051
Wisconsin	0	0	500	16,016	24,976	34,387
Wyoming	0	0	0	0	0	2,682
Total	6,845,369	7,611,705	8,540,030	10,258,022	11,508,021	10,352,688

State or Territory.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	1,501,571	1,168,085	923,817	1,444,339	1,479,437	1,443,017
Colorado	365,920	346,981	301,140	317,838	343,313	319,036
Georgia	81,807	90,726	92,029	60,212	53,673	33,000
Illinois	3,170	2,200	2,200	2,250	2,600	1,549
Indiana	2,207	5,724	6,551	4,804	4,353	2,904
Indian Territory	3,569	7,135	3,051	5,175	21,021	30,364
Kansas	9,132	8,565	8,439	5,287	4,785	6,181
Kentucky	36,123	48,619	29,748	25,460	27,107	32,117
Missouri	7,299	5,905	2,250	2,028	2,500	2,593
Montana	34,557	29,945	17,388	25,337	60,078	67,849
New Mexico	0	5,803	6,529	14,663	24,228	1,438
New York	0	12,850	16,500	18,521	(*a*)	(*a*)
Ohio	51,818	22,436	32,640	29,050	80,868	95,087
Pennsylvania	8,327,612	6,229,051	6,063,777	9,404,215	*b*7,356,502	*b* 8,966,924
Tennessee	354,096	265,777	292,646	396,790	339,202	368,769
Texas	0	0	0	286	0	394
Utah	7,309	16,005	16,056	22,519	20,447	23,617
Virginia	147,912	125,092	180,091	244,738	268,081	354,067
Washington	7,177	6,731	5,245	15,129	25,949	26,189
West Virginia	1,034,750	1,062,076	1,193,933	1,285,206	1,649,755	1,472,666
Wisconsin	33,800	14,958	4,250	4,972	5,332	17,216
Wyoming	0	2,916	4,352	4,895	19,542	24,007
Total	12,010,829	9,477,580	9,203,632	13,333,714	11,788,773	13,288,984

a Included with Pennsylvania. *b* Includes production of New York.

RANK OF COKE-PRODUCING STATES.

The following table gives the relative rank of the States and Territories in the production of coke from 1880 to 1897, inclusive:

Rank of the States and Territories in production of coke from 1880 to 1897.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Pennsylvania	1	1	1	1	1	1	1	1	1
West Virginia	2	2	2	2	3	3	4	2	2
Alabama	5	5	4	3	2	2	2	4	3
Colorado	7	6	6	5	5	5	5	5	5
Tennessee	3	3	3	4	4	4	3	3	4
Virginia	.....	.....	.....	8	7	7	6	6	6
Ohio	4	4	5	6	8	8	8	7	8
Montana	.....	.....	.....	.....	15	15	.....	16	12
Georgia	6	7	7	7	6	6	7	8	7
Kentucky	9	10	10	11	12	13	14	12	9
Washington	.....	.....	.....	.....	14	14	15	11	10
New Mexico	.....	.....	12	12	9	9	10	13	14
Indian Territory	11	11	11	13	13	12	12	14	15
Utah	12	.....	13	.....	.....	.....	.....	.....	.....
Wisconsin	.....	.....	.....	.....	.....	.....	.....	.....	18
Kansas	10	9	9	10	11	11	9	10	11
Indiana	.....	.....	.....	.....	.....	.....	13	9	13
Illinois	8	8	8	9	10	10	11	15	16
Missouri	.....	.....	.....	.....	.....	.....	.....	17	17
Texas	.....	.....	.....	.....	.....	.....	.....	.....	.....

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Pennsylvania	1	1	1	1	1	1	1	1	1
West Virginia	3	3	3	3	3	2	3	2	2
Alabama	2	2	2	2	2	3	2	3	3
Tennessee	4	4	4	5	5	5	4	5	4
Virginia	6	6	6	6	6	6	6	6	5
Colorado	5	5	5	4	4	4	5	4	6
Ohio	8	8	8	8	10	8	8	7	7
Montana	10	10	11	10	9	10	10	8	8
Georgia	7	7	7	7	7	7	7	9	9
Kentucky	12	11	10	9	8	9	9	10	10
Indian Territory	15	14	13	16	15	19	16	13	11
New York	.....	.....	.....	.....	13	11	12	16	12
Washington	17	17	16	15	16	16	13	11	13
Wyoming	.....	.....	19	.....	20	17	18	15	14
Utah	19	13	14	13	11	12	11	14	15
Wisconsin	9	9	9	11	12	18	17	17	16
Kansas	11	12	12	12	14	13	15	18	17
Indiana	14	16	18	17	19	14	19	19	18
Missouri	16	15	15	14	17	20	21	21	19
Illinois	13	18	17	18	21	21	20	20	20
New Mexico	18	19	20	.....	18	15	14	12	21
Texas	.....	.....	.....	.....	.....	.....	22	22	22

An inspection of the foregoing table shows that the same six States, Pennsylvania, West Virginia, Alabama, Colorado, Tennessee, and Virginia, have remained at the head of the list since 1886, but, with the exception of Pennsylvania, which stands preeminently and permanently in first place, their relative ranks have changed frequently. West Virginia and Alabama have been rivals for second place on the list ever since the latter State took third position in 1883. Nine times since then Alabama has held second place, while West Virginia has taken it six times. Colorado and Tennessee have been similar rivals for fourth place, Colorado holding it four times and Tennessee six times since 1887. Colorado dropped from the fourth place in 1896 to sixth place in 1897, Tennessee taking its place, and Virginia, which has held sixth place consistently since 1886, became fifth in importance as a coke producer. The most pronounced changes that occurred in 1897 were the advances of Indian Territory and New York from thirteenth and sixteenth places to eleventh and twelfth, respectively, and the fall of New Mexico from twelfth place to twenty-first.

VALUE AND AVERAGE SELLING PRICE OF COKE.

In the following table is given the total value of coke produced in the United States in each year from 1880 to 1897, inclusive:

Total value at the ovens of the coke made in the United States in the years from 1880 to 1897, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.
Alabama	$183,063	$326,819	$425,940	$598,473	$609,185	$755,645
Colorado	145,226	267,156	476,665	584,578	409,930	512,162
Georgia	81,789	88,753	100,194	147,166	169,192	144,198
Illinois	41,950	45,850	29,050	28,200	25,639	27,798
Indiana	0	0	0	0	0	0
Indian Territory	4,638	5,304	6,075	7,719	5,736	12,902
Kansas	6,000	10,200	11,460	16,560	14,580	13,255
Kentucky	12,250	12,630	11,530	14,425	8,760	8,499
Missouri	0	0	0	0	0	0
Montana	0	0	0	0	900	2,063
New Mexico	0	0	6,000	21,478	91,410	89,700
New York	0	0	0	0	0	0
Ohio	255,905	297,728	266,113	225,660	156,294	109,723
Pennsylvania	5,255,040	5,898,579	6,133,698	5,410,387	4,783,230	4,981,656
Tennessee	316,607	342,585	472,505	459,126	428,870	398,459
Utah	10,000	0	2,500	0	0	0
Virginia	0	0	0	44,345	111,300	85,993
Washington	0	0	0	0	1,900	1,477
West Virginia	318,797	429,571	520,437	563,490	425,952	485,588
Wisconsin	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0
Total	6,631,265	7,725,175	8,462,167	8,121,607	7,242,878	7,629,118

Total value at the ovens of the coke made in the United States, etc.—Continued.

State or Territory.	1886.	1887.	1888.	1889.	1890.	1891.
Alabama	$993,302	$775,090	$1,189,679	$2,372,417	$2,589,447	$2,986,242
Colorado	569,120	682,778	716,305	643,479	959,246	896,984
Georgia	179,031	174,410	177,907	149,059	150,995	231,878
Illinois	21,487	19,594	21,038	29,764	11,250	11,700
Indiana	17,953	51,141	31,993	25,922	19,706	7,596
Indian Territory	22,229	33,435	21,755	17,957	21,577	30,483
Kansas	19,204	28,575	29,073	26,593	29,116	33,296
Kentucky	10,082	31,730	47,244	29,769	22,191	68,281
Missouri	0	10,395	9,100	5,800	9,240	10,000
Montana	0	72,000	96,000	122,023	125,655	258,523
New Mexico	51,180	82,260	51,240	18,408	10,025	10,925
New York	0	0	0	0	0	0
Ohio	94,042	245,981	166,330	188,222	218,090	76,901
Pennsylvania	7,664,023	10,746,352	8,230,759	10,743,492	16,333,674	12,679,826
Tennessee	687,865	870,900	490,491	731,496	684,116	701,803
Utah	0	0	0	3,042	37,196	35,778
Virginia	305,880	417,368	260,000	325,861	278,724	265,107
Washington	4,125	102,375	0	30,728	46,696	42,000
West Virginia	513,843	976,732	905,549	1,074,177	1,524,746	1,845,043
Wisconsin	0	0	1,500	92,092	143,612	192,804
Wyoming	0	0	0	0	0	8,046
Total	11,153,366	15,321,116	12,445,963	16,630,301	23,215,302	20,393,216

State or Territory.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	$3,464,623	$2,648,632	$1,871,348	$3,033,521	$3,064,960	$3,094,461
Colorado	*a* 1,234,320	*a* 1,137,488	*a* 903,970	*a* 940,987	*a* 1,046,306	*a* 999,216
Georgia	163,614	136,089	116,286	70,580	68,486	42,240
Illinois	7,133	4,400	4,400	4,500	5,200	2,895
Indiana	6,472	9,048	13,102	9,333	8,647	5,795
Indian Territory	12,402	25,072	10,693	17,657	73,574	104,725
Kansas	19,906	18,640	15,660	11,289	8,676	9,272
Kentucky	72,563	97,350	51,566	37,249	42,062	45,454
Missouri	10,949	9,735	3,563	2,442	4,131	3,890
Montana	311,013	239,560	165,187	189,856	425,483	467,481
New Mexico	0	18,476	28,213	29,491	48,453	3,232
New York	0	35,925	.....	.....	(*b*)	(*b*)
Ohio	112,907	43,671	90,875	69,655	208,789	235,784
Pennsylvania	15,015,336	9,468,036	6,585,489	11,908,162	*c* 13,182,859	*c* 13,727,966
Tennessee	724,106	491,523	480,124	754,926	624,011	667,656
Utah	(*d*)	(*d*)	(*d*)	(*d*)	(*d*)	(*d*)
Virginia	322,486	282,898	295,747	322,564	404,573	495,864
Washington	50,446	34,207	18,249	64,632	104,894	115,754
West Virginia	1,821,965	1,716,907	1,639,687	1,724,239	2,259,999	1,933,808
Wisconsin	185,900	95,851	19,465	26,103	21,000	75,000
Wyoming	0	10,206	15,232	17,133	58,626	72,021
Total	23,536,141	16,523,714	12,328,856	19,234,319	21,660,729	22,102,514

a Includes value of Utah coke.
b Included with Pennsylvania.
c Includes value of New York coke.
d Included with Colorado.

While this table gives the totals of the value as returned in the schedules, the figures do not always represent the same thing. A statement as to the actual selling price of the coke was asked for, and in most cases, including possibly 80 per cent of all the coke produced, the figures are the actual selling price. In some cases, however, the value is an estimate. Considerable of the coke made in the United States is produced by proprietors of blast furnaces for consumption in their own furnaces, none being sold. The value, therefore, given for this coke would be an estimate, based in some instances, where there are coke works in the neighborhood selling coke for the general market, upon the price obtained for this coke; in other cases the cost is estimated at the cost of the coke at the furnace, plus a small percentage for profit on the coking operation, while in still other cases the value given is only the actual cost of the coke at the ovens.

In the following table is given the average value per short ton of the coke made in the United States for each year from 1880 to 1897, inclusive, by States and Territories:

Average value per short ton at the ovens of the coke made in the United States in the years from 1880 to 1897, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Alabama	$3.01	$3.00	$2.79	$2.75	$2.50	$2.50	$2.65	$2.39	$2.34
Colorado	5.68	5.29	4.67	4.36	3.45	3.88	3.99	4.00	4.00
Georgia	2.15	2.15	2.15	2.20	2.13	2.04	2.17	2.20	2.12
Illinois	3.30	3.10	2.55	2.10	1.96	2.68	2.65	2.13	2.84
Indiana	.....	.....	.....	.....	.....	.....	2.93	2.81	2.68
Indian Territory	3.00	3.00	3.00	3.00	3.00	3.60	3.50	3.33	2.90
Kansas	1.95	1.80	1.70	1.96	2.02	1.65	1.54	1.91	1.96
Kentucky	2.88	2.89	2.83	2.87	3.94	3.14	2.23	2.18	2.04
Missouri	.....	.....	.....	.....	.....	.....	.....	3.50	3.50
Montana	.....	.....	.....	.....	12.00	11.72	.....	10.00	8.00
New Mexico	.....	.....	6.00	5.50	5.00	5.00	5.00	6.00	6.00
Ohio	2.54	2.49	2.57	2.57	2.49	2.78	2.69	2.65	2.48
Pennsylvania	1.86	1.70	1.55	1.22	1.25	1.25	1.42	1.84	1.26
Tennessee	2.42	2.33	2.52	2.25	1.95	1.31	1.87	2.19	1.27
Utah	10.00	.....	10.00	.....	.....	.....	.....	.....	.....
Virginia	.....	.....	.....	1.75	1.75	1.75	2.50	2.50	1.74
Washington	.....	.....	.....	.....	4.75	4.75	5.00	7.00	0
West Virginia	2.30	2.30	2.26	2.19	1.19	1.86	1.94	2.22	1.70
Wisconsin	.....	.....	.....	.....	.....	.....	.....	.....	3.00
Average	1.99	1.88	1.77	1.49	1.49	1.49	1.63	2.01	1.46

Average value per short ton at the ovens of the coke made in the United States, etc.—Cont'd.

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	$2.30	$2.41	$2.33	$2.31	$2.27	$2.025	$2.10	$2.07	$2.14
Colorado	3.43	3.90	3.24	3.31	*a*3.13	*a*2.85	*a*2.76	*a*2.88	*a*2.916
Georgia	1.57	1.48	2.25	2.00	1.50	1.25	1.17	1.276	1.28
Illinois	2.57	2.25	2.25	2.25	2.00	2.00	2.00	2.00	1.87
Indiana	3.12	3.28	2.00	2.02	1.58	2.00	1.94	1.99	1.995
Indian Territory	2.70	3.25	3.22	3.47	3.51	3.50	3.41	3.50	3.45
Kansas	1.91	2.37	2.35	2.18	2.18	1.855	2.14	1.813	1.50
Kentucky	2.28	1.80	2.02	2.01	2.00	1.73	1.46	1.55	1.41
Missouri	1.10	1.51	1.46	1.50	1.65	1.58	1.20	1.65	1.50
Montana	8.69	8.71	8.91	9.00	8.00	9.50	7.49	7.08	6.89
New Mexico	5.32	4.89	4.75	0	3.18	4.32	2.01	2.00	2.25
New York	.....	.....	.....	.....	2.80	.....	.....	.....	.....
Ohio	2.50	2.92	1.99	2.18	1.95	2.78	2.40	2.58	2.48
Pennsylvania	1.40	1.91	1.82	1.80	1.52	1.086	1.266	*b*1.792	*b*1.53
Tennessee	2.03	1.96	1.93	2.05	1.85	1.64	1.90	1.84	1.81
Utah	4.00	4.36	4.50	0	.....	.....	.....	.....	.....
Virginia	2.22	1.68	1.58	2.18	2.26	1.64	1.32	1.509	1.40
Washington	8.00	8.00	7.00	7.03	5.08	3.48	4.27	4.04	4.42
West Virginia	1.76	1.83	1.83	1.76	1.62	1.373	1.34	1.37	1.31
Wisconsin	5.75	5.75	5.61	5.50	6.41	4.58	5.25	3.94	4.36
Wyoming	.....	.....	3.00	0	3.50	*c*3.50	3.50	3.00	3.00
Average	1.62	2.02	1.97	1.96	1.74	1.34	1.44	1.837	1.663

a Average value, including Utah. *b* Average value, including New York.
c Value estimated.

From this table it appears that the average value per ton of coke in the United States in 1897 was practically $1.66, which, while it was about 10 per cent less than the price in 1896, was a considerable improvement over the values realized in 1894 and 1895. The exceptionally high price in 1896 was not the result of any improvement in the trade conditions, but was due to the determination on the part of the principal producers in the Connellsville region of Pennsylvania to maintain prices at a remunerative figure, a determination which was successfully carried out. The price of Connellsville furnace coke was placed early in the year at from $1.75 to $2 per ton, with foundry at $2.30 and crushed at $2.35. These prices were maintained throughout the year with the result that the output of Connellsville coke fell off from 8,181,179 tons in 1895 to 5,462,490 tons in 1896, while the total value in the latter year was only $100,000 less than that of the much larger production in 1895. The higher price of Connellsville coke in 1896 benefited competitive regions, particularly other coke fields in Pennsylvania and the New River region of West Virginia, where

increased production was shown for the year. The average price received for all kinds of coke produced in the Connellsville region in 1896 was $1.834, practically the same as the average price for the entire United States. Prices for Connellsville coke were not so strictly maintained in 1897 and the average for the region was $1.55, a decrease of 28 cents from the average for 1896. The average price for the State of Pennsylvania fell off from $1.79 in 1896 to $1.53 in 1897, and it is observed that with one or two exceptions there was a general decrease in prices throughout the United States. The exceptions were in Alabama, where the price advanced from $2.07 to $2.14, Colorado from $2.88 to $2.916, New Mexico from $2 to $2.25, Washington from $4.04 to $4.42, and Wisconsin from $3.94 to $4.36, in all of which States the increase was due to local influences.

COAL CONSUMED IN THE MANUFACTURE OF COKE.

In the following table is given the total number of tons of coal used in the manufacture of coke in the United States for the years 1880 to 1897:

Amount of coal used in the manufacture of coke in the United States from 1880 to 1897 inclusive, by States and Territories.

[Short tons.]

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.
Alabama	106,283	184,881	261,839	359,699	413,184	507,934
Colorado	51,891	97,508	180,549	224,089	181,968	208,069
Georgia	63,402	68,960	77,670	111,687	132,113	117,781
Illinois	31,240	35,240	25,270	31,370	30,168	21,487
Indian Territory	2,494	2,852	3,266	4,150	3,084	5,781
Kansas	4,800	8,800	9,200	13,400	11,500	15,000
Kentucky	7,206	7,406	6,006	8,437	3,451	5,075
Montana	.....	.....	.....	.....	165	300
New Mexico	.....	.....	1,500	6,941	29,990	31,889
Ohio	172,453	201,145	181,577	152,502	108,164	68,796
Pennsylvania	4,347,558	5,393,503	6,149,179	6,823,275	6,204,604	6,178,500
Tennessee	217,656	241,644	313,537	330,961	348,295	412,538
Utah	2,000	.....	500	.....	.....	.....
Virginia	.....	.....	.....	39,000	99,000	81,899
Washington	.....	.....	.....	.....	700	544
West Virginia	230,758	304,823	366,653	411,159	385,588	415,533
Total	5,237,741	6,546,762	7,577,646	8,516,670	7,951,974	8,071,126

Amount of coal used in the manufacture of coke in the United States, etc.—Continued.

State or Territory.	1886.	1887.	1888.	1889.	1890.	1891.
Alabama	635,120	550,047	858,608	1,746,277	1,809,964	2,144,277
Colorado	228,060	267,487	274,212	299,731	407,023	452,749
Georgia	136,133	158,482	140,000	157,878	170,388	164,875
Illinois	17,806	16,596	13,020	19,250	9,000	10,000
Indiana	13,030	35,600	26,547	16,428	11,753	8,688
Indian Territory	10,242	20,121	13,126	13,277	13,278	20,551
Kansas	23,062	27,604	24,934	21,600	21,809	27,181
Kentucky	9,055	29,129	42,642	25,192	24,372	64,390
Missouri	.....	5,400	5,000	8,485	9,491	10,377
Montana	.....	10,800	20,000	30,576	32,148	61,667
New Mexico	18,194	22,549	14,628	7,162	3,980	4,000
New York	.....	.....	.....	.....	.....	.....
Ohio	59,332	164,974	124,201	132,828	126,921	69,320
Pennsylvania	8,290,849	8,938,438	9,673,097	11,581,292	13,046,143	10,588,544
Tennessee	621,669	655,857	630,099	626,016	600,387	623,177
Texas	.....	.....	.....	.....	.....	.....
Utah	.....	.....	.....	2,217	24,058	25,281
Virginia	200,018	235,841	230,529	238,793	251,683	285,113
Washington	1,400	22,500	.....	6,983	9,120	10,000
West Virginia	425,002	698,327	863,707	1,001,372	1,395,266	1,716,976
Wisconsin	.....	.....	1,000	25,616	38,425	52,904
Wyoming	.....	.....	.....	.....	.....	4,470
Total	10,688,972	11,859,752	12,945,350	15,960,973	18,005,209	16,344,540

State or Territory.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	2,585,966	2,015,398	1,574,245	2,459,465	2,573,713	2,451,475
Colorado	a599,200	a628,935	a542,429	a580,584	a639,238	a616,592
Georgia	158,978	171,645	166,523	118,900	109,655	67,000
Illinois	4,800	3,300	3,800	3,600	3,900	3,591
Indiana	6,456	11,549	13,489	9,898	8,956	7,022
Indian Territory	7,138	15,118	7,274	11,825	53,028	68,495
Kansas	15,437	13,645	13,288	8,424	8,940	11,772
Kentucky	70,783	97,212	66,418	63,419	55,719	64,234
Missouri	11,088	8,875	3,442	3,120	4,471	4,627
Montana	64,412	61,770	33,313	55,770	113,165	139,907
New Mexico	0	14,698	13,042	22,385	39,286	2,585
New York	.....	15,150	.....	22,207	(b)	(b)
Ohio	95,236	42,963	55,324	51,921	128,923	151,545
Pennsylvania	12,591,345	9,386,702	9,059,118	14,211,567	c11,124,610	c13,538,646
Tennessee	600,126	449,511	516,802	684,655	600,379	667,996
Texas	.....	.....	.....	530	0	700
Utah	.....	.....	.....	.....	(d)	(d)
Virginia	226,517	194,059	280,524	410,737	454,964	574,542
Washington	12,372	11,374	8,563	22,973	38,685	39,124
West Virginia	1,709,183	1,745,757	1,976,128	2,087,816	2,687,104	2,413,283
Wisconsin	54,300	24,085	6,343	8,287	8,648	29,207
Wyoming	0	5,400	8,685	10,240	41,038	54,976
Total	18,813,337	14,917,146	14,348,750	20,848,323	18,694,422	20,907,319

a Includes coal consumed in Utah.
b Included with Pennsylvania.
c Includes New York.
d Included with Colorado.

In regard to this table, it is well to repeat what has been stated in some of the previous reports. In the first place, it is to be noted that in many cases the statement as to the amount of coal used in the production of coke is an estimate. At but few works is the coal weighed before being charged into the ovens. A great deal of the coke made in the United States is from run of mine—that is, all of the product of mining, lump, nut, and slack, as it comes to the mouth of the pit in the mine car, is charged into the ovens—and if no coal is sold as coal it is comparatively easy to ascertain from the amounts paid for mining what is the amount of coal charged into the ovens. But even in such cases considerable difficulty arises, from the fact that mining is paid for by the measured bushel or ton of so many cubic feet, while our statistics are by weight, and the measured bushel or ton is often not the equivalent of the weighed bushel or ton. It is also true that in certain districts where the men are paid by the car the car contains, even of measured tons, more than the men are paid for. Under such circumstances it is not to the interest of the operator to weigh the coal as it is charged into the oven.

Further, in many districts coke making is simply for the purpose of utilizing the slack coal produced in mining or that which falls through the screen at the tipple when lump is sold. In such cases the slack is rarely, if ever, weighed as it is charged into the ovens, so that any statement as to the amount of coal used at such works will be an estimate. At some works the coal is often weighed for a brief period, and, the coke being weighed as it is sold, a percentage of yield is ascertained which is used in statements as to the amount of coal used and the yield of this coal in coke.

Great care has been exercised, in view of these facts, to reach a satisfactory estimate as to the amount of coal used in the production of coke, as given in the table immediately preceding, and the percentage yield of coal in coke as shown in the table next subsequent. Analyses of coals from most of the districts in the United States have been secured. These analyses, checked by information otherwise received as to the methods of coking in each district, have made it possible to reach a conclusion as to whether the returns made were approximately correct or not. Where it has been judged that they were incorrect, correspondence has usually led to revision. It is sometimes the custom of coke manufacturers who do not weigh the coal charged into the ovens to estimate that the yield of coke is equal to the percentage of the fixed carbon and ash in the coal. A report from a certain coke works showed a yield of 77 per cent. This was equal to the average amount of fixed carbon and ash in the coal. Further inquiry developed the fact that at other mines in this district, using the same character of coal, the yield as reported varied from 50 to 66 per cent. Upon the attention of the party making the return being called to these facts, the yield was reduced from 77 to 63 per cent. As coke is sold by weight, it has always

been assumed that the report of production of coke was accurate, and where the coal was not weighed, the yield of coal in coke being ascertained, a calculation could be made which would show approximately the amount of coal used.

But even under these conditions it is believed that more coal was actually used in the production of coke in each of the years covered by the above table than is shown.

It will also be observed that the amounts given in the above table differ materially from the figures given for the amount of coal made into coke which appear in the report on the production of coal—a separate chapter of this volume. In explanation of this it may be stated that this item in the coal report includes only such coal as is made into coke at the mines, and does not consider the coal which is first shipped to a point distant from the mines and there charged into the ovens. Such coal would be included in the shipments. For instance, the amount of coal made into coke in Alabama during 1897 was 2,451,475 tons, whereas in the report on the production of coal the amount of coal made into coke at the mines is given at only 1,137,196 tons. Similarly, in Pennsylvania the coal made into coke amounted to 13,583,646 tons, only 11,968,392 tons of which were made into coke at the mines.

The amount of coal necessary to produce a ton of coke, assuming that the above tables are approximately correct, was as follows:

Coal required to produce a ton of coke, in tons or pounds.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1880	1.57	3,140	1889	1.55	3,100
1881	1.59	3,180	1890	1.56	3,120
1882	1.58	3,160	1891	1.58	3,160
1883	1.56	3,120	1892	1.57	3,140
1884	1.63	3,260	1893	1.57	3,140
1885	1.58	3,160	1894	1.56	3,120
1886	1.56	3,120	1895	1.56	3,120
1887	1.56	3,120	1896	1.58½	3,170
1888	1.51	3,020	1897	1.57	3,140

The following table exhibits the percentage yield of coal in the manufacture of coke for the years 1880 to 1897, inclusive. By the "yield" is meant the percentage of the constituents of the coal that remains as coke after the process of coking. The table shows that the general average for most of the years given is about 64 per cent, but it is believed that even this is a little too high. It is not possible to acquire exact information on this point, for the reason that in many instances the coal is not weighed before being charged into the ovens. As stated in regard to the table showing the amount of coal made into

coke, the percentage yield, like the amount, is largely estimated. Probably the actual yield of coke throughout the United States, if the actual weight of the coal charged into the ovens and the actual weight of the coke drawn had been taken, would not have exceeded 60 or 61 per cent.

Percentage yield of coal in the manufacture of coke in the United States in the years 1880 to 1897, inclusive, by States and Territories.

State or Territory.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.
Alabama	57	59	58	60	60	59	59	59	60
Colorado	49	50	57	60	64	63	62.6	64	65.6
Georgia	60	60	60	60	60	60	60	50	60
Illinois	41	42	45	43	43	48	46	55.5	56.9
Indiana	0	0	0	0	0	0	47	50	45
Indian Territory	62	62	62	62	62	62	62	50	57
Kansas	64	64.4	65	62.9	62.3	53.7	54.2	54	59
Kentucky	60	60	59	60	64	53	50	50	54
Missouri	0	0	0	0	0	0	0	55	52
Montana	0	0	0	0	46	58.5	0	66.7	60
New Mexico	0	0	66.7	57.3	57.5	56.3	56	61	58
Ohio	58	59	57	58	58	57	59	56	54
Pennsylvania	65	64	64	65	62	64.6	65.2	65.3	68
Tennessee	60	60	60	62	63	53	59	61	61
Texas	0	0	0	0	0	0	50	0	0
Utah	50	0	50	0	0	0	0	0	0
Virginia	0	0	0	64.5	64.3	60	61.1	70.8	64.7
Washington	0	0	0	0	57.5	57	58.9	65	0
West Virginia	60	61	63	63	62	63	62	63.3	61.6
Wisconsin	0	0	0	0	0	0	0	0	50
Wyoming	0	0	0	0	0	0	0	0	0
Total average	63	63	63	64	61	63	64	64.2	66

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Alabama	59	59	60	58	50	58.7	58.7	57.5	58.8
Colorado	63	60	61	63.9	a57.7	a58.5	a58.6	a56.9	a55.6
Georgia	60	60	62.5	51.5	52.8	55.9	50.6	49	49.3
Illinois	60	55	52	66	66.7	57.9	62.5	66.7	43
Indiana	51	51	44	49.7	49.6	48.6	48.5	49	41.4
Indian Territory	50	50	46	50	47	42	43.8	40	44.3
Kansas	64	56	52	59.2	62.8	63.5	62.8	53.5	52.5
Kentucky	52	51	52	51	50	44.8	40.1	48.6	50
Missouri	62	65	66	65.8	66.5	65.4	65	55.9	56
Montana	46	45	47	53.6	48.5	52.2	45.4	53	48.5
New Mexico	48	51.5	57.5	0	39.5	50	65.5	61.7	55.6

a Average, including Utah.

Percentage yield of coal in the manufacture of coke in the United States, etc.—Continued.

State or Territory.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
New York	.....	.....	.....	.....	84.8	.....	83.4	.....	.....
Ohio	56	59	56	54.4	52	59	56	62.7	62.7
Pennsylvania	66	65	66	66.1	66	66.9	66.2	*a*66.1	*a*66.2
Tennessee	57	58	58	59	59	56.6	57.9	56.5	55
Texas	0	0	0	0	0	0	54	0	56.3
Utah	34	35	31	.....	.....	.....	.....	.....	.....
Virginia	61	66	58.8	65.3	64.5	64.2	59.6	58.9	61.6
Washington	55	64	60	58	59	61.2	65.9	67	67
West Virginia	61	59	58.8	60.5	60.8	60.4	61.6	61.4	61
Wisconsin	62.5	65	65	62.2	62	67	60	62	59
Wyoming	0	0	60	0	54	50	47.8	47.6	43.7
Total average.	64	64	63	64	63.5	64	64	63	63.5

a Average, including New York.

AMOUNT AND VALUE OF COAL USED IN COKE MAKING.

In the following tables is given a statement of the amount and value of the coal used in the manufacture of coke in the United States during the last three years, and also the amount of coal necessary to produce one ton of coke, together with the value of the coal used to make one ton of coke. The average price per ton of coal used in 1897 was 63 cents, against 65.9 cents in 1896 and 66 cents in 1895. It can be seen from this that the higher price of coke in 1896 and its lower price in 1897 were not due to any advance or decline in the value of the coal used in its manufacture, except possibly in Alabama, where the value of the coal to a ton of coke increased from $1.385 in 1896 to $1.42 in 1897; in New Mexico, where it advanced from $1.07 to $1.58, and in Washington, where it advanced from $2.67 to $2.95. In the other two States where the prices for coke were higher in 1897 the value of the coal to a ton of coke was less. In Colorado the value of coal per ton decreased from 94 cents in 1896 to 71.6 cents, and the value of coal to a ton of coke decreased from $1.65 to $1.29, while the price of coke advanced from $2.88 to $2.916. In Wisconsin the value of the coal declined from $2 to $1.88 per ton, the value of the coal in a ton of coke from $3.24 to $3.20, and the value of the coke advanced from $3.94 to $4.36.

In 1895 the average value of the coal in a ton of coke was $1.03, while the average price of the coke was $1.44, a difference of 41 cents. In 1896 the value of the coal in a ton of coke was $1.04, only one cent more than it was in 1895, while the average price per ton of coke was $1.84, a difference of 80 cents between the value of the coal used

in the coke and the coke made from it. In 1897 the average value of the coal used to a ton of coke was 99 cents, a decline of 5 cents from 1896, while the average price per ton of coke was $1.66, a difference of 67 cents between the value of the coal and the coke made from it.

Taking the six most important producing States, we find that in Pennsylvania the value of the coal used in making a ton of coke in 1897 was 87 cents and the price of coke $1.53, a difference of 66 cents, or 76 per cent. In West Virginia the value of the coal used in a ton of coke was 87 cents and the average price for coke $1.31, the coke being worth 50 per cent more than the coal charged into the ovens. In Alabama the value of the coal was $1.42 and that of the coke $2.14, a difference of 50 per cent. In Virginia the coal was worth 89 cents and the coke $1.40, a difference of 57 per cent. In Tennessee the difference between the value of the coal and the value of the coke was only 27 per cent, the figures being $1.42 and $1.81, respectively. In Colorado the difference was 126 per cent, the value of the coal being $1.29 and that of the coke $2.916, a difference of $1.626.

Amount and value of coal used in the manufacture of coke in the United States in 1897, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	Short tons.			*Short tons.*	
Alabama	2,451,475	$2,047,975	$0.83½	1.70	$1.42
Colorado (*a*)	616,592	441,450	.716	1.80	1.29
Georgia	67,000	33,500	.50	2.03	1.02
Illinois	3,591	1,436	.40	2.32	.93
Indiana	7,022	3,511	.50	2.49	1.25
Indian Territory	68,495	57,581	.84	2.25	1.89
Kansas	11,772	5,886	.50	1.90	.95
Kentucky	64,234	12,621	.20	2.00	.40
Missouri	4,627	2,698	.583	1.78	1.04
Montana	139,907	301,046	2.15	2.06	4.43
New Mexico	2,585	2,282	.88	1.80	1.58
Ohio	151,545	141,197	.93	1.59	1.48
Pennsylvania (*b*)	13,538,646	7,825,569	.578	1.51	.87
Tennessee	667,996	525,755	.787	1.81	1.42
Texas	700	.....	.....	1.78	.....
Virginia	574,542	315,986	.55	1.62	.89
Washington	39,124	77,377	1.98	1.49	2.95
West Virginia	2,413,283	1,290,468	.53	1.64	.87
Wisconsin	29,207	55,000	1.88	1.70	3.20
Wyoming	54,976	43,980	.80	2.29	1.83
Total and averages.	20,907,319	13,185,318	.63	1.57	.99

a Figures given for Colorado include the statistics of Utah.
b Figures given for Pennsylvania include the statistics of New York.

Amount and value of coal used in the manufacture of coke in the United States in 1896, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	Short tons.			*Short tons.*	
Alabama	2,573,713	$2,049,732	$0.796	1.74	$1.385
Colorado (*a*)	639,238	601,362	.94	1.76	1.65
Georgia	109,655	54,827	.50	2.04	1.02
Illinois	3,900	975	.25	1.50	.375
Indiana	8,956	4,360	.49	2.06	1.01
Indian Territory	53,028	43,257	.816	2.52	2.056
Kansas	8,940	4,170	.466	1.87	.87
Kentucky	55,719	14,521	.26	2.06	.536
Missouri	4,471	2,520	.56	1.79	1.00
Montana	113,165	194,747	1.72	1.88	3.23
New Mexico	39,286	25,918	.66	1.62	1.069
Ohio	128,923	130,755	1.01	1.59	1.606
Pennsylvania (*b*)	11,124,610	6,957,038	.625	1.51	.944
Tennessee	600,379	438,212	.73	1.77	1.29
Virginia	454,964	282,926	.62	1.70	1.05
Washington	38,685	69,420	1.79	1.49	2.67
West Virginia	2,687,104	1,394,827	.519	1.63	.846
Wisconsin	8,648	17,207	2.00	1.62	3.24
Wyoming	41,038	28,727	.70	2.10	1.47
Total and averages.	18,694,422	12,315,501	.659	1.585	1.04

a Figures given for Colorado include the statistics of Utah.
b Figures given for Pennsylvania include the statistics of New York.

Amount and value of coal used in the manufacture of coke in the United States in 1895, and amount and value of same per ton of coke.

State or Territory.	Coal used.	Total value of coal.	Value of coal per ton.	Amount of coal per ton of coke.	Value of coal to a ton of coke.
	Short tons.			*Short tons.*	
Alabama	2,459,465	$2,153,233	$0.875	1.70	$1.49
Colorado (*a*)	580,584	568,067	.978	1.70	1.66
Georgia	118,900	77,285	.65	1.97	1.28
Illinois	3,600	900	.25	1.60	.40
Indiana	9,898	4,749	.48	2.06	.99
Indian Territory	11,825	2,956	.25	2.28	.57
Kansas	8,424	3,555	.42	1.59	.67
Kentucky	63,419	12,841	.20	2.49	.50
Missouri	3,120	1,248	.40	1.54	.62
Montana	55,770	146,967	2.64	2.20	5.81
New Mexico	22,385	12,024	.537	1.53	.82
Ohio	51,921	50,593	.97	1.79	1.74
Pennsylvania	14,211,567	8,752,418	.616	1.51	.93
Tennessee	684,655	518,401	.757	1.73	1.31
Virginia	410,737	271,056	.66	1.68	1.11
Washington	22,973	43,532	1.89	1.52	2.87
West Virginia	2,087,816	1,126,161	.539	1.62	.87
Wisconsin	8,287	19,474	2.35	1.67	3.92
Wyoming	10,240	7,680	.75	2.09	1.57
Total and averages.	20,825,586	13,773,140	.66	1.56	1.03

a Figures given for Colorado include the statistics of Utah.

CONDITION IN WHICH COAL IS CHARGED INTO OVENS.

In the following table will be found a statement of the condition of coal when charged into ovens—that is, whether it is run of mine, slack, washed, or unwashed. The tables for 1897, 1896, and 1895 are given. The headings explain themselves. It is only necessary to state that run of mine, washed, includes that run-of-mine coal which is crushed before being washed.

Character of coal used in the manufacture of coke in 1897.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Alabama	902,310	120,420	91,200	1,337,545	2,451,475
Colorado (*a*)	0	0	393,214	223,378	616,592
Georgia	0	67,000	0	0	67,000
Illinois	0	0	3,591	0	3,591
Indiana	0	0	0	7,022	7,022
Indian Territory	0	6,923	0	61,572	68,495
Kansas	0	0	11,772	0	11,772
Kentucky	4,176	0	0	60,058	64,234
Missouri	0	0	4,627	0	4,627
Montana	0	75,000	0	64,907	139,907
New Mexico	0	0	2,585	0	2,585
Ohio	92,192	0	29,353	30,000	151,545
Pennsylvania (*b*)	11,540,459	301,052	1,441,611	255,524	13,538,646
Tennessee	36,485	400,166	119,755	111,590	667,996
Texas	0	0	0	700	700
Virginia	286,158	0	227,363	61,021	574,542
Washington	0	39,124	0	0	39,124
West Virginia	373,205	28,145	1,800,528	211,405	2,413,283
Wisconsin	0	0	0	29,207	29,207
Wyoming	0	0	54,976	0	54,976
Total	13,234,985	1,037,830	4,180,575	2,453,929	20,907,319

a Includes Utah's consumption of coal.
b Includes coal coked in New York.

Character of coal used in the manufacture of coke in 1896.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Alabama	1,292,191	70,125	51,674	1,159,723	2,573,713
Colorado (*a*)	143,604	0	378,776	116,858	639,238
Georgia	0	109,655	0	0	109,655
Illinois	0	0	0	3,900	3,900
Indiana	0	0	0	8,956	8,956
Indian Territory	0	0	0	53,028	53,028
Kansas	0	0	8,940	0	8,940
Kentucky	16,271	0	0	39,448	55,719
Missouri	0	0	4,471	0	4,471
Montana	0	50,000	0	63,165	113,165
New Mexico	0	0	39,286	0	39,286
Ohio	88,616	0	24,325	15,982	128,923
Pennsylvania (*b*)	9,289,089	273,082	1,463,047	99,392	11,124,610
Tennessee	0	206,319	219,231	174,829	600,379
Virginia	70,756	0	370,624	13,584	454,964
Washington	0	20,967	0	17,718	38,685
West Virginia	407,378	33,096	2,079,237	167,393	2,687,104
Wisconsin	0	0	5,183	3,465	8,648
Wyoming	0	0	41,038	0	41,038
Total	11,307,905	763,244	4,685,832	1,937,441	18,694,422

a Includes Utah's consumption of coal.
b Includes coal coked in New York

Character of coal used in the manufacture of coke in 1895.

State or Territory.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Alabama	1,208,020	0	32,068	1,219,377	2,459,465
Colorado (*a*)	119,868	0	453,597	7,119	580,584
Georgia	0	118,900	0	0	118,900
Illinois	0	0	0	3,600	3,600
Indiana	0	0	0	9,898	9,898
Indian Territory	0	0	0	11,825	11,825
Kansas	0	0	8,424	0	8,424
Kentucky	0	502	624	62,293	63,419
Missouri	0	0	3,120	0	3,120
Montana	0	0	0	55,770	55,770
New Mexico	10,000	0	12,385	0	22,385
New York	0	0	22,207	0	22,207
Ohio	28,053	0	10,868	13,000	51,921
Pennsylvania	13,618,376	34,728	440,869	117,594	14,211,567
Tennessee	96,744	59,284	285,906	242,721	684,655
Texas	0	0	0	530	530
Virginia	114,802	0	295,935	0	410,737
Washington	0	0	0	22,973	22,973
West Virginia	405,725	24,054	1,476,003	182,034	2,087,816
Wisconsin	8,287	0	0	0	8,287
Wyoming	0	0	10,240	0	10,240
Total	15,609,875	237,468	3,052,246	1,948,734	20,848,323

a Including Utah's consumption.

From the above tables it is shown that 68.3 per cent of the total amount of coal used in making coke in 1897 was run of mine; in 1896 it was 64.6 per cent, and in 1895 it was 76 per cent. A notable increase is observed in the amount of washed coal charged into the ovens. In 1895, when 15,609,875 tons of unwashed run-of-mine coal were used, the washed run of mine was only 237,468 tons. In 1897 the amount of unwashed run-of-mine coal used was 13,234,985 tons, while the washed run of mine was 1,037,830 tons. The washed slack coal used in 1897 was about 500,000 tons more than the same character of coal used in either 1895 or 1896. The percentage of the total amount of washed coal used increased from 10.5 in 1895 to 14 in 1896 and 16.7 in 1897

In the following table the statistics regarding the character of the coal for the years 1890 to 1897, inclusive, are consolidated:

Character of coal used in the manufacture of coke in the United States since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	14,060,907	338,563	2,674,492	931,247	18,005,209
1891	12,255,415	290,807	2,945,359	852,959	16,344,540
1892	14,453,638	324,050	3,256,493	779,156	18,813,337
1893	10,306,082	350,112	3,049,075	1,211,877	14,917,146
1894	9,648,750	405,266	3,102,652	1,192,082	14,348,750
1895	15,609,875	237,468	3,052,246	1,948,734	20,848,323
1896	11,307,905	763,244	4,685,832	1,937,441	18,694,422
1897	13,234,985	1,037,830	4,180,575	2,453,929	20,907,319

IMPORTS.

The following table gives the quantities and value of coke imported and entered for consumption in the United States from 1869 to 1897, inclusive. In the reports of the Treasury Department the quantities given are long tons. These have been reduced to short tons to make the tables consistent with the other tables in this report:

Coke imported and entered for consumption in the United States, 1869 to 1897, inclusive.

Year ending—	Quantity.	Value.	Year ending—	Quantity.	Value.
	Short tons.			*Short tons.*	
June 30, 1869		$2,053	June 30, 1884	14,483	$36,278
1870		6,388	1885	20,876	64,814
1871		19,528	Dec. 31, 1886	28,124	84,801
1872	9,575	9,217	1887	35,320	100,312
1873	1,091	1,366	1888	35,201	107,914
1874	634	4,588	1889	28,608	88,008
1875	1,046	9,648	1890	20,808	101,767
1876	2,065	8,657	1891	50,753	223,184
1877	4,068	16,686	1892	27,420	86,350
1878	6,616	24,186	1893	37,183	99,683
1879	6,035	24,748	1894	32,566	70,359
1880	5,047	18,406	1895	29,622	71,366
1881	15,210	64,987	1896	43,372	114,713
1882	14,924	53,244	1897	34,937	98,077
1883	20,634	113,114			

DEVELOPMENT OF BY-PRODUCT COKE MAKING.

Coke making in the United States may be said to be at the beginning of a new era. There is not going to be any revolution, nor any unsettling of existing conditions by the development of the by-product systems of coke making, whose progress in this country is shown in the statistics presented in these reports. It has become the habit of late to designate the prevalent method of coke making in this country as the "wasteful" beehive oven, and to criticise unfavorably the action of producers for not only failing to save the valuable contents of the coal, but also for the pollution of the atmosphere by the smoke and gases given off. In many cases the latter is the stronger objection. It is not to be doubted that men and corporations who have millions of dollars invested in coal lands, mines, and coking plants will employ such methods in their business as will make the best returns. When we speak of the beehive oven as a wasteful method of producing coke we must take into consideration, first, the initial cost of the plant for saving the by-products; second, the increased cost, if any, of operation and maintenance; and third (which is very important), a profitable market for the products. If our great coke-producing regions were in a vicinity where the gas produced in the process could be readily and profitably disposed of for manufacturing or domestic purposes there is no doubt that by-product plants would rapidly displace the bee-hive oven. The remoteness of the coking districts from markets for consumption will cause the development of by-product coke making to be a thing of gradual growth. Profitable markets will have to be developed for the by-products; and it must also be considered that increased supplies of fuel gas, tar, and ammonia—the principal by-products—will necessarily depress prices.

The new era upon which coke making in the United States is entering was inaugurated by the construction of 12 Semet-Solvay ovens at Syracuse, New York. They were begun in 1891 and completed in 1893. They are operated in connection with the Solvay Process Soda Works in that city, and the ammonia is collected for use in making soda ash, while it is an easy matter to dispose of the tar and gas. Thirteen more of the same style of ovens were added to this plant in 1896, and they have all been in steady operation ever since. The 12 ovens built in 1893 may be considered in the way of experimental work, for it is noticed that no by-product ovens were begun in either 1893 or 1894, and it was not until 1895 that the additional 13 ovens were begun at Syracuse. The successful operations of these ovens at Syracuse having been demonstrated, two more banks of ovens, in addition to the 13 at that place, were begun in the same year. One of these, a bank of 25 ovens, was begun at Sharon, in Mercer County, Pennsylvania; the other, consisting of 50 ovens, was begun at Dunbar, in Fayette County. Both of these plants were completed and began making coke in 1896.

In 1895 was also begun the initial plant of Otto-Hoffmann by-product ovens at Johnstown, Pennsylvania. These were also completed in 1896. In the same year (1895) the construction of 30 Newton-Chambers ovens was begun at Latrobe, Pennsylvania, which were likewise completed in 1896. These ovens are simply beehive ovens, with apparatus for saving the by-products, and the heat of the coking process is generated in the oven itself. In the other two systems mentioned the heat is generated in flues outside of the coking chamber, the Semet-Solvay having the flues set horizontally and the Otto-Hoffmann having vertical flues. The details of the principles upon which these ovens are operated have been fully described in previous volumes of Mineral Resources, by contributions to the technical press, and by papers presented before technical societies. It is not considered necessary, therefore, to repeat such descriptions in this report.

Among the 383 ovens building at the close of 1896 there were 120 Otto-Hoffmann by-product ovens in the Pittsburg district. These, and the completion of the 88 Semet-Solvay ovens, the 60 Otto-Hoffmann ovens at Johnstown, and 30 Newton-Chambers ovens, together with a small experimental plant of 3 Slocum ovens at Bolivar, Pennsylvania, completed the record for the year. In 1897 we find that 120 ovens of the Otto-Hoffmann type have been completed in the Pittsburg district and 400 more are reported in course of construction, near Boston, Massachusetts, in the summer of 1898. No Semet-Solvay ovens were completed in 1897, but the close of the year finds 120 of this type building at Ensley, Alabama, while preparations are reported as making for the erection of 75 more at Wheeling, West Virginia.

From the foregoing it is seen that at the close of 1897 there were 310 by-product ovens in active operation and 195 in course of construction or contemplated. These do not include what is promised to be the most extensive operations of this kind yet proposed. Reference is here made to the plant at Everett, Massachusetts, the plans for which have been laid for some time, but upon which no actual building was done until the spring of 1898. It is stated that the plant at completion will consist of 1,200 Otto-Hoffmann ovens, 400 of which are in course of construction at the time of writing this report, July, 1898. The work is being carried on by the New England Coke and Gas Company, and it was inaugurated for the purpose of utilizing Nova Scotia coal, in which mines a large amount of American capital is invested. Contracts have already been made for the disposal, in the city of Boston, of all the gas produced.

It is to be observed that in every instance presented the by-product plants have been located where the gas produced and not consumed in the process can be profitably disposed of, while at Syracuse the ammonia also is immediately consumed. At Dunbar are extensive ironworks in which the gas can be used for fuel. The locomotive-tire works at Latrobe can use the surplus fuel gas produced at the Newton-Chambers ovens at that place. At Johnstown and along the Monongahela River

near Pittsburg the gas is readily disposed of, the declining supply of natural gas making a supply of by-product fuel gas a desirable factor.

The new era in coke making, consequently, upon which we are entering, does not mean a change in methods only. It means also the gradual shifting of the coke-making industry from the remote mining regions to the centers of industrial activity. The railroad companies will haul less in bulk but more in weight. Fuel gas will be largely substituted for coal in iron works, and not only will the country around the present coking regions be eventually cleared of its smoke-laden atmosphere, but cities like Pittsburg, Cleveland, Chicago, etc., will be supplied with smokeless fuel for domestic and manufacturing purposes.

In the chapter on the production of coal comment is made on the inroads which the use of gas and coke for domestic purposes is making upon the anthracite coal trade in the Eastern cities. The eventual construction of by-product coke plants in the near vicinity of New York, Philadelphia, Baltimore, etc., may be expected to follow the demonstration of the success of the plant at Everett, Mass. The preparation of coke for domestic use has not waited for the development of the by-product ovens. Large producers of bee-hive coke in the Connellsville region have extensive plants for crushing the product and separating it into sizes for domestic use. In the heated summer months, when a quick, hot fire in cooking ranges is desirable, the use of coke has been found most satisfactory, and its use is growing. Gas is also largely used for this purpose. It is evident, therefore, that the by-product coke-makers will not have to give all their attention to the preparation of a metallurgical coke, nor depend entirely upon manufacturing industries for their market.

The late Joseph D. Weeks was greatly interested in the subject of by-product coke making, and devoted a large amount of time and labor to collecting information in regard to it. As an accredited representative of the United States Geological Survey, Mr. Weeks paid two visits to Europe for the purpose of studying the methods in operation there and to ascertain the results obtained. Every courtesy was extended Mr. Weeks by the operators of by-product coking establishments, some going so far as to give him access to their books and allowing him to take abstracts from them. Unfortunately, Mr. Weeks's sudden death, in December, 1896, occurred before he was able to publish in full the results of his investigations, and just at the time when the introduction of by-product ovens, for which he had contended so earnestly and faithfully for several years, was being successfully accomplished.

A portion of the results of Mr. Weeks's investigations have been published. This paper refers principally to the amount and value of the by-products obtained, not from laboratory tests, but from practical operations on a commercial scale. Mr. Weeks estimated that, considing the prices for tar, ammonia, and the excess gas [1] at that time (1895),

[1] By "excess" gas is meant that in excess of the amount consumed in coking.

the value of the by-products amounted to about 65 or 70 cents to the ton of coke. The amounts and values of the by-products vary of course with the quality of the coal. In his report for 1894, written and published in 1895, Mr. Weeks placed the contents of by-products in Connellsville coal at 1 to 1.2 per cent—say, 20 pounds—of sulphate of ammonia; from 3 to 3.5 per cent—say, 60 to 70 pounds—of tar; and from 1 to 1.75 per cent of benzole. The amount of gas produced will vary greatly. Mr. Weeks placed the amount of Connellsville coal at 8,000 cubic feet of gas per ton of coal. About 50 per cent of the gas is used in generating the heat in the coking process, so that, say, 4,000 cubic feet of excess gas would be available for revenue. In the Pocahontas coal these constituents would be much less, as this coal is low in volatile gases, running from 18 to 20 per cent of volatile matter, as compared with from 28 to 34 per cent in Connellsville, and the percentage of fixed carbon or coke being proportionately higher.

The foregoing figures regarding the by-products, quoted from Mr. Weeks, are taken per ton of coal. As it requires about 1½ tons of coal to produce 1 ton of coke, the by-products per ton of coke would be about 50 per cent more than the estimates given. In his report for 1894, from which these figures are taken, Mr. Weeks said: "A complete report on the various forms of the by-product ovens will be given in a supplementary report." In this Mr. Weeks doubtless referred to the records made at the by-product plants which he visited in Europe, and it is this report which Mr. Weeks never finished. In conversation with the writer, however, he stated that at a number of places he visited the revenue received from the by-products paid all the expenses connected with mining, transporting, and coking the coal (including royalties), and that the resultant coke was net profit to the producer.

As the Otto-Hoffmann and the Semet-Solvay ovens represent the principal systems so far adopted in this country, the following statistics regarding the use of the same ovens in other countries will be found of interest:

In Germany the Otto-Hoffmann oven is largely used, while the Semet-Solvay ovens have their greatest development in Belgium. At the close of 1897, according to the Colliery Guardian, of London, England, there were 729 Semet-Solvay ovens in operation and 412 in course of construction, a total of 1,141, exclusive of those in the United States. These included 135 in Great Britain, 25 in Lorraine, 16 in Japan, and 55 in northern France. The remainder are all said to be in Belgium, which, according to this, would seem to be the home, as it is the place of invention, of the Semet-Solvay oven.

In the Journal für Gasbeleuchtung und Wasserversorgung (Munich) the following résumé is given of the actual work of a battery of 60 Otto-Hoffmann ovens operating with local coals in the three principal mining districts of Germany:

One ton of coal produces, in the Ruhr district—coke, 1,672 pounds; tar, 60.5 pounds; sulphate of ammonia, 25.3 pounds. In Silesia—coke,

1,496 pounds; tar, 93.5 pounds; sulphate of ammonia, 26.4 pounds. In the Saar—coke, 1,540 pounds; tar, 91.3 pounds; sulphate of ammonia, 18.7 pounds.

The yearly product of 60 ovens is, in the Ruhr—coke, 51,300 tons; tar, 1,860 tons; sulphate of ammonia, 780 tons. In Silesia—coke, 48,000 tons; tar, 3,000 tons; sulphate of ammonia, 840 tons. In the Saar—coke, 40,500 tons; tar, 2,400 tons; sulphate of ammonia, 492 tons.

The generation, consumption, and surplus of gas for one oven per day are as follows: In the Ruhr—production, 32,000 cubic feet; consumption, 19,200 cubic feet; surplus, 12,800 cubic feet. In Upper Silesia—production, 36,800 cubic feet; consumption, 20,800 cubic feet; surplus, 16,000 cubic feet. In Saar—production, 32,000 cubic feet; consumption, 19,200 cubic feet; surplus, 12,800 cubic feet.

A battery of 60 ovens, working under the above conditions, is computed to furnish gas for their own heating, and yield a surplus of from 760,000 to 960,000 cubic feet per day to be used for other purposes. It is reckoned in practice that 3,200 cubic feet of this surplus coke gas is equivalent, for purposes of heating, to 193.5 pounds of coal; and the saving of fuel in working 60 coke ovens would therefore be: In the Ruhr, 21 tons per day and 7,560 tons per year; in Silesia, 26.25 tons per day and 9,450 tons per year; in the Saar, 21 tons per day and 7,560 tons per year.

Since, however, the Otto-Hoffmann oven involves also the use of the other appliances which require heat to the extent of one-third the amount saved in the form of gas, it follows that the actual economy in fuel is about two-thirds of the above totals expressed in coal. Add to this saving of coal the two by-products—sulphate of ammonia, worth in the market 2.35 cents per pound, and tar, worth about 0.2 cent per pound, and the profits which are claimed for this system do not appear incredible.

From another and trustworthy source it is announced that the revenue actually derived from the tar and ammonia produced by one year's working of a group of 60 ovens in Westphalia, which cost in construction $2,805 each, was about 25 per cent on the capital invested in the plant.

It is to be regretted that similar statistics from actual records regarding the operations of Semet-Solvay ovens are not available. Dr. William L. Dudley, in an address before the Engineering Association of the South, stated that the first cost of a Semet-Solvay oven, including the necessary ammonia condensers, was about $3,100, as against $325 for the ordinary beehive oven. The advantages claimed for the Semet-Solvay oven are: (1) long life of the oven itself, as it will last for ten years with very little repairing, whereas the beehive oven requires extensive repairs after a few years' use; (2) increase in product of coke, the Semet-Solvay oven coking 4 tons of coal every twenty-four hours, while the beehive oven will coke only 2 tons every forty-eight or sev-

enty-two hours; (3) better quality of coke, shown by a test in which 1,621 pounds of Semet-Solvay coke were used in producing a ton of pig iron, against 2,160 pounds of beehive coke to the ton of iron; (4) the by-products, which, according to Dr. Dudley, are, per ton of coal, 9.88 pounds of sulphate of ammonia, 43.5 pounds of coal tar, and about 5,000 cubic feet of excess gas—worth altogether about 48 cents per ton of coke.

While there are no available statistics of the results obtained at a plant of Semet-Solvay ovens for a given length of time and operated under normal conditions, Mr. R. M. Atwater, secretary of the Semet-Solvay Company, has kindly furnished the following statement of the results obtained from one Semet-Solvay oven under operation continuously for one year, using standard coal.

Record of one Semet-Solvay oven for one year.

Coal charged into oven	short tons	1,600
Coke produced	do	1,150
Total gas produced	cubic feet	16,000,000
Gas used by ovens	do	10,000,000
Surplus gas available for other purposes	do	6,000,000
Tar produced	gallons	16,000
Ammonia produced as sulphate	short tons	16

Mr. Atwater has also permitted the use of the manuscript of a pamphlet about to be issued by the Semet-Solvay Company, from which the following has been abstracted:

The Semet-Solvay retort coke oven is primarily the invention of Mr. L. Semet, an engineer and director of Solvay & Co., of Brussels, Belgium. Since its first installation in Belgium, in 1882, it has been constantly improved in detail and perfected in operation. It has been adopted with favor in all the leading countries engaged in coal and iron production, as the following table shows:

Number and capacity of Semet-Solvay ovens in operation and under construction.

Country.	Plants.	Ovens.	Volatile contents of the coal.	Annual capacity in production of coke.
			Per cent.	*Tons.*
Belgium	10	579	16 to 21	663,000
England	11	370	30 to 35	416,000
America	7	*a* 297	30 to 35	337,000
France	4	155	22 to 25	190,000
Germany	2	97	20 to 22	97,000
Japan	1	16	.....	16,000
Total	35	1,514	.....	1,719,000

a Including ovens built and building.

This wide acceptance of the system is the best assurance that the retort coke oven is no longer an experimental device.

In January, 1892, the Solvay Process Company put into operation the first block of retort ovens in this country, at Syracuse, New York. The distrust with which the innovation was regarded slowly gave way to appreciation. In 1895 a plant of 50 ovens was installed at Dunbar, Pennsylvania; in 1896 a plant of 25 ovens at Sharon, Pennsylvania; in 1897 plants of 60 ovens at Wheeling, West Virginia; 130 ovens at Ensley, Alabama; 10 ovens at Halifax, Nova Scotia, and 7 ovens in Boston, Massachusetts. The plant at Syracuse has been in uninterrupted operation for over five years. The operations of the later plants have all been for five years. They have all been satisfactory and arrangements are being made to increase their capacity. The product of these plants is blast-furnace and foundry coke of satisfactory quality for the best metallurgical work in the Bessemer and foundry iron furnaces.

The People's Heat and Light Company of Halifax, Nova Scotia, has recently completed a block of 10 modified Semet-Solvay ovens. Prof. Robert H. Richards, of the Massachusetts Institute of Technology, visited the plant early in the summer of the present year, and has kindly furnished the following brief description: Each oven is 5 feet 6 inches high, widens from 16 inches to 17 inches wide away from the ram and is 30 feet long. The time of coking in these ovens is from twenty to twenty-four hours. The Cape Breton coal yields 8,500 to 9,500 cubic feet of gas per ton, and 75 per cent of good quality of coke.

The plant makes 37 short tons of coke per day, producing a total of 310,000 cubic feet of gas, of which 100,000 cubic feet are sold as illuminating gas for the city of Halifax, while 40,000 cubic feet are sold as heating gas, and 170,000 cubic feet are consumed under the ovens. The tar and ammonia liquors are saved and sold.

In regard to the gas, the scheme is to send the earlier portions of the gas into the holders which distribute illuminating gas, and the moment the candle power of the gas that is being generated falls below 16, the gas is turned into the fuel gas holder. The fuel gas has a candle power of about 8½.

The process appears to be one of the most satisfactory yet produced for furnishing good coke and good illuminating gas, practically without enrichment, and a fuel gas of sufficiently high calorific power, and at the same time it completely does away with the smoke nuisance for any city that will adopt it.

THE COKING INDUSTRY, BY STATES.

ALABAMA.

Since 1880 Alabama has stood within the first five of the coke-producing States. In two years only (1880 and 1881) was she so low as fifth place. In 1882 Alabama advanced to fourth place; in 1883 to third place, and in 1884 to second place. Once since then (in 1887) the State has fallen back to fourth place and four times to third place. In each case West Virginia has been the successful contestant for second place—in 1887, 1888, 1894, 1896, and 1897. The displacement of Alabama in 1896 was not due to any decrease in production, the output for the year being 31,439 tons more than in 1895, but was caused by an increased activity in West Virginia, when the operators profited by the high prices asked for Connellsville coke and added more than 360,000 tons to their product of 1895. West Virginia's output decreased over 175,000 tons in 1897, and if Alabama had equaled her output of 1896 the State would have regained her position, but the product fell below that of 1895, and Alabama continues in third place.

The coal fields of Alabama are divided into three subdistricts, known as the Warrior, the Coosa, and the Cahaba, these districts being named from the rivers which drain them. Coke ovens are built in all three districts, but coke has been made for the last three years in but two—the Warrior and the Cahaba. The most important of these districts, both as a coal producer and coke maker, is the Warrior, the ovens in this district being located near Birmingham.

Of the 5,365 ovens in the State, 4,728 are in the Warrior district, and of the total production of 1,443,017 tons in 1897, 1,383,540 tons were made in the Warrior district.

While most of the ovens built in the State are of the ordinary beehive pattern—the more recent ones being of the usual dimensions, 12 feet in diameter and 7 feet high—it is evident from the frequent attempts that have been made to introduce other ovens that the beehive oven as a coker of Alabama coal is not entirely satisfactory. The ovens other than beehive, which have thus far been introduced successfully into Alabama, are solid-wall ovens, or ovens in which there are no flues in the walls, and in which the coking chamber or combustion chamber, wherein the heat for coking is produced, are the same. Two forms of these modified solid-wall ovens are in use in Alabama at the present time, one known as the "Thomas" oven, which has already been described in this series of reports, and the other as the "double oblong." These ovens are 21 feet long and 9 feet wide, open at both ends. The ovens are charged from the top and drawn at the ends. They produce in a given time about 75 per cent more coke than the ordinary beehive oven.

The close of 1897 finds Alabama introducing by-product coking ovens, 120 of the Semet-Solvay type being in course of construction on Decem-

ber 31. These ovens are building at Ensley for the Tennessee Coal, Iron and Railroad Company, and will undoubtedly begin a new era in coke making in Alabama.

Practical investigation has shown that the coke product of Alabama coal is greatly improved in quality by washing the coal before it is charged into the ovens. In 1890 the practice of washing was in an experimental stage, and 123,189 tons of coal, all of which was slack, was washed before coking. It would seem that these experiments were not entirely satisfactory, for in 1891 the amount of washed coal used was only 8,570 tons out of a total of 2,144,277 tons, but in 1892 the washed coal used increased to 111,500 tons, 4.4 per cent of the total, and has increased each year since then, until in 1897 the amount of washed slacked coal used was nearly eleven times the amount used in 1890, and added to this was an amount of washed run-of-mine coal nearly equal to the washed slack coal used in the earlier year. Washing run-of-mine coal was first tried in 1893, 51,163 tons of this being used in that year. This added to the 425,730 tons of washed slack made a total of 476,893 tons, more than four times the washed coal used in 1892, and 21 per cent of the total amount used in 1893. The next year, 1894, saw a decrease to 7,429 tons in the amount of run-of-mine coal washed, but the washed slack coal increased to 677,899 tons, making, altogether, 685,328 tons of washed coal, nearly 50 per cent more than in 1893, and equivalent to 43.5 per cent of the total amount of coal used. The big increase in percentage of washed coal used in 1894 was due, in part, to a falling off in the production of coke, all of which was in coke made from unwashed coal. In 1895 no run-of-mine coal was washed, but the washed slack coal nearly doubled, amounting to 1,219,377 tons, a little less than 50 per cent of the total. In 1896, the washing of run-of-mine coal was resumed, 70,125 tons being so prepared. Washed slack decreased about 60,000 tons, but the total washed coal increased about 10,000 tons, and was 48 per cent of the total. In 1897 the amount of washed run-of-mine coal increased to 120,420 short tons, and the washed slack to 1,337,545 tons, making a total of 1,457,965 tons of washed coal used, 59 per cent of the total.

The increasing use of washed coal is readily explained. It has been found that washing not only reduces the ash and sulphur, but, in many cases, improves the physical structure of the coke.

The statistics of coke production in Alabama since 1880 are as follows:

Statistics of the manufacture of coke in Alabama from 1880 to 1897, inclusive

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per ct.*
1880 ..	4	316	100	106,283	60,781	$183,063	$3.01	57
1881 ..	4	416	120	184,881	109,033	326,819	3.00	59
1882 ..	5	536	.....	261,839	152,940	425,940	2.79	58
1883 ..	6	767	122	359,699	217,531	598,473	2.75	60
1884 ..	8	*a* 976	242	413,184	244,009	609,185	2.50	60
1885 ..	11	1,075	16	507,934	301,180	755,645	2.50	59
1886 ..	14	*a* 1,301	1,012	635,120	375,054	993,302	2.65	59
1887 ..	15	1,555	1,362	550,047	325,020	775,090	2.39	59
1888 ..	18	2,475	406	848,608	508,511	1,189,579	2.34	60
1889 ..	19	3,944	427	1,746,277	1,030,510	2,372,417	2.30	59
1890 ..	20	4,805	371	1,809,964	1,072,942	2,589,447	2.41	59
1891 ..	21	5,068	50	2,144,277	1,282,496	2,986,242	2.33	60
1892 ..	20	5,320	90	2,585,966	1,501,571	3,464,623	2.31	58
1893 ..	23	5,548	60	2,015,398	1,168,085	2,648,632	2.27	58
1894 ..	22	5,551	50	1,574,245	923,817	1,871,348	2.025	58.7
1895 ..	22	5,658	50	2,459,465	1,444,339	3,033,521	2.10	58.7
1896 ..	24	5,363	.....	2,573,713	1,479,437	3,064,960	2.07	57.5
1897 ..	25	5,365	120	2,451,475	1,443,017	3,094,461	2.14	58.8

a One establishment made coke on the ground.

The character of the coal used in the manufacture of coke in Alabama since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Alabama since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890.....	1,480,669	0	206,106	123,189	1,809,964
1891.....	1,943,469	0	192,238	8,570	2,144,277
1892.....	2,463,366	0	11,100	111,500	2,585,966
1893.....	1,246,307	51,163	292,198	425,730	2,015,398
1894.....	411,097	7,429	477,820	677,899	1,574,245
1895.....	1,208,020	0	32,068	1,219,377	2,459,465
1896.....	1,292,191	70,125	51,674	1,159,723	2,573,713
1897.....	902,310	120,420	91,200	1,337,545	2,451,475

COLORADO.

Although Colorado dropped from fourth place among the coke-producing States in 1896 to sixth place in 1897, the State retains its position as the most important coke producer outside of the Appalachian region. The coal fields and coking coals of the State have been fully described in the volumes of Mineral Resources for 1892 and 1894.

Coke production in Colorado attained its maximum figure in 1892, when the output amounted to 365,920 tons. It declined to 346,981 tons in 1893, since which year it has ranged from 301,140 tons in 1894 to 343,313 tons in 1896.

Mr. R. C. Hills, of Denver, who has carefully studied the coal fields of Colorado, and contributed more than anyone else to the knowledge of the coal resources of the State, has divided the coke-producing regions into three districts, which he designates as the Raton, the Grand River and the La Plata. In the first named, the Raton, are included all the coking plants in Las Animas County, and which had been subdivided by the late Joseph D. Weeks into the Raton Canyon and Trinidad subdistricts or fields. These are so closely related as coking districts, however, that they have been combined as one, and the nomenclature of Mr. Hills has been adopted. The district in 1896 had 810 ovens and produced 198,507 tons of coke. Two ovens were abandoned in 1897, reducing the total to 808, which produced 187,061 tons during the year.

The Grand River district contains the ovens located at Crested Butte and Cardiff, and which have been designated by Mr. Weeks as the Crested Butte and Coal Basin subdistricts. Coal coked at Crested Butte is mined there; the coal coked at Cardiff is mined at Spring Gulch. Mr. Hills considers the Coal Basin or Spring Gulch area as the most important coking coal field in the State. The coke, he states, is better adapted for the use of lead smelters than any other in the State, although it is not so well glazed as an iron smelter would desire. There are 368 ovens in the Grand River field, which produced 121,199 tons of coke in 1897 against 126,471 tons in 1896.

The La Plata district, which is the coking district we have called Durango, has three works with 58 ovens. The total production in this district in 1896 was 11,855 tons, and in 1897 7,846 tons.

Coke is also produced in Denver from coal brought from other districts. It is coked in a species of retort, operated somewhat on the plan of a gas retort and somewhat as a by-product coke oven. The plant consists of 36 retorts. A portion of the gas is used to fire the benches, for lighting, and also to raise steam. In addition to the gas used for these purposes there is a surplus of some 120,000 cubic feet per day, which is sold to the Denver Consolidated Gas Company for illuminating purposes. The coke made is used for domestic purposes in place of anthracite coal.

The statistics of the production of coke in Colorado from 1880 to 1897 are given in the following table. From 1892 to 1897, both inclusive, the statements of production of coke in Utah are included in Colorado.

Statistics of the manufacture of coke in Colorado from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	1	200	50	51,891	25,568	$145,226	$5.68	49
1881	2	267	0	97,508	48,587	267,156	5.29	50
1882	5	344	0	180,549	102,105	476,665	4.67	57
1883	7	352	0	224,089	133,997	584,578	4.36	60
1884	8	409	24	181,968	115,719	409,930	3.45	64
1885	7	434	0	208,069	131,960	512,162	3.88	63
1886	7	483	0	228,060	142,797	569,120	3.99	62.6
1887	7	532	0	267,487	170,698	682,778	4.00	64
1888	7	602	100	274,212	179,682	716,305	4.00	65.6
1889	9	834	50	299,731	187,638	643,479	3.43	63
1890	8	916	30	407,023	245,756	959,246	3.90	60
1891	7	948	21	452,749	277,074	896,984	3.24	61
1892 (*a*).	9	*b* 1,128	220	599,200	*c* 373,229	1,234,320	3.31	62.3
1893 (*a*).	8	*b* 1,154	200	628,935	*d* 362,986	1,137,488	3.13	57.7
1894 (*a*).	8	*b* 1,154	250	542,429	*e* 317,196	903,970	2.85	58.5
1895 (*a*).	9	*b* 1,169	0	580,584	*f* 340,357	940,987	2.76	58.6
1896 (*a*).	11	*b* 1,275	0	639,238	*g* 363,760	1,046,306	2.88	56.9
1897 (*a*).	12	*b* 1,273	0	616,592	*h* 342,653	999,216	2.916	55.6

a Includes production and value of coke in Utah, and of coal coked.
b Includes 36 gas retorts.
c Colorado's coke production, 365,920 tons.
d Colorado's coke production, 346,981 tons.
e Colorado's coke production, 301,140 tons.
f Colorado's coke production, 317,838 tons.
g Colorado's coke production, 343,313 tons.
h Colorado's coke production, 319,036 tons.

As in Alabama, it has been found that washing the slack coal in Colorado improves the value of the coke made from it. No attempt to wash the coal was made prior to 1895. In that year the amount of slack coal washed before coking was 7,119 tons. In 1896 the amount of washed slack coal used was 116,858 tons, while in 1897 it increased to 223,378 tons and entirely supplanted the use of run-of-mine coal, none of which was used in the manufacture of coke in 1897.

The character of the coal used in the manufacture of coke in Colorado and Utah since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Colorado and Utah since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	36,058	0	395,023	0	431,081
1891	93,752	0	384,278	0	478,030
1892	82,098	0	517,102	0	599,200
1893	109,915	0	519,020	0	628,935
1894	126,642	0	415,787	0	542,429
1895	119,868	0	453,597	7,119	580,584
1896	143,604	0	378,776	116,858	639,238
1897	0	0	393,214	223,378	616,592

GEORGIA.

Coking in Georgia is an industry of comparatively little importance, and is on the decline. The only coal produced in the State is from the extreme northwestern portion, which is cut by the eastern border of the Appalachian coal field. The coal, as it is mined, is washed before being coked. The amount of coal charged into the ovens is the amount mined, and not the weight of the coal after being washed.

The production in 1897 was only 33,000 tons, as compared with 53,673 tons in 1896, 60,212 tons in 1895, and 93,029 tons in 1894. Thirty-four ovens were abandoned in 1897, reducing the number in the State to 300.

The statistics of the production of coke in Georgia, 1880 to 1897, are as follows:

Statistics of the manufacture of coke in Georgia, 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	1	140	40	63,402	38,041	$81,789	$2.15	60
1881	1	180	40	68,960	41,376	88,753	2.15	60
1882	1	220	44	77,670	46,602	100,194	2.15	60
1883	1	264	36	111,687	67,012	147,166	2.20	60
1884	1	300	0	132,113	79,268	169,192	2.13	60
1885	2	300	0	117,781	70,669	144,198	2.04	60
1886	2	300	0	136,133	82,680	179,031	2.17	60
1887	2	300	0	158,482	79,241	174,410	2.20	50
1888	1	290	0	140,000	83,721	177,907	2.12	60
1889	1	300	0	157,878	94,727	149,059	1.57	60
1890	1	300	0	170,388	102,233	150,995	1.48	60
1891	1	300	0	164,875	103,057	231,878	2.25	62.5
1892	1	300	0	158,978	81,807	163,614	2.00	51.5
1893	1	338	0	171,645	90,726	136,089	1.50	52.8
1894	1	338	0	166,523	93,029	116,286	1.25	55.9
1895	1	330	0	118,900	60,212	70,580	1.17	50.6
1896	1	334	0	109,655	53,673	68,486	1.276	49
1897	1	300	0	67,000	33,000	42,240	1.28	49.3

The character of the coal used in the manufacture of coke in Georgia since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Georgia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	0	170,388	170,388
1891	106,131	0	0	58,744	164,875
1892	0	0	0	158,978	158,978
1893	0	0	0	171,645	171,645
1894	0	166,523	0	0	166,523
1895	0	118,900	0	0	118,900
1896	0	109,655	0	0	109,655
1897	0	67,000	0	0	67,000

ILLINOIS.

Notwithstanding the efforts that have been made to improve the quality of coke manufactured from Illinois coal by washing the coal before coking, the production continues to be insignificant, the output in 1897 being the smallest on record. Laboratory tests have shown that some of the Illinois coals are true coking coals, but their coking qualities vary greatly and their successful use upon a large scale has not been demonstrated. The impurities in Illinois coals have worked against it in the manufacture of metallurgical coke, and as New River and Pennsylvania cokes can be obtained at reasonable cost in markets that would be fed by the Illinois product, consumers find it economy to use the superior article. The statistics of production in 1897 show that the percentage yield of Illinois coal in coke is increased by washing the coal, even if it does not produce an article capable of competing with Pennsylvania or West Virginia coke. From 1892 to 1896 the coal, all of which was slack, was washed before coking and the percentage of coke obtained varied from 57.9 per cent to 66.7 per cent. In 1897 the coal was not washed, and only 43 per cent of coke was obtained.

Statistics of the manufacture of coke in Illinois from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	6	176	0	31,240	12,700	$41,950	$3.30	41
1881	6	176	0	35,240	14,800	45,850	3.10	42
1882	7	304	0	25,270	11,400	29,050	2.55	45
1883	7	316	0	31,170	13,400	28,200	2.10	43
1884	9	325	0	30,168	13,095	25,639	1.96	43
1885	9	320	0	21,487	10,350	27,798	2.68	48
1886	9	335	0	17,806	8,103	21,487	2.65	46
1887	8	278	0	16,596	9,108	19,594	2.13	55.5
1888	8	221	0	13,020	7,410	21,038	2.84	56.9
1889	4	149	0	19,250	11,583	29,764	2.57	60
1890	4	148	0	9,000	5,000	11,250	2.25	55
1891	1	25	0	10,000	5,200	11,700	2.25	52
1892	1	24	0	4,800	3,170	7,133	2.25	66
1893	1	24	0	3,300	2,200	4,400	2.00	66.7
1894	1	24	0	3,800	2,200	4,400	2.00	57.9
1895	3	129	0	3,600	2,250	4,500	2.00	62.5
1896	3	127	0	3,900	2,600	5,200	2.00	66.7
1897	2	126	0	3,591	1,549	2,895	1.87	43

The character of the coal used in the manufacture of coke in Illinois since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Illinois since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	0	9,000	9,000
1891	0	0	10,000	0	10,000
1892	0	0	4,800	0	4,800
1893	0	0	0	3,300	3,300
1894	0	0	0	3,800	3,800
1895	0	0	0	3,600	3,600
1896	0	0	0	3,900	3,900
1897	0	0	3,591	0	3,591

INDIANA.

Conditions very similar to those which have discouraged coke making in Illinois prevail in Indiana. Good coking coals exist in the State, but the product obtained is not equal to that of Connellsville, New River, or Pocahontas, any of which can be purchased at very little difference in cost, and consumers prefer to pay the slightly higher price for the superior article. There are only two banks of ovens in the State, and only one of these produced coke in 1897. The production of Indiana in 1897, like that of Illinois, was the smallest in the history of the State, amounting to only 2,904 short tons, a decrease of 1,449 tons, or one-third, from the output of 1896.

All of the coal coked in the State is slack, and for the last three years all of it has been washed before charged into the ovens.

The statistics of the manufacture of coke in Indiana from 1886 to 1897, both inclusive, are given in the following table:

Statistics of the manufacture of coke in Indiana from 1886 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1886	4	100	18	13,030	6,124	$17,953	$2.93	47
1887	4	119	0	35,600	17,658	51,141	2.81	50
1888	3	103	0	26,547	11,956	31,993	2.68	45
1889	4	111	0	16,428	8,301	25,922	3.12	51
1890	4	101	0	11,753	6,013	19,706	3.28	51
1891	2	84	0	8,688	3,798	7,596	2.00	44
1892	2	84	0	6,456	3,207	6,472	2.02	49.7
1893	2	94	0	11,549	5,724	9,048	1.58	49.6
1894	2	94	0	13,489	6,551	13,102	2.00	48.6
1895	2	94	0	9,898	4,804	9,333	1.94	48.5
1896	2	94	0	8,956	4,353	8,647	1.99	49
1897	2	94	0	7,022	2,904	5,795	1.995	41.4

The character of the coal used in the manufacture of coke in Indiana since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Indiana since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	0	11,753	11,753
1891	0	0	0	8,688	8,688
1892	0	0	0	6,456	6,456
1893	0	0	930	10,619	11,549
1894	0	0	8,689	4,800	13,489
1895	0	0	0	9,898	9,898
1896	0	0	0	8,956	8,956
1897	0	0	0	7,022	7,022

INDIAN TERRITORY.

Intelligent effort to develop the manufacture of coke from Indian Territory coals is meeting with encouraging success. Prior to 1896 these efforts had been directed toward utilizing the slack coal produced at the mines of the Osage Coal and Mining Company, near MacAlester. During 1895 50 ovens were built by the Choctaw Coke Company, near the town of Alderson, for the purpose of utilizing the slack coal from the mines of the Choctaw, Oklahoma and Gulf Railroad Company at Alderson and Hartshorne. All of the coal charged into the ovens is washed, and 6,923 tons of washed run-of-mine coal was used in 1897 by the Osage company in addition to the slack coal used.

Mr. John Fulton, of Johnstown, Pennsylvania, has furnished the following information regarding the operations of the Choctaw Coke Company:

The works of this company, as stated, are located near the town of Alderson, on the line of the Choctaw, Oklahoma and Gulf Railroad. The plant consists of 50 beehive ovens, built in a double line. The ovens are 12 feet in diameter and 6 feet high. They have been planned intelligently, constructed on modern principles, and are well adapted for the manufacture of coke from the coals of that portion of the Choctaw field. The coal for coke manufacture is obtained from the two large mines of the railroad company, one at Alderson and the other at Hartshorne, 9 miles distant. In these mines two seams are worked—the McAlester and the Grady beds. These coal beds are from 1,200 to 1,300 feet apart, the McAlester being above and the Grady below. Each seam is about 4 feet thick and the coal of both possesses qualities

approaching the Connellsville coking coal, as is shown by the following analysis:

Analysis of Indian Territory coking coal and coke.

	Coal.	Coke.
	Per cent.	*Per cent.*
Moisture	1.48	1.55
Volatile matter	35.81	1.34
Fixed carbon	56.71	90.68
Ash	6.00	6.43
Total	100.00	100.00
Sulphur	1.05	1.84
Phosphorus	.02	.024

The coals are found in a deep trough or basin very similar to that of the Connellsville, and the mining is conducted chiefly by slopes, after the manner in vogue in the Connellsville field. Up to the close of 1897 only slack coal (washed) was used for coking, but recently it has been decided to use also run-of-mine coal (crushed and washed) in order to improve the quality and assure a uniform product of coke. The works produce principally 72-hour coke, although some 48-hour coke is made. The coke is resonant, silvery, and firm bodied. In general quality and appearance it resembles the standard coke of the Connellsville region of Pennsylvania. The works are managed with practical skill by the superintendent, Mr. John H. Needham. The average monthly output of the coke ovens has been given at 1,200 short tons. This, however, is being increased under recent improvements to 1,500 tons and upward a month.

The coke produced at these works is marketed mainly in Mexico, the city of Monterey being the official headquarters of President G. T. Potter for its sale to smelters, etc.

The total coke product of the Indian Territory in 1897 was 30,364 tons, an increase of nearly 50 per cent over 1896 and almost six times the product of 1895.

The statistics of the manufacture of coke in the Indian Territory from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Indian Territory from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	1	20	0	2,494	1,546	$4,638	$3.00	62
1881	1	20	0	2,852	1,768	5,304	3.00	62
1882	1	20	0	3,266	2,025	6,075	3.00	62
1883	1	20	0	4,150	2,573	7,719	3.00	62
1884	1	20	0	3,084	1,912	5,736	3.00	62
1885	1	40	0	5,781	3,584	12,902	3.60	62
1886	1	40	0	10,242	6,351	22,229	3.30	62
1887	1	80	0	20,121	10,060	33,435	3.33	50
1888	1	80	0	13,126	7,502	21,755	2.90	57
1889	1	78	0	13,277	6,639	17,957	2.70	50
1890	1	78	0	13,278	6,639	21,577	3.25	50
1891	1	80	0	20,551	9,464	30,483	3.22	46
1892	1	80	0	7,138	3,569	12,402	3.47	50
1893	1	80	0	15,118	7,135	25,072	3.51	47
1894	1	80	0	7,274	3,051	10,693	3.50	42
1895	1	80	0	11,825	5,175	17,657	3.41	43.8
1896	2	130	0	53,028	21,021	73,574	3.50	40
1897	2	130	0	68,495	30,364	104,725	3.45	44.3

The character of the coal used in the manufacture of coke in the Indian Territory since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in the Indian Territory since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	0	13,278	13,278
1891	0	0	9,500	11,051	20,551
1892	0	0	0	7,138	7,138
1893	0	0	0	15,118	15,118
1894	0	0	0	7,274	7,274
1895	0	0	0	11,825	11,825
1896	0	0	0	53,028	53,028
1897	0	6,923	0	61,572	68,495

KANSAS.

The coke industry of Kansas is only of local importance, the production of coke in this State being chiefly for domestic purposes and the smelting of lead and zinc. Most of the coke produced in the State is made by the lead and zinc smelters for their own use.

The statistics of the manufacture of coke in Kansas from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in Kansas from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	2	6	.....	4,800	3,070	$6,000	$1.95	64
1881	3	15	.....	8,800	5,670	10,200	1.80	64.4
1882	3	20	.....	9,200	6,080	11,460	1.70	66
1883	4	23	.....	13,400	8,430	16,560	1.96	62.9
1884	4	23	.....	11,500	7,190	14,580	2.02	62.5
1885	4	23	.....	15,000	8,050	13,255	1.65	53.7
1886	4	36	.....	23,062	12,493	19,204	1.54	54.2
1887	4	39	.....	27,604	14,950	28,575	1.91	54
1888	6	58	.....	24,934	14,831	29,073	1.96	59.5
1889	6	68	.....	21,600	13,910	26,593	1.91	64
1890	7	68	.....	21,809	12,311	29,116	2.37	56
1891	6	72	.....	27,181	14,174	33,296	2.35	52
1892	6	75	.....	15,437	9,132	19,906	2.18	59.2
1893	6	75	0	13,645	8,565	18,640	2.18	62.8
1894	6	61	0	13,288	8,439	15,660	1.855	63.5
1895	5	55	0	8,424	5,287	11,289	2.14	62.8
1896	6	55	0	8,940	4,785	8,676	1.813	53.5
1897	4	57	0	11,772	6,181	9,272	1.50	52.5

The character of the coal used in the manufacture of coke in Kansas since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Kansas since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	19,619	2,190	21,809
1891	0	0	27,181	0	27,181
1892	0	0	15,437	0	15,437
1893	0	0	12,445	1,200	13,645
1894	0	0	13,288	0	13,288
1895	0	0	8,424	0	8,424
1896	0	0	8,940	0	8,940
1897	0	0	11,772	0	11,772

KENTUCKY.

Four ovens were added to Kentucky's number by the Ashland Coal and Iron Company in 1897, increasing the total to 268, and putting the number of establishments back to 5, the same as in 1895. One establishment, however, having a bank of 50 ovens did not make any coke in 1897, so that the actual number of producing establishments was 4, and the number of active ovens 218. The production of coke in 1897 was 32,117 short tons, an increase of 5,010 tons, or about 19 per cent, over 1896.

The statistics of the manufacture of coke in Kentucky from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in Kentucky from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	5	45	.....	7,206	4,250	$12,250	$2.88	59
1881	5	45	.....	7,406	4,370	12,630	2.89	59
1882	5	45	.....	6,906	4,070	11,530	2.83	59
1883	5	45	.....	8,437	5,025	14,425	2.87	60
1884	5	45	.....	3,451	2,223	8,760	3.94	64
1885	5	33	.....	5,075	2,704	8,489	3.14	53
1886	6	76	2	9,055	4,528	10,082	2.23	50
1887	6	98	.....	29,129	14,565	31,730	2.18	50
1888	10	132	2	42,642	23,150	47,244	2.04	54
1889	9	166	100	25,192	13,021	29,769	2.28	52
1890	9	175	303	24,372	12,343	22,191	1.80	51
1891	7	115	24	64,390	33,777	68,281	2.02	52
1892	5	287	100	70,783	36,123	72,563	2.01	51
1893	4	283	100	97,212	48,619	97,350	2.00	50
1894	6	293	0	66,418	29,748	51,566	1.73	44.8
1895	5	293	0	63,419	25,460	37,249	1.46	40.1
1896	4	264	0	55,719	27,107	42,062	1.55	48.6
1897	5	268	0	64,234	32,117	45,454	1.41	50

The character of the coal used in the manufacture of coke in Kentucky since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Kentucky since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	3,000	2,100	19,272	24,372
1891	11,000	0	3,500	49,890	64,390
1892	0	5,955	7,883	56,945	70,783
1893	825	11,973	26,759	57,655	97,212
1894	0	2,980	7,900	55,538	66,418
1895	0	502	624	62,293	63,419
1896	16,271	0	0	39,448	55,719
1897	4,176	0	0	60,058	64,234

MISSOURI.

Coke production in Missouri is of comparatively small importance, and there is little to say in regard to the industry in the State except to note the addition of 8 new ovens by the Cherokee Lanyon Zinc Company at Nevada, bringing the total number up to 15. The three establishments in the State are all portions of zinc-smelting works who use their coke product for zinc smelting. The production in 1897 increased slightly over 1896.

The statistics of the production of coke in Missouri from 1887, when coking began in this State, to 1897 are as follows:

Statistics of the manufacture of coke in Missouri from 1887 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1887	1	4	.....	5,400	2,970	$10,395	$3.50	55
1888	1	4	.....	5,000	2,600	9,100	3.50	52
1889	3	9	.....	8,485	5,275	5,800	1.10	62
1890	3	10	.....	9,491	6,136	9,240	1.51	65
1891	3	10	.....	10,377	6,872	10,000	1.45	66
1892	3	10	.....	11,088	7,299	10,949	1 50	65.8
1893	3	10	0	8,875	5,905	9,735	1.65	66.5
1894	3	10	0	3,442	2,250	3,563	1.58	65.4
1895	3	10	0	3,120	2,028	2,442	1.20	65
1896	3	7	0	4,471	2,500	4,131	1.65	55.9
1897	3	15	0	4,627	2,593	3,890	1.50	56

The character of the coal used for coke in Missouri since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Missouri since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	0	9,491	0	9,491
1891	0	0	10,377	0	10,377
1892	0	0	11,088	0	11,088
1893	0	0	8,875	0	8,875
1894	0	0	3,442	0	3,442
1895	0	0	3,120	0	3,120
1896	0	0	4,471	0	4,471
1897	0	0	4,627	0	4,627

MONTANA.

Coke production in Montana has increased each year since 1894, when, owing to the panic and business depression, it fell off to about one-half of what it was in 1892. The product in 1896 was the largest up to that time, and the output of 1897 was 11 per cent larger than 1896. The number of establishments and ovens remain the same.

The statistics of the manufacture of coke in Montana from 1883, when ovens were first reported, to 1897 are as follows:

Statistics of the manufacture of coke in Montana from 1883 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1883	1	2	0	0	0	0	0	0
1884	3	5	12	165	75	$900	$12.00	46
1885	2	2	0	300	175	2,063	11.72	58.5
1886	4	16	0	0	0	0	0	0
1887	2	27	0	10,800	7,200	72,000	10.00	66⅔
1888	1	40	0	20,000	12,000	96,000	8.00	60
1889	2	90	50	30,576	14,043	122,023	8.69	46
1890	2	140	0	32,148	14,427	125,655	8.71	45
1891	2	140	0	61,667	29,009	258,523	8.91	47
1892	2	153	0	64,412	34,557	311,013	9.00	53.6
1893	2	153	0	61,770	29,945	239,560	8.00	48.5
1894	2	153	0	33,313	17,388	165,187	9.50	52.2
1895	3	303	0	55,770	25,337	189,856	7.49	45.4
1896	3	303	0	113,165	60,078	425,483	7.08	53
1897	3	303	0	139,907	67,849	467,481	6.89	48.5

The character of the coal used in the manufacture of coke in Montana since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Montana.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	22,852	0	9,296	32,148
1891	0	34,000	0	27,667	61,667
1892	0	28,000	0	36,412	64,412
1893	0	44,000	0	17,770	61,770
1894	0	33,313	0	0	33,313
1895	0	0	0	55,770	55,770
1896	0	50,000	0	63,165	113,165
1897	0	75,000	0	64,907	139,907

NEW MEXICO.

Seventy-six new ovens were built in 1897 at Gardner, near Raton, by the Raton Coal and Coke Company, but they did not begin making coke before the 1st of January, 1898. The production at the one other establishment fell off from 24,228 tons in 1896 to 1,438 tons in 1897. All of the coke made in the Territory is used by silver smelters in the vicinity of the ovens.

The statistics of the production of coke in New Mexico from 1882, when coke ovens were first reported, until 1897 are as follows:

Statistics of the manufacture of coke in New Mexico from 1882 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built. (a)	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1882	2	0	12	1,500	1,000	$6,000	$6.00	66⅔
1883	2	12	28	6,941	3,905	21,478	5.50	57¼
1884	2	70	0	29,990	18,282	91,410	5.00	57¼
1885	2	70	0	31,889	17,940	89,700	5.00	56¼
1886	2	70	0	18,194	10,236	51,180	5.00	56
1887	1	70	0	22,549	13,710	82,260	6.00	61
1888	1	70	0	14,628	8,540	51,240	6.00	58
1889	2	70	0	7,162	3,460	18,408	5.32	48
1890	2	70	0	3,980	2,050	10,025	4.89	51.5
1891	1	70	0	4,000	2,300	10,925	4.75	57.5
1892	1	50	0	0	0	0	0	0
1893	1	50	0	14,698	5,803	18,476	3.18	39.5
1894	1	50	0	13,042	6,529	28,213	4.32	50
1895	1	50	0	22,385	14,663	29,491	2.01	65.5
1896	1	50	0	39,286	24,228	48,453	2.00	61.7
1897	2	126	0	2,585	1,438	3,232	2.25	55.6

a At one works there are ten stone pits, with an average capacity of 10 tons each.

The character of the coal used in the manufacture of coke in New Mexico since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in New Mexico since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	3,980	0	0	0	3,980
1891	4,000	0	0	0	4,000
1892	0	0	0	0	0
1893	14,698	0	0	0	14,698
1894	0	0	13,042	0	13,042
1895	.....	.....	.....	.....	22,385
1896	0	0	39,286	0	39,286
1897	0	0	2,585	0	2,585

NEW YORK.

The authority to publish separately the figures of production at the Semet-Solvay works, near Syracuse, has been withheld for 1896 and 1897, and the output for the last two years is included in Pennsylvania's production. The 13 ovens reported as building in 1893, 1894, and 1895 were completed in 1896, increasing the total number to 25.

The statistics of the manufacture of coke in New York from 1893 to 1897 are as follows:

Statistics of the manufacture of coke in New York, 1893 to 1897.

	1893.	1894.	1895.	1896.	1897.
Number of establishments	1	1	1	1	1
Number of ovens built	12	12	12	25	25
Number of ovens building	13	13	13	0	0
Amount of coke produced..tons..	12,850	16,500	18,521	.....	.....
Amount of coal used.....do...	15,150	.....	22,207	.....	.....
Yield of coal in coke....per cent..	84.8	.....	83.4	.....	.....

OHIO.

Notwithstanding the large consumption of coke in Ohio and the large fields of coking coals in the State, the coking industry is of slight importance. This is doubtless due to the same cause that obtains in Indiana, the proximity of the Connellsville, New River, and Pocahontas fields, and the cheapness with which these cokes can be procured.

In previous reports of Mineral Resources the State has been divided into two coke-producing districts, called the Ohio and the Cincinnati. This division is continued in the present chapter. Two establishments having 175 ovens in the Cherry Valley iron district are included in the Ohio coke district.

The coke production of the State in 1897 was the largest in fifteen years, most of the increase being in the Cincinnati district.

In the following table the statistics of the production of coke in the two districts of Ohio for the years 1880 to 1897 are consolidated:

Statistics of the manufacture of coke in Ohio from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	15	616	25	172,453	100,596	$255,905	$2.54	58
1881	15	641	0	201,045	119,469	297,728	2.49	59
1882	16	647	0	181,577	103,722	266,113	2.57	57
1883	18	682	0	152,502	87,834	225,660	2.57	58
1884	19	732	0	108,164	62,709	156,294	2.49	58
1885	13	642	0	68,796	39,416	109,723	2.78	57
1886	15	560	0	59,332	34,932	94,042	2.69	59
1887	15	585	223	164,974	93,004	245,981	2.65	56
1888	15	547	12	124,201	67,194	166,330	2.48	54
1889	13	462	0	132,828	75,124	188,222	2.50	56
1890	13	443	1	126,921	74,633	218,090	2.92	59
1891	9	421	0	69,320	38,718	76,901	1.99	56
1892	10	436	0	95,236	51,818	112,907	2.18	54.4
1893	9	435	0	42,963	22,436	43,671	1.95	52
1894	8	363	0	55,324	32,340	90,875	2.78	59
1895	8	377	0	51,921	29,050	69,655	2.40	56
1896	9	431	0	128,923	80,868	208,789	2.58	62.7
1897	9	433	0	151,545	95,087	235,784	2.48	62.7

Cincinnati district.—All the coke made in this district is from the dust and screenings of the coal yards at Cincinnati and from the coal boats and barges that bring coal from the Upper Ohio, chiefly from the Pittsburg and the Kanawha regions of West Virginia. When the ovens are in operation, some run of mine and slack from Pittsburg mines is used in the North Bend block of ovens, situated on the Ohio River a short distance below Cincinnati.

The statistics of the manufacture of coke in the Cincinnati district from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Cincinnati district, Ohio, from 1880 to 1897.

Year.	Establishments.	Ovens,		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	4	32	0	16,141	10,326	$42,255	$4.09	64
1881	4	32	0	20,607	13,237	54,439	4.11	64
1882	4	32	0	19,687	12,045	47,437	3.78	61
1883	5	57	0	33,978	20,106	65,990	3.28	59
1884	5	57	0	32,134	18,840	61,072	3.24	59
1885	5	82	0	17,480	10,962	35,873	3.27	63
1886	5	82	0	17,015	10,566	31,633	2.99	62.1
1887	5	150	20	56,723	32,894	95,754	2.91	58
1888	6	156	12	63,217	35,868	95,618	2.67	57
1889	5	146	0	75,892	45,108	120,899	2.68	59.4
1890	5	150	0	68,266	43,278	171,848	3.97	63
1891	3	130	0	13,403	9,080	31,529	3.47	67.7
1892	4	146	0	31,330	19,320	64,319	3.33	61.3
1893	3	142	0	13,700	9,000	27,000	3.00	65.7
1894	3	92	0	42,995	26,417	81,751	3.09	61
1895	3	92	0	9,628	5,657	16,971	3.00	58.8
1896	3	92	0	16,495	10,181	31,068	3.05	61.7
1897	3	92	0	40,200	23,532	67,079	2.85	59

Ohio district.—This district, as noted above, includes all of the ovens coking Ohio coal and the ovens at Leetonia, in Columbiana County, and in the vicinity of Steubenville and Bridgeport, which latter place is opposite Wheeling, West Virginia. It also includes 125 ovens of the Marietta Run Coal and Coke Company and 50 ovens of the Black Diamond Coal and Coke Company in the Federal Valley district.

Statistics of the manufacture of coke in the Ohio district, Ohio, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	11	584	25	156,312	90,270	$213,650	$2.37	57
1881	11	609	0	180,438	106,232	243,289	2.39	59
1882	12	615	0	161,890	91,677	218,676	2.39	57
1883	13	625	0	118,524	67,728	459,670	2.36	57
1884	14	675	0	76,030	43,869	95,222	2.17	58
1885	8	560	0	51,316	28,454	73,850	2.60	55
1886	10	478	0	42,317	24,366	62,409	2.56	57¾
1887	10	435	203	108,251	60,110	150,227	2.50	55½
1888	9	391	0	60,984	31,326	70,712	2.25	51
1889	8	316	0	56,936	30,016	67,323	2.24	52.7
1890	8	293	1	58,655	31,335	46,242	1.47	53.4
1891	6	291	0	55,917	29,638	45,372	1.53	53
1892	6	290	0	63,906	32,498	48,588	1.50	50.9
1893	6	293	0	29,263	13,436	16,671	1.24	46
1894	5	271	0	12,329	6,223	9,124	1.466	50.5
1895	5	285	0	42,293	23,393	52,684	2.25	55.3
1896	6	339	0	112,428	70,687	177,721	2.51	62.8
1897	6	341	0	111,345	71,555	168,705	2.36	64

The character of the coal used in the manufacture of coke in Ohio since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Ohio since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	34,729	0	54,473	37,719	126,921
1891	5,200	0	64,120	0	69,320
1892	35,334	0	32,402	27,500	95,236
1893	0	0	24,859	18,104	42,963
1894	0	0	14,845	40,479	55,324
1895	28,053	0	10,868	13,000	51,921
1896	88,616	0	24,325	15,982	128,923
1897	92,192	0	29,353	30,000	151,545

PENNSYLVANIA.

The coking districts of Pennsylvania have been so frequently described in previous volumes of Mineral Resources that it is not necessary to enter into any details regarding them. As it is important, however, that the dividing line between these districts should be kept in mind in examining these statistics, the following brief statement as to the territory included in these districts, which has been published in previous reports, is repeated here for the sake of convenience.

The Allegheny Mountain district includes the ovens along the line of the Pennsylvania Railroad from Gallitzin eastward over the crest of the Alleghenies to beyond Altoona. The Allegheny Valley district includes the coke works of Armstrong and Butler counties and one of those in Clarion County, the other ovens in the latter county being included in the Reynoldsville-Walston district. The Beaver district includes the ovens in Beaver County; the Blossburg and Broad Top those in the Blossburg and Broad Top coal fields. The ovens of the Clearfield-Center district are chiefly in the two counties from which it derives its name. The Connellsville district is the well-known region in western Pennsylvania, in Westmoreland and Fayette counties, extending from just south of Latrobe to Fairchance. The Greensburg, Irwin, Pittsburg, and Reynoldsville Walston districts include the ovens near the towns which have given the names to these districts. The Upper Connellsville district, sometimes called the Latrobe district, is near the town of Latrobe.

The production of coke in Pennsylvania in 1897 shows an increase of 1,610,422 tons, or about 22 per cent over the output for 1896. It must be remembered, however, that while the production in 1896 was larger than in either 1893 or 1894, it was more than 2,000,000 tons less than the output in 1895, and was not equal to the usual production under normal trade conditions. During 1893 and 1894 the industry was seriously affected by the panic of the former year and the general depression of prices which prevailed during 1894. In 1895 a temporary boom was experienced in the iron trade, due to the desire of buyers to take advantage of the extremely low prices prevailing during 1894 and the earlier months of 1895, and this boom was reflected in the increased production of coke. Producers in Pennsylvania, particularly those in the Connellsville region, endeavored to make up for the losses experienced in the two preceding years, and the production was pushed until it reached a total of 9,404,215 tons, an increase of 3,340,000 tons, or practically 55 per cent over the output of 1894. Prices for this enormous product, while somewhat improved as compared with those of 1894, were, with the exception of that year, lower than in any year since 1888. In the early part of 1896 the principal producers in the Connellsville region put the price of furnace coke at $2 per ton, with foundry at $2.30 and crushed at $2.35, maintaining

these prices until the end of the year, and while some less important producers sold their furnace coke at $1.75, the average of the region for the year was $1.834, an advance of nearly 50 per cent in the average price over 1896. The result of this was that while the production of coke decreased over 2,000,000 tons in the State, the value of the product increased $1,275,000 over that of 1895. The action of the Connellsville producers in upholding prices in 1896 enabled operators in competitive fields to obtain a footing in markets formerly held by Connellsville coke, and the returns for 1897 show that while the prices for the year were higher than in any year since 1892, with the exception of 1896, no attempt was made to maintain the prices at a sacrifice of the tonnage, and operators directed their efforts to the securing of markets lost in the previous year. As a result the production of the State increased to 8,966,924 tons, and the total value of the product increased from $13,182,859 in 1896 to $13,727,966 in 1897. The average price per ton declined 26 cents, about one-half of the increase in 1896 over 1895. It will be seen from this that while the production in 1897 increased 22 per cent, the value increased only a little more than 4 per cent.

In the following table the statistics are given of the production of coke in Pennsylvania for the years 1880 to 1897:

Statistics of the manufacture of coke in Pennsylvania from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880..	124	9,501	836	4,347,558	2,821,384	$5,255,040	$1.86	65
1881..	132	10,881	761	5,393,503	3,437,708	5,898,579	1.70	64
1882..	137	12,424	642	6,149,179	3,945,034	6,133,698	1.55	64
1883..	140	13,610	211	6,823,275	4,438,464	5,410,387	1.22	65
1884..	145	14,285	232	6,204,604	3,822,128	4,783,230	1.25	62
1885..	133	14,553	317	6,178,500	3,991,805	4,981,656	1.25	64.6
1886..	108	16,314	2,558	8,290,849	5,406,597	7,664,023	1.42	65.2
1887..	151	18,294	802	8,938,438	5,832,849	10,746,352	1.84	65.3
1888..	120	20,381	1,565	9,673,097	6,545,779	8,230,759	1.26	68
1889..	109	22,143	567	11,581,292	7,659,055	10,743,492	1.40	66
1890..	106	23,430	74	13,046,143	8,560,245	16,333,674	1.91	65.6
1891..	109	25,324	11	10,588,544	6,954,846	12,679,826	1.82	66
1892..	109	25,366	269	12,591,345	8,327,612	15,015,336	1.80	66.1
1893..	102	25,744	19	9,386,702	6,229,051	9,468,036	1.52	66
1894..	101	25,824	118	9,059,118	6,063,777	6,585,489	1.086	66.9
1895..	99	26,042	170	14,211,567	9,404,215	11,908,162	1.266	66.2
1896*a*.	158	26,658	154	11,124,610	7,356,502	13,182,859	1.792	66.1
1897*a*.	153	26,910	307	13,538,646	8,966,924	13,727,966	1.53	66.2

a Includes coal used, coke produced, and its value in New York.

The quality of the coal produced in the principal coking regions of Pennsylvania is such that little or no preparation is necessary before charging into the ovens. For this reason it is found that by far the larger portion of the coal used in the manufacture of coke in Pennsylvania is unwashed, generally from 80 to 90 per cent of the coal coked being unwashed run of mine. There was more coal washed in 1897 than in any year since 1891. In 1896 the amount of washed coal, including run of mine and slack, was only 372,474 tons, or about 3.5 per cent of the total. In 1897 the amount of washed coal was 556,576 tons, a little over 4 per cent of the total.

The character of the coal used in the manufacture of coke in Pennsylvania since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Pennsylvania since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	11,788,625	303,591	630,195	323,732	13,046,143
1891	9,470,646	256,807	558,106	302,985	10,588,544
1892	11,237,253	159,698	1,059,994	134,400	12,591,345
1893	8,302,307	216,762	739,128	128,505	9,386,702
1894	8,671,534	118,279	204,811	64,494	9,059,118
1895	13,618,376	34,728	440,869	117,594	14,211,567
1896 (*a*)	9,289,089	273,082	1,463,047	99,392	11,124,610
1897 (*a*)	11,540,459	301,052	1,441,611	255,524	13,538,646

a Includes coal used in New York.

PRODUCTION OF COKE IN PENNSYLVANIA, BY DISTRICTS.

The following tables are interesting as showing how the high prices set for Connellsville coke in 1896 affected the other coke-producing districts of the State. It will be seen that with the exception of the Blossburg and Broadtop districts the output in every district in 1896 shows an increase over the preceding year, and it appears that with the exception of the Upper Connellsville and the Irwin districts the producers in the districts outside of the Connellsville not only held the ground secured by them in 1896, but improved that advantage with increased production in 1897.

In the following tables will be found the statistics of the production of coke in Pennsylvania, by districts, for the years 1895, 1896, and 1897:

Coke production in Pennsylvania in 1897, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Average price per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per ct.*
Allegheny Mountain	13	a 1,185	0	417,470	278,578	$365,191	$1.31	66.7
Allegheny Valley	2	116	0	8,300	5,000	10,000	2.00	60.2
Beaver	3	b 33	0	42,200	27,276	61,646	2.26	64.6
Broadtop	5	491	15	106,706	66,949	107,430	1.60	62.7
Clearfield-Center	7	668	0	230,395	153,517	197,139	1.28	66
Connellsville	86	c 18,467	92	10,243,690	6,860,826	10,662,428	1.55	67
Greensburg	3	178	0	81,927	52,495	65,619	1.25	64
Irwin	5	696	0	207,704	136,663	189,869	1.39	65.8
Pittsburg	9	d 1,233	200	832,505	548,981	864,326	1.57	66
Reynoldsville-Walston	6	e 1,980	0	810,808	491,267	759,609	1.55	60.6
Upper Connellsville	14	f 1,863	0	556,941	345,372	444,709	1.29	62
Total	153	26,910	307	13,538,646	8,966,924	13,727,966	1.53	66.2

a Includes 60 Otto-Hoffmann ovens.
b Includes 25 Semet-Solvay ovens.
c Includes 50 Semet-Solvay ovens.
d Includes 240 Otto-Hoffmann ovens.
e Includes production and value of coal and coke in New York.
f Includes 30 Newton-Chambers and 3 Slocum ovens.

Coke production in Pennsylvania in 1896, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Average price per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per ct.*
Allegheny Mountain	13	a 1,188	0	408,827	266,473	$349,373	$1.31	65
Allegheny Valley	2	116	0	12,445	7,467	14,934	2.00	60
Beaver	3	b 35	0	13,845	9,004	17,200	1.91	65
Broad Top	5	480	0	111,145	72,175	126,306	1.75	64.9
Clearfield-Center	7	666	0	183,056	118,155	164,266	1.39	64.5
Connellsville	88	c 18,347	0	8,107,536	5,462,490	10,018,946	1.834	67.4
Greensburg	3	178	0	36,963	24,642	30,928	1.255	66.7
Irwin	5	669	0	279,104	175,916	275,518	1.566	63
Pittsburg	11	1,264	d 120	583,984	368,070	941,076	2.56	63
Reynoldsville-Walston (e)	7	1,852	34	770,104	445,998	673,625	1.51	57.9
Upper Connellsville	14	f 1,863	0	617,601	406,112	570,687	1.405	65.7
Total	158	26,658	154	11,124,610	7,356,502	13,182,859	1.792	66.1

a Includes 60 Otto-Hoffmann ovens.
b Includes 25 Semet-Solvay ovens in Mercer County.
c Includes 50 Semet-Solvay ovens.
d Otto-Hoffmann ovens.
e Includes coal used, coke produced, and its value in New York.
f Includes 30 Newton-Chambers and 3 Slocum ovens.

Coke production in Pennsylvania in 1895, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Average price ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per ct.*
Allegheny Mountain	13	a 1,233	0	271,096	173,965	$214,741	$1.23	64
Allegheny Valley	2	116	0	0	0	0	0	0
Beaver	2	8	0	2,888	1,584	3,940	2.49	54.8
Blossburg	1	200	0	976	488	1,220	2.50	50
Broad Top	5	460	0	133,276	85,842	150,224	1.75	64.4
Clearfield-Center	8	695	0	155,088	99,469	131,188	1.32	64
Connellsville	29	18,028	b 80	12,174,597	8,181,179	10,122,458	1.237	67.2
Greensburg	3	118	0	31,300	20,309	22,340	1.10	65
Irwin	5	725	0	166,124	103,872	105,609	1.017	62.5
Pittsburg	9	973	0	452,845	232,529	547,284	2.35	51.3
Reynoldsville-Walston	8	1,637	0	504,092	296,820	357,266	1.20	58.9
Upper Connellsville	14	1,849	c 30	319,285	208,158	251,892	1.21	65
Total	99	26,042	110	14,211,567	9,404,215	11,908,162	1.266	66.2

a Includes 60 Otto-Hoffmann ovens. b Includes 50 Semet-Solvay ovens.
c By-product beehive ovens.

Connellsville district.—In considering the statistics of the manufacture of coke in Pennsylvania by districts, the Connellsville region, of course, is preeminently the most important. The output in this region has in every year since 1880, with the exception of 1896, produced more than 50 per cent of the total coke product of the United States. As has before been stated, the decreased production of Connellsville coke in 1896, which for the first time in the history of the region made its product less than 50 per cent of the total, was the determination on the part of the principal producers to uphold prices throughout the year. Connellsville coke could not be bought during any time in 1896 for less than $1.75 per ton, and the larger operators kept the price at $2 for furnace coke, and while the prices were successfully maintained the production decreased over 2,700,000 tons. How this decrease of production in the Connellsville region affected the output of competitive districts, has already been referred to and is more fully discussed in the report for 1896.

The following are the statistics of the manufacture of coke in the Connellsville region from 1880 to 1897:

Statistics of the manufacture of coke in the Connellsville region, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	67	7,211	731	3,367,856	2,205,946	$3,948,643	$1.79	65.5
1881	70	8,208	654	4,018,782	2,639,002	4,301,573	1.63	65.7
1882	72	9,283	592	4,628,736	3,043,394	4,473,789	1.47	65.8
1883	74	10,176	101	5,355,380	3,552,402	4,049,738	1.14	66.3
1884	76	10,543	200	4,829,054	3,192,105	3,607,078	1.13	66.1
1885	68	10,471	48	4,683,831	3,096,012	3,776,388	1.22	66.1
1886	36	11,324	1,895	6,305,460	4,180,521	5,701,086	1.36	66.3
1887	73	11,923	98	6,182,846	4,146,989	7,437,669	1.79	67
1888	38	12,818	1,320	7,191,708	4,955,553	5,884,081	1.19	69
1889	29	14,458	430	8,832,371	5,930,428	7,974,633	1.34	67
1890	28	15,865	30	9,748,449	6,464,156	11,537,370	1.94	66.3
1891	33	17,551	0	7,083,705	4,760,665	8,903,454	1.87	67
1892	31	17,309	0	9,389,549	6,329,452	11,598,407	1.83	67.4
1893	28	17,504	5	7,095,491	4,805,623	7,141,031	1.49	67.7
1894	29	17,829	0	7,656,169	5,192,080	5,405,691	1.04	67.8
1895	29	18,028	*a* 80	12,174,597	8,181,179	10,122,458	1.237	67.2
1896	88	*a*18,347	0	8,107,536	5,462,490	10,018,946	1.834	67.4
1897	86	*a*18,467	92	10,243,690	6,860,826	10,662,428	1.55	67

a Includes 50 Semet-Solvay by-product ovens.

The beehive oven continues to be practically the only style of oven used in the Connellsville region, the only exception in the region being a bank of 50 Semet-Solvay ovens, which were completed in 1895, and which contributed to the product in 1896 and 1897. One of the advantages possessed by the Semet-Solvay ovens in the saving of the by-products from the distillation of the coal is the fact that they can be and are operated continually, the reports in the Connellsville Courier and to the American Manufacturer showing that these ovens were operated seven days in the week throughout the year. The Semet-Solvay ovens in the Connellsville district are located in Dunbar, Pennsylvania, and operated by the Dunbar Furnace Company. It is stated that it is the intention of the company to erect 50 additional ovens of the same type. The total number of ovens in existence in the Connellsville region during 1897 was 18,467, a gain of 120 over 1896; and 92 ovens were in course of construction at the end of the year.

The following table, showing the monthly shipments of Connellsville coke during the last four years, has been compiled from the files of the American Manufacturer, of Pittsburg. It should be remembered that the great strike of 1894 and the high prices set for Connellsville coal in 1896 are responsible for the small shipments reported in those years.

Monthly shipments of coke from the Connellsville region from 1894 to 1897, inclusive.

Month.	Cars.			
	1894.	1895.	1896.	1897.
January	17,558	29,530	26,891	30,064
February	20,560	31,643	31,808	25,492
March	23,216	44,384	29,992	26,226
April	20,678	29,674	27,240	24,981
May	3,328	32,930	33,307	30,868
June	11,518	30,507	22,263	25,204
July	11,518	32,944	23,457	32,159
August	23,476	41,820	22,214	33,868
September	35,841	35,568	12,815	30,187
October	30,294	37,251	17,237	40,910
November	30,714	47,680	16,804	33,635
December	31,774	38,885	21,238	42,482
Total	260,475	432,816	285,266	376,076

It will be seen from the above table that the greatest activity during 1897 was in the month of December, when the shipments aggregated 51,262 cars, nearly as much as the combined shipments in February and March, and more than the combined shipments in March and April. The coke trade during the year, according to the reports to the American Manufacturer, showed at times the greatest activity ever seen in the region. This was not noticeable during the early months of the year, particularly in February, March, and April, but the summer months showed a considerable improvement, and, stimulated by the remarkable activity in the iron industry during the latter part of the year, the last three months were very productive, showing an average of about 41,000 cars each. Prices varied considerably during the year. In the early part of January $1.90 was named as the price for Connellsville furnace coke, but actual sales are reported as being made at much lower figures. Coke sold as low as $1.65 during the month of January, declining during February, March, and April until in May and June it was as low as $1.30, and small sales were reported at $1.25. Toward the close of the year prices were firm and sales of furnace coke for spot shipment were made at $1.65 per ton.

The following table shows how prices were quoted throughout the year:

Average monthly prices of coke during 1897.

Month.	Furnace.		Foundry.	Crushed.
January	$1.75 to	$2.00	$2.30	$2.35
February	1.75	2.00	2.30	2.35
March	1.50	1.75	2.30	2.35
April	1.50	1.60	2.30	2.35
May	1.30	1.50	1.75	1.85
June		1.50	1.75	1.85
July		1.50	2.30	2.30
August		1.50	2.30	2.30
September	1.40	1.50	2.30	2.30
October	1.50	1.75	2.15	2.30
November		1.75	2.15	2.30
December		1.75	2.15	2.30

How the above compares with the prices for the corresponding months in 1896 may be seen below:

Average monthly prices of coke during 1896.

Month.	Furnace.		Foundry.	Crushed.
January	$1.75 to	$2.00	$2.30	$2.35
February	1.75	2.00	2.30	2.35
March	1.75	2.00	2.30	2.35
April	1.75	2.00	2.30	2.35
May	1.75	2.00	2.30	2.35
June	1.75	2.00	2.30	2.35
July	1.75	2.00	2.30	2.35
August	1.75	2.00	2.30	2.35
September	1.75	2.00	2.30	2.35
October	1.75	2.00	2.30	2.35
November	1.75	2.00	2.30	2.35
December	1.75	2.00	2.30	2.35

The following table gives the ruling and circular prices of blast-furnace coke free on board at the ovens for the past seventeen years:

Monthly prices of Connellsville blast-furnace coke free on board at ovens.

Month.	1881.		1882.		1883.		1884.	1885.
January	$1.50 to $1.75		$1.70 to $1.80		$1.15 to $1.20		$1.00	$1.10
February	1.50	1.75	1.70	1.80	1.10	1.20	1.00	1.10
March	1.50	1.75	1.70	1.75		1.05	1.00	1.10
April	1.60	1.75	1.70	1.75		1.05	1.10	1.20
May	1.60	1.65	1.65	1.70	.95	1.05	1.10	1.20
June	1.60	1.65	1.50	1.65		.90	1.10	1.20
July	1.50	1.60	1.35	1.50		.90	1.10	1.20
August		1.60		1.35		.90	1.10	1.20
September		1.60	1.25	1.35		1.00	1.10	1.20
October	1.60	1.65		1.25		1.00	1.10	1.20
November	1.60	1.65	1.25	1.35		1.00	1.10	1.20
December	1.60	1.70	1.15	1.35		1.00	1.10	1.20

Month.	1886.	1887.	1888.	1889.	1890.	1891.
January	$1.20	$1.50	$1.75	$1.25	$1.75	$1.90
February	1.20	2.00	1.75	1.25	1.75	1.90
March	1.35	2.00	$1.25 to 1.50	1.25	2.15	1.90
April	1.35	2.00	1.00	1.15	2.15	1.90
May	1.50	2.00	1.00	1.10	2.15	1.90
June	1.50	2.00	1.00	1.10	2.15	1.90
July	1.50	2.00	1.00	$1.00 to 1.10	2.15	1.90
August	1.50	2.00	1.00	1.10	2.15	1.90
September	1.50	2.00	1.00	1.25 1.50	2.15	1.85
October	1.50	2.00	1.00	1.50	2.15	1.85
November	1.50	2.00	1.25	1.75	2.15	1.80
December	1.50	2.00	1.25	1.75	2.15	1.80

Month.	1892.	1893.	1894.	1895.	1896.		1897.	
January	$1.90	$1.90	$0.95 to $1.00	$1.00	$1.75 to $2.00		$1.75 to $2.00	
February	1.90	1.90	.95	1.00	1.75	2.00	1.75	2.00
March	1.90	1.90	1.00	1.00	1.75	2.00	1.50	1.75
April	1.90	1.70	.92	1.35	1.75	2.00	1.50	1.60
May	1.80	1.60	.92	1.35	1.75	2.00	1.30	1.50
June	1.80	1.50	1.00	1.35	1.75	2.00		1.50
July	1.75	1.45	1.00	1.35	1.75	2.00		1.50
August	1.75	1.25	1.15 2.00	1.35	1.75	2.00		1.50
September	1.75	1.20	1.30 1.40	1.35	1.75	2.00	1.40	1.50
October	1.75	1.20	1.00	1.60	1.75	2.00	1.50	1.75
November	1.75	1.10	1.01	1.60	1.75	2.00		1.75
December	1.75	1.05	1.00	1.60	1.75	2.00		1.75

Upper Connellsville district.—The Upper Connellsville district includes that portion of the Connellsville trough or basin lying north of a point a short distance below Latrobe. The coal differs somewhat from that of the lower part of the basin, so that, in addition to its geographical position, there is another reason for the separation of the production of this field from that of the Connellsville field proper. The Upper Connellsville region contains 1,863 ovens, distributed among 14 establishments. Of these, 4 establishments, embracing 259 ovens, did not make coke in 1897, so that the output for the year was furnished by 10 establishments having a total of 1,604 ovens. The producing ovens in 1897 included a bank of 30 Newton-Chambers by-product beehive ovens, completed in 1896, at Latrobe. The idle ovens included three Slocum ovens at Bolivar.

Production of coke in this district in the last five years has not been up to the record made from 1886 to 1892, inclusive, when it exceeded 400,000 tons in each of the seven years, and averaged 493,000 tons per year. The product in 1896 amounted to 406,112 tons, but did not reach the figure attained in any of the seven years from 1886 to 1892, and in 1897 fell off to 345,372 short tons. In both 1896 and 1897, however, the product was more than in any of the three years immediately preceding.

The following are the statistics of the manufacture of coke in the Upper Connellsville region for the years 1880 to 1897:

Statistics of the manufacture of coke in the Upper Connellsville district from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1880	8	757	0	319,927	229,433	$397,945	$1.73	70
1881	10	986	0	588,924	343,728	548,362	1.60	58
1882	11	1,118	0	650,174	375,918	536,503	1.43	58
1883	11	1,118	0	668,882	389,053	422,174	1.08	58
1884	11	1,118	0	496,894	294,477	311,665	1.06	59
1885	11	1,168	40	555,735	319,297	346,168	1.08	57
1886	12	1,337	29	691,331	442,968	572,073	1.29	64.1
1887	16	1,442	87	717,274	470,233	840,144	1.79	65.6
1888	16	1,977	0	657,966	441,966	617,189	1.40	68
1889	13	1,568	80	635,220	417,263	609,828	1.46	65.6
1890	14	1,569	28	889,277	577,246	1,008,102	1.75	64.9
1891	14	1,724	0	1,000,184	649,316	1,111,056	1.71	65
1892	14	1,843	0	706,171	451,975	691,323	1.53	64
1893	14	1,843	0	499,809	320,793	447,090	1.39	64
1894	14	1,843	0	279,971	176,799	212,595	1.20	63
1895	14	1,849	*a* 30	319,285	208,158	251,892	1.21	65
1896	14	*b* 1,863	0	617,601	406,112	570,687	1.405	65.7
1897	14	*b* 1,863	0	556,941	345,372	444,709	1.29	62

a By-product beehive ovens. *b* Includes 33 by-product ovens.

Allegheny Mountain district.—In this district are included all the ovens along the line of the Pennsylvania Railroad east of Blairsville and those in Somerset County. This district, like the other prominent ones in the State, profited by the higher prices of Connellsville coke in 1896; but, unlike the Upper Connellsville district, the Allegheny Mountain region not only held its own in 1897 but increased its production nearly 5 per cent over that of 1896. In another respect, however, it is like the Upper Connellsville, in that the production in each of the last five years has been less than that of any year from 1887 to 1892, inclusive.

There are thirteen establishments in the district, with a total of 1,185 ovens. Of these, four establishments, having 180 ovens, were nonproductive. The productive ovens included one bank of 60 Otto-Hoffmann by-product ovens at Johnstown. Five establishments used unwashed run-of-mine coal, three used unwashed slack, and one works used washed slack.

The statistics of the manufacture of coke in the Allegheny Mountain district from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Allegheny Mountain district of Pennsylvania from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880.....	8	291	0	201,345	127,525	$289,929	$2.27	63
1881.....	9	371	0	225,563	144,430	329,198	2.28	64
1882.....	10	481	0	284,544	179,580	377,286	2.10	63
1883.....	10	532	0	200,343	135,342	240,641	1.78	68
1884.....	12	614	0	241,459	156,290	203,213	1.30	65
1885.....	11	523	82	327,666	212,242	286,539	1.30	65
1886.....	10	579	14	351,070	227,369	374,013	1.64	64.8
1887.....	10	694	150	461,922	297,724	671,437	2.25	64.4
1888.....	12	950	145	521,047	335,689	479,845	1.43	64.4
1889.....	16	1,069	20	564,112	354,288	601,964	1.69	63.5
1890.....	16	1,171	0	633,974	402,514	730,048	1.81	63.5
1891.....	16	1,201	0	708,523	448,067	782,175	1.75	63
1892.....	16	1,260	0	724,903	448,522	775,927	1.73	61.9
1893.....	15	1,260	0	275,865	173,131	264,292	1.53	62.8
1894.....	15	1,253	0	92,965	58,823	71,161	1.21	63.3
1895.....	13	1,233	60	271,096	173,965	214,741	1.23	64
1896.....	13	[a]1,188	0	408,827	266,473	349,373	1.31	65
1897.....	13	[a]1,185	0	417,470	278,578	365,191	1.31	66.7

[a] Includes 60 Otto-Hoffmann ovens.

Clearfield-Center district.—This district includes the ovens in Clearfield and Center counties, including Snow Shoe, Moshannon, and other well-known coal districts. There are 7 establishments in this district, 4 of which made coke in 1897, leaving 3 idle. The total number of ovens in the district is 668; the active ones in 1897 numbered 388, making 280 idle, and distributing the active and idle ovens in nearly equal proportions according to the establishments. The output of the district in 1897 was the largest in six years, and, with two exceptions, the largest in the history of the region. Formerly the ovens of this district depended chiefly upon the slack coal produced at the mines in the vicinity, but the supply was uncertain and unsatisfactory. The fact that all of the coal used in 1897 was unwashed run of mine indicates that the industry has been placed upon an independent basis.

The statistics of the manufacture of coke in the Clearfield-Center district for the years 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Clearfield-Center district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*per cent.*
1880.....	1	0	0	200	100	$200	$2.00	50
1881.....	2	50	0	20,025	13,350	22,695	1.70	67
1882.....	1	50	0	25,000	17,160	27,406	1.60	69
1883.....	1	60	0	26,500	18,696	28,844	1.50	71
1884.....	1	60	0	33,000	23,431	32,849	1.40	71
1885.....	2	245	0	69,720	48,103	70,331	1.46	69
1886.....	3	299	20	84,870	55,810	94,877	1.70	66
1887.....	6	523	10	154,566	97,852	198,095	2.02	63.3
1888.....	6	601	0	172,999	115,338	174,220	1.51	66.6
1889.....	6	671	0	195,473	120,734	215,112	1.78	61.7
1890.....	7	701	0	331,104	212,286	391,957	1.85	64
1891.....	7	666	0	293,542	183,911	339,082	1.84	63
1892.....	7	731	0	231,357	147,819	264,422	1.79	63.9
1893.....	8	695	0	155,119	98,650	171,482	1.74	63.6
1894.....	8	694	0	61,428	38,825	51,482	1.33	63
1895.....	8	695	0	155,088	99,469	131,188	1.32	64
1896.....	7	666	0	183,056	118,155	164,266	1.39	64.5
1897.....	7	668	0	230,395	153,517	197,139	1.28	66

Broad Top district.—The ovens situated in Bedford and Huntingdon counties, comprising what is known as the Broad Top coal-field, are included in this district. This district was the one exception to the increased production outside of the Connellsville district in 1896, the

output here decreasing 13,667 tons, and a further decrease, 5,226 tons, is observed in the product for 1897. Three out of the five establishments and 248 out of the 491 ovens were idle during the year. This circumstance, taken in connection with the fact that the production in 1897 was only 55 per cent and the average for the last five years less than 60 per cent of the average output in the eleven years from 1882 to 1892, inclusive, seems to indicate that coke making in the Broad Top region is on the decline. All of the coal used at the two productive establishments in 1897 was unwashed run of mine.

The statistics of the manufacture of coke in the Broad Top region from 1880 to 1897 are shown in the following table:

Statistics of the manufacture of coke in the Broad Top region, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1880.....	5	188	105	92,894	51,130	$123,748	$2.40	55
1881.....	5	188	105	111,593	66,560	167,074	2.51	59
1882.....	5	293	50	170,637	105,111	215,079	2.05	62
1883.....	5	343	110	220,932	147,154	271,692	1.84	66
1884.....	5	453	0	227,954	151,959	264,569	1.74	66
1885.....	5	537	0	190,836	112,073	185,656	1.65	58
1886.....	5	562	100	171,137	108,294	187,321	1.73	63.3
1887.....	5	581	0	262,730	164,535	347,061	2.11	62.6
1888.....	5	591	0	196,015	119,469	286,655	2.40	61
1889.....	5	589	0	152,090	91,256	186,718	2.05	60
1890.....	5	482	16	247,823	157,208	314,416	2.00	63
1891.....	5	448	0	146,008	90,728	197,048	2.17	62
1892.....	5	448	8	185,600	117,554	216,090	1.84	63.3
1893.....	5	456	14	136,069	86,752	150,196	1.73	63.8
1894.....	5	454	14	53,216	34,089	51,815	1.52	64
1895.....	5	460	0	133,276	85,842	150,224	1.75	64.4
1896.....	5	480	0	111,145	72,175	126,306	1.75	64.9
1897.....	5	491	15	106,706	66,949	107,430	1.60	62.7

Pittsburg district.—Much of the coal made into coke in the Pittsburg district is slack, usually obtained from the mines along the several pools of the Monongahela River and brought to Pittsburg by barges. Latterly also considerable coal has been brought from the fourth pool of the Monongahela River to Pittsburg for coking. The predictions made in previous reports that the Pittsburg district was destined to assume much greater importance as a coke-producing center has been verified. The prediction was based on the contemplated building of a

large number of by-product ovens along the Monongahela River near Pittsburg. The year 1897 saw 120 Otto-Hoffmann by-product ovens added to the coke-making equipment of this region. These assisted materially in augmenting the output for the year, which was about 50 per cent more than in 1896, two and one-third times the product of 1895, and more than twice the output in any previous year. It is observable, too, that the percentage yield of coal in coke was the highest ever attained, and that with the exception of 1888 and 1894 the selling value per ton of coke was the lowest on record. There were 9 establishments in the district, and a total of 1,353 ovens at the close of 1897. One concern having 19 ovens was idle during the year. Five establishments used unwashed run of mine coal, two used unwashed slack, and one concern used washed slack coal before coking.

The statistics of the manufacture of coke in the Pittsburg district, Pennsylvania, for the years 1880 to 1897 are stated in the following table:

Statistics of the manufacture of coke in the Pittsburg district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1880.....	21	534	0	194,393	105,974	$254,500	$2.40	55
1881.....	21	538	0	178,509	96,310	206,965	2.15	54
1882.....	21	557	0	114,956	64,779	134,378	2.07	56.3
1883.....	20	542	0	119,310	66,820	126,020	1.89	56
1884.....	20	535	0	97,367	53,857	99,911	1.87	55
1885.....	17	416	4	91,101	46,930	72,509	1.55	51.5
1886.....	18	730	0	228,874	138,646	221,617	1.88	60.6
1887.....	20	880	235	366,184	177,097	315,546	1.78	48.4
1888.....	22	980	0	428,899	264,156	350,818	1.33	62
1889.....	17	600	21	233,571	141,324	283,402	2.00	60.5
1890.....	14	541	0	149,230	93,984	171,465	1.82	63
1891.....	13	590	11	154,054	94,160	201,458	2.14	61
1892.....	15	725	261	292,357	176,365	376,613	2.14	60.3
1893.....	10	885	0	357,400	216,268	438,801	2.03	60.5
1894.....	9	779	104	371,569	227,100	351,825	1.55	61
1895.....	9	973	0	452,845	232,529	547,284	2.35	51.3
1896.....	11	1,264	*a* 120	583,984	368,070	941,076	2.56	63
1897.....	9	*a* 1,233	200	832,505	548,981	864,326	1.57	66

a Otto-Hoffmann by-product ovens.

Beaver district.—The district is an unimportant one, and the industry was on the decline, with spasmodic reactions from 1880 to 1895. The completion of 25 Semet-Solvay ovens in 1896 revived the production somewhat and in 1897 trebled the production of 1896.

The following are the statistics of the manufacture of coke in the Beaver district, Pennsylvania, for the years 1880 to 1897:

Statistics of the manufacture of coke in the Beaver district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	5	106	.....	8,013	4,880	$10,150	$2.08	61
1881	5	106	.....	6,887	4,333	9,013	2.08	63
1882	5	106	.....	11,699	7,960	15,124	1.90	68
1883	5	107	.....	19,510	12,395	21,062	1.70	64
1884	4	89	.....	2,250	1,390	2,168	1.56	62
1885	4	89	.....	686	438	696	1.59	63
1886	3	87	.....	698	411	646	1.57	59
1887	3	65	.....	25,207	13,818	24,137	1.75	55
1888	4	145	.....	262	175	260	1.48	66.6
1889	3	90	.....	3,100	1,853	3,848	2.07	60
1890	3	90	.....	4,010	2,148	4,564	2.12	53.5
1891	3	88	.....	4,224	2,332	6,663	2.86	55
1892	2	10	0	3,925	2,154	6,270	2.91	54.9
1893	2	10	0	2,998	1,644	4,446	2.70	54.8
1894	2	8	0	2,968	1,624	4,251	2.62	54.7
1895	2	8	0	2,888	1,584	3,940	1.49	54.8
1896	3	*a* 35	0	13,845	9,004	17,200	1.91	65
1897	3	*a* 33	0	42,200	27,276	61,646	2.26	64.6

a Includes 25 Semet-Solvay ovens in Mercer County.

Allegheny Valley district.—This district includes the coke works of Armstrong and Butler counties, situated in the valley of the Allegheny River. There was no coke made in this district in 1894 or 1895, but production was resumed in 1896, with an output of 7,467 tons. The product in 1897 was about two-thirds that of 1896.

The statistics of the manufacture of coke in the Allegheny Valley district for the years 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Allegheny Valley district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	5	97	0	45,355	23,470	$49,068	$2.10	52
1881	5	109	0	55,676	29,650	64,664	2.18	53
1882	6	159	0	76,000	41,897	80,294	1.92	55
1883	6	159	0	64,810	34,868	62,982	1.81	54
1884	7	209	0	55,110	31,430	54,859	1.75	57
1885	5	208	0	28,630	15,326	30,151	1.97	53.5
1886	5	208	0	51,580	28,948	44,422	1.54	56
1887	5	288	88	77,666	44,621	84,913	1.90	57.1
1888	5	376	0	37,792	21,719	36,008	1.66	57.5
1889	4	198	0	13,105	6,569	10,538	1.62	50
1890	3	148	0	33,049	18,733	40,204	2.15	56.7
1891	3	148	0	21,833	11,314	25,909	2.29	52
1892	3	148	0	0	0	0	0	0
1893	2	116	0	10,927	6,557	11,147	1.70	60
1894	2	116	0	0	0	0	0	0
1895	2	116	0	0	0	0	0	0
1896	2	116	0	12,445	7,467	14,934	2.00	60
1897	2	116	0	8,300	5,000	10,000	2.00	60.2

Reynoldsville-Walston district.—This district includes all the ovens on the Rochester and Pittsburg Railroad, as well as those on the Low Grade Division of the Allegheny Valley Railway, and the mines of the New York, Lake Erie and Western Railroad. It is at the present time the third most important coking district in Pennsylvania, and was second in importance in 1895 and 1896, with promise of great increase in production in the future. The production of coke in this district in 1897 (including a small amount made in New York) was the largest in its history. Compared with 1896, the output in 1897 shows an increase of 45,269 tons, or about 25 per cent. There are six establishments in the district, with a total of 1,980 ovens. Three of these establishments were nonproductive in 1897, but the three idle works possessed altogether only 290 ovens, so the possible production was not seriously cut down by their idleness. All of the coal used in making coke is slack, and all of it in 1897 came from the mines in Clearfield and Jefferson counties. About 6 per cent only is washed before coking, there being but one washery (supplying a bank of 100 ovens) in the district.

The following are the statistics of the manufacture of coke in the Reynoldsville-Walston district for the years 1880 to 1897:

Statistics of the manufacture of coke in the Reynoldsville-Walston district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	3	117	0	45,055	28,090	$46,359	$1.65	62
1881	4	125	2	99,489	44,260	80,785	1.85	44
1882	5	177	0	87,314	44,709	80,339	1.80	51
1883	6	229	0	76,580	37,044	65,584	1.77	48
1884	7	321	0	159,151	78,646	113,155	1.44	49
1885	8	600	143	183,806	114,409	153,795	1.35	62
1886	9	783	500	271,037	161,828	217,834	1.35	59.7
1887	11	1,492	134	507,320	316,107	592,728	1.88	62.3
1888	9	1,636	100	404,346	253,662	320,203	1.26	62.7
1889	8	1,747	0	514,461	313,011	436,857	1.40	60.8
1890	8	1,737	0	652,966	406,184	771,996	1.90	62
1891	7	1,747	0	769,100	470,479	744,098	1.58	61
1892	8	1,734	0	683,539	425,250	743,227	1.75	62.2
1893	8	1,755	0	562,033	339,314	586,212	1.73	60.4
1894	8	1,755	0	336,554	207,238	297,596	1.44	61.6
1895	8	1,637	0	504,092	296,820	357,266	1.20	58.9
1896*a*	7	1,852	34	770,104	445,998	673,625	1.51	57.9
1897*a*	6	1,980	0	810,808	491,267	759,609	1.55	60.6

a Includes coal used, coke produced, and its value in New York.

Blossburg district.—This district, which was at one time of considerable importance as a coke-producing district, especially to central and western New York, produced very little coke in 1894 and 1895, and none in 1896 or 1897. The ovens have been abandoned.

Statistics of the manufacture of coke in the Blossburg district, Pennsylvania, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880.....	1	200	0	72,520	44,836	$134,500	$3.00	62
1881.....	1	200	0	88,055	56,085	168,250	3.00	64
1882.....	1	200	0	100,119	64,526	193,500	3.00	64
1883.....	2	344	0	71,028	44,690	122,450	2.74	63
1884.....	2	344	32	62,365	39,043	93,763	2.40	63
1885.....	2	296	0	46,489	26,975	59,423	2.17	58
1886.....	2	405	0	136,136	81,801	174,532	2.13	60
1887.....	2	406	0	182,623	103,873	234,622	2.26	56.9
1888.....	2	407	0	62,063	38,052	81,400	2.14	61
1889.....	2	407	0	31,806	18,422	47,765	2.59	58
1890.....	2	407	0	41,785	23,196	62,804	2.71	55.5
1891.....	2	407	0	46,084	24,351	66,195	2.72	53
1892.....	2	407	0	30,746	16,675	45,855	2.75	54.2
1893.....	2	407	0	22,176	11,463	31,427	2.74	50.7
1894.....	1	250	0	670	332	896	2.70	50
1895.....	1	200	0	976	488	1,220	2.50	50
1896.....	0	0	0	0	0	0	0	0
1897.....	0	0	0	0	0	0	0	0

Greensburg district.—The Greensburg district includes a small number of ovens situated in the Greensburg coal basin, erected chiefly for the utilization of the slack coal. The coal is all from the Pittsburg vein. There are three establishments, having a total of 178 ovens, 60 of which were added in 1896. The result of the addition of the new ovens is shown in the more than doubled output in 1897 as compared with 1896, and the largest product recorded in the district. None of the coal used in this district is washed.

Statistics of the manufacture of coke in the Greensburg district, Pennsylvania, from 1889 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1889	2	50	16	32,070	20,459	$21,523	$1.05	63.8
1890	2	58	0	44,000	30,261	44,290	1.46	68.7
1891	2	58	0	38,188	22,441	36,627	1.63	59
1892	2	58	0	15,005	9,037	13,173	1.46	60.2
1893	3	88	0	29,983	18,393	26,303	1.43	61
1894	3	118	0	27,290	15,872	18,413	1.16	58.2
1895	3	118	0	31,300	20,309	22,340	1.10	65
1896	3	178	0	36,963	24,642	30,928	1.255	66
1897	3	178	0	81,927	52,495	65,619	1.25	64

Irwin district.—The Irwin district comprises the ovens situated near the town of that name; also those located in what may be termed the Irwin basin, on the Youghiogheny River. It will be noted that this district is of considerable importance as a coke producer. Most of the coke made in the district is produced by the Carnegie Steel Company, Limited, at Larimer and Douglas, where slack from the gas coal mined in the immediate vicinity is made into coke. The coal coked by the Carnegie Company is washed before it is charged into the ovens. One of the other works uses unwashed slack, and one uses unwashed run of mine. One establishment having 117 ovens was idle in 1897.

The statistics of the manufacture of coke in the Irwin district from 1889 to 1897 are shown in the following table:

Statistics of the manufacture of coke in the Irwin district, Pennsylvania, from 1889 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1889	4	696	0	373,913	243,448	$351,304	$1.44	65
1890	4	661	0	270,476	172,329	256,458	1.49	63.7
1891	4	696	0	323,099	197,082	266,061	1.35	61
1892	4	696	0	328,193	202,809	284,029	1.40	61.8
1893	5	725	0	238,832	150,463	175,609	1.30	63
1894	5	725	0	176,318	110,995	119,764	1.08	63
1895	5	725	0	166,124	103,872	105,609	1.017	62.5
1896	5	669	0	279,104	175,916	275,518	1.566	63
1897	5	696	0	207,704	136,663	189,869	1.39	65.8

TENNESSEE.

Owing to an increase of 29,567 short tons in 1897 as compared with 1896, and a decrease of 24,277 tons in Colorado's production, Tennessee regained its place as fourth in importance among the coke producing States. Tennessee and Colorado have been close rivals for fourth place since the former was permanently supplanted in third position by Alabama in 1888. In the ten years from 1888 to 1897, inclusive, Tennessee has held fourth place six times, while Colorado has had the distinction four times. The decreased production in Colorado during 1897 and an increase of about 86,000 tons in Virginia's output, puts the latter State in fifth place, while Colorado dropped to sixth place, for the first time in fifteen years.

With the exception of 1895, the coke production of Tennessee in 1897 was the largest since 1888, and there have been only three years, 1887, 1888, and 1895, when the coke output in the State exceeded that of 1897. The 100 ovens which were under construction at the close of 1896 were completed in 1897, while 13 ovens were abandoned, making the total number of ovens in the State at the close of 1897, 1,948 as compared with 1,861 in 1896. Three establishments, having a total of 170 ovens, did not produce any coke, so that the product was distributed among 1,778 ovens, making the average production per oven 207.6 tons during the year. The 100 new ovens completed in 1897 were built by the State for using the slack coal product of its mines at Petros. The slack is washed before coking.

The following are the statistics of the manufacture of coke in Tennessee for the years 1880 to 1897:

Statistics of manufacture of coke in Tennessee from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1880.....	6	656	68	217,656	130,609	$316,607	$2.42	60
1881.....	6	724	84	241,644	143,853	342,585	2.38	60
1882.....	8	861	14	313,537	187,695	472,505	2.52	60
1883.....	11	992	10	330,961	203,691	459,126	2.25	62
1884.....	*a* 13	1,105	175	348,295	219,723	428,870	1.95	63
1885.....	12	1,387	36	412,538	218,842	398,459	1.82	53
1886.....	12	1,485	126	621,669	368,139	687,865	1.87	59
1887.....	11	1,560	165	655,857	396,979	870,900	2.19	61
1888.....	11	1,634	84	630,099	385,693	490,491	1.27	61
1889.....	12	1,639	40	626,016	359,710	731,496	2.03	57
1890.....	11	1,664	292	600,387	348,728	684,116	1.96	58
1891.....	11	1,995	0	623,177	364,318	701,803	1.93	58
1892.....	11	1,941	0	600,126	354,096	724,106	2.05	59
1893.....	11	1,942	0	449,511	265,777	491,523	1.85	61
1894.....	11	1,860	0	516,802	292,646	480,124	1.64	56.6
1895.....	12	1,903	0	684,655	396,790	754,926	1.90	57.9
1896.....	15	1,861	100	600,379	339,202	624,011	1.84	56.5
1897.....	15	1,948	0	667,996	368,769	667,656	1.81	55

a One establishment made coke in pits.

The character of the coal used in the manufacture of coke in Tennessee since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Tennessee since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	255, 359	0	273, 028	72, 000	600, 387
1891	184, 556	0	377, 914	60, 707	623, 177
1892	176, 453	15, 000	367, 827	40, 846	600, 126
1893	179, 126	0	137, 483	132, 902	449, 511
1894	166, 990	61, 841	149, 958	138, 013	516, 802
1895	96, 744	59, 284	285, 906	242, 721	684, 655
1896	0	206, 319	219, 231	174, 829	600, 379
1897	36, 485	400, 166	119, 755	111, 590	667, 996

TEXAS.

Texas appears for the first time as a producer of coke upon a commercial scale. Twenty ovens have been erected by the Texas and Pacific Coal Company for utilizing the slack coal produced at its mine. The company has expended considerable money in experimenting, the greatest difficulty encountered being in the efforts to secure a washing plant that would successfully wash the coal. The product in 1897 was small, amounting to but 394 short tons, but it shows that the enterprise of the company has demonstrated the practicability of making coke from Texas coal.

UTAH.

As there is but one establishment making coke in Utah, detailed statistics of production have been included with that of Colorado, as the coals in this State are practically identical in character with those of western Colorado.

The following is the amount of coke produced in Utah from 1889 to 1897:

Production of coke in Utah from 1889 to 1897.

Year.	Tons.	Year.	Tons.
1889	761	1894	16, 056
1890	8, 528	1895	22, 519
1891	7, 949	1896	20, 447
1892	7, 309	1897	23, 617
1893	16, 005		

VIRGINIA.

Coke-making in Virginia from Virginia coal may be said to have begun in 1895, when coke produced in Wise County, on the Clinch Valley division of the Norfolk and Western Railroad, was placed upon the market. Previous to 1895 there were only two establishments in the State, one of which was at Pocahontas, in the Flat Top coal region, the other at Low Moor, just east of the West Virginia line. The coal for the Pocahontas ovens is drawn from mines which extend beyond the boundary line between Virginia and West Virginia, and much, if not the greater part, of the product belongs of right to the latter State. It has been customary, however, to credit all of the product to Virginia, as the openings are in that State. The ovens at Low Moor are fed entirely by coal mined in the New River district of West Virginia. The Clinch Valley or Wise County product belongs entirely to Virginia, and over 60 per cent of the coke product of Virginia in 1897 was from this region.

As will be seen in the accompanying tables, the number of ovens increased from 1,138 in 1896 to 1,453 in 1897, all of the new ones being in the Clinch Valley district. The 110 ovens in course of construction on December 31 are also in this district. The Virginia Coal and Iron Company at Stonega had 100 of the new ovens building at the close of the year, which, when completed, will make a total of 500 owned by this company. The other 10 ovens were being erected by the Dorchester Coal and Coke Company. When these are added to the ones now in existence in the Clinch Valley the total for the district will be 835, whereas there were none in 1894. The Toms Creek Coal and Coke Company has 215 ovens now in operation.

The attempt to produce coke from the Triassic coal of the Richmond basin does not seem to have met with success, as no coke was made in 1897 at the 4 ovens built there the previous year.

The amount of coal coked in Virginia in 1897 was nearly equally divided between run of mine and slack. All of the former was charged into the ovens without washing. About 21 per cent of the slack used was washed. Until 1896 washing the coal before coking was not practiced in Virginia. In that year a plant was erected by the Toms Creek Coal and Coke Company and 13,584 tons of slack coal were washed. The amount of slack coal washed in 1897 was 61,021 tons.

The following are the statistics of the manufacture of coke in Virginia from 1883 to 1897:

Statistics of the manufacture of coke in Virginia from 1883 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1883	1	200	0	39,000	25,340	$44,345	$1.75	65
1884	1	200	0	99,000	63,600	111,300	1.75	64.25
1885	1	200	0	81,899	49,139	85,993	1.75	60
1886	2	350	100	200,018	122,352	305,880	2.50	61.2
1887	2	350	300	235,841	166,947	417,368	2.50	70.8
1888	2	550	0	230,529	140,199	260,000	1.74	64.7
1889	2	550	250	238,793	146,528	325,861	2.22	61
1890	2	550	250	251,683	165,847	278,724	1.68	66
1891	2	550	250	285,113	167,516	265,107	1.58	58.8
1892	2	594	206	226,517	147,912	322,486	2.18	65.3
1893	2	594	206	194,059	125,092	282,898	2.26	64.5
1894	2	736	100	280,524	180,091	295,747	1.64	64.2
1895	5	832	350	410,737	244,738	322,564	1.32	59.6
1896	7	1,138	101	454,964	268,081	404,573	1.509	58.9
1897	6	1,453	110	574,542	354,067	495,864	1.40	61.6

The character of the coal used in the manufacture of coke in Virginia since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Virginia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	98,215	0	153,468	0	251,683
1891	107,498	0	177,615	0	285,113
1892	106,010	0	120,507	0	226,517
1893	107,498	0	86,561	0	194,059
1894	103,874	0	176,650	0	280,524
1895	114,802	0	295,935	0	410,737
1896	70,756	0	370,624	13,584	454,964
1897	286,158	0	227,363	61,021	574,542

WASHINGTON.

There are only three coke-making establishments in Washington, and but two of these have been in operation during the last three years. These are the only coking plants on the Pacific coast. The coals of Washington, like those of the Rocky Mountain States, are of Cretaceous origin, and in some places still preserve lignitic characteristics. In other places they have been altered by local conditions and are true coking coals. From 1891 to 1895 most of the coal coked in Washington was washed slack. In 1896, however, more than half of the coal used was washed run of mine, and in 1897 all of the coke was made from washed run-of-mine coal.

The product in 1897, while not large when compared with that of some of the coke-producing States, exceeded that of any other year in the history of the State.

Coke making began in Washington in 1884, with a product of 400 short tons. The statistics of production since that time are exhibited in the following table:

Statistics of the production of coke in Washington from 1884 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1884.....	1	0	0	700	400	$1,900	$4.75	57.5
1885.....	1	2	0	544	311	1,477	4.75	57
1886.....	1	11	21	1,400	825	4,125	5.00	58.9
1887.....	1	30	0	22,500	14,625	102,375	7.00	65
1888.....	3	30	100	0	0	0	0	0
1889.....	1	30	0	6,983	3,841	30,728	8.00	55
1890.....	2	30	80	9,120	5,837	46,696	8.00	64
1891.....	2	80	0	10,000	6,000	42,000	7.00	60
1892.....	3	84	30	12,372	7,177	50,446	7.03	58
1893.....	3	84	0	11,374	6,731	34,207	5.08	59
1894.....	3	84	0	8,563	5,245	18,249	3.48	61.2
1895.....	3	110	0	22,973	15,129	64,632	4.27	65.9
1896.....	3	120	0	38,685	25,949	104,894	4.04	67
1897.....	3	120	0	39,124	26,189	115,754	4.42	67

The character of the coal used in the manufacture of coke in Washington since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Washington since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	0	9,120	0	0	9,120
1891	0	0	10,000	0	10,000
1892	0	0	0	12,372	12,372
1893	0	10,974	0	405	11,379
1894	0	0	0	8,563	8,563
1895	0	0	0	22,973	22,973
1896	0	20,967	0	17,718	38,685
1897	0	39,124	0	0	39,124

WEST VIRGINIA.

West Virginia, in spite of a decrease of over 177,000 tons in the production of coke during 1897, as compared with the preceding year, continues in second place among the coke-producing States, a position she has held nine times during the last eighteen years. In the other nine years West Virginia occupied third place eight times and fourth place once. In each case Alabama was the successful competitor for second place, while in 1886, when West Virginia dropped for the first and only time to fourth place, Tennessee took third place.

The coking regions of West Virginia have been separated by the late Joseph D. Weeks into five distinct districts, and the nomenclature adopted by Mr. Weeks has become generally recognized, viz, the Kanawha, the New River, the Flat Top, the Upper Monongahela, and the Upper Potomac. The first two are compact and continuous. They include the ovens along the line of the Chesapeake and Ohio Railroad from west of Low Moor, in Virginia, to the Kanawha Valley. The Flat Top region includes the ovens in what is sometimes called the Pocahontas district. The fourth district, the Upper Monongahela or Northern, is a scattered one, including the ovens in Preston, Taylor, Harrison, and Marion counties, on the upper waters of the Monongahela. The district which has been termed the Upper Potomac includes the coke ovens in the Elk Garden and Upper Potomac fields. These districts have been so frequently described that it is not necessary to repeat the description at this point, but those interested are referred to previous volumes of Mineral Resources.

The following table exhibits the statistics of coke production in West Virginia since 1880:

Statistics of the manufacture of coke in West Virginia from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	18	631	40	230,758	138,755	$318,797	$2.30	60
1881	19	689	0	304,823	187,126	429,571	2.30	61
1882	22	878	0	366,653	230,398	520,437	2.26	63
1883	24	962	9	411,159	257,519	563,490	2.19	63
1884	27	1,005	127	385,588	223,472	425,952	1.91	62
1885	27	978	63	415,533	260,571	485,588	1.86	63
1886	29	1,100	317	425,002	264,158	513,843	1.94	62
1887	39	2,080	742	698,327	442,031	976,732	2.21	63.3
1888	51	2,764	318	854,531	525,927	896,797	1.71	61.5
1889	53	3,438	631	1,001,372	607,880	1,074,177	1.76	60
1890	55	4,060	334	1,395,266	833,377	1,524,746	1.83	60
1891	55	4,621	555	1,716,976	1,009,051	1,845,043	1.83	58.8
1892	72	5,843	978	1,709,183	1,034,750	1,821,965	1.76	60.5
1893	75	7,354	132	1,745,757	1,062,076	1,716,907	1.62	60.8
1894	78	7,858	60	1,976,128	1,193,933	1,639,687	1.373	60.4
1895	78	7,834	55	2,087,816	1,285,206	1,724,239	1.34	61.6
1896	84	8,351	28	2,687,104	1,649,755	2,259,999	1.37	61.4
1897	81	8,404	38	2,413,283	1,472,666	1,933,808	1.31	61

As will be seen from the above table, the record for 1897 shows that year as the second in a period of eighteen years when the production of coke was less than that of the previous year. The decrease in 1897 was not due, however, to any depression in the coke-making industry of the State. West Virginia profited largely in 1896 by the higher prices and consequent decreased production in the Connellsville region of Pennsylvania, and the increase in the output in that year was exceptional, notwithstanding an uninterrupted annual increased production since 1884. Although the output in 1897 was 177,000 short tons less than in 1896, it exceeded that of 1895 by about 187,000 tons, which a glance at the foregoing table will show was according to the normal rate of increase during the last few years.

It will be observed that the average price per ton obtained for the coke product of West Virginia in 1897 was 6 cents lower than that of 1896, and was the lowest price ever reached. This decline may be readily accounted for in the natural endeavors of West Virginia producers to retain the markets secured during 1896, even at a reduction

in price. Under the circumstances the decline is noteworthy only as being so slight.

The greater portion of coal used in the manufacture of coke in West Virginia is slack, 90 per cent or over of which is unwashed. In the Pocahontas region, where 721,000 tons of coke were produced in 1897, none of the coal was washed, and out of 1,172,200 tons of coal used all but 153,500 tons was unwashed slack. In the Kanawha district the coal used was nearly equally divided between slack and run of mine, both unwashed. One establishment on Loup Creek, in the New River district, used washed slack; three works in the district used run of mine, unwashed, and all the rest used unwashed slack. The two works in the Upper Potomac region both used unwashed slack. Washeries were accordingly practically confined to the Upper Monongahela district, where one concern used washed run-of-mine coal and four works used washed slack.

The character of the coal used in the manufacture of coke in West Virginia since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in West Virginia since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	324,847	0	930,989	139,430	1,395,266
1891	276,259	0	1,116,060	324,657	1,716,976
1892	298,824	115,397	1,108,353	186,609	1,709,183
1893	324,932	15,240	1,176,656	228,929	1,745,757
1894	162,270	14,901	1,607,735	191,222	1,976,128
1895	405,725	24,054	1,476,003	182,034	2,087,816
1896	407,378	33,096	2,079,237	167,393	2,687,104
1897	373,205	28,145	1,800,528	211,405	2,413,283

COKE PRODUCTION IN WEST VIRGINIA BY DISTRICTS.

Three of the coke-producing districts of West Virginia are in the southern part of the State and two are in the northern portion. All three of the southern districts, the Flat Top, the New River, and the Kanawha, are drained by the New River, or its western end, the Kanawha. The northern districts, as their names imply, are drained respectively by the headwaters of the Potomac and Monongahela rivers. The Upper Potomac is the only district on the eastern slope of the Allegheny Mountains, and it is the only district in which the product in 1897 exceeded that of 1896. The Flat Top district was the one to profit most by the favorable conditions in 1896, and the product

increased nearly 330,000 tons, or over 60 per cent as compared with 1895. Conversely the Flat Top district suffered the largest decrease in 1897, its product being more than 130,000 tons less than in 1896, and while still nearly 200,000 tons larger than in 1895, was short of the 1894 output by more than 25,000 tons. The New River district, next to the Flat Top, geographically and productively, just about held its own in 1897, the product decreasing only 1,109 tons and being, with the exception of the preceding year, the largest ever recorded. The Kanawha district did not participate in the increased production in 1896, but, on the other hand, lost 7,000 tons, followed in 1897 by a further decrease of 40,000 tons. The Upper Monongahela also lost in both years—34,000 tons in 1896 and 31,000 tons in 1897. Out of 22 establishments in this district and a total of 1,363 ovens, 11 establishments having 379 ovens were idle in 1897. Most of the coke in this district is made in the vicinity of Fairmount, Marion County. The Upper Potomac district has experienced only one year of decreased production since coke making began there in 1887. This was in 1894, the year of general depression following the panic of 1893.

In the following table will be found consolidated the statistics of the production of coke in West Virginia in the three years especially covered by this report, viz, 1895, 1896, and 1897, by districts:

Production of coke in West Virginia in 1897, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke produced.	Average price of coke per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per ct.*
Kanawha	7	576	20	189,312	117,849	$187,359	$1.59	59.1
New River ...	17	1,225	0	439,103	268,263	419,151	1.56	61.1
Flat Top	36	4,648	18	1,172,206	720,988	868,484	1.21	61.5
Upper Monongahela	22	1,363	0	289,678	175,165	180,802	1.03	60.5
Upper Potomac.....	2	592	0	312,984	190,401	278,012	1.46	60.8
Total ..	84	8,404	38	2,413,283	1,472,666	1,933,808	1.31	61

Production of coke in West Virginia in 1896, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke produced.	Average price of coke, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
Kanawha	7	576	10	259,715	157,741	$263,210	$1.67	60.7
New River ...	17	1,259	0	425,219	269,372	443,072	1.64	63.3
Flat Top	36	4,648	18	1,400,369	852,120	1,100,312	1.291	60.8
Upper Monongahela	22	1,386	0	331,526	206,429	211,272	1.023	62.3
Upper Potomac.....	2	482	0	270,275	164,093	242,133	1.476	60.7
Total ..	84	8,351	28	2,687,104	1,649,755	2,259,999	1.37	61.4

Production of coke in West Virginia in 1895, by districts.

District.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke produced.	Average price of coke, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
Kanawha	6	506	0	267,520	164,729	$270,879	$1.64	61.6
New River ...	14	978	0	385,899	244,815	404,978	1.65	63.4
Flat Top	36	4,648	18	858,913	524,252	656,494	1.25	61
Upper Monongahela	20	1,260	37	392,297	240,657	265,293	1.10	61.3
Upper Potomac.....	2	442	0	183,187	110,753	126,595	1.14	60.5
Total ..	78	7,834	55	2,087,816	1,285,206	1,724,293	1.34	61.6

Pocahontas-Flat Top district.—Next to the Connellsville district this is the most important coking region in the United States. Outside of Pennsylvania and Alabama it produces more coke than any other single State, and nearly as much as any two. Like the Connellsville region, it produces a typical blast-furnace coke, and as a steam coal, the coal used has only one rival, the Clearfield coal of Pennsylvania. Flat Top coke is chemically superior to Connellsville, as it is lower in ash, and is regarded by some ironmasters as the equal in physical properties to Connellsville coke. The production of coke in the district in 1896 was exceptional, owing to the higher prices placed on Connellsville coke, while that of 1895 was unusually small, on account of a miners' strike throughout the region. It returned to its normal proportions in 1897. The average price in 1897 was the lowest on record.

Statistics of the manufacture of coke in the Flat Top district of West Virginia from 1886 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.	*Short tons.*	*Short tons.*			*Per cent.*
1886.....	2	10	38	1,075	658	$1,316	$2.00	61.2
1887.....	5	348	642	76,274	51,071	100,738	1.97	67
1888.....	13	882	200	164,818	103,947	183,938	1.77	63
1889.....	16	1,433	431	387,533	240,386	405,635	1.69	64
1890.....	17	1,584	252	566,118	325.576	571,239	1.75	57.5
1891.....	19	1,889	358	537,847	312,421	545,367	1.70	58
1892.....	30	2,848	933	595,734	353,696	596,911	1.69	59.3
1893.....	34	4,349	80	746,051	451,503	713,261	1.58	60.5
1894.....	36	4,648	18	1,229,136	746,762	989,876	1.325	60.7
1895.....	36	4,648	18	858,913	524,252	656,494	1.25	61
1896.....	36	4,648	18	1,400,369	852,120	1,100,312	1.291	60.8
1897.....	36	4,648	18	1,172,206	720,988	868,484	1.21	61.5

New River district.—This district is second in importance to the Flat Top and adjoins it on the west. It includes the ovens along the Chesapeake and Ohio Railroad from Quinnimont to Nuttallburg. The coal makes an excellent coke, which is in good demand, its market being chiefly east of the mountains. The coke made at Lowmoor, Va., really belongs to this district, as the coal is drawn from it.

The district just about held its own in the competition for trade in 1897, the product being 1,109 tons less than in 1896, a difference of less than 0.5 per cent. There are 17 establishments in the district, all of which were in operation in 1897.

The statistics of the manufacture of coke in the New River district from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the New River district, West Virginia, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	6	468	40	159,032	98,427	$239,977	$2.14	62
1881	6	499	0	219,446	136,423	334,652	2.45	62
1882	6	518	0	233,361	148,373	352,415	2.38	64
1883	6	546	0	264,171	167,795.	384,552	2.29	64
1884	8	547	12	219,839	135,335	274,988	2.03	62
1885	8	519	0	244,769	156,007	325,001	2.08	63.75
1886	8	513	5	203,621	127,006	281,778	2.22	62
1887	11	518	50	253,373	159,836	401,164	2.51	63
1888	12	743	0	334,695	199,831	390,182	1.95	60
1889	12	773	0	268,185	157,186	351,132	2.23	58.6
1890	12	773	4	275,458	174,295	377,847	2.17	63
1891	13	787	102	309,073	193,711	426,630	2.20	63
1892	14	965	0	315,511	196,359	429,376	2.19	62
1893	13	947	10	281,600	178,049	355,965	2.00	63
1894	14	1,089	0	222,900	140,842	245,154	1.74	63.2
1895	14	978	0	385,899	244,815	404,978	1.65	63.4
1896	17	1,259	0	425,219	269,372	443,072	1.64	63.3
1897	17	1,225	0	439,103	268,263	419,151	1.56	61.1

Kanawha district.—The Kanawha district includes all the ovens along the Kanawha River from its formation by the junction of the New and Gauley Rivers at Gauley to the western limit of the coal fields. There are seven establishments in the district, with a total of 576 ovens, all of which were operated during the year. The largest production recorded in the Kanawha district was in 1895, when the strike in the Flat Top district created a demand for other West Virginia cokes, and the output of this region increased nearly 60 per cent over 1895, and reached a total of 164,729 tons. High-priced Connellsville coke kept the production of this district in 1896 nearly to the figure reached in 1895, but in 1897 the product decreased to 117,849 tons, the smallest, with one exception, in seven years.

The statistics of the manufacture of coke in the Kanawha district from 1880 to 1897 are as follows:

Statistics of the manufacture of coke in the Kanawha district, West Virginia, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880	4	18	0	6,789	4,300	$9,890	$2.30	63.3
1881	4	18	0	11,516	6,900	16,905	2.45	60
1882	5	*a* 138	0	40,782	26,170	62,808	2.40	64
1883	5	*a* 147	0	58,735	37,970	88,090	2.32	64.6
1884	6	*a* 177	15	60,281	39,000	76,070	1.95	64.6
1885	7	*b* 181	63	65,348	37,551	63,082	1.68	57
1886	7	302	170	89,410	54,329	117,649	2.17	60.7
1887	7	548	0	153,784	96,721	201,418	2.08	63
1888	9	572	8	141,641	84,052	146,837	1.75	59
1889	6	474	0	109,466	63,678	117,340	1.84	58
1890	6	474	0	182,340	104,076	196,583	1.89	57
1891	6	474	0	241,427	134,715	276,420	2.05	56
1892	6	506	0	242,627	140,641	284,174	2.02	58
1893	6	506	0	215,108	122,241	237,308	1.94	56.8
1894	6	506	0	176,746	104,160	181,586	1.74	58.9
1895	6	506	0	267,520	164,729	270,879	1.64	61.6
1896	7	576	10	259,715	157,741	263,210	1.67	60.7
1897	7	576	20	199,312	117,849	187,359	1.59	59.1

a Eighty of these ovens are Coppée, the balance beehive.
b Sixty of these ovens are Coppée, the balance beehive.

Upper Monongahela district.—The Upper Monongahela district includes the ovens in the group of counties lying along the line of the Baltimore and Ohio Railroad, near the headwaters of the Monongahela River—Preston, Taylor, Harrison, and Marion counties. There are 22 establishments in this district, eleven of which did not produce any coke in 1897. The 11 active establishments, however, operate 984 of the 1,363 ovens in the district. Most of the coke is produced in Marion County, near Fairmont, 829 of the 984 active ovens being in that region. Harrison County had 22 ovens making coke in 1897, Monongalia County 50, and Preston County 83. About half the amount of coal used is washed slack, and about 10 per cent is washed run of mine. There are 6 washeries in this district, and only 1 more in the State.

The production in the district in 1897 was, with one exception, the smallest in seven years, as shown in the following table:

Statistics of the manufacture of coke in the Upper Monongahela district, West Virginia, from 1880 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1880.....	8	145	0	64,937	36,028	$68,930	$1.91	55
1881.....	9	172	0	73,863	43,803	78,014	1.78	59
1882.....	11	222	0	92,510	55,855	105,214	1.88	60
1883.....	13	269	0	88,253	51,754	90,848	1.76	59
1884.....	13	281	100	78,468	49,139	74,894	1.52	63
1885.....	12	278	0	105,416	67,013	97,505	1.45	63.5
1886.....	12	275	104	131,896	82,165	113,100	1.38	62.3
1887.....	15	646	0	211,330	132,192	268,990	2.03	62.5
1888.....	17	567	110	213,377	138,097	175,840	1.27	64.7
1889.....	17	674	200	210,083	128,685	171,511	1.33	62.5
1890.....	18	1,051	50	276,367	167,459	260,574	1.56	60
1891.....	15	1,081	56	517,615	291,605	462,677	1.58	56
1892.....	19	1,129	45	441,266	265,363	390,296	1.47	60.1
1893.....	19	1,158	42	379,506	225,676	295,123	1.31	59
1894.....	20	1,221	42	280,748	158,623	179,525	1.13	56.5
1895.....	20	1,260	37	392,297	240,657	265,293	1.10	61.3
1896.....	22	1,386	0	331,526	206,429	211,272	1.023	62.3
1897.....	22	1,363	0	289,678	175,165	180,802	1.03	60.5

Upper Potomac district.—In the Upper Potomac district are included the ovens along the line of the West Virginia Central and Pittsburg Railway, running south from near Cumberland, Maryland. This district has been thoroughly described, not only in previous volumes of Mineral Resources, but also in a separate publication by the Survey.

With the exception of 1894, the production of coke in this region has shown a steadily increasing business since operations began in 1887. In this way it has rivaled the record of the State. The decrease in 1894 was due to the depression following the financial panic of 1893. There are only two operators in the district, but the ovens number 592, 16 more than the number owned by seven operators in the Kanawha district, and the average number of ovens to an establishment, the highest in the State, about 2.3 times the average to an establishment in the Flat Top district.

Statistics of the production of coke in the Upper Potomac district of West Virginia are as follows:

Statistics of the manufacture of coke in the Upper Potomac district of West Virginia from 1887 to 1897.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1887.....	1	20	50	3,565	2,211	$4,422	$2.00	62
1888.....	1	28	0	9,176	5,835	8,752	1.50	64
1889.....	2	84	0	26,105	17,945	28,559	1.58	69
1890.....	2	178	28	94,983	61,971	118,503	1.91	65
1891.....	2	390	39	111,014	76,599	133,549	1.75	69
1892.....	3	395	0	114,045	78,691	121,208	1.54	69
1893.....	3	394	0	123,492	84,607	115,250	1.36	68.5
1894.....	2	394	0	66,598	43,546	43,546	1.00	65.4
1895.....	2	442	0	183,187	110,753	126,595	1.14	60.5
1896.....	2	482	0	270,275	164,093	242,133	1.476	60.7
1897.....	2	592	0	312,984	190,401	278,012	1.46	60.8

WISCONSIN.

All the coke made in Wisconsin is from Connellsville (Pennsylvania) coal and the coke is standard Connellsville. Its production, therefore, is not of much interest, except as showing that coal can be carried to a distance and successfully made into coke.

The statistics of the manufacture of coke in Wisconsin from 1888 to 1897 inclusive are as follows:

Statistics of the manufacture of coke in Wisconsin.

Year.	Establishments.	Ovens.		Coal used.	Coke produced.	Total value of coke at ovens.	Value of coke at ovens, per ton.	Yield of coal in coke.
		Built.	Building.					
				Short tons.	*Short tons.*			*Per cent.*
1888.....	1	50	.....	1,000	500	$1,500	$3.00	50
1889.....	1	50	.....	25,616	16,016	92,092	5.75	62.5
1890.....	1	70	.....	38,425	24,976	143,612	5.75	65
1891.....	1	120	0	52,904	34,387	192,804	5.61	65
1892.....	1	120	0	54,300	33,800	185,900	5.50	62.2
1893.....	1	120	0	24,085	14,958	95,851	6.41	62
1894.....	1	120	0	6,343	4,250	19,465	4.58	67
1895.....	1	120	0	8,287	4,972	26,103	5.25	60
1896.....	1	120	0	8,648	5,332	21,000	3.94	62
1897.....	1	120	0	29,207	17,216	75,000	4.36	59

The character of the coal used in the manufacture of coke in Wisconsin since 1890 is shown in the following table:

Character of coal used in the manufacture of coke in Wisconsin since 1890.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1890	38,425	0	0	0	38,425
1891	52,904	0	0	0	52,904
1892	54,300	0	0	0	54,300
1893	20,474	0	3,611	0	24,085
1894	6,343	0	0	0	6,343
1895	8,287	0	0	0	8,287
1896	0	0	5,183	3,465	8,648
1897	0	0	0	29,207	29,207

WYOMING.

There is but one establishment making coke in Wyoming, that of the Cambria Mining Company, located at Cambria, Weston County. This establishment began the manufacture of coke in 1891, but produced no coke in 1892. Manufacture was resumed in 1893 and has increased each year ever since.

All of the coal used in coking is unwashed slack, which does not give as good a result as washed slack. When the latter is used, the coke is of fine texture and very strong. It is dense, and capable of sustaining any weight ordinarily required of coke used, as this is, in silver smelting. As at present produced, however, the coke is very high in ash.

The statistics of the production of coke in Wyoming from 1891 to 1897 inclusive are as follows:

Statistics of the production of coke in Wyoming from 1891 to 1897.

	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Number of establishments	1	1	1	1	1	1	1
Number of ovens built	24	24	24	24	74	74	74
Number of ovens building	0	0	0	0	0	0	0
Amount of coal used, short tons	4,470	0	5,400	8,685	10,240	41,038	54,976
Coke produced, short tons	2,682	0	2,916	4,352	4,895	19,542	24,007
Total value of coke at ovens	$8,046	0	$10,206	$15,232	$17,133	$58,626	$72,021
Value of coke at ovens, per ton	$3.00	0	$3.50	*a* $3.50	$3.50	$3.00	$3.00
Yield of coal in coke, per cent	60	0	54	50	47.8	47.6	43.7

a Value estimated.

The character of the coal used in the manufacture of coke in Wyoming is shown in the following table:

Character of coal used in the manufacture of coke in Wyoming since 1891.

Year.	Run of mine.		Slack.		Total.
	Unwashed.	Washed.	Unwashed.	Washed.	
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1891	0	0	4,470	0	4,470
1892	0	0	0	0	0
1893	0	0	5,400	0	5,400
1894	0	0	8,685	0	8,685
1895	0	0	10,240	0	10,240
1896	0	0	41,038	0	41,038
1897	0	0	54,976	0	54,976

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