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DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR.

THE

UNITED STATES GEOLOGICAL SURVEY

ITS

ORIGIN, DEVELOPMENT, ORGANIZATION, AND OPERATIONS

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CONTENTS.

ILLUSTRATIONS.

LETTER OF TRANSMITTAL.

Department of the Interior,
United States Geological Survey,
Washington, D. C., February 18, 1904.

Sir: There is presented herewith, for publication as a bulletin, an account of the origin, development, and present organization of the United States Geological Survey, with short summaries of its various operations during the first quarter-century of its existence. This bulletin has been prepared in accordance with your instructions, and it is believed that it will be read with interest generally, both in this country and abroad, as a brief record of the rise, growth, administration, and work of an important branch of the public service.

Very respectfully,

H. C. Rizer,
Chief Clerk.

Hon. Charles D. Walcott,
Director of United States Geological Survey.

THE UNITED STATES GEOLOGICAL SURVEY: ITS ORIGIN, DEVELOPMENT, ORGANIZATION, AND OPERATIONS.

INTRODUCTION.

ORIGIN AND DEVELOPMENT OF THE SURVEY.

The United States Geological Survey, in the Department of the Interior, was created by act of Congress approved March 3, 1879, so that March 3, 1904, marks the completion of the twenty-fifth year of its existence. The quarter-century anniversary happens to fall near the date set for the opening of the Louisiana Purchase Exposition at St. Louis, at which the Survey will make an exhibit. It is hoped that many of the people of this country will be interested in that exhibit, and, in connection therewith, it has been thought desirable to place before the public, by means of a small bulletin, an account of the organization and work of the Survey and the results it has achieved.

Prior to the date of the act above mentioned five Federal surveys had been engaged in mapping portions of the territory of the United States. The oldest of these, the Coast and Geodetic Survey, had restricted its mapping to the coast line, but had extended certain geodetic and scientific investigations over various portions of the country. The other four organizations had made topographic, geologic, and other scientific and economic surveys in the Territories west of the one hundredth meridian. The Geological Exploration of the Fortieth Parallel was engaged from 1867 to 1872, under the direction of Mr. Clarence King, in surveying a zone, 105 miles wide, extending from the meridian of 104° to that of 120° west of Greenwich, and comprising an area of 86,390 square miles. The Geological and Geographical Survey of the Territories, under Dr. F. V. Hayden, between 1873 and 1878, surveyed areas in Colorado, New Mexico, Utah, Wyoming, and Idaho, comprising about 100,000 square miles. The Geographical Survey West of the One Hundredth Meridian, under Capt. George M. Wheeler, U. S. Army, was engaged in extending surveys in various portions of the country west of the meridian named in its title. It surveyed an area of about 359,000 square miles. The work of the Geographical and Geological Survey of the Rocky Mountain Region, under

Maj. J. W. Powell, covered an area of about 67,000 square miles, in Wyoming, Utah, and Arizona.

Before the creation of these more elaborate Federal surveys exploration parties, mainly under the War Department, were dispatched in various directions over the mountain regions of the Far West, where they made topographic and geologic surveys and examinations of the natural resources. In these expeditions the parties followed the more important Indian trails, river basins, and mountain passes.

When the United States Geological Survey was created all these earlier surveys were discontinued except the Coast and Geodetic Survey, which, as a part of the new Department of Commerce and Labor, continues to make surveys of the coast, and geodetic and scientific investigations on lines which have been followed for more than half a century.

The first Director of the Geological Survey was Mr. Clarence King, formerly Director of the Exploration of the Fortieth Parallel. Mr. King held the office until 1881, when he resigned, and was succeeded by Maj. J. W. Powell, formerly Director of the Survey of the Rocky Mountain Region. Major Powell held the office until 1894, when he resigned and was succeeded by the present incumbent, Mr. Charles D. Walcott.

The paragraph of the organic act creating the office of the Director of the United States Geological Survey reads, in part, as follows:

> * * * this officer shall have the direction of the Geological Survey, and the classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain.

The first Director had doubt concerning the precise intention of Congress, regarding both the functions of the organization and its field of operations. In respect to the first point, he concluded "that the intention of Congress was to begin a rigid scientific classification of the lands of the national domain, * * * for the general information of the people of the country, and to produce a series of land maps which should show all those features upon which intelligent agriculturists, miners, engineers, and timbermen might hereafter base their operations and which would obviously be of the highest value to all students of the political economy and resources of the United States." Doubt arose respecting the field of operations of the new organization because of ambiguity in the term "national domain," which might be taken to mean either the land actually owned by the nation, or the area within its boundaries. The Director adopted a conservative course and planned to survey only areas within the limits of the public lands. This limitation, however, was removed by an act of Congress approved August 7, 1882, which contained a clause reading, in part, "to continue the preparation of a geological map of the United States." This was accepted as authority for the extension of the geologic and topographic surveys and other investigations into all portions of the United States.

The Director, advised by the Secretary of the Interior and the interested committees in Congress, at once recognized the necessity of making a good topographic map, as a basis for classifying the public lands. A satisfactory classification of the lands, and especially of the products of the national domain, requires an indication on the base maps of the cleared and the cultivated lands, with subclassifications of these. Water is regarded as one of the most valuable resources of the country, and under the clause requiring an examination of the mineral resources a hydrographic survey has been made, to ascertain the amount and quality of the water supplies. From time to time Congress has definitely recognized these various functions by specific legislation providing for the making of "topographic surveys in various portions of the United States," for "gauging the streams and determining the water supply of the United States," for "the survey of the public lands that have been or may hereafter be designated as forest reserves," for preparing "maps of Alaska showing all known topographic and geologic features," etc.

The growth of the work of the United States Geological Survey may be well illustrated by the increase of its annual appropriations and by the increase in the amount of topographic mapping accomplished within a year. The first appropriation amounted to $106,000, and provided, in addition to the Director's salary, $19,624 for topographic surveys, $56,000 for geologic surveys, and $24,376 for pay of temporary employees and for contingent expenses. Ten years later the appropriation (for the fiscal year 1889–1890) amounted to $801,240, exclusive of that for publications. The specific purposes mentioned were topography, geology, paleontology, chemistry, illustrations, mineral resources, library, irrigation, and engraving geologic maps. This appropriation was much greater than that for the years immediately preceding and succeeding, because of the large item for irrigation, which was succeeded by much smaller appropriations for hydrographic surveys. The appropriations were, however, increased from year to year, until ten years later (fiscal year 1899–1900) the total reached the sum of $844,740. For the fiscal year 1903–4 there was appropriated a total of $1,377,820, the larger items being:

Topography	$300,000
Geology	150,000
Alaska	60,000
Hydrography	200,000
Chemical and physical researches	20,000
Mineral resources	50,000
Engraving and printing geologic maps	100,000
Surveying forest reserves	130,000

During the first year (1879–80) the topographers mapped, on the small scale of about 4 miles to the inch and with the large contour interval of 200 feet, 3,400 square miles. During the last year (1902–3) there were mapped approximately 31,000 square miles, on, however, the much larger and more detailed scales of 1 mile and 2 miles to the inch and with relief shown by contours having intervals varying between 10 and 100 feet.

PRESENT ORGANIZATION OF THE SURVEY.

For convenience of administration the Geological Survey is organized in branches, divisions, and sections. The work classifies naturally into five great branches: (1) Administrative, (2) geologic, (3) topographic, (4) hydrographic, (5) publication. The branches are subdivided into divisions, and some of the divisions into sections. In the administrative branch the division is in most instances the administrative unit. In the technical branches the division is in some instances the administrative unit, while in others it is organized for inspection purposes only, and the section is the administrative unit.

The permanent force of the Survey has grown during the last twenty-five years from 39 to 678. The organization and the number of persons employed are shown in the table on the opposite page.

This table shows only the number and classification of persons regularly employed; the field force of the Survey is temporarily increased during the field season by the employment of skilled assistants and aids in surveying and by laborers to the number of 50 in the geologic branch, 200 in the topographic branch, and 250 in the hydrographic branch, thus bringing the total number of employees up to about 1,200 during the field season of 1903.

The Director is appointed by the President; all other permanent positions are within the civil-service rules and regulations and can be filled only by means of competitive examination of applicants. Laborers employed temporarily for field work during the field season are engaged by chiefs of parties at or near the field of work.

Organization and personnel of the United States Geological Survey.

Branch.	Division.	Section.	Number of persons permanently employed.
Administrative	Executive	Correspondence, records, supplies, and shipments	12
		Instruments	2
		Steam engineer, firemen, mechanics, and messenger, watch, and labor force	43
	Disbursements and accounts		14
	Library		9
Geologic	Geology and paleontology	Areal geology Pleistocene geology Pre-Cambrian and metamorphic geology Petrology Economic geology of metalliferous ores Economic geology of nonmetalliferous minerals Paleontology	87
	Alaskan mineral resources		12
	Mining and mineral resources		26
	Chemical and physical researches	Physics Chemistry	11
Topographic	Topography	Eastern	53
		Western	34
		Triangulation and computing.	3
		Inspection of surveying and mapping.	2
	Geography and forestry		5
Hydrographic	Hydrography		26
	Hydrology	Eastern Western	14
	Hydro-economics		6
	Reclamation service	(16 arid States and Territories.)	187
Publication	Editorial	Texts	5
		Geologic maps	4
		Topographic maps	5
		Illustrations	12
		Photography	9
	Engraving and printing		85
	Documents		12
			678

GENERAL RESULTS ACHIEVED BY THE SURVEY.

Among the more important results achieved by the organization are the following:

A complete topographic map (see pp. 55–71) of 929,850 square miles of the area of the United States, which, including Alaska, amounts to 3,622,933 square miles. In other words, the Survey has finished the mapping, on more or less detailed scales, of 26 per cent of the area of the country, including Alaska, and 31 per cent excluding Alaska.

This map is published in the form of 1,327 separate atlas sheets, printed in three colors from copperplate engravings. The topographic maps of the Geological Survey have greatly expedited investigations by cities of their water supply, and have been of the highest value to railway companies and State highway bureaus in designing and planning their projects. The improvement of highways in New York, Maryland, Massachusetts, and other States has been greatly facilitated and the cost of the State work materially reduced by these maps. The elaborate and valuable reports recently completed on the future water supply of the city of New York and on the New York State Barge Canal have been rendered conclusive in large measure only through the agency of the existing topographic maps.

Many of the broader problems whose solution must necessarily precede the final geologic mapping of the country have been solved. The geologic mapping of the surface formations has been extended over about 171,000 square miles, and 106 geologic folios have been published, while nearly an equal number are in various stages of preparation. These folios consist of descriptive text, a topographic sheet, geologic sheets for areal and economic geology, structure sections, columnar sections, etc. (see pp. 99–100). Each folio thus presents a practically complete history of the topography, geology, and mineral resources of the area described.

Coincident with the geologic work, important experiments and investigations into the physical characteristics of rocks in various processes of formation, and of volcanic and geyser action, have been conducted in the physical laboratory (see pp. 53–55), and many important conclusions have been reached. The chemical laboratory (see pp. 50–53) and the petrographic laboratory (see p. 27) have been engaged in solving, chemically and microscopically, the more important problems connected with rock composition and structure, while the paleontologic section (see p. 27) has aided in solving stratigraphic and structural problems by the classification and identification of the fossil remains of plants and animals.

The engraving and printing division (see pp. 113–117) has engraved 1,421 series of copper plates for as many topographic atlas sheets, each series consisting of three plates, one for each color. It has lithographed on stone the colors, ranging in number from 10 to nearly 30, necessary for distinguishing in each of about 100 geologic folios the various formations and outcrops. It has printed several editions of most of the topographic maps and at least one edition of the geologic folios, besides revising both as occasion therefor has arisen, and engraving and printing miscellaneous State and United States maps.

The hydrographic branch (see pp. 74–93), including the reclamation service, has recorded during the last fifteen years the maximum, minimum, and mean discharges of all the more important rivers, and for shorter periods the same facts concerning all the lesser tributaries of the many hundreds of streams in the United States. These results have been assembled and studied, and the flow of the streams has been compared with the precipitation as shown by the records of the Weather Bureau. The physical characteristics of the river basins have been studied in respect to their forestation, soil covering, etc., and there has been accumulated a vast amount of data from which it is possible to estimate closely the volume or run-off of each of the streams. The development of the water powers of the country, especially in the Southern States, has received a great impetus in the last few years through the facts brought to light by the hydrographic branch in respect to the volume and regularity of the discharge of, and the amount of fall in, the various streams of the country. Many unknown water powers have been found, and projects already commenced have had their value or their defects made manifest through the evidence resulting from the surveys of this branch. Data have been gathered concerning the public lands which are irrigable and their relation to possible water supplies. A large number of reservoir sites have been examined and surveyed in a preliminary way, and the lands withdrawn from sale or occupation pending more detailed studies. A number of these reservoir and irrigation projects have been studied in greater detail, surveys of the irrigable lands, as well as of canal lines, have been made, and some have been finally approved for construction by the reclamation service. (See pp. 91–93.)

The division of geography and forestry (see pp. 71–74) has made detailed examinations of 110,000 square miles, including a classification of the lands, as forested (with stand and kind of timber), grazing, desert, and cultivable, and has prepared final reports on these reserves, showing the character and amount of the timber and many other facts which will serve as a basis for the future forest management of these properties.

Perhaps the immediate value to the people of the work of the Geological Survey is best shown by the aid it extends in developing the mineral resources and in forwarding important engineering projects in which the people, as well as the State and Federal Governments, are interested. To instance a few cases: The work of the geologic branch has had a wide educational influence upon the public at large, but more directly upon those engaged in the mining industry. Among the many direct practical benefits which it has conferred upon this industry may be mentioned the investigation of the mining geology of Leadville, which has not only guided exploration and secured economical mining in a district that has produced between $200,000,000 and $300,000,000, but has been of even more beneficial result in teaching the mining engineer and the miner the practical importance of geologic study in carrying on their work; in other words, it has greatly improved mining methods throughout the whole country. The investigation of the origin and geologic relations of the Lake Superior iron ores and the publication of numerous reports on that region have so effectively directed the prospector in the discovery of the deposits and the miner in economical methods of development that this region now leads the world in the production of iron ore. The detailed areal mapping and the determination of underground structure in the Appalachian coal field are placing the development of its coal, petroleum, and gas resources upon a scientific basis and relieving these branches of the mineral industry of a large part of the hazard and uncertainty which has always hitherto been associated with them. The collection and publication of reliable statistics of mineral production (see pp. 48–50) have furnished a sound commercial basis for all branches of the mineral industry.

ADMINISTRATIVE BRANCH.

EXECUTIVE DIVISION.

This division is in general charge of the chief clerk. It embraces three sections: (1) Correspondence, records, supplies, and shipments; (2) instruments; and (3) messenger, watch, and labor force.

Section of Correspondence, Records, Supplies, and Shipments.

This section is the successor of a miscellaneous division which was established early in 1885. That division had charge of the preparation of letters and reports, without restriction as to subject, a class of work which was then and for years afterwards done under the immediate control of the Director and the chief clerk, and not by the heads of branches, divisions, and sections, as at present. The old division also attended to the incoming mail, opening, recording, and referring or otherwise acting upon it, and to matters relating to appointments and attendance, much as is done under the present organization; but it did not have charge of property accounting, supplies, or shipments. In May, 1901, the division was reorganized on broader lines, its functions were enlarged, and its force of two or three persons was much increased; the force employed in the section now numbers 12. Recently the more specific name given above was adopted.

This section is that part of the administrative branch in which the official mail of the Survey, including also the money mail, is opened, registered, and distributed to the several branches, divisions, and sections for attention, and through which a large part of the outgoing mail is dispatched. In it the roster of the Survey is kept and all business relating to appointments, promotions, transfers, and other changes is conducted, as is all business pertaining to the attendance of employees. It also has charge of the property accounting, of the custody and issue of stationery, of the purchase and distribution of miscellaneous supplies, and of express and freight shipments.

All letters received by the Survey are stamped with date and serial number. Letters without contents are recorded by the card-catalogue system, while money letters are registered by book system. The mail is then distributed to the various divisions and sections of the office for official action. When answered or otherwise disposed of, letters that relate to the business of the adminstrative branch are filed in this section, together with carbon copies of the answers; but letters pertaining to the internal administration of other branches are filed in the divisions to which they pertain.

At the appointment desk all business relating to appointments, sepaations, etc., is attended to. The Survey's permanent working force, now numbering about 700, is being steadily augmented, and between 700 and 800 changes of one kind or another were made during the fiscal year 1902-3. This work involves much correspondence with the Secretary of the Interior, the Civil Service Commission, and applicants for employment, and the keeping of a full system of records. At the appointment desk is also kept a record of the attendance of employees and of applications for annual or sick leave or leave without pay.

From the purchase vouchers the property clerk abstracts all nonexpendable property and transmits the abstract to the several subcustodians. On its return a consolidated abstract is compiled, which shows the entire responsibility and purchase of nonexpendable property in the field. This abstract is transmitted to the custodian, who in turn receipts to the Director. At the expiration of the quarter, purchases as shown on the consolidated reports are inserted in a property return.

For all open-market purchases made in the District of Columbia the written authority of the Secretary of the Interior is required. The obtaining of these authorizations, the making of requisitions for the supplies, and the checking of the bills constitute another branch of the work of this section. All stationery used by the Survey in field and office is likewise procured through and issued from this section.

The shipment and receipt of supplies, field material, etc., by freight and express, and the registering of mail and handling of incoming registered mail are also parts of the work of this section.

Section of Instruments.

To this section are intrusted the details regarding the purchase of, accountability for, and repairs of all instruments used by the Survey. The clerk in charge is designated custodian of instruments.

When the Survey was organized the stock of instruments was very small and no particular custodial method was observed. Their aggregate value was perhaps $10,000, while now the valuation approximates $90,000. Those used by the topographic force were under the control of the chief topographer, who supervised their purchase and their issue to the field parties and attended to the necessary repairs. As operations were extended the stock of instruments so increased and the wear and tear assumed such proportions that a custodian for all classes of instruments was designated and an instrument shop was established for their systematic repair. This shop was continued until a reduction in appropriations for the topographic branch in 1890–91 necessitated its abolishment. Shortly after this a change was made in the administration of the topographic branch, when the duties of the chief topographer were delegated to the section chiefs, and one of their number took charge of the purchase and repair of instruments, the custody remaining as before. Repairs of such instruments as actually needed attention were then made annually by contract with instrument makers. This method continued for several years, when the duties connected with the purchase and repair of instruments were transferred to the custodian, and a separate allotment was made to him for the purpose of attending to these details without drawing on the allotments for the various topographic sections.

When plans are determined upon for field work an estimate of the instruments required is furnished to the custodian of instruments, and it becomes his duty to see that the necessary articles are forthcoming when needed. In the topographic branch sufficient stock is kept to meet, as far as possible, any unforeseen conditions, but in the geologic branch instruments are obtained for each field party as occasion arises. If the stock is not sufficient it is augmented by purchase. The section chiefs determine what types of instruments will be the most serviceable, and the instruments are purchased when and where the best interests of the Survey will thereby be subserved. They are issued to the party chiefs upon requisition and are charged to them on memorandum cards.

When instruments are transferred from one party to another in the field, a special invoice card is made out in duplicate and exchanged between the persons or parties involved, and the duplicate, acknowledging the transfer, is sent to the custodian, so that the proper entries may be made in the records.

When practicable, separate parts of the instruments used are kept in stock and are supplied upon requisition, letter, or telegram, so that there is never any delay in furnishing field parties with necessary instruments.

Each year every instrument used is carefully overhauled. On returning from the field the users of instruments tag them, make notes of their condition, and call attention to needed repairs. The instruments are examined by the custodian, who is thus able to determine their probable condition, especially any peculiar defects noted by the user, and he then arranges for the repairs. These are made either by the manufacturers, who are able to take a number of instruments in hand at one time, or by the Survey mechanician, who attends to the minor but equally necessary repairs.

Standard types of instruments are used wherever applicable, but for most of the work the best instruments are of specially designed forms adapted to the requirements. Among the latter are theodolites, plane-table movements, and telescopic and sight alidades.

The topographic records are also in the custody of this section. The field methods in use at the time of the organization of the Survey consisted entirely of the taking of notes, so that the records were all in book form, and for some years there was no necessity for an elaborate system of filing. As the work progressed, however, and the plane table was brought into use as the principal instrument for mapping, the results assumed different shape. This necessitated a systematic method of filing, and a double entry card-catalogue system was adopted. The plane-table sheets and the books are numbered and filed in cases by themselves. Other miscellaneous material connected with the survey of individual areas is filed in special envelopes, each envelope containing the material for a particular area. The records now comprise over 18,000 pieces, and the catalogue necessary for them consists of about 40,000 cards.

Messenger, Watch, and Labor Force.

In this force are included a steam engineer, firemen, a carpenter, elevator conductors, janitors, watchmen, messengers, laborers, and charwomen, all of whom are under the direction of the chief clerk, either immediately or through a watchman in charge.

DIVISION OF DISBURSEMENTS AND ACCOUNTS.

That portion of the Geological Survey which has supervision of the finances is known as the division of disbursements and accounts. This division was, necessarily, one of the first to be organized after the Survey was established in 1879. It has always been in charge of a chief disbursing clerk, who at the present time has 13 assistants.

This division prepares the annual estimates of the amounts which the Director judges the Survey will need during the next fiscal year, for the information of the appropriation committees in Congress; keeps accounts with the appropriations and allotments made for the various lines of work, and examines all vouchers for expenditures, to see that every requirement has been complied with, before they are forwarded to the Treasury Department for final accounting. Prior to 1901 this division was charged also with the property accountability and the making of purchases; but in the year named, owing to great increase in the appropriations and in the number of accounts and vouchers, the duties relating to property were transferred to the section of correspondence, records, supplies, and shipments.

The chief disbursing clerk pays the salaries of most of the employees and many other bills; but during the field season, when many parties are at work in sections of the country remote from Washington, it is necessary that bills be paid by special disbursing agents near at hand.

There are numerous laws of the United States regulating the disbursement of money by its agents. All disbursing agents are required to submit their official accounts to the accounting officers of the Treasury, who pass judgment on their legality. The rulings of the accounting officers form a body of judicial law supplementary to statute law. The entire system of enactments and rulings is so voluminous and complex that no successful attempt has been made to codify it.

Disbursing agents of the Survey are bonded officers, and must render strict account of the moneys intrusted to them. They are required to have their funds deposited either with the Treasurer of the United States or an assistant treasurer of the United States or with a designated depositary; and disbursing agents are not responsible for the loss of funds thus deposited. They are also required in most cases to make disbursements by check, and are thus relieved of the responsibility involved in the actual handling of cash.

In the office of the chief disbursing clerk the following books are kept: (1) A ledger of disbursements, showing an open debit and credit account with every disbursing officer, and also with every appropriation made from year to year; (2) a consolidated account current, showing a recapitulation of all public funds in the hands of disbursing officers, as per last report, received since, expended or otherwise disposed of, and remaining on hand at the end of every month; (3) a classification of expenditures, showing the amounts paid under the different heads of appropriations; (4) an allotment book, showing the amount allotted every division of the Survey for the fiscal year's work.

It is the universal custom of the Government in the settlement of its bills to require the signing of receipts before payment. When accounts are settled by mail, vouchers in duplicate, properly filled out, are transmitted to the creditor for signature, and upon their return a check is sent in payment. All vouchers must be written and signed in duplicate. One set is transmitted by the disbursing officer to the Director of the Survey at the end of each month, and is ultimately filed in the archives of the Treasury Department. The other set remains in the hands of the disbursing officer. Four classes of vouchers are used—salary vouchers (pay rolls and single vouchers), traveling-expense vouchers, field-expense vouchers (supported by subvouchers), and purchase vouchers. Vouchers must be certified by chiefs of parties and divisions, audited in the office of the chief disbursing clerk, and approved by the Director of the Survey, before payment can be made. From time to time, usually once a year, accounting officers of the Treasury Department, in compliance with law, make a general investigation of the accounts of all disbursing officers of the Survey, and report the result to the Secretary of the Treasury.

Topographic, geologic, and hydrographic work in cooperation with States has been actively engaged in during the last few years, and is constantly growing in importance and volume. During the current fiscal year the Survey is cooperating with 14 States, covering 21 separate appropriations and allotments, whose accounts received, examined, paid, or forwarded to the several State disbursing officers for payment average 230 monthly, exclusive of subvouchers. The appropriations for the current fiscal year's work in cooperative surveys aggregate $217,800.

The expenditure of money from the reclamation fund (see pp. 91–93), also, has greatly increased the work and responsibility of this division.

The first appropriation made for the work of the Survey, March 3, 1879, was $106,000. The amount appropriated for the current fiscal year's work (1903–4) is $1,377,820.

During the whole of the first fiscal year of the Survey only 726 money accounts were received, examined, paid, booked, and transmitted to the Treasury Department for settlement. The present fiscal year shows a monthly average of 1,800 accounts—not including subvouchers—examined, paid, and forwarded to the Treasury Department for settlement.

LIBRARY.

The establishment of a library as a part of the equipment of the Geological Survey was suggested in the organic law by the clause "all literary and cartographic material received in exchange [for publications] shall be the property of the United States and form a part of the library of the organization;" and it was further provided that special memoirs and reports should be issued in quarto size, and that 3,000 copies of each should be published for scientific exchanges and for sale.

Considerable time was required for the Survey to put into operation an exchange system—to prepare and publish reports and special memoirs which could be offered to scientific men and institutions in exchange for material needed for the new library. As a nucleus, the late Maj. J. W. Powell deposited his private collection of State geological survey reports; some material was received from the Powell and Hayden surveys; current material was donated and purchased, and soon the library began to fulfill the objects for which it was established.

The collection was arranged in a room in the northeast pavilion of the present United States National Museum building, where the Survey office was then located, and remained there until 1885, when the office was moved to its present location. As the collection increased the quarters were enlarged from time to time and new shelving was added. In 1901 a large part of the wooden shelves was replaced by metal stacks and shelves. At present there are 30 metal stacks, containing 4,800 linear feet of metal shelving; and two rooms are necessary for the maps that have accumulated. Besides the collection in the library proper, several thousand books and pamphlets relating to paleobotany, physics, and chemistry are deposited in the laboratories of these sections. The books are in constant use by the specialists who are employed in research in these branches of science, and their work is greatly facilitated by having them at hand.

The growth of the collection has been steady. About 1,300 periodicals and proceedings of scientific societies are received annually. There have been a few gifts, the most notable being that of about a thousand volumes of scientific serials, transactions of scientific societies, and monographs collected by the late Dr. F. V. Hayden while in charge of one of the earlier geologic and geographic surveys and presented to the Geological Survey by Mrs. Hayden after her husband's death; and that of 576 books and pamphlets, mostly on early American geology, presented in 1889 by Miss Frances Lea, of Philadelphia, after the death of her father, Dr. Isaac Lea. Several large purchases have been made. In 1882 there were bought from the geologic library of Mr. Robert Clarke, of Cincinnati, 1,885 volumes. This collection was especially rich in reports of early State surveys and Federal exploring expeditions. In 1888 the sale of the library of M. Jules Desnoyers, of Paris, afforded opportunity to purchase 700 books and 2,000 brochures, and in 1896 chemical dissertations to the number of 6,000 were bought.

For several years Congress has appropriated annually the sum of $2,000 for the purchase of periodicals and books. The main source, however, of the increase of the library has been exchange, by which are acquired the publications of almost every scientific institution, private and governmental, engaged in similar lines of research throughout the world, as well as those of authors publishing individually. The exchange list, which was established in 1883, has gradually increased. At first it was separated into two divisions—one consisting of those to whom all Survey publications except maps were sent, the other of those who received only the annual reports. It was soon found that by this plan many individuals and institutions were receiving Survey publications which were not used or permanently placed in their libraries, while others failed to receive those they most needed. To remedy this faulty distribution the following plan has been devised: Individuals and institutions whose work is so general that they need all Survey publications—libraries, publishers of periodicals, and scientific societies—are placed on a list to receive all the publications except maps. To all geologists who need books of a special character the Survey sends, at intervals of about two months, a list of its new publications, and from these lists they select the publications they desire. By act of Congress copies of geologic and topographic maps may be sent in exchange to a limited number of individuals and institutions. This list has been complete for several years, the number allowed by law falling far short of the demand.

The distribution of the publications of the Geological Survey was conducted under the supervision of the librarian until 1893, when it was transferred to the newly established document division.

There are in the library about 50,000 bound volumes, 80,000 pamphlets, and 30,000 maps, besides many books that form parts of sets of periodicals and of proceedings of societies, museums, and congresses that have not been entered in the accession book. A rather large percentage of books received are unbound, and during the last few years the binding has not kept pace with the increase. An effort is being made to remedy this, and in 1903 there were bound 1,750 books, and in addition many pamphlets were furnished with board covers by the library assistants.

An author card catalogue has been in use since the establishment of the library. At first much of the cataloguing was done by untrained assistants and by methods essentially different from the accepted usage of the large libraries of the present day. This author catalogue is being replaced by a new catalogue of printed cards, procured from the Library of Congress and the John Crerar Library. A subject index on cards is in preparation and is being added to as fast as the books are catalogued. A shelf list of books in the library is also in preparation. In arranging books on shelves a subject classification is used. Serial publications are grouped together, the general arrangement being: First, official geological surveys; second, periodicals; third, proceedings and transactions of scientific societies; fourth, separate books and pamphlets, arranged according to subject-matter. In addition to library work proper, the work of preparing an annual bibliography and index of North American geology, paleontology, mineralogy, and petrology is done by the library force.

A librarian was first appointed in 1882. At that time he could perform all the duties connected with the office. With the increase of the library, through publications of the Survey, purchases, donations, and exchanges, the working force has been increased until it now consists of 9 persons, including the librarian in charge.

Under the law the library is open from 9 a. m. until 4.30 p. m. During these hours it is in constant use by outside students as well as by members of the Survey. The latter are permitted, in addition, to draw from the library any books, except encyclopedias and dictionaries, that are needed by them in their investigations.

The work of the Geological Survey has a wide range in the domain of science and economics. It is recognized that the library should completely cover the field of geology in its broadest sense, including the practical, historical, and bibliographic ground. The endeavor is made to procure all publications needed for reference in geology, geography, engineering, statistics, chemistry, and physics, and for administrative purposes. This standard of completeness has not been reached, but it is believed that the library of the Geological Survey approaches it more nearly than any other, except, perhaps, that of the Geological Society of London.

GEOLOGIC BRANCH.

The geologic branch is composed of four divisions: (1) Geology and paleontology; (2) Alaskan mineral resources; (3) mining and mineral resources; (4) chemical and physical researches.

DIVISION OF GEOLOGY AND PALEONTOLOGY.

Previous to the organization of the United States Geological Survey, in 1879, there had existed various organizations in which men had been trained and investigations started. The newly organized Survey inherited much unfinished work from these different surveys previously prosecuted under the auspices of the Government in the Western Territories. Since it seemed desirable to carry forward and complete these surveys as rapidly as possible, investigations were continued in the fields covered by them, and thus the early organization of the Survey was determined in part by antecedent geologic work. At the same time, however, demands for local economic investigations came from various portions of the country, and new investigations were consequently begun.

The history of the division of geology and paleontology may be divided into four periods: (1) From the organization of the Survey in 1879 to 1884, during which there was a process of differentiation of the various lines of work that were being carried on; (2) from 1884 to 1893, during which geologic work was organized under divisions based in part on the subject-matter under investigation, but largely on geographic provinces; (3) from 1893 to 1899, during which work was organized in independent parties, each chief of party reporting to the Director; and (4) from 1900 to the present, during which the geologic and paleontologic work has been in a single administrative division, but separated for scientific supervision into several sections.

(1) The law of 1879, under which the Survey was organized, defined the duties of the organization as the "classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain." Under this law, as interpreted by the first Director, the activities of the Survey were confined entirely to the public lands, and consequently to the Western States. The work was organized under five divisions, each of which was practically complete in itself, carrying on geologic, topographic, and chemical investigations. This form of organization continued for two years, when topographic work independent of the geologic parties was begun. Shortly afterwards the same action was taken with regard to paleontology, and at the same time a separate division was formed for the collection of statistics of mineral production. At the end of this first period, therefore, the work of the Geological Survey had become well differentiated and most of the forms of activity in which it is at present engaged were represented. In 1882 an amendment to the sundry civil bill was passed providing for the preparation of a geologic map of the United States, and this was regarded as sanction for extending the work of the Survey over the whole country. New divisions were therefore established for the investigation of the eastern portion of the United States as well as the western.

(2) During the second period the work of the Survey was divided into three groups of divisions—geologic, geographic, and accessory. Under geologic were grouped the following divisions:

1. Division of Archean geology.
2. Division of Atlantic Coastal Plain geology.
3. Appalachian division.
4. Lake Superior division.
5. Division of glacial geology.
6. Montana division.
7. Yellowstone National Park division.
8. Colorado division.
9. California division.
10. Division of volcanic geology.
11. Mississippi division.
12. Potomac division.

Paleontology was also divided into the following divisions:

1. Division of vertebrate paleontology.
2. Division of Paleozoic invertebrate paleontology.
3. Division of Mesozoic invertebrate paleontology.
4. Division of Cenozoic invertebrate paleontology.
5. Division of paleobotany.
6. Division of fossil insects.

The next year a division of correlation was established, and a little later the Florida and New Jersey divisions, making in all 15 divisions in geology. The heads of these divisions reported to the Director until 1889, when the office of chief geologist was established.

(3) In 1893 all the geologic divisions were abolished and the work was organized under separate independent parties, each party chief reporting to the Director. This form of organization continued from 1893 to 1899, during which time the number of parties increased from 23 to 58. During this period details both of administration and of scientific supervision were attended to by the Director.

(4) With the increase of his duties the Director, in 1900, found it necessary to change the form of organization. Various sections were established under section chiefs, who had scientific supervision but no administrative control over the work. The latter remained with the Director until 1902, when the office of geologist in charge of geology was created and the administrative control of the division was transferred to that office. At the same time paleontology was included with the division of geology.

As already stated, the character of the early work of the Survey was determined in part by the problems inherited from previous organizations and in part by the urgent demand, particularly from mine operators, for the economic investigation of various mining districts. Thus, of the five divisions originally composing the Survey organization, three were devoted to the completion of studies already begun under previous organizations, namely, the investigation of the geology of the Colorado Plateaus, which had been begun under the Powell survey; the study of the Quaternary lakes in the Great Basin region, which had been started by the geologists of the Wheeler survey; and the geology of Montana, which was left incomplete by the Hayden survey. Three new investigations were begun, one in each of the three mining districts that were then most important—the Washoe district, containing the famous Comstock lode; the Eureka district, and the Leadville district. With the extension of the geologic work to the Eastern States, gradually less and less attention was given to the economic geology, and of the 15 divisions which existed in 1890 fewer than a third were engaged in work which had a direct economic bearing. The work was directed more largely to the investigation of the broad problems of geology as a scientific basis for the preparation of the geologic map of the United States. This work, which was the largest of its kind ever undertaken by a Government organization, required careful consideration and thorough investigation of many fundamental problems in geology which have only an indirect bearing upon the development of economic resources. The first folio of this atlas was issued in 1894, fifteen years after the organization of the Survey and eleven years after the necessary legal authority for the preparation of the map had been secured. (See pp. 98–103.)

After the scheme for the publication of the map had assumed final form the necessity for these broader studies was less urgent and the work of the Survey returned more and more to economic lines. The early economic work was confined to the investigation of the ores of the precious metals, but it is now distributed over the whole field of mineral production, embracing the nonmetalliferous minerals as well as the metalliferous ores. Of the 53 parties engaged in field work during the year 1903–4, 24 were engaged in work which was primarily economic, while 14 others were employed on work which was more or less directly economic in character.

The division of geology and paleontology is now under the general direction of the geologist in charge. Since, however, the work is somewhat varied, scientific control along various lines is vested in chiefs of the following sections:

Areal geology.
Pleistocene geology.
Pre-Cambrian and metamorphic geology.
Petrology.
Paleontology.
Economic geology of metalliferous ores.
Economic geology of nonmetalliferous minerals.

The first-named section has immediate charge of the work of making a geologic map of the United States. The sections of Pleistocene and pre-Cambrian geology represent specializations of that map work. The petrologic section is concerned with the study of the rocks themselves, the paleontologic with the fossils in the rocks, and the two remaining sections are concerned with the metalliferous ores and the nonmetalliferous minerals.

The section chiefs are in effect consulting geologists who help the individual workers in the formulation and solution of their problems. Each field party works under the supervision of one or more section chiefs, selected according to the nature of the problems of the area. Before publication all manuscripts are submitted for criticism and approval to the chiefs concerned.

The main purpose of the Survey is defined by law to be the making of a geologic map of the United States. In discriminating the different formations and determining the complicated structure of the various mining districts, however, many facts of interest and importance in themselves are brought out. With very little additional work it is usually possible to give a fairly complete account of the ore bodies, and such work absorbs a very large share of the time and energy of the corps. This is as it should be, since one of the main purposes of the map is to aid in the development of our natural resources.

Geologic maps are valuable in many ways. They show the areas within which coal, iron, and other useful minerals occur, the limits of the artesian basins, the course of metalliferous veins, and many other things needful to the development of a region. In connection with structure sections, which usually accompany such a map, it is often possible to indicate very precisely not only the localities but the extent of beds of commercial importance and many of the conditions which influence their availability in mining.

The geologic map of the United States which is being made by the Survey is in large part on scales of 1 and 2 miles to the inch. Such a map of the whole country on the scale of 1 mile to the inch would require paper dimensions of about 240 by 180 feet—about the area of half a city block. This would be too large for general use, so the map is being made piece by piece, each sheet on the scales named representing one sixteenth or one-quarter of a square degree of the earth's surface (see pp. 60–61). The individual sheets as they are completed are bound up with a brief descriptive text in folios (see pp. 99–100). Thus the information relating to each area is available at once, and it is not necessary to wait for the completion of the whole.

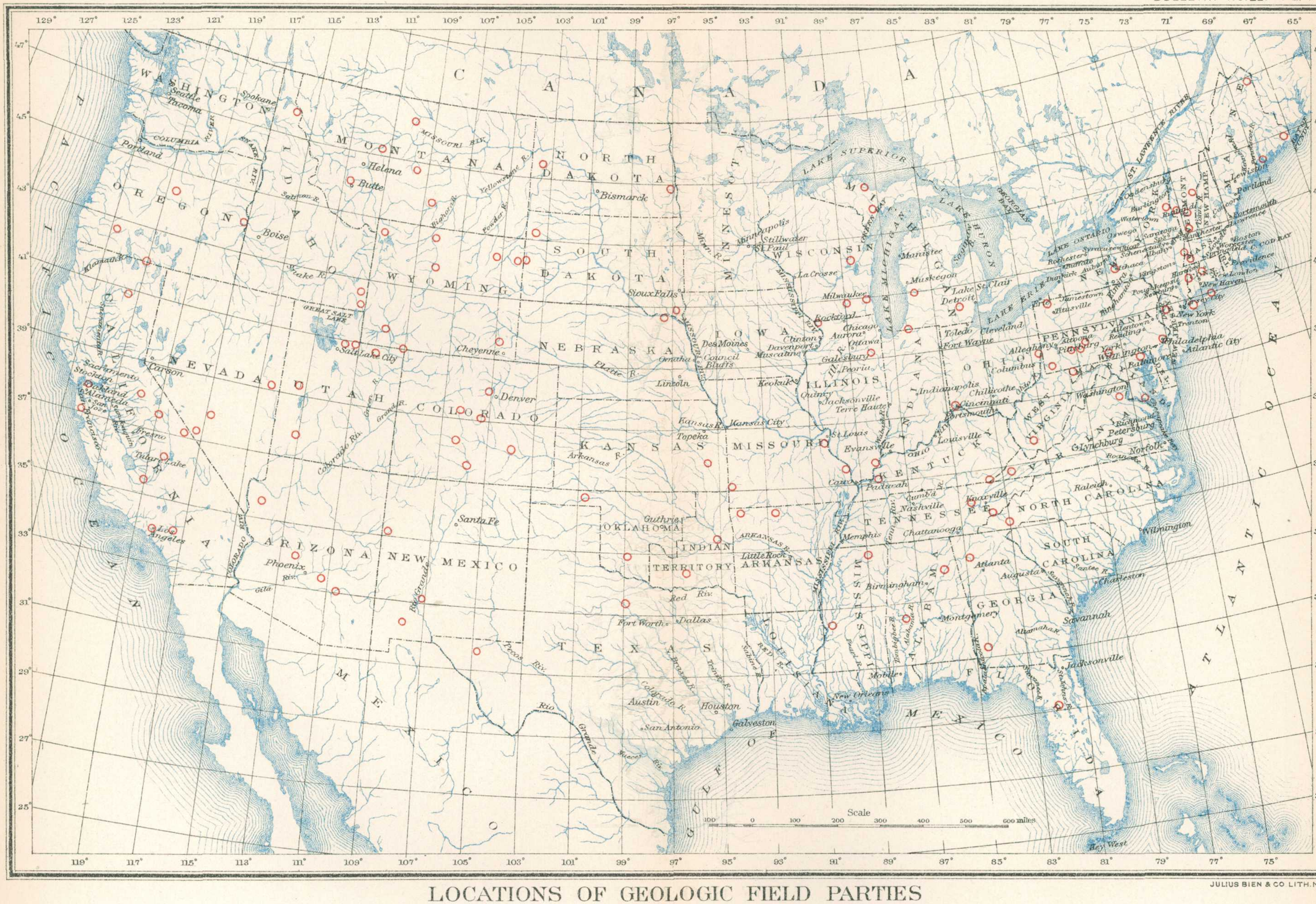
Of the 3,025,000 square miles of area of the United States, excluding Alaska and island possessions, the geologic map of 100,000 square miles has now been surveyed and published. A large additional area has been covered by preliminary or reconnaissance surveys, and the field parties are at work in widely scattered areas, as shown by Pl. I.

The base map used by the geologist is prepared by the topographic branch, though occasionally the geologist works with the topographer, or even at times does preliminary work in advance of topographic mapping. In such cases he must measure his own distances, usually by pacing, and determine altitudes by means of the barometer.

In order to make his map, the geologist needs to determine the character and distribution of the individual rock masses and their relations to one another. To do this it is necessary to travel over the whole area and carefully plot all outcrops and ledges of rock. The dips of the rocks must be measured in order to determine the amount of deformation they have undergone, and since in places they have been repeatedly folded and broken it requires many careful observations to determine the position of the individual beds beneath the surface.

In some districts, as in much of the Lake Superior region, magnetic surveys are made in connection with the geologic work. In that case observations are made with a dipping needle at many points, and the results are plotted to show the underground distribution of the ores. Unfortunately, very few ores are magnetic, so that this method can be used but rarely.

Many rocks do not show their true character in the outcrop, where they have been changed by the process of weathering. It is also difficult, if not impossible, to determine by the eye the nature of many igneous rocks. Samples are accordingly taken and, when necessary, chemical analyses of these are made. More commonly the nature of a rock may be determined by studying it with the microscope, and this



LOCATIONS OF GEOLOGIC FIELD PARTIES

YEAR 1903–04

work is the particular province of the section of petrology. Rocks may be ground down to sections so thin that they become transparent, and then, with a particular form of microscope, the minerals composing them may be determined.

On the return of the geologist from the field such microscopic sections as are necessary are made and are studied in consultation with the chief of the section of petrology. Analyses of rocks or ore are made in the chemical laboratory, and the fossils collected are submitted to the paleontologists for determination and interpretation. The field notes are plotted, sections are drawn, and the report is written.

Accompanying each report is a geologic map on which is shown, by appropriate colors and symbols, the distribution of the various formations. Geologic time—the time during which the rocks were made—is divided into several large parts called periods. Smaller time divisions are called epochs, and still smaller ones stages. The age of a rock is expressed by naming the time interval in which it was formed. The sedimentary rocks are grouped together into systems. The principal divisions of a system are called series. Any aggregate of formations less than a series is called a group. Where a part of a formation is specially designated it is known as a member. In the work of the Geological Survey the following systems and series are recognized:

Rock systems and series.

System.		Series.
Cenozoic	Quaternary	Recent. Pleistocene.
	Tertiary	Pliocene. Miocene. Oligocene. Eocene.
Mesozoic	Cretaceous	
	Jurassic	
	Triassic	
Paleozoic	Carboniferous	Permian. Pennsylvanian. Mississippian.
	Devonian	
	Silurian	
	Ordovician	
	Cambrian	Saratogan. Acadian. Georgian.
	Algonkian	
	Archean	

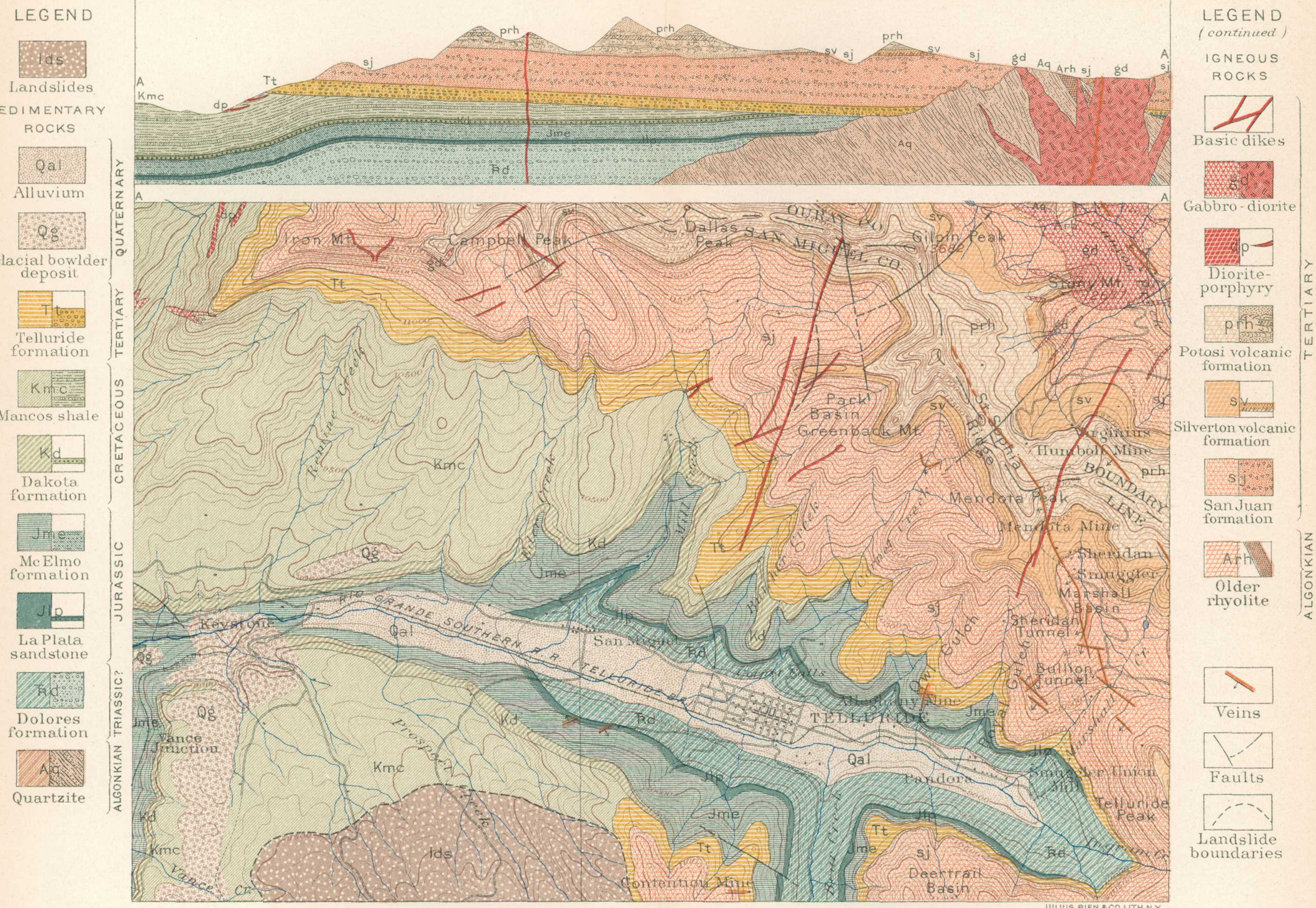
The character and age of each rock mass are shown on the map, and by means of structure sections the relations of the different masses are indicated. Pl. II shows a portion of the Telluride, Colorado, sheet. In the foreground is the map, and above it is a structure section. Such a map and section give a fairly complete account of the geologic history of the area in a very condensed form.

From the study of fossils and of the characters of the rocks trustworthy ideas may be obtained as to the climatic conditions of the past. It has been learned, for example, that Greenland and the northern countries which are now covered by perpetual snow and ice formerly had a warm climate, and that at a later time the northern portion of the United States, extending down about to the Ohio and Missouri rivers, was covered by a great ice sheet similar to that now covering Greenland. The records of this ice period are very complete, but also very confusing; fossils help but little in making out the history, and because of its complexity a special section of the Survey is devoted to its study.

Another portion of the geologic section which is of great complexity and in which fossils are too rare to be of much service is the pre-Cambrian. In the rocks of this age are the great copper and iron mines of the Lake Superior region, the lead deposits of the Cœur d'Alene, many of the copper deposits of Arizona, and the gold-silver veins of the West. A special section of the Survey is accordingly devoted to the study of the stratigraphy of the pre-Cambrian rocks. Six monographs have been prepared describing the iron ranges, and one the copper-bearing rocks, of the Lake Superior region. The mining districts of the West are being studied by this section in connection with the two sections devoted to economic geology.

The economic work of the Survey has from the first been made very prominent. In mapping the geologic formations the relation of the rocks to the ore bodies is necessarily studied in considerable detail. The distribution, mode of occurrence, and genesis of the ores are also investigated, in order that their economic importance may be properly estimated and their development carried on with the greatest economy. Two sorts of data result from these studies—first, those which throw light on the general laws governing the formation of ores and other minerals of economic importance; and second, facts of geologic structure and occurrence which are immediately useful in the development of the particular ore bodies studied.

The Survey has consistently occupied the position that its greatest and most peculiar usefulness lay along the first-mentioned line of research. The principles controlling mineral deposition and the laws governing the occurrence of ore bodies can be satisfactorily determined only as a result of the comprehensive study of many mines and mining camps. This work is beyond the reach of individuals, but is



GEOLOGIC MAP AND SECTION OF THE REGION AROUND TELLURIDE, COLO.

ILLUSTRATING THE METHOD OF REPRESENTING GEOLOGIC FORMATIONS

Scale: $\frac{1}{62,500}$

1 ½ 0 1 2 miles

1 ½ 0 1 2 3 kilometers

Contour interval 100 feet

Datum is mean sea level

appropriate to the national organization. The application of the principles to particular ore bodies and camps is quite within reach of the individual mining engineers charged with development work.

That the Survey work does actually result in the development of these principles is evidenced by the simultaneous formulation by Emmons, Van Hise, and Weed of the doctrine of the secondary enrichment of metallic sulphides; by Emmons's statement of lateral segregation as applied to the genesis of the Leadville ores; by Van Hise's development of the principles of metamorphism in relation to ore bodies, and by many similar results.

The importance of aiding in the actual development of the resources of the country is constantly recognized, in two ways—first, by preparing handbooks and summaries of existing information regarding particular deposits or resources; second, by making careful structural studies of particular mining camps. Work of the first sort is exemplified in the series of papers, together presenting a succinct review of the coal resources of the United States, published in Part III of the Twenty-second Annual Report of the Survey; another such paper is that grouping all existing data regarding the asphalt deposits of this country, published in Part I of the same annual report. Similar papers covering the clay resources, Portland-cement materials, gypsum, etc., are in preparation. Studies of individual mining camps are constantly being made, a large number of the areas having already been surveyed either provisionally or finally.

In the early months of the development of a camp there are rarely sufficient exposures, either natural or artificial, to furnish data for a complete account of the ore bodies. Often at that time it is possible only to formulate general statements as to genesis and structure. Occasionally it happens that even after detailed studies have been made development is pushed so rapidly that still further details become available. Cripple Creek, which was the subject of a very careful study in 1894, is now being restudied in order to take advantage of the development of the district since that time; Leadville, also, which was the subject of an elaborate monograph in 1886, is being restudied, and probably other camps of the West will, in time, warrant similar resurveys.

For published results of the work of this division see the list of Survey publications, especially series A, B, C, D of the classification table.

DIVISION OF ALASKAN MINERAL RESOURCES.

HISTORY OF INVESTIGATIONS.

In 1895, through an appropriation by Congress of $5,000 for the investigation of the gold and coal deposits of Alaska, the Geological Survey for the first time was enabled to take up work in Alaska independent of other organizations. The same amount was appropriated the two following years, and in 1898 it was increased to $25,000. Systematic work along both geologic and topographic lines was then begun and the investigation of all the mineral resources commenced in earnest. The work developed rapidly; the appropriation was increased to $60,000, and, in accordance with plans approved by the Secretary of the Interior, on July 3, 1903, the division of Alaskan mineral resources was established. At the same time the administration of the work, which at first had been a subordinate function of the geologic branch of the Survey, and later was placed in charge of a committee consisting of a geologist and a geographer, was vested in a single geologist. The appropriations for this Alaskan work up to the present time aggregate $252,089.60.

Previous to 1898 the investigations were largely of a preliminary character. At first they were undertaken in cooperation with other organizations and necessarily without a comprehensive plan. The first opportunity came through invitation of the United States Coast and Geodetic Survey, in May, 1889, "to send a representative with the boundary survey parties for the purpose of making geological observations in Alaska." This was accepted. In 1890, and again in 1891, the Survey combined with the National Geographic Society in the investigation of the Mount St. Elias region. In 1891, also, a geologist from the Survey accompanied an expedition organized by a syndicate of newspapers to explore the area lying north of the St. Elias Range. In 1892 an expedition under private auspices explored Glacier Bay, and the results were published by the Survey. In 1895, with a Congressional appropriation of $5,000 for the investigation of the gold and coal resources of Alaska, the Survey was placed in a position to send an independent expedition to Alaska to prosecute work of an economic character along the southern coast. In 1896, under a similar appropriation, work was commenced in the interior by the investigation of the placer gold-producing areas along the Yukon River.

As the field season of 1898 approached, previous conditions had greatly changed. This portion of North America had been brought prominently before the world through the discovery of the rich gold deposits of the Klondike region, in Canadian territory, and, following popular demand, Congress, by an act dated January 28, 1898, appropriated $20,000 for surveys in Alaska.

Here was a great region of the national domain, the interior of which was largely unknown. The general conditions were to be ascertained and described, the geography studied, the topography mapped, the character, distribution, metamorphism, and mineralization of the bed rock investigated, and the relation of the mineral deposits to the bed rock, and their character, value, and distribution, so far as possible, made clear. All these various kinds of information were to be embodied as quickly as possible in accurate maps and practical reports. The first hasty reconnaissances were so planned as to cover the areas of greatest economic importance and to form a framework about which more detailed studies could be grouped.

GEOGRAPHY OF ALASKA.

GENERAL FEATURES.

Alaska was purchased from Russia in 1867 for $7,200,000, but for thirty years it remained practically forgotten. The events of 1898 revived public interest in the Territory, but general knowledge of it is still very limited. The relation of Alaska to the United States had long been overlooked; it had been relegated to the uninhabitable polar regions, because no comparison of its climatic features with those of countries in approximately the same latitude had been presented. On looking at a map or globe of the world it is seen that Scandinavia and Alaska are about neck and neck in reaching toward the pole, but that Alaska has the greater southern extension and is nearly twice as large as Scandinavia. The possibilities of Scandinavia are already understood; the development of Alaska has just commenced.

The southeastern boundary of Alaska is within two days' distance by steamer from Seattle. From the far western extremity can be plainly seen the Diomede Islands, between which runs the boundary between the United States and Russia. Beyond them, visible at a distance of 60 miles from Alaska, looms a portion of the Siberian coast.

The area of Alaska is over 590,000 square miles—about one-fifth that of the United States, and two-thirds that of the region included in the Louisiana Purchase. The shape is irregular; it consists of a large, compact body of land with a projection from each of the lower corners, one toward the southeast, called the Panhandle, and one toward the southwest, called the Alaska Peninsula. This peninsula and the Aleutian Islands extend our territory far toward Asia, reaching out to meet the Commander Islands, a somewhat similar extension eastward from the peninsula of Kamchatka. The Panhandle and the Alaska Peninsula exhibit unusual irregularity of form, include many associated islands separated from one another and the mainland by narrow waterways, and, as a whole, present a striking contrast to the main portion.

The boundary line varies greatly in character. The main eastern boundary is a straight line from Mount St. Elias to the Arctic coast, along the one hundred and forty-first meridian. The boundary along the northeastern side of the Panhandle, which has just been fixed by international agreement, follows an irregular course among the mountains of the Coast Range. The waters of Portland Canal and Dixon Entrance terminate it to the south. The southeastern or Pacific edge has the form of an arc, concave toward the open ocean, but the continuity of this great curve is interrupted by many inlets. The western boundary of Alaska has the appearance of incompleteness. One looks involuntarily for its continuation and finds it in Siberia. It is very probable that at one or more times in its history Alaska has been connected by land with the latter country, and even at the present time the waters of Bering Strait have a depth of hardly 200 feet. This western boundary is indented by Kotzebue and Norton sounds, which separate the land mass into three bulky portions, the middle one of which, Seward Peninsula, approaches nearest to Siberia. The arc of the southern coast is reversed in the Aleutian Islands, and the concave side is occupied by Bering Sea. The distance from the end of the Panhandle to the outermost of the Aleutian Islands is about equal to that from the Atlantic to the Pacific, and between the same point and the Arctic Ocean is included a stretch of country equal to that from Florida to Canada. The northern coast is regular, and from it the sea floor slopes gently beneath the waters of the Arctic Ocean.

The surface of Alaska exhibits a wealth of topographic features of contrasting variety—mountains, plateaus, and lowlands—developed on a truly grand scale.

In a broad way, the larger features of topography correspond with those of the Western States. There is a Pacific Mountain system, a plateau region, a Rocky Mountain system, and a plains region. These four divisions are well marked and show the close geographic relation of this area to the southern part of the continent. Through the States and British Columbia the mountain trends are north-south and northwest-southeast, but after they enter Alaska they swerve to the west, and finally to the southwest, and thus determine the configuration of the southern coasts and the valley of the Yukon River. The irregular appearance of the western coast is due to the western trend of the main lines of structure, which find their continuation on the other side of Bering Sea.

THE MOUNTAINS.

The Pacific Mountain system has been divided into four ranges—the Coast, the St. Elias, the Aleutian, and the Alaskan. These subdivisions of the system may be recognized in the model exhibited by the Geological Survey at the Louisiana Purchase Exposition in 1904.

The greater part of the Coast Range lies back of the Panhandle of Alaska, in British Columbia. It attains a width of 100 miles and a height of 7,000 to 8,000 feet, but shows no well-defined crest line.

Closely associated with these mountains in the islands of the Panhandle are the beginnings of the St. Elias Range, which, farther west, includes that magnificent group, the Fairweather Mountains, and still farther westward attains its fullest expression in the lofty summits of

Mount St. Elias (18,091 feet) and Mount Logan. The width of the range in the vicinity of these peaks is about 100 miles, and the extreme height is attained in Mount Logan, in Canadian territory (approximately 19,500 feet). Beyond Mount St. Elias the range is divided; a subordinate range, called the Nutzotin Mountains, diverges to the northwest, and another, the Chugach Mountains, trends southwest across the Copper River and down toward the Kenai Peninsula. Between these two ranges lie the Wrangell Mountains, Mount Wrangell itself being an active volcano.

Along the western side of Cook Inlet is a range which extends out into the Alaska Peninsula and continues through the Aleutian Islands. This has been called the Aleutian Range. It is composed largely of volcanic material, and embraces a number of active volcanoes. In the Cook Inlet region eruptions within recent years have scattered volcanic dust for miles over the surrounding country.

Farther back from Cook Inlet, to the west, extends the Alaskan Range of mountains, with a northeast-southwest trend, which gradually bends round to the east and is connected more or less closely with the Nutzotin Mountains, an extension from the St. Elias Range. This includes many snowy peaks, among which two—Mount Foraker and Mount McKinley—stand out above all the others. McKinley is the loftiest mountain in North America. Its height, which has twice been determined by the Geological Survey, is about 20,300 feet.

The Rocky Mountain system extends through the Yukon Territory and approaches the Arctic coast in the northeastern portion of Alaska. It then bends toward the west and crosses the northern portion of Alaska as a mountainous belt, composed of several ranges, with a minimum width of about 80 miles and an altitude of about 6,000 feet. There is no well-defined crest line. Toward the west it apparently becomes two divergent ranges, one of which reaches the coast in the vicinity of Cape Lisburne; the other forms the divide between the Kowak (or Kobuk) and Noatak rivers.

Between the Pacific Mountain system and the Rocky Mountain system lies a vast area called the Yukon Plateau. As the mountains have been found to be extensions of similar features in the Yukon Territory, British Columbia, and the United States, so the great interior basin represents probably the northward extension of a similar and related feature which in the United States lies between the Pacific Mountain and Rocky Mountain systems.

The traveler between the main drainage areas of the interior is struck by the uniform elevation of the interstream areas. Rounded hills, level mesas, and persistent flat-topped ridges, composed of rocks of varying structure, rise to about the same level, and give the impression that they are the remnants of a former continuous surface. Occasional limited areas of rugged mountains rise above this level, and innumerable stream valleys have been incised below it, but from the northern base of the St. Elias and Alaskan ranges to the southern foothills of the Rocky Mountain system, and throughout their length, the remnants of this ancient level are to be seen. In height it varies from about 5,000 feet, close to the bases of the mountain systems, to less than 3,000 feet in the vicinity of the main lines of drainage, and slopes gradually toward the north.

There is an area about 160 miles in width between the northern base of the Rocky Mountains and the Arctic Ocean. A portion of this area next to the mountains, and extending 80 miles northward, has a southern extension along the eastern base of the northern Canadian Rockies, and is comparable with the Great Plains region of the United States. There is a gradual slope from an elevation of 2,500 feet at the base of the mountains to 800 feet at the outer margin. The surface is gently rolling and diversified by only a few minor ridges parallel with the main range. Beyond this plain a nearly flat coastal plain 80 miles in width extends to the shores of the Arctic Ocean.

The main surface features of Alaska, then, from south to north, are the Pacific Mountain system, the Yukon Plateau, the Rocky Mountain system, and the Arctic slope. The general trend of these from the eastern boundary to Bering Sea is at first northwest and then southwest. These features and their trend are the visible expression of important structural lines intimately associated with the geologic development of the country.

THE RIVERS.

The development of the surface features of Alaska is inseparably connected with the history of the deeply incised drainage systems. The rivers fall naturally into three groups—those of the south and southeast coasts, those of the west coast, and those of the north coast.

The rivers of the south and southeast coasts, from southeastern Alaska westward, include the Stikine, Taku, Chilkat, Alsek, Copper, Matanuska, and Sushitna. They drain the southern slopes of the Pacific ranges and a portion of the plateau region lying north of the mountains. The Stikine, Taku, and Alsek have their sources beyond the mountains and reach the coast through deep-cut canyons in the Coast and St. Elias ranges. The Chilkat finds its way to the coast between the Coast Mountains and the St. Elias Range. The Copper drains a portion of the large irregular area between the Alaskan Range and the mountains to the east, and reaches the coast through a canyon cut through the Chugach Mountains. The Matanuska and Sushitna occupy the area between the Copper River drainage basin and the eastern slope of the Alaskan Range, and are tributary to Cook Inlet. As they flow more or less parallel to the main structural lines, the necessity of a canyon through a coastal range is avoided.

Most of these rivers are swift, powerful streams which attain a length of from 60 to 300 miles or more, flow through a region presenting great variety of topographic forms, and transport abundant sediment to be deposited in the extensive deltas at their mouths. Their characteristics are impressed upon them by the region traversed, and the glacial slopes of the lofty Pacific ranges have imparted to them a resistless energy which makes their availability to the ordinary uses of civilization very difficult.

The rivers of the western coast are of an entirely different character. These broad, gently flowing streams derive their waters from the remotest sources in the interior, and most of them offer easy ways of transportation and communication for hundreds of miles inland. The most important are (from south to north) the Kuskokwim, Yukon, Selawik, Kowak (or Kobuk), and Noatak.

Most of the drainage from the western side of the Alaskan Range finds its way to the Kuskokwim, and the same river drains the little-explored area westward toward the coast. Its tributaries follow widely divergent courses; the upper ones interlock with those of the Yukon, the divide between the two systems being low. After gathering many important tributaries from various sources, the main stream flows southwestward through a region of hills and lowlands to Bering Sea.

The Yukon River and its tributaries form a drainage system comparable to that of the Mississippi. From the source of its longest tributary, far within Canadian territory, to its mouth in Bering Sea the distance is over 2,000 miles. Where it enters Alaska, a few miles above Eagle, it has already become a river of great size, and for 1,300 miles thereafter it traverses the plateau region and gathers to itself the waters of many tributaries. Its course within Alaska shows a close adjustment to the main structural lines, which have already been considered.

A study of the entire Yukon drainage would require familiarity with a large part of Yukon Territory and British Columbia. It is sufficient here to realize the fact that this great system has tributaries ramifying far within the Rocky Mountains to the east and in close proximity to the Arctic and Pacific oceans on the north and south, and that in gaining control of this vast area the whole system has entrenched itself to a depth of 1,000 to 3,000 feet in the plateau, so that the smaller streams, the tributaries of the larger ones, and the main streams themselves often flow in narrow, steep-walled canyons below the general surface, while in other portions of their courses they traverse lowlands of great extent.

From the Canadian boundary, where it is only half a mile to a mile in width, as far as Circle the valley of the Yukon is comparatively narrow and is bounded by the Yukon Plateau. From Circle to within a short distance of Rampart the river traverses a great lowland, known as the Yukon Flats, and here, divided into many interlacing channels, covers a zone 10 to 15 miles wide. From the vicinity of Rampart to the mouth of the Tanana River it is again contracted, and then, for a distance of 600 miles, flows in a meandering course through a broad valley, often bounded by hills and bluffs on the right, until it loses its great volume of water in the many distributary channels leading it through the great mud flats of the delta to Bering Sea.

The main tributaries of the Yukon in Alaska are the Koyukuk, the Porcupine, and the Tanana.

The Koyukuk enters the Yukon about 400 miles above its mouth and brings to it the drainage from an area several hundred miles distant along the southern slopes of the Rocky Mountains. The Porcupine pursues a peculiar course. It rises near the boundary on the Alaskan side, flows northeast toward the Mackenzie, and then, turning abruptly at the base of the Rocky Mountains, flows southwest and enters the Yukon about 200 miles below the boundary. The Tanana has its source near the boundary, in the St. Elias and Wrangell mountains. It flows northwestward in a course parallel with that of the upper Yukon and drains the northern slopes of the Pacific Mountain system and the large portion of the Yukon Plateau on either side of it.

The drainage areas embraced by the Selawik, Kowak, and Noatak rivers lie partly within the plateau region and partly within the Rocky Mountain region. These rivers follow a general westerly course, parallel with the mountain ranges, to the waters of Kotzebue Sound.

The northern slopes of the Rocky Mountains and the plains region are drained by many unexplored streams, which have their sources far within the mountains, flow in canyons across the plains, and enter the Arctic Ocean in an indefinite way, after traversing the ill-drained area of the Coastal Plains.

COAST LINE AND ISLANDS.

The coast line of Alaska is very irregular and, including that of the numerous islands, has a length of about 26,000 miles. It differs greatly in character at different places. In southeastern Alaska the mountains rise abruptly from the water and dip steeply below its surface. The precipitous character of the coast is carried westward through the Aleutian Islands. The western and northern coasts are generally low, and shallows are common. The most important inlets are Prince William Sound, Cook Inlet, Bristol Bay, Norton Sound, and Kotzebue Sound. There is an occasional fringe of coastal plain along the southern coast, and still more of it on the western coast, while along the Arctic Ocean it attains a width of 80 miles.

The important islands are those of the Panhandle of the southeast coast, Kodiak, south of Cook Inlet, and Nunivak and St. Lawrence, in Bering Sea.

On the relief model the submarine platform is strikingly shown. This attains a width of about 25 miles on the south coast and occupies a large portion of Bering Sea, extending 450 miles off the mouth of the Kuskokwim. Unalaska, a town of the Aleutian Islands, is situated nearly on the line where the surface of the submarine platform falls off abruptly to the depths of the Pacific.

CLIMATE, VEGETATION, AND RESOURCES.

Very erroneous impressions have prevailed about the climate of Alaska. The area is so large that a great variety of climate is to be found in its different portions. The climate of the southeast coast resembles that of the northwest coast of the United States, but farther north and west the winters become longer and colder, and Arctic conditions prevail in the interior. The summers, even to the Arctic Circle, are hot and the length of the day furnishes abundant opportunity for the growth of vegetation.

Among the mountains of the Pacific system climatic conditions have produced many glaciers, making this portion of Alaska one of the finest fields in the world for the study of glacial phenomena. The varied climatic conditions which have covered the highest peaks with eternal snow and glaciers have clothed the lower ranges and foothills with moss, all the coastal regions west of Kodiak and northward to the Arctic Ocean with the greenish-brown vegetation of the tundra, and the river valleys from the Kowak (or Kobuk) southward with an increasing growth of timber. The distribution of vegetation is instructively shown on the relief model.

The resources of the country have more than proved the wisdom of its purchase. At first furs, fish, and timber were supposed to be the only valuable products, but gold, copper, silver, tin, and coal are now produced. The search for these metals and their exploitation has resulted in an increase of the white population from 430 in 1880 to over 30,000 in the decade 1890–1900, and has led to the rapid exploration of the mineral resources and active participation by the Geological Survey in the development of the country.

OPERATIONS OF THE ALASKAN DIVISION.

The preceding brief sketch is intended to show in a general way the objects of the work which the United States Geological Survey is doing in Alaska and the conditions under which the work must be done, and it will serve as a basis for the following account of the results accomplished by the organization.

In 1898 plans were made to survey as much as possible of the portion of Alaska that lies south of the Yukon River. A combined force of geologists and topographers was sent to the field in the early spring, and transportation to Alaska was furnished by the Navy

Department on the gunboat *Wheeling*. Four parties were included in the organization. Two of these commenced work at Cook Inlet; the other two started inland together from Skagway. In the same season two members of the Survey were attached to the military expeditions operating in the Copper River country.

In 1899 two expeditions were sent to Alaska, one to explore the area at the head of the White and Tanana rivers, and, if possible, to continue the work to the Yukon River, and thus gain information in regard to a section of Alaska from the southern coast to the Yukon; the other to continue the section north of the Yukon, including the basin of the Koyukuk River. The gathering of the parties at St. Michael in the fall made possible a hasty reconnaissance of the then recently discovered gold fields of Seward Peninsula. An army expedition explored the valley of the Chitina River and the Skolai Mountains, and the results were published by the Survey.

The work of the year 1900 was concentrated in Seward Peninsula and the Copper River country, and detailed topographic and geologic surveys were made in both of these regions.

In 1901 work was continued in Seward Peninsula; the mining district of Ketchikan, in southeast Alaska, was investigated; the investigation of the geologic section across Alaska from the south coast, begun in 1899, was completed by a party which carried the work from the Koyukuk Valley to the Arctic Ocean, and the region westward from the Koyukuk to Kotzebue Sound was explored.

In 1902 two parties were detailed to finish the survey of the Copper River country; the coal deposits of the Yukon were investigated; a reconnaissance was made of the unknown area along the western slopes of the Alaskan Range, and a detailed topographic survey was made of the mining region near Juneau.

During the season of 1903 seven parties were sent north. Topographic and geologic work was continued by two parties in Seward Peninsula; detailed studies were made of the geology and mineral resources of the Juneau district; the oil deposits of the Controller Bay region were investigated; a party was sent to secure paleontologic evidence of the stratigraphic succession along the Yukon, with reference to the coal deposits; and topographic and geologic work, with studies of important placer deposits, were carried on by two parties in the Yukon-Tanana country.

The Alaskan work has been directed primarily to an investigation of the mineral resources, in accordance with the wording of the act under which appropriations are made. With this end in view, as far as possible every known and reported region where mineral deposits occur has been visited and studied in such detail as time and means would permit. The surveys can be roughly grouped in three classes: The first includes the extension of the general exploration all over the Territory, to determine the location and outlines of new areas of economic importance, and eventually to obtain complete geologic and geographic knowledge; the second embraces the reconnaissance mapping of regions of known mineral production; the third consists of detailed examinations and surveys of mining districts.

The months from May to September are usually employed in field work. The parties are each placed in charge of the senior geologist or topographer, and have varied in size from 3 to 15 men. The methods pursued are those which experience has demonstrated will give greatest mobility to the parties and most quickly attain the results desired. In this work there has been trained a group of men, including geologists, topographers, and camp men, who are especially fitted to contend with the conditions confronting the Alaskan explorer.

The transportation of equipment and provisions for an entire season becomes a most important factor in the operations of a survey party. Some of the journeys have been performed on foot, and the method of transportation has been the most primitive of all—that of packing the outfit on the backs of men. When a navigable stream was reached a framework of spruce and willow was built, the pack covers were stretched upon it and smeared with pitch, and the journey was continued by canoe or improvised raft. Some of the trips have been along the main-stream valleys, where the light cedar canoe has been the favorite means of transportation, with back-packing over the portages.

With the advent of pack trains the mobility of the expeditions has been greatly increased, and they are no longer confined to the main-stream valleys. Horses, varying in weight from about 800 to 1,000 pounds, are used, and from June to September they are self-supporting in most of the areas covered. When a party has started for the field in the winter, recourse has been had to dog teams, and this method was employed in the early part of the long journey across Alaska from the Yukon to the Arctic Ocean.

The work along the coast has usually been done with whaleboats or small sailing vessels, but in the archipelago of southeastern Alaska gasoline launches have been used.

The geologist who undertakes field work in Alaska is embarrassed by the fact that there are usually no base maps for his use. For this reason methods somewhat different from those ordinarily followed have been adopted.

In connection with the regular instrumental surveys by the topographer, a foot traverse of the route is made by the geologist, generally on the scale of 1 mile to the inch, with courses and altitudes determined by the compass and barometer, respectively, and distances estimated by pacing, or when traveling on the water by timing. As the country is traversed the corresponding distances and bearings are platted in the notebook, the contours and stream courses are roughly sketched, and the whole serves as a basis for the geologic notes. The work is checked with that of the topographer or, in the absence of a topographer, with the known positions of terminal points.

All possible information is obtained in regard to bed rock, with special reference to the occurrence of mineral deposits, and specimens are collected for future study. In the trips of a reconnaissance character more attention is given to the stream gravels, perhaps, than when time is less pressing. These local collections often throw light on the qualitative lithology of an area, while the quantitative character has to be left largely undetermined. The geologists are also called upon to make notes on the distribution of timber, fish, and game, and to gather information about the natives as well as the white population. A number of the expeditions have made valuable collections of plants.

In making topographic maps of the different parts of Alaska, it has been found necessary to adopt special instruments and methods fitted to the exceptional conditions encountered, though the general scheme for executing topographic work is the same as elsewhere.

In reconnaissance surveys the work is started, if possible, at some place of known position; otherwise observations are made with a transit having a vertical circle to determine the latitude and azimuth at the starting point, and longitude is determined by tying the traverse to some point previously established. Starting from the point thus ascertained, angles are taken and distances measured along the traverse, and these are plotted on a plane-table sheet to the scale of about 3 miles to the inch. Distances are determined by stadia measurements with a telescopic alidade or a hand stenometer, both of these instruments being devised for use with a short base or with a rod of known length. When atmospheric conditions prevent the use of paper for plotting the traverse, a sheet of white celluloid is substituted.

As the traverse progresses salient features of topography are located by intersection, and the elevations of these points, as well as of stations actually occupied, are determined by vertical angles or barometric readings. These locations enable the topographer to adjust his sketch showing the drainage and configuration of the country adjacent to the route. As often as possible latitude and azimuth observations are made and sights to prominent mountains are taken, thus enabling a more accurate adjustment of the field sheets.

In localities where large areas have been mapped, such as Seward Peninsula or the Copper River Basin, the method is that usually employed by the Survey in other fields. A base is laid out and triangulation is expanded instrumentally until a sufficient number of points are located to control the area to be surveyed. The positions of these points are computed and plotted on a plane-table sheet, to serve as a control for intervening locations, which are filled in by graphic triangulation, elevations being determined by vertical angles and barometric readings. These determinations enable the topographer to sketch the configuration from commanding points by contours spaced at regular intervals.

At the close of the season the parties are disbanded and the geologists and topographers return to Washington with maps, notes, and collections. The topographic material is assembled and adjusted as rapidly as possible and maps are prepared for publication.

The geologist's time is given to assembling and plotting his field notes and studying and comparing the specimens collected, usually by the aid of the microscope. Assays and chemical analyses are made by the section of chemistry, and collections of fossils are examined by specialists in paleontology. When all the data are in hand the geologist prepares a report, which, if possible, is submitted for publication during the winter following the field work. The report also contains valuable information in regard to the timber, game, and fish of the region traversed.

It is the practice in the Alaskan division to prepare preliminary statements showing the economic results of all investigations, for immediate publication, leaving the strictly scientific data for more thorough study. This policy has enabled the Survey to issue much timely information in regard to new mining districts.

In 1899 the Alaskan work occupied 2 geologists and 2 topographers, with an additional field force of 12 men. With increased appropriations and also by greater economy of expenditure, which is the result of a closer appreciation of the field conditions, the force has gradually been increased. The division now includes a geologist in charge, 7 geologists, 3 geologic assistants, 2 topographers, 2 topographic assistants, and a field force of 25 to 30 camp men. During the season of 1903 this force was divided into seven parties.

RESULTS.

It is difficult at the present day to conceive how little was known of Alaska previous to 1898. The expeditions of the earlier years had resulted in contributions to the knowledge of the Yukon Valley, the interior plateau, the St. Elias Range, and the coast south of that range, but most of the country was practically unknown.

The reconnaissance trips of 1898 added to the map many of the most important geographic features lying south of the Yukon River, and the trips of each succeeding year have filled many gaps in the earlier work and extended it from the Yukon to the Arctic Ocean and from the Koyukuk to the coast of Bering Sea. Thus were the broad geographic features outlined and the important mountain ranges and drainage areas defined. The preceding sketch of the geography of Alaska, which embodies all the available data, is based chiefly on the work of the Geological Survey. The topographic maps are the graphic expression of these geographic facts, and one of the most important functions of the Survey in Alaska has been the production of such maps. Most of the expeditions have had at least one topographer, and from every expedition a map of the route traversed has resulted. The value of these maps can not be overestimated. There are demands for them from prospectors, engineers, capitalists, and school-teachers, and they form one of the most essential preliminaries toward the development of the country in any direction. They indicate routes of travel to the prospector and explorer, railway and wagon routes to the locating engineer, and possible sources of water power to the mine operator.

An area of from 90,000 to 100,000 square miles—about one-sixth of the total area of Alaska—has been covered by topographic surveys. The results have been compiled on a map which will be included in a forthcoming report designed to give a comprehensive account of the geography of the Territory.

In connection with the Alaskan work, the explorers have used many new names for streams, mountains, and the other features discovered. In the office these names have been collected and brought into the form of a geographic dictionary of Alaska, which gives the locations of the features named, in many cases the origin and meaning of the name, and a chronologic list of authorities.

While the aim of the work has been to investigate the mineral resources, this necessitated geologic studies, for it is only on a basis of thorough geologic knowledge that the facts gathered in regard to the value and distribution of ore deposits can be adequately interpreted. From year to year this fundamental knowledge is growing, and in course of time the geologic history of the Territory will be deciphered. Much is already known of the general succession and distribution of the bed-rock formations, and in a few years it will be possible to publish a preliminary geologic map.

The studies of the bed-rock geology, extended by each expedition, are resulting in an accumulation of material which becomes increasingly valuable in tracing the distribution and origin of deposits having economic value. The occurrence of such deposits is but a minor feature of the general geology, but the most important factor in the development of the country. The function of the Survey is to study the relation of the two, and in the course of these studies results of immediate practical importance to the people of Alaska have been achieved. These have been chiefly in connection with the occurrence of gold, copper, tin, and coal.

In 1895 and 1896 the gold-bearing localities of the southern coast were visited and facts of ecomomic value were collected regarding the occurrence of the gold and its relation to the country rock. Investigations were made of the mining districts along the Yukon River, where the gold was found to originate in veins and mineralized zones in the older schistose formations. From these sources it had been washed out and concentrated in the placers.

In the reconnaissance trips of 1898 the distribution of gold was determined in many areas. The rocks of the Sushitna Valley were briefly described, and the origin of the placer gold was referred to the quartz seams in the Sushitna slates. In a trip across the Alaskan Range the mineralization was found to be much less than in the mining regions of the Yukon. It seems to be limited to a portion of the range and to be dependent on the intrusion of igneous rocks. The schist formations of the Tanana country were found to be similar to, and probably to belong to, the same horizon as the gold-bearing rocks of the upper Yukon. The regions which might prove of economic value for their mineral deposits were outlined, and it is interesting to note in this connection that the new mining camp of Fairbanks has recently been developed in one of these areas. Along the southern coast the gold deposits of the Sunrise and Matanuska regions were investigated, the process of natural concentration of gold in placers was described, and the possibility of hydraulic and quartz mining was considered in the published reports. In the Copper River country gold was found to occur in small amounts in quartz stringers, and these were considered the source of the placer gold which was found in limited quantities.

In 1899 the Porcupine placer district was examined and the gold was found to be derived from mineralized areas in the slate. In the same year the gold deposits of the Koyukuk were described. At the end of the season the newly discovered gold deposits of Nome were investigated. This work resulted in the first accurate report of the region, which was ready for the public the following spring. The topography, country rock, and gravels were described. The fact was emphasized that the source of the gold was in the hills, and not, as many supposed at that time, offshore. The attention of prospectors was directed to the high gravels occurring as terraces on the hill slopes, and these have since been worked with very profitable results. It was further predicted that the tundra between Nome and the hills would probably produce gold in paying quantities, as it is now doing. The manner in which concentration has been brought about by wave action was described, and the methods of mining employed at that time were reported. The work of these few weeks may be taken as an illustration of the practical value of the Survey's investigation.

Work was continued in Seward Peninsula the two following years, and again in 1903, and data were collected on the occurrence and distribution of the gold. The facts were established that the gold was concentrated in the placers from a comparatively local origin in the schists, and that the richer occurrences frequently had their origin in a process of double concentration. The processes of concentration and reconcentration were fully treated and their economic importance was emphasized.

The gold and copper deposits of the Ketchikan mining district were investigated in 1901 and found to be closely associated with igneous rocks. The origin of the gold in the Chistochina placers in the Copper River Basin has been referred to locally metamorphosed areas of Permian shales. Along the northwestern slope of the Alaskan Range, north of Mount McKinley, colors were found in the stream gravels, which may indicate a mineralized area in that region.

The extension of the work in 1903 established the fact that workable placers are present in the northeastern part of Seward Peninsula, and also in the Fairbanks district, in the Tanana Valley. A detailed examination of the Juneau gold district of southeastern Alaska showed that the deposits fall into two groups—those occurring in a well-marked zone skirting the mainland, and those occurring in less persistent belts, which are isolated from the first.

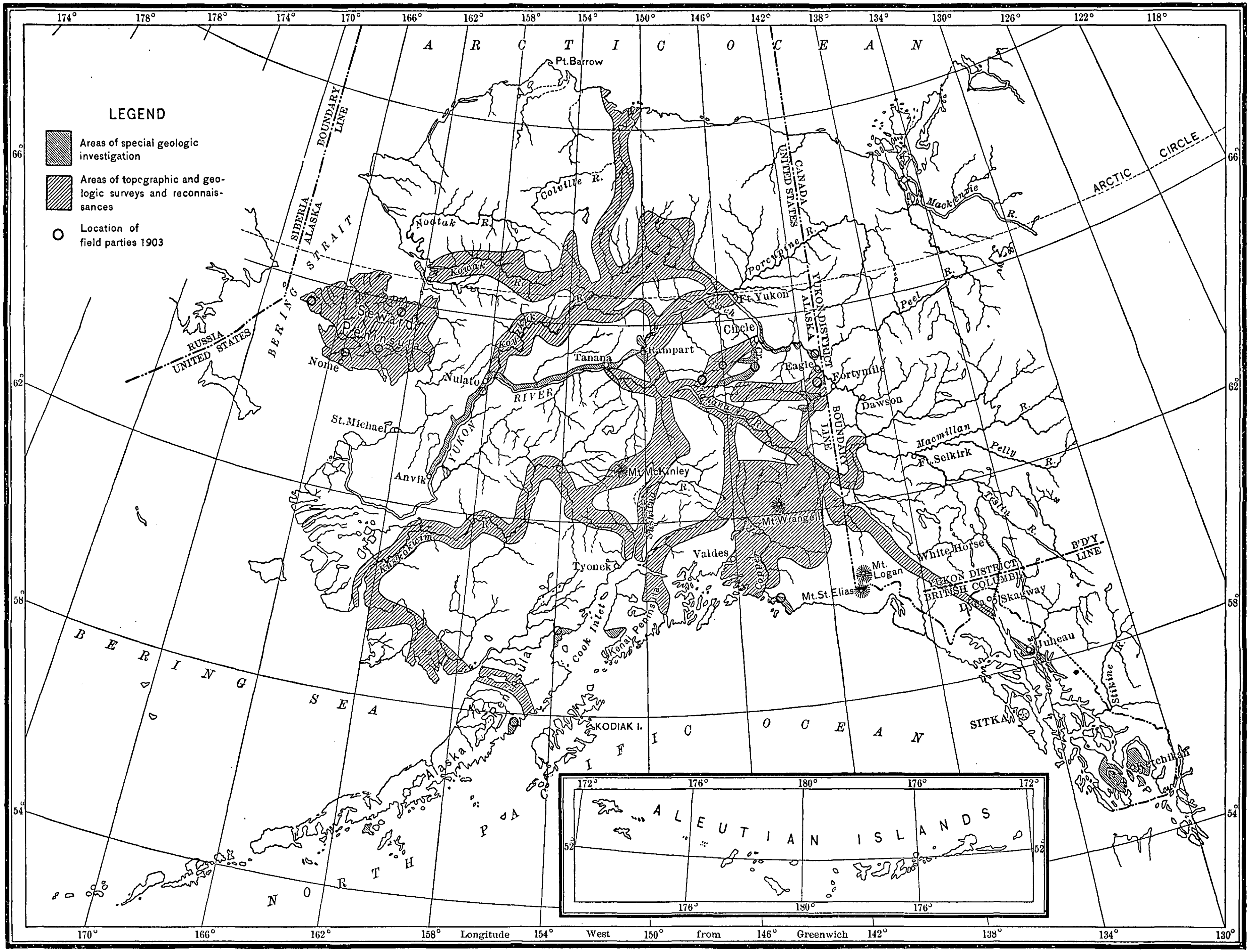
In 1898 the copper deposits of Prince William Sound were investigated, and the copper was found to be widely distributed as sulphides in shear zones of greenstone rocks or associated with diabasic intrusives.

In 1899 the copper deposits of Kletsan Creek, at the head of White River, were investigated. Copper had long been known to occur in the stream gravels of this region, and the locality had been visited by one of the earlier expeditions. The source of placer nuggets was found in veins along the contacts of crystalline limestone and intrusive greenstone, where it occurs in the native or metallic form with calcite.

In 1900 one of the most important economic problems was the investigation of the Copper River country. Copper was found to occur native in cavities and stringers in the Nikolai greenstone (an old volcanic flow), and as sulphides, bornite, and chalcopyrite, in fissure veins near the contact of the igneous rock with overlying limestones. The different localities were visited and copper was reported to exist in amounts sufficient to justify exploration. Further work was done in this area in 1902. The Nikolai greenstones and the overlying Chitistone limestones were mapped and copper-bearing localities along the contact were indicated. The copper deposits of the upper Tanana were found to be associated with diabasic intrusives, and to be similar to the Kletsan Creek deposits, already noted.

In the investigation of the mineral deposits of the Ketchikan mining district in 1901 copper was found to occur both in veins and in mineralized shear zones, chiefly as chalcopyrite, malachite, bornite, and chalcocite. These were found in feldspathic schists, probably intrusive in greenstone, in the greenstones themselves, and along the contacts of crystalline limestone with intrusives.

While work was in progress in the York region in 1900, attention



MAP OF ALASKA, SHOWING PROGRESS OF TOPOGRAPHIC AND GEOLOGIC SURVEYS, 1898-1903

Scale 100 0 100 200 300 400 miles

was called to a mineral found associated with the gold in the sluice boxes, which proved to be cassiterite—the oxide of tin. The source of this mineral was not definitely ascertained, but it was found in streams draining areas of slates which contained quartz and calcite seams and were penetrated by intrusives of diabasic character. The publication of a timely report by the Geological Survey stimulated interest among prospectors, which led to further knowledge of the distribution. In the following season work was continued by the Survey, and it was suggested that a source might be found in the vicinity of the granite contacts. One of the most interesting developments of the year 1903 was the tracing of the tin ore to deposits in granitic dikes, and this was accomplished mostly through the work of the Survey party. In other localities it seemed to have been derived from the slates. The investigation of this occurrence, in reference to the distribution and association of the stream tin, the location of the lode deposit, and the geologic maps, indicating similar rock occurrences where tin might possibly be found, constitute illustrations of the value of the Survey work to the people of Alaska.

In 1895 the localities along the southern coast where coal exists in quantities of economic importance were visited and the character of the coals was determined. In connection with this work a large amount of material was assembled relating to coals and their analyses and to the distribution of the coal-bearing rocks throughout Alaska.

In addition to the regular work of the Survey, reports are occasionally prepared that embody the results of several workers and place in compact form material which possesses much practical value. Such a report was published in 1901 on "The Coal Resources of Alaska." This includes a summary of the knowledge of the Alaskan coals up to the time of its publication.

In connection with the work from the Koyukuk to the Arctic Ocean, the coals along the Colville River and at Cape Lisburne were found to occur in rocks of Mesozoic age; and as the rocks of the Colville area strike off toward Cape Lisburne, it is possible that the occurrences in the two areas are closely related.

In 1902 the coal deposits of the Yukon were investigated and found to occur, with possibly one exception, in the upper Cretaceous and Kenai formations. The coals were grouped into those of the Circle province, the Rampart province, and the Nulato province. They range in character from high-grade lignites to semibituminous coals.

In 1903 a party was sent to the region in the vicinity of Controller Bay to investigate the occurrence of oil. The coast from the vicinity of the Copper River delta to Cape St. Elias was visited, also a large portion of the valley of the Chilkat River. Later the oil fields on the west coast of Cook Inlet and of Cold Bay, on the Alaska Peninsula, were investigated.

Pl. III shows the progress of geologic and topographic reconnaissances and special investigations in Alaska.

For publications relating to Alaska and maps of the Territory, see the list of Survey publications.

DIVISION OF MINING AND MINERAL RESOURCES.

The division of mining statistics and technology (now the division of mining and mineral resources) was organized in 1882 to study the mineral resources of the United States and to serve as a means of cooperation with the mining interests. The results have been published usually in annual volumes entitled "Mineral Resources of the United States." At first only the more important lines of inquiry were taken up, and the work was so arranged that prompt publication might be had.

The authority for this work was contained in the act of August 7, 1882, authorizing the United States Geological Survey, in addition to its other duties, to procure statistics in relation to mines and mining. The first report from this division was a chart showing the mineral products of the United States for 1882, and was issued in less than six months after the division had been created.

In 1882 the division consisted of one employee, who carried on the work in the office of the Survey at Washington, with occasional help of a clerical nature, until 1884, when two assistants were assigned to the work. About 25 persons outside of Washington contributed papers to these early reports, some gratuitously and others for a consideration. Few of them, however, could be called employees of the Survey, since, if they were paid at all, the compensation was only sufficient to cover the actual expenses incurred in the preparation of papers.

In 1892 the division employed 8 persons in the Washington office and about 25 contributors outside the city. In 1903 the division had grown to 18 employees in the Washington office and between 40 and 45 outside the city.

In organizing the work of the division each important mineral industry was assigned to the best expert on the subject who could be found in the United States. By degrees the work of each one of these grew to include a complete canvass of the subject among all the producers in the United States, so that the reports issued were statistically complete each year, and embraced, besides statements of production and value, a brief account of the technical developments of the year and of additions to the knowledge of existing mineral deposits.

To accomplish this, it is necessary at all times to keep as complete a list as possible of the mineral producers of the country. This is done largely by correspondence, supplemented by field work of agents. On all cards of inquiry requests are made of producers for the names of new operators in their vicinity. The technical press is also carefully scrutinized for new names. As a further means of keeping the directories of producers up to date, each year the lists are printed and distributed to producers for corrections and additions. The names thus obtained are placed on a tentative list and the persons or firms are communicated with before their names are incorporated in the working list. This communication is had in two ways—by a return postal card, and by a special circular letter.

When persons report themselves actively engaged in any mineral industries, their names are incorporated in the lists, and at the close of each year cards are sent to these producers requesting information concerning their products for the calendar year. When these cards are returned to the Survey they are edited or corrected for tabulation. Where inconsistencies occur which the person in charge of the subject is unable to reconcile, communication is had with the producer by letter. This is necessary in only a small proportion of cases. Cards which are complete are tabulated as rapidly as possible in books especially prepared for that purpose, and those needing correction by operators are tabulated as rapidly as they are made complete.

Three requests are, if necessary, mailed to producers, and the most important remaining unheard from after the third request are visited by special agents for the purpose of obtaining the desired information. The permanent form of the list of producers is that of a card index, the cards showing, in addition to the names of the operators and the location of the office and of the mine, the changes in the firm name and the total value reported for a series of years.

As an outcome of this study of the mineral resources of the United States, maps showing the occurrence of iron ores, coal, building stones, petroleum, and other substances have been prepared and published, in addition to the annual volume; also special papers in regard to the technical conditions of various branches of the mining industry. The work of collecting the mining statistics for the Eleventh and Twelfth censuses was performed by this division of the Survey. The division is ready at all times to give available information to those inquiring into the occurrence and utilization of mineral substances, and a large correspondence of this nature is carried on.

To this division are referred large numbers of mineral specimens for examination. It is not possible to make analyses of these specimens, but whenever such are sent in with request for analysis the minerals are examined as completely as may be possible without analysis, and the sender is advised as to whether an analysis is desirable or not; if it is, a person is named by whom the analysis can be made at the expense of the sender.

Where unusual demand for any mineral product has developed, special efforts have been made to stimulate production of adequate supplies from deposits in the United States by a general investigation of the occurrence of the mineral concerned. In this way much help has been given to producers and others of such minerals as monazite, zircon, iridosmine, platinum, and lately minerals containing radium. The unusual interest aroused by the discovery of radium in certain minerals in the United States and elsewhere has caused a great demand for information concerning the minerals which show radio-active and radio-responsive properties. Therefore a special exhibit of minerals possessing these properties and of radium compounds will be shown as part of the exhibit of the Geological Survey at the Louisiana Purchase Exposition, to be held at St. Louis this year.

For publications giving the results of the work of this division, see the Survey's list of publications.

DIVISION OF CHEMICAL AND PHYSICAL RESEARCHES.

Section of Chemistry.

In 1880 a small laboratory was organized at Denver, Colo., on the recommendation of the geologist in charge of that division. In 1882 another laboratory was organized at San Francisco, Cal., on the recommendation of the geologist in charge of geologic work on the Pacific coast. In 1883 a central laboratory was established in Washington, and to this, by degrees, the equipment and personnel of the other laboratories were transferred. The consolidation was completed in 1890.

In 1892 eight chemists were employed in this laboratory, but in that year the appropriations were so greatly decreased by Congress that the working force was reduced to three. Since then there has been gradual enlargement of resources, and at present six chemists are engaged on the chemical work of the Survey.

Up to January 1, 1904, nearly 5,300 analyses had been made in the Washington laboratory alone. These cover the entire range of products in which the geologist is interested. Rocks of every description, ores, minerals, clays, coals, and waters have all received attention. A specialty of the laboratory has been the complete analysis of eruptive rocks, and of these something like 1,000 have been made. Completeness and accuracy have been the aim of the chemist engaged on this work, and it is believed that the thoroughness of the analyses of rocks now carried out in the laboratory exceeds that ever before attempted. In Bulletin No. 168 the rock analyses were summed up to January 1, 1900, and a new edition of that bulletin is now in preparation. In the analyses of igneous rocks it is customary in the Survey's laboratory to look for about 20 different constituents; commonly, in analyses made elsewhere, from 12 to 15 are determined in a single rock. Two results have followed from this exhaustive plan of investigation. In the first place, it has been found that many substances supposed to be relatively rare are very common and widely diffused. The supposedly rare element, titanium, for example, is almost invariably found in appreciable quantities, and the average percentage of titanium dioxide in eruptive rocks is found to be nearly 0.073. Barium and strontium are also commonly found in igneous rocks, especially in those of the Rocky Mountain region. Chromium and nickel are by no means unusual; even vanadium and zirconium are commonly encountered. By means of these analyses the petrographers have been enabled to study rocks much more thoroughly on the chemical side than ever before, and it has been possible to compute with very close approach to accuracy the average composition of the earth's crust.

In mineralogy much has been accomplished. Over 500 analyses of minerals are found in the records of the Survey, representing over 150 species. Fifteen of the latter were discovered by the chemists of the Survey as new. In other cases little-known species and rare minerals were completely analyzed for the first time, and in still other cases the nature of species of doubtful composition has been thoroughly determined. The mineral analyses of the Survey have been brought together in Bulletin No. 220.

Many analyses of natural waters from mineral springs and from mines have been made. The most important group of these, however, represents the waters of the Yellowstone National Park, and were published in Bulletin No. 47. These waters are unique in character, and of considerable variety. Most of the geyser waters contain appreciable quantities of such unusual substances as boric acid, arsenic, and lithia, and one water in particular—the water of the spring known as The Devils Inkpot—is unique, containing a little over 3 grams to the liter of solid salts, and 83 per cent of this saline matter is ammonium sulphate. From the water of this spring 2.8 grams per liter of ammonium sulphate can be extracted. Ordinarily ammonia in natural water is attributed to the decomposition of organic matter, but in this case it is of volcanic origin, and is probably brought from nitrogen compounds existing at great depths. In connection with the analytical work of the laboratory, special attention has been given to improving analytical methods, with the result that many new ones have been worked out. Notable among these are the determinations of titanium, lithium, and boron. The experience thus gained has been recorded in Bulletin No. 176, which is recognized as a standard work of reference by students and specialists, and is extensively used in university laboratories. It has been translated into German, and is recognized all over the world as the standard authority on silicate analysis.

Technical chemists engaged in manufacturing or metallurgic establishments are in the habit of using rapid methods of considerable variety and sometimes of doubtful accuracy. In several cases the Survey has been called upon to standardize work of this kind. Some years ago, at the request of the Colorado Scientific Society, a uniform sample of ore containing zinc was prepared. One portion of this was sent to the Survey laboratory, and other portions were distributed to a number of chemists in Colorado. The latter determined their zinc by a variety of rapid methods; the Survey sample was analyzed with the utmost care and accuracy. In this way it was determined which of the rapid methods was the best, and the smelter chemists of Colorado were aided in their work. In a similar manner the Survey has formulated the best method for the proximate analysis of coal, and recently there has been made a very thorough investigation of the analysis of Portland cement. In the latter case the work was initiated by the New York section of the Society for Chemical Industry. Uniform samples of cement rock and finished cement were prepared and distributed among about 20 different chemists who were engaged in that class of work. The Survey analyses served as a standard by which to check others, and the result is a decided improvement in this class of technical work.

Another field of labor which has been much cultivated by the chemists of the Survey is that of purely scientific research. At present investigations are under way having for their purpose the elucidation of the processes which operate in the secondary enrichment of ore bodies. Elaborate investigations have also been made and are still in progress relative to the chemical constitution of the natural silicates, and these have shed much light on the troublesome question of molecular structure. It has been found, for instance, that various silicates are easily broken up by heat alone in such way that the changes occurring can be measured quantitatively. Thus, talc on ignition has one-fourth of its silica split off in the free state. Other minerals break up into two portions, one soluble and the other insoluble in strong acids, and in the case of the chlorites the insoluble portion has the composition of spinel. It has also been found possible to effect replacements in silicates analogous to those which the organic chemist employs in determining the structure of a hydrocarbon, and one group of silicates has thus been prepared in which the bases, soda, lime, and potash, have been replaced by the compound radical ammonium. Silicates containing 10 per cent of ammonia have been prepared which were perfectly stable at 300° C. These are the first ammonium silicates known to science. The chief chemist has also been called upon to act as chairman of the International Commission on Atomic Weights.

Other investigations have had practical aims in view. The elaborate research undertaken by one of the chemists on natural soda is a case in point. The alkaline lakes of California, Owens and Mono lakes particularly, contain large quantities of sodium carbonate, and the problem in hand was to determine the conditions under which that salt could be commercially extracted and freed from its impurities. The results obtained will be found in Bulletin No. 60.

For Survey publications on chemical subjects, see the Survey's list of publications. A very large part of the work done for the geologists, however, is scattered through the various publications of the Survey; and in addition to the official publications the chemists have been frequent contributors to scientific journals, to the Smithsonian Miscellaneous Collections, and to the proceedings of chemical and other societies, both in this country and in Europe.

Section of Physics.

Physical research by the United States Geological Survey began in 1880, under direction of the geologist in charge of the division of California, when it appeared desirable to investigate the extraordinary thermal conditions of the Comstock Lode and to ascertain whether terrestrial electricity and magnetism were disturbed by the presence of ore bodies. The results are contained in Monograph III, on the Comstock Lode, and in the Annual Report for the year 1882.

At the close of this investigation, which was of course made in the field with portable and more or less extemporized apparatus, plans were prepared, under the direction of the late Mr. Clarence King, then Director of the Survey, for the equipment of a laboratory and the systematic study of certain geophysical problems under more favorable conditions. Most of the apparatus for this laboratory was constructed in Europe, the expense being borne personally by the Director, Mr. King. By November, 1882, the apparatus was received, and a private house in New Haven, Conn., was rented for use as a laboratory.

A brief classification of the researches proposed at that time is contained in the Second Annual Report of the Survey, and is of very considerable interest. If such a classification of the most important work to be done in geophysics were required to-day, after twenty years of marvelously active and productive work in most other branches of science, the classification then made would serve without the change of a word, so little attention has been given to geophysical problems as compared with those of other sciences.

The outline was this:

(*a*) Phenomena of fusion. These would comprehend temperature of fusion, specific volume at this temperature of the solid and of the liquid materials, respectively, heat expansion, compressibility, latent heat of fusion, specific heats—all considered with especial reference to their variation with pressure.

(*b*) Phenomena of elasticity and viscosity, considered, as before, with especial reference to their dependence on temperature and pressure.

(*c*) Phenomena of heat conductivity under analogous circumstances.

The establishment at New Haven was planned on a large scale and was intended to be permanent, but relatively little more than the trying out of the plant and the determination of the instrumental constants was accomplished there.

In July, 1883, when a chief chemist of the Geological Survey was appointed, physics was incorporated with chemistry, and a concentration of all the laboratories of the Survey in Washington was determined upon. A year later the laboratory was established in cramped quarters in the National Museum, where temperature work on so large a scale as the New Haven plans contemplated appeared impracticable and had to be abandoned. Independent outside researches upon the effect of extreme pressure upon solids and upon high temperatures were, however, carried on under the general supervision of officers of the Survey.

From 1883 until 1892 research work at the Smithsonian Institution was continued without serious interruption.

The first independent official publication from the physical laboratory appeared in Bulletin No. 14 (1885), on "The Electrical and Magnetic Properties of the Iron Carburets," though the annual reports of the Survey and frequent contributions to foreign scientific journals gave ample evidence of the activity of the physical laboratory. The study of the iron carburets was a remarkably thorough one, continuing through a part of Bulletin No. 27 and all of Bulletin No. 35.

Perhaps the most important contribution to knowledge of high temperatures is contained in Bulletin No. 54, "On the Thermo-electric Measurement of High Temperatures." In this publication the fundamental measurement of temperatures upon the gas scale, up to and somewhat beyond the melting point of gold, was rescued from the confusion into which it had been thrown by the gas-thermometer measurements of Deville and Troost, in which iodine vapor was used above its (then unknown) dissociation temperature. The thermo-electric pyrometer became a practical and accurate laboratory instrument, and a new and unique method of measuring temperatures by the varying viscosity of gases was developed. This investigation has become so widely known and received such general recognition that its author was asked to write the report on high-temperature measurement for the great Congress of Physicists at Paris in 1900.

The entire work of those years occupies 15 bulletins and parts of a monograph and an annual report.

In 1892 the annual appropriation for chemistry and physics was reduced from $17,000 to $5,000, and physical research had to be entirely abandoned. So much of the apparatus as had been privately purchased was taken away, the laboratory was dismantled, and no further physical research was attempted until several years later.

In 1900 provision was again made to begin some work in physics, and a room was partitioned off for a laboratory on the fifth floor of the office building which the Survey now occupies. The physical and chemical laboratories were then united under the official designation "division of chemical and physical researches." So little of the earlier equipment remained that all of the first year was spent in building and calibrating special apparatus and in general laboratory furnishing. Much more than usual difficulty was encountered in preparing for accurate physical measurements in the space assigned therefor, both on account of the location of the laboratory and on account of lack of the services of a skilled mechanic.

In the two years during which the laboratory has been in operation three researches have been undertaken. The most important one is a thorough and systematic thermal investigation of the relations of the feldspars, their melting temperatures, conditions of crystallization, etc. This experimental work is now approaching completion, but no results have yet been published. There have also been made measurements of the elastic constants of an interesting artificial pseudo-solid formed by beating the white of egg into a stiff foam with a small quantity of sugar in solution, and of the linear force exerted by growing crystals.

For Survey publications relating to physics, see the Survey's list of publications. The physicists of the Survey have also made numerous contributions to other scientific periodicals and series.

TOPOGRAPHIC BRANCH.

The topographic branch is organized in two divisions—topography, and geography and forestry.

DIVISION OF TOPOGRAPHY.

Eastern and Western Sections.

The division of topography is divided for administrative purposes into two sections, the eastern and the western, but the work of the two sections is identical in character. The chiefs of these sections are the administrative heads, the one of all topographic surveys executed east of the one-hundredth meredian, and the other of all those executed west of that meridan. With the Director they form a committee having jurisdiction over all work of the division of topography. This includes a section of triangulation and computing, a section of inspection of topographic surveying and mapping, and thirteen subsections of topographic field work—three in the western section and ten in the eastern.

The employees are procured through civil-service examinations held from time to time for the recruiting of the force. All appointments are to the minor position of topographic aid, and appointees are advanced by promotion through the grades of assistant topographer, topographer, and geographer, the latter title going with the larger administrative responsibilities.

Surveys may be divided into three classes:

1. Those made for general purposes, or information surveys, which may be exploratory, geodetic, geographic, topographic, geologic, etc.

2. Those made for jurisdictional purposes, or cadastral surveys, which define political boundaries and those of private property and determine the inclosed areas.

3. Those made for construction purposes, or engineering surveys, on which are based estimates of the cost of public and private works, such as canals, railways, water supplies, etc., and their construction and improvement.

The topographic survey, one of those in the first class, is made for military, industrial, and scientific purposes. The topographic map, made directly from nature by measurements and sketches on the ground, is the mother map from which all others are derived. It shows with accuracy all the drainage, relief, and cultural features which it is practicable to represent on the scale chosen.

The act of March 3, 1879, which created the United States Geological Survey, appropriated $106,000 for a geologic survey and classification of the lands of the public domain. The presentation of the results of a geologic survey necessitates a good topographic map. There was in existence no such map of the greater part of the public domain; therefore, of the sum appropriated, $19,624 was allotted for topographic surveys during the first year. In 1882, after the change of directors from Clarence King to J. W. Powell, and the extension of the work to "the preparation of a geologic map of the United States," the topographic branch was reorganized by the appointment of a chief geographer, and the work was divided into the northeast, southeast, central, and western sections of topography. The allotment for topographic surveys for the fiscal year 1882–83 amounted to $70,700, and necessitated a corresponding increase in the field force.

A similar organization of the topographic branch was maintained, with slight changes, until the beginning of the fiscal year 1888–89. An act making appropriations for the fiscal year ending June 30, 1889, provided the sum of $199,000 for "topographic surveys in various portions of the United States." Thus, while during the first decade of the existence of the Survey topographic surveys were executed as a necessary adjunct to geologic work and the classification of lands, at the beginning of the second decade the value of the topographic maps for other purposes had become so apparent that Congress provided specially for their preparation and publication.

During the first few years the present organization continued to use, in its map work, the same scale that had been employed by the earlier independent surveys—about 4 miles to the inch, or 1:250000, with relief shown by 200-foot contours; but when the cooperative surveys of the States were begun (see p. 60) it was seen to be desirable to increase the scale and contour interval, not only for the work in those States, but for that in other States in which cooperation was not being carried on. This change was gradually extended to other regions, so that at the close of the first decade of the existence of the organization the scale and methods of work had been elaborated until they had reached practically their present status.

The earlier topographic mapping of the Survey was subjected to some criticism on account of lack of refinement in detail. It was a question of judgment whether the appropriation should be expended in accurately mapping a limited area or in making reconnaissance surveys over a more extended area. The less accurate maps were less expensive, and served a useful purpose in establishing the value of topographic surveys. The results have proved the wisdom of a policy whereby the people were gradually educated to the use of refined and detailed maps, while Congress learned to appreciate the cost and the comparative slowness with which accurate surveys would be prosecuted over so vast a territory as that of the United States. Had fewer square miles been mapped annually in the early years, but with the accuracy attained at present, it is doubtful if Congress would have continued to maintain the organization. As it was, valuable results were rapidly put forth, and in time it has been possible to supersede the older reconnaissance maps with more detailed maps, which serve as a basis for satisfactory delineation of the underlying mineral resources.

As the topographic work steadily advanced, not only in scope, but in accuracy, it was found desirable to obtain from Congress authority to run careful spirit-level lines and to establish bench marks for permanent record of elevations upon the ground, and also to carry on control by triangulation or traverse with greater accuracy and to mark the positions more permanently than had been possible without statutory authority. Accordingly, on June 11, 1896, an act was approved which provided that "elevations above a base level located in each area under survey shall be determined and marked on the ground by iron or stone posts or bench marks," etc. Thereafter it was possible to provide for the running of careful spirit levels over all the areas under survey and to extend the amount of spirit leveling, thereby securing more accurate location of contours. Since that act was passed the topographic mapping has reached as high a degree of detail and quality as seems desirable for the scales adopted.

The features exhibited on the topographic maps of the United States Geological Survey are:

1. Hydrography, or water features, as ponds, streams, lakes, swamps, etc., which are printed in blue.

2. Hypsography, or relief of surface, as hills, valleys, and plains, which are printed in brown.

3. Culture, or features constructed by man, as cities, roads, villages, and the names and boundaries, which are printed in black.

This combination of colors renders these topographic maps readily legible. On the reverse of each sheet is a description of the mode of reading the map, and a legend, or series of conventional signs, indicating how the various facts shown on the map are represented. All these conventions are self-explanatory and are readily understood and interpreted by the layman, except, perhaps, the brown "contour" lines.

These contours are lines of equal elevation—lines along which the ground would be touched by the border of a water surface (of the ocean, for instance) if it were repeatedly raised by a given amount.

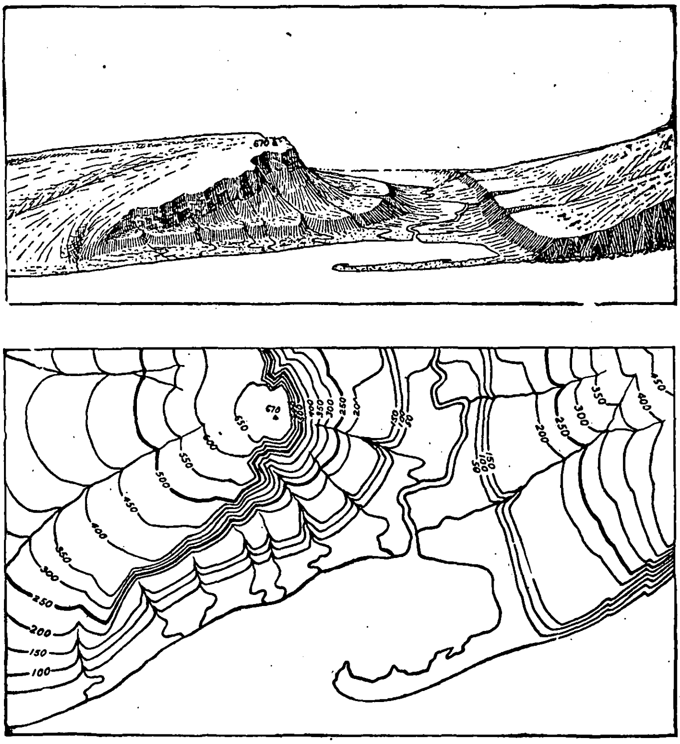


FIG. 1.—Ideal view and corresponding contour map.

Contour lines express three features of relief—(1) elevation, (2) horizontal form, and (3) grade or slope. To explain more clearly the manner in which the contours shown on the maps of the Geological Survey delineate height, form, and slope, the accompanying contour map (fig. 1) has been prepared from the ideal view shown above it. It may be interpreted as follows:

1. A contour indicates a certain height above sea level. In this illustration the contour interval is 50 feet; therefore the contours are drawn at 50, 100, 150, and 200 feet, and so on, above mean sea level. Along the 250-foot contour lie all points of the surface 250 feet above sea; along the 200-foot contour, all points that are 200 feet above sea,

and so on. In the space between any two contours are found elevations above the lower and below the higher contour. Thus the contour at 150 feet falls just below the edge of the terrace, while that at 200 feet lies above the terrace; therefore all points on the terrace are shown to be more than 150 but less than 200 feet above sea. The summit of the higher hill is stated to be 670 feet above sea; accordingly the contour at 650 feet surrounds it. In this illustration all the contours are numbered, and those for 250 and 500 feet are accentuated by being made heavier. Usually it is not desirable to number all the contours, and then the accentuating and numbering of certain of them—say, every fifth one—suffice, for the heights of others may be ascertained by counting up or down from a numbered contour.

2. Contours define the horizontal forms of slopes. Since contours are continuous horizontal lines, they wind smoothly about smooth surfaces, recede into all reentrant angles of ravines, and project in passing about prominences. These relations of contour curves and angles to forms of the landscape can be traced in the map and view.

3. Contours show the approximate grade of any slope. The altitudinal space between two contours is the same, whether they lie along a cliff or on a gentle slope; but to rise a given height on a gentle slope, one must go farther than on a steep slope, and therefore contours are far apart on gentle slopes and near together on steep ones.

The topographic maps of the United States Geological Survey represent, besides the natural features mentioned, such artificial features as are of a public or more enduring nature, as State, county, township, and city boundary lines; reservation, land-grant, and public-land township lines; railways, streets, roads, and paths; bridges, ferries, dams, locks, and wharves; the location of permanent bench marks and triangulation stations, and the positions of light-ships and light-houses, mines, shafts, and tunnels. The only private features shown are houses, factories, stores, etc., no barns or outbuildings being represented.

The uses of such topographic maps are many. For the purposes of the National Government and the State they are invaluable, as they furnish data from which may be determined the value of projects for highway improvement, for railways, for city water supply and sewerage, and for the subdivision into counties, townships, etc. They serve the military departments of the Government, National and State, in locating encampment grounds, in planning practice or actual operations in the field, and, during war, in indicating the precise situations of ravines, ditches, buildings, etc. The Post-Office Department utilizes them in considering all problems connected with the changing of mail routes, star routes, and especially in connection with contracts and assignments of rural free-delivery routes. As the outlines of wooded areas are to be indicated on these maps, National and State foresters will find them invaluable as a base for classifying the woodlands and recording the nature and quantity of the various trees and the relation of the wooded areas to highways of transportation, as railways, streams, etc. These maps are, of course, essential to detailed geologic studies and to investigations concerning mineral resources, water power, and land reclamation.

A good topographic map renders unnecessary a special survey for each new need. Prior to the existence of such maps every city was obliged to expend large sums in water-supply surveys. At far less cost the topographic map shows not only all these important local features, but also the relations between the artificial features in the immediate neighborhood and the topography and culture of the surrounding country, and thus broadens the scope of every such investigation.

In 1884 cooperation in public surveys between the Federal and State governments was proposed by the State of Massachusetts. In the year mentioned the legislature of that State passed a resolution providing for "a topographical survey and map of the Commonwealth" in cooperation with the United States Geological Survey, and appropriated the sum of $40,000 for carrying on the same. The Federal Survey allotted an equal sum to the work, and, in consultation with the State commissioners, agreed to make its surveys in the field on the larger scale of 2 inches to the mile, and to publish the results in separate atlas sheets having a scale of 1:62500, or about 1 mile to the inch, and with 20-foot contours. Under this arrangement the survey of the State of Massachusetts was completed in 1888. In the same year, 1884, a somewhat similar arrangement was made with the State of New Jersey, and the survey of that State was completed in 1887. In 1885 cooperation was arranged with the State of Rhode Island, and the survey of that State was completed in that year. In 1889 the cooperative survey of Connecticut was commenced, and it was completed in 1891. At the present time cooperative topographic work is progressing in New York, Pennsylvania, Ohio, West Virginia, Maryland, Maine, Kentucky, Alabama, Louisiana, Michigan, and California.

The general plan adopted for mapping the United States consists in dividing the country into quadrilateral areas (called "quadrangles") bounded by parallels and meridians of latitude and longitude. Three regular scales and a series of special scales have been adopted. For reconnaissance maps in the rougher portions of the Far West and Alaska the scale of 1:250000, or nearly 4 miles to the inch, is standard. For the general map of the United States the scale of 1:125000, or nearly 2 miles to the inch, is standard. In the more densely populated districts—the Atlantic coast, parts of the Central region, and portions of the Pacific coast—the scale of 1:62500, or about 1 mile to the inch, is standard. These scales are readily convertible into the metric and other systems understood in foreign countries. However, at the bottom of each sheet the scale is expressed in three ways—by a graduated line representing miles and parts of miles in English inches; by a similar line indicating distance in the metric system, and by a fraction. Special larger scales, from 2,000 feet to the inch up to 100 feet to the inch, are used for detailed surveys of important mining regions, for the planning and construction of irrigation projects, etc.

The maps are printed on sheets approximately 13 by 17 inches. The area represented on a sheet on the 1-mile scale is 15 minutes of latitude and of longitude, or, on the average, about 225 square miles; on the 2-mile scale, 30 minutes of latitude and of longitude, or about 1,000 square miles; and on the reconnaissance or 4-mile scale, 1 degree of latitude and of longitude, or approximately 4,000 square miles. An atlas sheet is known by the name of the most important town, city, or natural feature within the quadrangle represented.

The methods of field work followed in making these topographic surveys are as follows: At rather distant intervals throughout the territory under survey, say 10 to 25 miles, monuments are established, the positions of which are accurately determined by trigonometric methods and recorded in degrees of latitude and longitude. For this purpose base lines from 4 to 6 miles in length are measured with great accuracy, the location of one end of each base and of its azimuth being determined astronomically. From this base a network of triangulation is expanded to hilltops, mountain summits, and other prominent objects, the positions of which are carefully determined by computation. This is the special work of the section of triangulation and computing (see p. 64). All existing triangulation by other organizations is utilized. Where the nature of the country renders the extension of triangulation impracticable, primary control is extended by means of careful lines of traverse. The details of the methods employed are elaborated in another portion of this pamphlet (pp. 65–69).

The resultant positions are plotted accurately, by latitude and longitude, on large sheets of drawing paper, approximately 18 by 24 inches in size, called plane-table sheets. To each topographer is assigned, as his season's work, the mapping of one or more quadrangles, and he enters the field equipped with the plane-table sheet, which has on it only the trigonometric positions. A field party usually consists, in addition to the topographer in charge, of one skilled assistant, of the grade of assistant topographer or topographic aid, and several surveyors temporarily employed as traversemen or levelmen, with the necessary rodmen, teamsters, cooks, and other camp hands where subsistence is by camping.

The levelmen proceed to run lines of spirit levels over the various roads and paths, to determine elevations. The higher order of primary leveling, elsewhere described, is run at such distances apart that at least two permanent bench marks may be established in each township or equivalent area 6 miles square. Levels of a less degree of accuracy are then run over every road, and where these are too far apart, say a mile or more, the levels are run over trails or across country, either by spirit level or by vertical angulation with stadia.

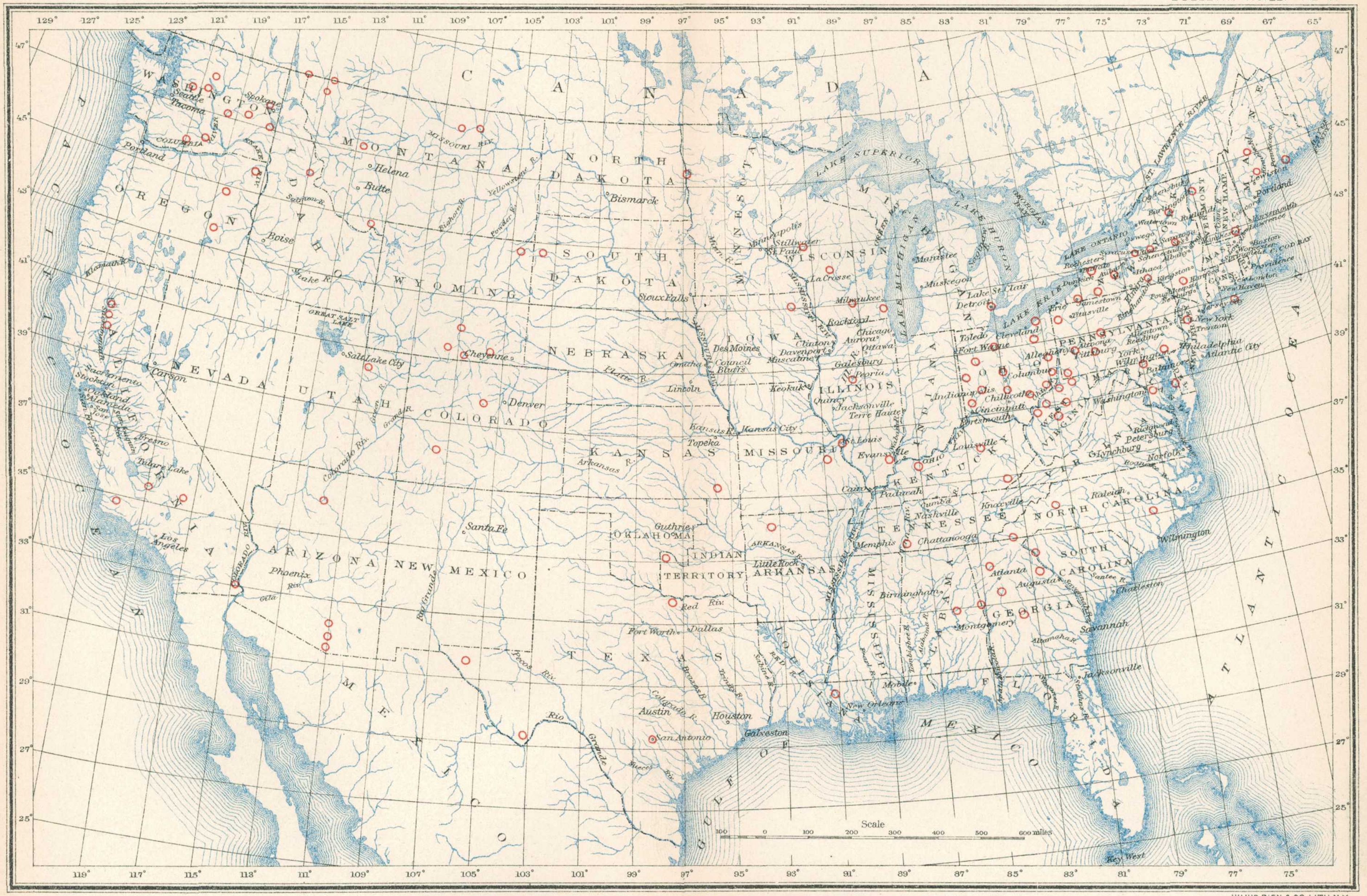
Meantime the topographer is extending a graphic triangulation on his plane-table board, the object of which is to locate precisely, on his sheet, points all over the area under survey. These include signals placed upon prominent hills, church spires, lone trees, and other definite objects; or in case the country is of such nature that it can not be controlled by triangulation, he has careful lines of traverse, by stadia or steel tape, run at intervals of about 6 miles and connected with the lines of primary traverse previously run across the sheet. At the same time the traversemen, equipped with lighter plane-table boards on which are smaller sheets representing about one-fourth of the whole quadrangle, are running graphic traverse lines over all roads and paths and across country, with a view to locating the cultural features, the courses of streams, the outlines of lakes, etc. On highways the distances are measured by counting the revolutions of a wheel, the circumference of which is known, or by stadia, and in dense woods by tape.

On the completion of this primary control and coincident with its preparation the topographer transfers to a clean sketch sheet the primary control points and adjusts to these the positions determined by secondary plane-table triangulation or stadia or tape traverse. The less accurate traverse lines are then adjusted between these more accurate positions and the elevations procured by spirit leveling or vertical triangulation are then added to the map.

Equipped with this control sheet, on which are shown approximately one trigonometric location per square inch of paper, two or three linear inches of traverse per square inch of paper, and from two to ten elevations per square inch of paper, the topographer walks or rides over all roads and paths and about the margins of lakes, across country, etc., selecting routes so near one another that he may be able to see all portions of the land. If the country is rough he uses an aneroid, setting it at one of the fixed elevations and frequently checking it by others of like kind; with it he is able to determine the crossing of each contour line on his route of travel. In a relatively flat country he uses a hand level, or reads vertical angles from his plane table and ascertains like facts. Stopping frequently, he sketches in, by means of contour lines, the relief of the country, and corrects as he goes the positions of roads, houses, streams, etc., located by his assistants.

For locations of topographic parties in 1903–4 see Pl. IV.

At the close of the field season the temporary employees are discharged and the party chief returns to the office. Here, during the



LOCATIONS OF TOPOGRAPHIC FIELD PARTIES

YEAR 1903-04

winter season, he completes with great care the drafting of the maps, using the three colored inks selected as standard for this work—black for culture, blue for drainage, and brown for relief. Town and county maps are consulted, correspondence is entered into with postmasters and other local officials and railroad corporations, all compiled material is carefully scrutinized, and the final outlining of political boundaries and the lettering of names are completed.

These original drawings, as they are called, are at once copied by photography or photolithography, so that they may be available for immediate consultation by the public, pending their engraving on copper for final publication.

The cost of the surveys first made, on the scale of 4 miles to the inch, averaged $1.75 a square mile. Those made a few years later, on the scale of about 2 miles to the inch, averaged in cost $4 a square mile, while those made on the scale of approximately 1 mile to the inch, averaged in cost $10 a square mile. During the field season of 1884 a single party mapped over 11,000 square miles. A few years later the output of a single party, on the scale of 2 miles to the inch, was about 3,000 square miles in a season. To-day the more refined and detailed maps, on the scale of about 2 miles to the inch, with a contour interval of 100 feet, cost from $7 to $11 a square mile, according to the country, and a single party can rarely map over 600 to 1,000 square miles in a season. On the scale of 1 mile to the inch, a party now maps rarely more than 500 square miles in a season, and the cost of this work varies between $12 and $30 a square mile, according to the nature of the country.

The chief results accomplished by the topographic branch during the quarter-century are (1) a complete topographic map, published on 1,327 atlas sheets, of 929,850 square miles, or about 31 per cent of the area of the United States; and (2) the control by primary triangulation or traverse of approximately 587,000 additional square miles. In the completed work is included the running of more than 102,800 linear miles of spirit leveling, as a basis for the determination by less precise methods of the innumerable points locating contours. As a basis for the topographic mapping, the primary triangulation of the Coast and Geodetic Survey, of the Lake Survey and of the army engineers on the Mississippi and Missouri rivers, has been utilized where available, in addition to the primary triangulation and traverse by the Geological Survey.

The area mapped is as great as that of Austria, Belgium, Bulgaria, Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Servia, Spain, Switzerland, and the United Kingdom of Great Britain. The work has necessarily cost a large sum. The appropriation in 1879 was $19,624; ten years later it was $218,200. The last appropriation (for 1903–4) aggregated over $300,000, which was augmented by allotments to this work from the appropriation for forest surveys and from State funds for cooperative purposes, bringing the total to nearly $500,000. The expenditure upon this work since its inception in 1879 has been $6,672,000.

Pl. V shows the areas that have been covered by the topographic surveys.

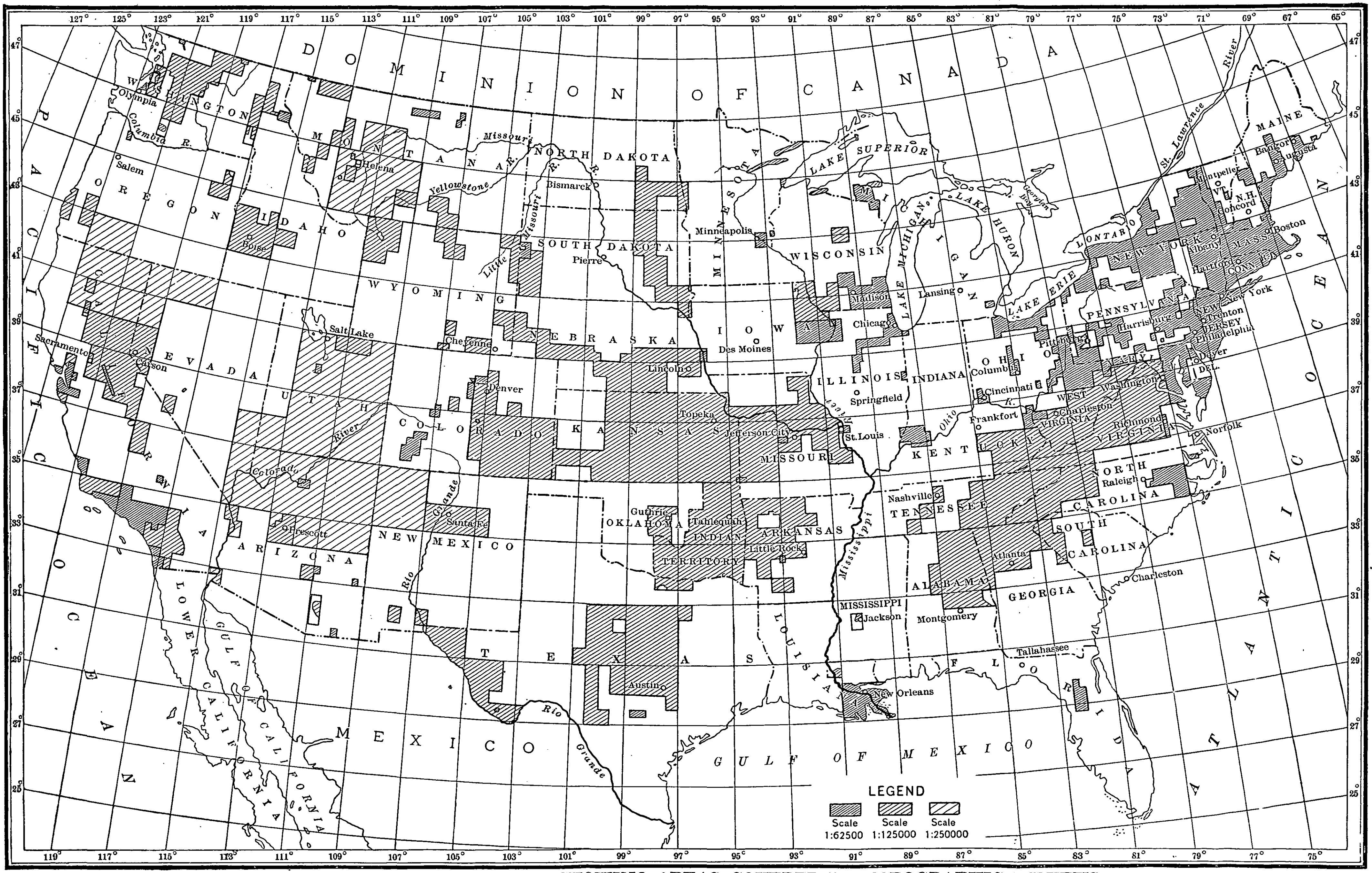
The results of the work of this division may be seen, also, by reference to the tables of atlas sheets and other maps in the Survey's list of publications.

Section of Triangulation and Computing.

Since the inception of topographic work by the Geological Survey, primary triangulation and primary traverse have been executed on an extensive scale. At first topographers were assigned to the work of observing astronomic positions, measuring base lines, or extending primary triangulation. They acted, however, under the direction of the chiefs of the topographic sections, and frequently, in addition to their work as triangulators, were in charge of parties making topographic surveys. Gradually, as individuals evinced special aptitude for this work they were assigned to it exclusively.

As the work of the topographic branch increased it became evident that the part thereof which consisted of field triangulation and office computation needed systematizing, and therefore, in 1894, when the topographic branch was reorganized, it was separated into two divisions—one of triangulation and another of topography. For a few years the actual administration of the triangulation division remained in the hands of the chiefs of topographic sections; but in January, 1897, in order to secure uniformity in the office work connected with this division, a chief computer was appointed, under whom all office computations were conducted. In 1903, upon a further reorganization of the topographic branch, the division of triangulation was abolished and all the work of triangulation and computing was segregated in a section, the chief of which is in administrative charge of office computing. But, for convenience, the triangulation field work continues to be administered by the topographic section chiefs. During the last three years, however, the chief of the section of triangulation and computing has been in immediate charge of the field work of triangulation in the eastern section, under the direction of its chief.

For several years after the enactment of the law of 1896, authorizing and directing the running of careful spirit levels in connection with the topographic mapping, the office reduction and computation of results remained in the hands of the topographic chiefs. Gradually, as the work expanded, it became evident that for proper organization and supervision it should be made a separate section, and in 1901 the chief of the section of triangulation and computing was called upon to



MAP OF THE UNITED STATES, SHOWING AREAS COVERED BY TOPOGRAPHIC SURVEYS AND THE SCALE EMPLOYED FOR EACH AREA

Scale
100 0 100 200 300 miles

TO YEAR 1904

supervise such office computations. Since the creation in 1903 of the separate section bearing the above title, all office work connected with the reduction and publication of the results of spirit leveling has been in charge of the chief of that section.

The methods and instruments employed in the astronomic and trigonometric work, as well as in the spirit leveling, of the Geological Survey have developed as the work has progressed. This development has been in the direction of economy and efficiency as well as accuracy, so that at the present time, with a diminished expenditure for both field and office work, a much higher degree of accuracy is obtained than was possible at the outset.

Triangulation.—In early years the instruments used in triangulation were vernier theodolites reading to 10 seconds, with circles 6, 7, 8, 10, and 11 inches in diameter. In 1889 there were substituted for these, 8-inch theodolites reading by microscope to 2 seconds, and these have since been exclusively employed in the primary triangulation. It is believed that the instruments at present used are of as high a grade as those in use in any other part of the world, and that, by employing sharper signals, by exercising more care in selecting the times for observing, and by taking a larger number of measurements of angles than heretofore, results can be obtained with them equal to the best secured in geodetic work.

The signals used differ with the differing facilities afforded by the various localities. The commonest form—that generally used where sawed timber can be obtained—is the ordinary quadripod and pole. In the Rocky Mountain region a monument of stones is generally used. Each station is marked with a bronze tablet cemented in solid rock or in a dressed-stone post set in the ground, and sometimes by an iron bench-mark post. One or more witness marks are always left.

Base measurement.—In the early years of the work base lines were measured with secondary base bars. These were used until 1887, when steel tapes 300 feet in length, under constant tension, were substituted and have since been employed. They have been found more advantageous for the following reasons: The base can be measured more rapidly, and, owing to the diminished number of contacts, with quite as great accuracy. By making the measurements on cloudy days or at night, the correction for temperature can be determined nearly or quite as accurately. Longer bases are measured, thus simplifying the expansion; and because of the cheapness and speed of this method bases are measured more frequently, thus affording a greater number of checks on the triangulation. After the base line has been fully prepared for measurement and the men handling the tape have had a little training, a speed of a mile an hour can be attained, so that under favorable conditions a base 5 miles in length can be measured twice in one day.

The precision of measurement is represented by a probable error of from 1/100000 to 1/300000, sufficiently accurate for all primary triangulation not required in the solution of geodetic problems.

Primary traverse.—Where it is inexpedient, because of great expense, to procure primary control by means of triangulation, as in a heavily forested and level country or in the prairies of the Central West, the means adopted is the running of traverse lines of a high degree of accuracy. The instruments used are, a good transit reading by vernier to 30 seconds, a 300-foot steel tape, a 100-foot steel tape, 2 standard thermometers, 4 hand recorders, 2 flag poles, and for azimuth observations a good watch and electric hand lamps. In order that the effect of errors of angular measurement may be minimized, astronomic azimuths are observed at intervals of 8 to 10 miles. The effect of errors in both azimuth and distance is practically eliminated by closing the traverse back on itself or on some other adjusted primary traverse, or, better still, by connecting with primary triangulation stations or astronomic positions.

The initial and terminal points of the primary traverse, and intermediate points on the line of the traverses which may be used as tie points for primary or secondary control, are indicated by permanent marks—bronze tablets cemented in masonry, or bench-mark posts set in the ground.

In localities over which the United States land surveys have been extended township and section corners serve as such permanent marks.

Spirit leveling.—Beginning with the season of 1896 the field parties engaged in the topographic mapping have conducted careful spirit leveling on a scale more extended and of a quality more accurate than had ever before been attempted in this country. This was in pursuance of the act of Congress providing for the sundry civil expenses of the Government for the fiscal year 1896–97, a paragraph of which is as follows:

> For topographic surveys in various portions of the United States * * * *Provided,* That hereafter in such surveys west of the ninety-fifth meridian, elevations above a base-level located in each area under survey shall be determined and marked on the ground by iron or stone posts or permanent bench marks, at least two such posts or bench marks to be established in each township, or equivalent area, except in the forest-clad and mountain areas, where at least one shall be established, and these shall be placed, whenever practicable, near the township corners of the public-land surveys; and in the area east of the ninety-fifth meridian at least one such post or bench mark shall be similarly established in each area equivalent to the area of a township of the public-land survey.

It was realized by the framers of the above act that it would be impossible to establish and mark on the monuments their exact height above sea level. Any attempt to do this would have necessitated the running of thousands of miles of precise levels in order to connect with sea level the initial points within the various areas under topographic survey, and this would have cost immense sums and occupied several years, during which the topographic surveys would have continued without being accompanied by spirit leveling and the establishment of the bench marks required. The act was therefore so framed as to permit of the acceptance of some point within each area under topographic survey as a central datum point for that area, and the elevation of the initial bench mark established there was determined as nearly as practicable from existing elevations adjusted through by railway levels or other levels brought from the sea. In consequence, though all the elevations connected with the same central datum point agree one with the other, they may not be reduced to mean sea level because of the differences between the primary elevations upon which leveling in the various localities is based. However, prior to and since 1896 precise-level lines have been extended by this Survey and other organizations to more accurately determine inland elevations above sea level, and the elevations originally determined have been corrected from time to time in publications, so that at the present time nearly all the central points have been reduced to mean sea-level datum, carrying with them all the levels resting thereon.

It was decided in 1896 that in addition to determining the elevations of these bench marks they should be instrumentally connected with the horizontal measurements taken in the course of topographic surveys, but only with such accuracy as would permit of their being properly plotted on the resulting maps, the location and elevation of these bench marks being published in two ways—first, by a symbol on the atlas sheets, the letters B. M., and the elevation to the nearest foot; second, by lists of bench marks in the annual reports or bulletins of the Survey, with a full description of each bench mark and its exact elevation above sea level to the thousandth of a foot, as adjusted and referred to the various central datum points, these lists to be corrected in publications from time to time as better connections are made with sea level.

It was thought that these bench marks should be of the most attractive and substantial character consistent with reasonable cost, and after an examination of the various forms used by other Government and city surveys, two standard styles were selected. First, a circular bronze or aluminum tablet, 3½ inches in diameter and one-fourth inch thick, appropriately lettered, having a 3-inch stem to be cemented into a drill hole in the vertical walls of public buildings, bridge abutments, or other substantial masonry structures. The second form, to be employed where masonry or rock is not accessible, consists of hollow wrought-iron posts, 4 feet in length and 3½ inches in outer diameter, split at the bottom and expanded to 12 inches, so as to prevent both the easy subsidence of the post and its being maliciously pulled out of the ground. The iron is heavily coated with hot asphalt, and over the top of the post is riveted a bronze tablet similar to that first described. These posts are set in the earth with only one foot of their length projecting above the surface, and wherever possible a flat stone is placed at the bottom as a suitable rest.

In order that these bench marks should be so marked as to fulfill the apparent intention of Congress and supply the popular demand by showing approximate elevations above mean sea level, it was decided that they should not be given ordinary serial numbers, but that the approximate elevation to the nearest foot should be stamped upon them, and these figures should constitute their numbering. It was soon found, however, that the assumed elevation above sea level as determined for a given point might be changed during a season or within a few seasons, and that this might change by several feet the relative elevations stamped upon two bench marks adjacent one to the other. To satisfy both conditions, therefore—the popular demand for sea-level heights and the scientific demand for exact differences between adjacent bench marks—the following method was adopted:

The elevation above mean sea level to the nearest foot, as determined at the time of running the levels, is stamped upon the bench mark, and, in addition, an abbreviation of the name of the central datum point. Thus, for an elevation depending on North Creek, the mark would be, say, "1728 N. C." on tablet or iron post. This datum being subsequently found to be in error about 5 feet, later bench marks established in that neighborhood are marked as though resting upon a different datum, that of Albany, from which the check was obtained, and the next bench mark to that above cited may be stamped "1810 A." An engineer running between these two and finding them out according to his levels by 5 feet, will at once realize that the letters "N. C." or the letter "A." carries some special meaning, and will doubtless write to the office of the Geological Survey to inquire concerning it, when the desired information will be furnished.

The primary leveling is done by first-class methods, but not of such quality as would classify it as precise leveling. In order to check and eliminate the errors incident to such work, lines of levels run within an area under topographic survey are so arranged as to close back on themselves in circuits or polygonal figures, these lines being run by a single levelman and rodman; the closure of various circuits, then, leads at once to the detection of any gross error. Unusually long or important lines are run by a levelman and two rodmen in such manner as to make a duplicate rodded line.

In order to establish as nearly uniform grade of accuracy for the work as practicable, general instructions have been issued to the levelmen, and are printed in the "Instructions governing the topographic branch." The allowable limit for closure error for good work is set at 0.05 $\sqrt{D}$ feet, in which D represents the length of the line or circuit in miles.

The instruments in general use are 20-inch engineer's levels and New York rods, the latter furnished with plumbing levels and with a specially constructed foot plate. The only respect in which the rods differ from those regularly furnished consists in making the foot plate a truncated pyramid of brass, the bottom of which is but one-half inch in width. This is in order to keep it freer of dirt and to compel its being placed more accurately on the top of the steel turning peg. The only change from the regular form made in the instrument is in increasing the sensitiveness of the level bubble so that 1 division on the tube equals 10 seconds of arc. All turning points must be on steel pegs at least 12 inches in length and driven firmly into the ground.

In addition to the ordinary primary and flying levels, the Geological Survey has run several lines of precise levels, most of which form elements in the precise-level net extending from the Atlantic coast to the Mississippi River and the Gulf of Mexico, which comprises in addition the work of the Corps of Engineers of the Army, the Coast and Geodetic Survey, the Lake Survey, and the Pennsylvania and the Baltimore and Ohio railroad companies.

The precise-leveling instruments used by this Survey differ from the ordinary spirit levels in many particulars, the effect of which is to make them high-grade instruments of precision, 8-inch and 4-inch bubble tubes being used. The rods are of special design, 10 feet long, double-faced target reading and nonextensible, and are made from selected white pine and treated with boiling paraffin or linseed oil. The lines are run with two rods and rodmen, an umbrellaman, and a laborer. Instructions for the conduct of the work differ from those for primary work in the following essential points:

The instrument is at all times shaded from the wind and the sun; fore and back sights are of exactly equal lengths, and no sight over 300 feet in length is permitted except in special cases. The instrument is unclamped from the tripod after the legs have been firmly set. Four steel turning points are used at the same time, two for each rodman, and they are so used that those employed for backsights are not withdrawn until the foresight pegs have been set; thus the line depends at no time on the stability of the instrument, as there are always two turning points in the ground. The limit of apparent error in the work is fixed at $.03 \sqrt{\text{distance in miles}}$, which represents the allowable difference, in feet, in the elevations of any bench mark as determined by the duplicate lines.

Office work.—The office work of triangulation consists in reduction to center, station adjustment, computation of spherical excess of triangles, and adjustment of figures by the method of least squares; also the computation of distances and azimuths between and the geodetic coordinates of from 300 to 400 primary and secondary points per annum. The positions of all points in the Appalachian region from Maine to Alabama, those along the thirty-ninth parallel from the Atlantic to the Pacific, and those along the ninety-eighth meridian are now computed upon the United States standard datum.

The office work of primary traverse consists in the reduction of all azimuth observations and the adjustment of the line between azimuth stations, and of the computation of between 7,000 and 8,000 latitudes and departures and of 1,000 geographic positions per annum.

The results of primary triangulation and traverse are summarized and published at the close of each fiscal year in the form of a bulletin (Series F).

The office work of level adjustment consists in the preparation of plates showing groups of level circuits by States, with an indication of the error of each circuit. Where a group of primary level lines connects with the precise-level net at several points the errors are corrected by distribution in proportion to mileage, after determining weighted values for the intermediate points; but a group of circuits extending from one point or circuit is treated by adjusting first the circuit in which the largest closure (within limits) occurs and then correcting the remaining closure errors of successive circuits in proportion to the mileage. This method answers all practical purposes. The vast amount of leveling data sent in from all parts of the United States by the numerous field parties would not admit of a treatment by the method of least squares. As showing the amount of this class of work, it may be stated that during the last fiscal year (1902–3), 29,160 miles of levels were adjusted, correcting the elevations of 1,826 bench marks.

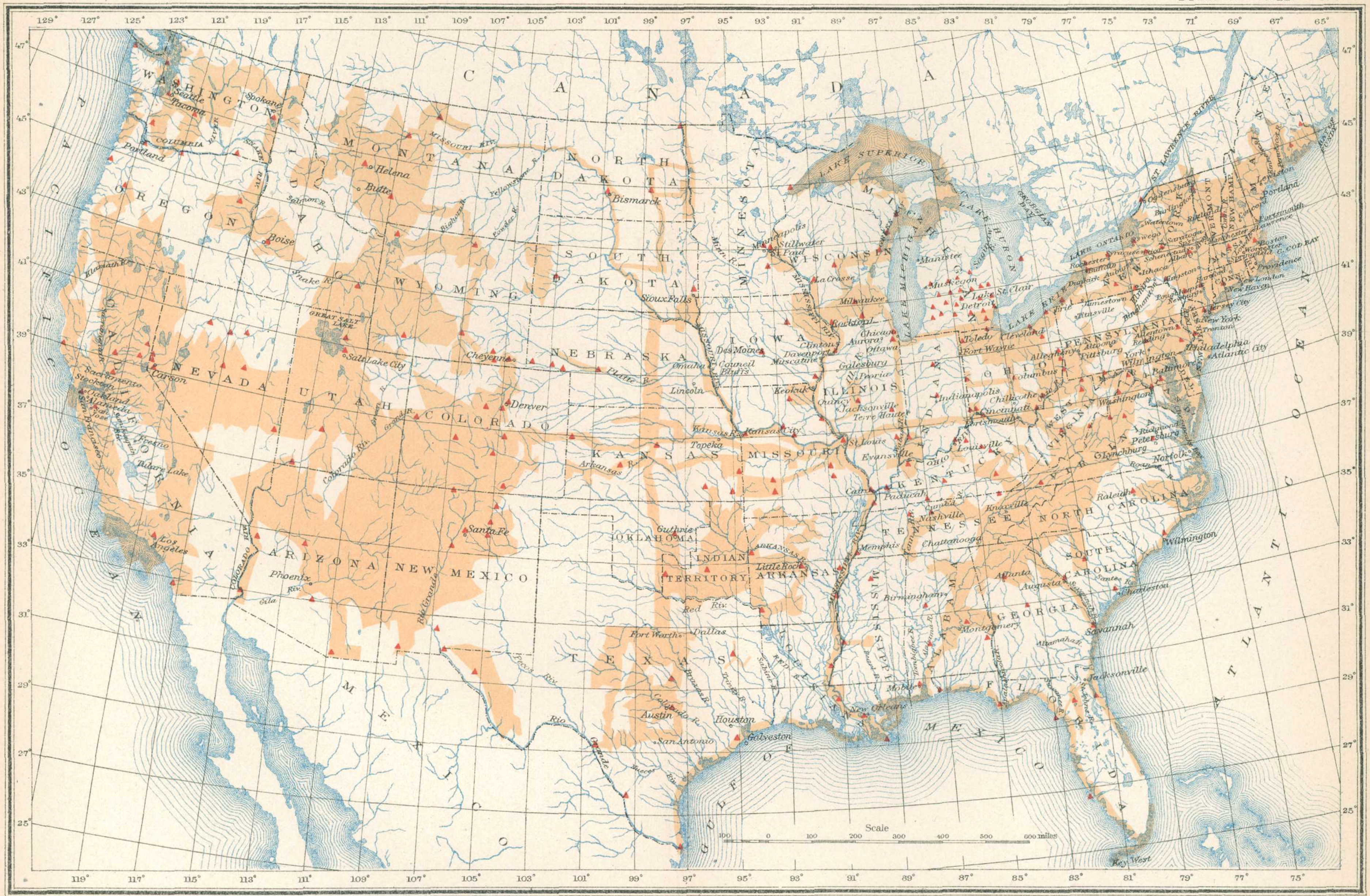
The results are annually summarized and published in the form of a bulletin (Series F).

Pl. VI shows the progress made in astronomic location and primary control to January 1, 1904.

For publications on this subject see the Survey's list of publications.

Section of Inspection of Surveying and Mapping.

Coincident with the reorganization of the topographic branch in 1903 provision was made for the inspection of topographic surveying and mapping, to be carried on through consultation and collaboration with the section chiefs. To the chief of this new section was also given the direction of the preparation of such base maps as might be required for various purposes. The inspection of field work and the final drawing of the maps lie entirely outside of the duties of administration, are general in character, and consist chiefly in keeping in touch with the various topographers, criticising their expression of topographic



JULIUS BIEN & CO. LITH. N.Y.

MAP SHOWING CONDITION OF ASTRONOMIC LOCATION AND PRIMARY CONTROL

YEAR 1903–04

- Areas controlled by triangulation or traverse
- ▲ Astronomic station

forms and choice of essential details, and in eliminating as far as possible their mannerisms and individualities, with a view to gaining uniformity of expression for similar features throughout the country.

For several years it had been manifest that a system of general inspection was desirable, because of the great extent of the operations of the Survey and the impossibility of individuals working in widely separated localities making intelligent comparisons and avoiding diversity of style. The need is now met by the new section of inspection. It is also a part of the duties of the inspector, in consultation with the section chiefs, to examine into and reconcile questions which may arise between the geologic and topographic branches as to proper and adequate delineation of features required in special investigations.

Special attention is given by this section to a classification of the physiographic types of topography throughout the United States and their relation to the geologic structure. For this purpose there has been prepared for the use of the topographers and others a series of charts on which are represented characteristic types in the grand physiographic divisions of the United States, with examples of approved contouring of each type.

A wall map of the United States is being prepared, which will be used also as a general base map for all purposes. The scale is 40 miles to the inch, with relief represented by 1,000-foot contours. It will show State and county boundaries, with the names and locations of county seats, and all railroads and drainage. This map will be an example of technical and artistic cartography, and will serve as an accurate and convenient base upon which to plot a great variety of information.

DIVISION OF GEOGRAPHY AND FORESTRY.

This division was organized in 1896. Its work is varied in character. To it were originally consigned all matters connected with general geography, including the compilation of secondary maps and the preparation of papers on geographic and physiographic subjects. To these duties there were added in 1897 the examination of forests and forest conditions in the reserves and other wooded regions of the country, and the preparation of reports on them.

The annual allotments which have been made for this work are as follows: 1896, $6,000; 1897 and 1898, $20,000 each; 1899, 1900, and 1901, $25,000 each; 1902 and 1903, $20,000 each.

The field force employed in the examination of forests has varied in different years, and most of the men have been employed for a part of the year only. This work being the first attempt to accurately examine and appraise the forests of this country, it was necessary both to build up an organization and to originate plans and methods for field work and for presentation of the results in reports and on maps.

It was decided to classify lands as wooded and nonwooded; to classify the wooded land as that covered with forests valuable for lumber, and that of value only for firewood and other minor purposes; to estimate the amount of timber on the former and the stand per acre; to define those areas on which the timber has been cut and those on which it has been burned, and on each of these areas the lands on which there is a regrowth of the forest.

Besides these data, information was required concerning the size, species, and quality of the tree growth, the extent to which it is diseased, the character of the undergrowth, the depth of humus and litter, the character of streams in respect to the driving of logs, the character of the country with reference to the building of logging railways, the demand for lumber in the neighborhood, and the effect of grazing (especially that of sheep) upon the present and future forests.

Following is a schedule, by years, of the forest reserves and adjacent regions which have been examined:

In 1897: Washington, Priest River, Bitterroot (in part), Black Hills, Bighorn, Teton and Yellowstone Park, San Jacinto, San Bernardino, and San Gabriel.

In 1898: All reserves of Colorado, the Flathead, Bitterroot (completed).

In 1899: Lewis and Clarke, Mount Rainier, Olympic (in part), Cascade Range in southern Oregon, part of Sierra Nevada, including Stanislaus and Lake Tahoe reserves, and Yosemite National Park. Besides the above, much information concerning the conditions of the forests in northern Minnesota was obtained, principally through correspondence.

In 1900: Olympic (completed), northern part of Sierra Nevada, Sierra (in part), Cascade Range between Washington and Mount Rainier reserves.

In 1901: Sierra (completed), Cascade Range in Oregon (completed), San Francisco Mountain Reserve (in part), southern Appalachians in North Carolina and adjacent States (in part).

In 1902: San Francisco Mountain Reserve (completed), Black Mesa, Uinta (in part), southern Appalachian Mountains in North Carolina and adjacent States.

In 1903: Gila River, Lincoln, Wichita, part of Whatcom County, Wash., Little Belt, Absaroka.

These examinations, extending over a period of seven years, cover 70,400,000 acres. Reports on these areas, down to those examined in 1901, except those in the Sierra Forest Reserve and in the Appalachians, have been published. Of the reserves examined in 1902 the reports on the San Francisco Mountain and Black Mesa reserves have been prepared and are in the hands of the printer. All these reports are accompanied by maps and other illustrations.

In addition to these examinations a large amount of information has been collected, mainly from the reports of lumber cruisers in private employ, concerning the forests of Washington outside of the reserves, and from these data and the examinations of reserves there have been prepared estimates of the amount of timber in the State and of its distribution areally and by species. Similar results have been obtained for Oregon, in part by collating cruisings, in part by the Survey's own examinations of reserves, but in by far the larger part through the personal work of Mr. A. J. Johnson, who devoted two years to traveling about the State and inspecting its forests.

Out of the examination of forest reserves has grown the preparation of economic or land-classification sheets, showing—on the regular atlas sheets of the Survey as a base—not only the forests, with burnt and cut lands, but the irrigable and pasture lands. Of these sheets 35 have been published, some as illustrations in reports on forest reserves and others independently.

The preparation of such land-classification maps and reports did not originate with this Survey. Three of the old surveys of the West, popularly known as the Hayden, Powell, and Wheeler surveys, gave attention to this subject and embodied the results in reports. In the Hayden Atlas of Colorado, published in 1876, there is a land-classification map of the entire State, and a bulletin of that survey was devoted to this subject.

The Powell survey published a land-classification map of Utah, and a volume entitled "Lands of the Arid Regions." This book is a classic on the subject, and formed the basis upon which the entire system, not only of land classification, but of irrigation, is founded. The Wheeler survey also published an edition of its atlas sheets colored to represent forests, grazing lands, and desert lands. The plan adopted by the Geological Survey in its land-classification sheets is much more elaborate than these, but in general principles conforms to them.

Another result of these examinations is the collection of land-classification data by the topographers in the course of their topographic work. Mainly from this source information of this character, covering several hundred thousand square miles in various parts of the country, has been assembled. This information is of different degrees of accuracy and fullness for different areas, but altogether it forms a very valuable contribution to our knowledge of the forests of the United States. Its possession has enabled this office to guide the Department in extending and modifying the boundaries of reserves.

There is still another by-product of the examination of forest reserves. In certain cases no topographic maps existed, and in order to represent geographically the data collected it became necessary to prepare maps. This has been done in the cases of the Olympic and Mount Rainier reserves in Washington and most of the Cascade Range Reserve in Oregon. These maps, having been published on a scale of 4 miles to the inch, can rank only as reconnaissance maps, but they will serve a useful purpose until better ones can be prepared.

The office force of the division has always been small, comprising usually two or three clerks and a chief draftsman, under whose direction complete small-scale maps of 11 States and Territories have been compiled.

The subject of magnetic declination has been studied by this division, and an extensive compilation of the measurements of declination taken within the United States has been made, including a complete canvass of the data available in the United States Land Office, where hundreds of thousands of measurements derived from the subdivision service are recorded. By the aid of these data the magnetic declination in the Central and Western States is now as well known as it was formerly in the Northeastern States. The secular variation has been studied, and its movements during the last century within the limits of the United States have been ascertained.

The subject of physiography has received attention, especially as illustrated by the atlas sheets of this Survey. Their use as a means of instruction in the schools has been forwarded by the preparation and publication of three folios—two of them entitled "Physiographic Types" and the third "Physical Geography of the Texas Region."

The compilation of a gazetteer of the United States, to comprise all names found on the atlas sheets, has been commenced by the preparation of gazetteers of the States. Thirteen such gazetteers have been compiled.

The profiles of the rivers of the United States have been studied and a publication has been made thereon (Water-Supply Paper 44).

The compilation of measurements of altitudes has been continued, and the results have been presented in a revised and extended edition of the "Dictionary of Altitudes" (Bulletin 160).

The study of the boundaries of the States and of the United States, with a history of their development, has been continued, and three bulletins on that subject have been issued (Bulletins 13, 171, 226).

A compilation has been made of the origin of place names, and the results have been published in a bulletin, which contains such information regarding about 10,000 names in the United States (Bulletin 197).

For titles of all publications prepared by this division see the Survey's list of publications.

HYDROGRAPHIC BRANCH.

The hydrographic investigations of the Geological Survey began, as a distinct feature of its work, in the fall of 1888 with the establishment of a camp of instruction at Embudo, N. Mex., under the charge of the present chief of the branch. They have been continued and gradually expanded, the work being strengthened as larger funds became available. The first specific appropriation for gaging streams was made in an act of Congress approved August 18, 1894, being $12,500. This amount has been added to from time to time, and the work has expanded to a point where several divisions and sections have been organized to cover the various needs of different parts of the country.

The division of hydrography, first definitely recognized in 1894, has been superseded by the hydrographic branch, which now includes the divisions of hydrography, hydrology, hydro-economics, and the reclamation service. The field and office details of these divisions are directed by men who have had special technical training along their respective lines.

DIVISION OF HYDROGRAPHY.

The work of the division of hydrography consists chiefly in the determination of the flow or discharge of rivers. In this connection other information useful in hydrographic studies, such as river profiles, duration of floods and extent of damage caused by them, water-power data, etc., is collected. This investigation has been so closely related to the investigations which led to the establishment of the reclamation service that the early history of both divisions is a review of practically the same facts.

The organization of the hydrographic branch of the United States Geological Survey was made possible by the passage of the act of October 2, 1888. The portion of that act relating to the hydrographic work was the result of the efforts of the late Maj. J. W. Powell, then Director of the Survey, who had devoted a large portion of his life to the study of problems connected with the utilization of the arid lands of the West by irrigation. It provided:

For the purpose of investigating the extent to which the arid region of the United States can be redeemed by irrigation and the segregation of the irrigable lands in such arid region, and for the selection of sites for reservoirs and other hydraulic works necessary for the storage and utilization of water for irrigation and the prevention of floods and overflows, and to make the necessary maps, including the pay of employees in field and in office, the cost of all instruments, apparatus, and materials, and all other necessary expenses connected therewith, the work to be performed by the Geological Survey, under the direction of the Secretary of the Interior, the sum of one hundred thousand dollars, or so much thereof as may be necessary. * * * And all the lands which may hereafter be designated or selected by such United States surveys for sites for reservoirs, ditches, or canals for irrigation purposes, and all the lands made susceptible of irrigation by such reservoirs, ditches, or canals are from this time henceforth hereby reserved from sale as the property of the United States, and shall not be subject after the passage of this act to entry, settlement, or occupation until further provided by law: *Provided*, That the President may at any time in his discretion by proclamation open any portion or all of the lands reserved by this provision to settlement under the homestead laws.

Initiatory to the act were two Senate resolutions, passed on January 13, 1888, and March 27, 1888, calling upon the Director of the Geological Survey, through the Secretary of the Interior, for information as to the desirability of the Government undertaking irrigation investigations, and the sum necessary for such purpose. In his reply the Director summed up the conditions existing at that time and pointed out the methods which should be pursued in carrying on the investigation. He also made special reference to the work of gaging streams, and in concluding suggested the clause which was afterwards embodied in the first part of the act. In this he recommended that the sum of $250,000 be appropriated to start the work. This amount was reduced by Congress to $100,000.

In expending the $100,000 appropriated by Congress on October 2, 1888, the law was interpreted as not authorizing the construction of works of irrigation, but only as directing a comprehensive investigation of conditions, and the money was expended in such way as to obtain the desired information in the shortest time.

The work was found to divide naturally into two parts—the topographic features and the engineering features.

The topographic work consisted of surveys delineating the topographic features of the country, the areas of all drainage basins, the courses of streams, the situations of lakes, springs, and other bodies of water, the positions of possible reservoir sites, the locations of dams and canal lines, and the altitude, position, and general character of all irrigable lands. These surveys were undertaken by the topographic branch of the Geological Survey, and immediately after the passage of the act operations were begun in Montana, Nevada, Colorado, and New Mexico. The methods in use by the Geological Survey were found to be well suited to this work, and in many localities there was necessary only a continuation of the work already in progress.

The hydraulic work consisted of measuring the flow of rivers, rainfall, evaporation, and matter carried in suspension by water. It also included the study of general meteorology, ascertaining the duty of water, and determining the mode and cost of constructing dams and reservoirs.

At the instruction camp established, as has been said, early in the fall of 1888 on the Rio Grande, near Embudo, N. Mex., there were 14 student hydrographers, whose work consisted in practicing stream measurements by the various methods, measuring the rise and fall of the stream from day to day, the daily evaporation, and the amount of water carried in suspension. Observations were also made with meteorologic instruments.

At that time the four principal methods of gaging streams were by weirs, floats, formula, and meter. These methods were compared, both scientifically and practically, and at the close of the winter of 1888–89 sufficiently well-defined methods had been developed to enable the men to be assigned to practical field duty.

At the end of the first year methods for carrying on the various branches of the work had been developed, an aggregate of about 12,000 square miles had been topographically surveyed, and gaging stations had been established on the more important streams in the territory under investigation. This was an excellent showing, for the work had been in progress only eight months, during which the winter season had intervened.

In providing for the second year's work Congress appropriated the sum of $250,000. This enabled the extension of the work into new territory, and, as the methods already developed had proved satisfactory, the delays of the previous year were avoided. The personnel remained practically unchanged, save for a few additions. The results of the second year's work showed topographic surveys aggregating about 20,850 square miles, about 200 reservoir sites had been located, and the stream-measurement work was rapidly pushed in advance of the other investigations, as with this class of data length of series is one of the important factors.

Notwithstanding the efficient work and good showing which had been made during the two years prior to June 30, 1890, Congress failed, during the next four years, to make special provision for hydrographic work. This necessitated the stopping of practically all the work except that of stream measurement, which was kept up by a small allotment made annually from a general appropriation, to which was added a small amount by the Tenth Census, while hearty cooperation was received from several States, corporations, and individuals. With these limited resources a large amount of stream-measurement data was collected and several special investigations were undertaken.

The operations of the engineering branch of the irrigation survey were conducted on lines similar to and in the same drainage basins as those of the topographic and hydrographic branches. Among the more important investigations were surveys for a reservoir project on the lower Rio Grande, near El Paso, Tex., the preliminary survey for a canal in the Arkansas Basin in Colorado, and a survey in the basin of Sun River in Montana for storage reservoirs and distributing canals. Preliminary surveys for important canal projects were made in the Snake River Basin in Idaho, for the location of reservoir and canal projects on Carson and Truckee rivers in Nevada, and for reservoirs at the headwaters of Tuolumne and Merced rivers in California.

Unfortunately, the discontinuance of the appropriations for this work caused it to be dropped when it had reached only a preliminary stage. Much important and valuable information had, however, been gathered through the results of these surveys. More or less complete surveys were made of nearly 20 reservoirs in various parts of the country. Preliminary canal surveys, both for the diversion of water from rivers, or its conduct from the reservoirs, and for its distribution to the irrigable lands, were made in a number of cases. Preliminary examinations of more than 100 reservoir projects were made, also careful surveys for the segregation of land possibly irrigable, on the basis of which several hundred thousand acres were temporarily withdrawn from settlement, pending the completion of more detailed investigations.

The organization consisted of a chief engineer, under whom two supervising engineers had general direction of the projects undertaken, one on the Pacific slope, and the other in the country east thereof. Six divisions, each presided over by an engineer, were organized and named the divisions of Colorado, Montana, California, Nevada, New Mexico, and Idaho. The field work consisted of reconnaissance or preliminary examinations by the division chief, who, when he found a group of irrigable lands so situated that they might possibly be irrigated from an available water supply, organized a party which at once proceeded to make the necessary surveys to determine the relation between the two. If the results indicated the project as possibly feasible, more detailed surveys were made to ascertain the grade and mileage of canal, or, if a reservoir, its possible capacity and the practicability of closing it with a dam. These surveys were necessarily conducted in cooperation with the hydrographic investigations, hydrographers being assigned to the measurement of the stream discharges in the areas under consideration.

On the close of the work some of the division chiefs were detained temporarily in the Washington office pending the preparation of a final report, and the results were published in the Thirteenth Annual Report of the Survey, in the form of textual matter giving estimates of the possible cost of construction of various kinds, and maps showing the details of the projects.

The publication and diffusion of the information relating to streams of the West brought to public attention the necessity for such work and for obtaining more detailed facts concerning the water resources of all parts of the country. As a result, the following clause providing for stream measurements was inserted in a bill which was passed by Congress on August 18, 1894:

For gaging the streams and determining the water supply of the United States, including the investigation of underground currents and artesian wells in the arid and semiarid sections, twelve thousand five hundred dollars.

This was the first definite legislative recognition of the stream-measurement work of the hydrographic branch, and it placed the branch upon a stable basis from which it has risen to its present important position. Since that time Congress has appropriated annually sums ranging from $12,500 in 1895 to $200,000 in 1903.

During this period, aside from these regular appropriations, $20,000 was appropriated for making special investigations on Gila River and Queen Creek in Arizona, and about $5,000 to meet deficiencies and for other purposes.

On June 17, 1902, the President signed the national reclamation act, which led to separation of the stream-measurement work and the irrigation work of the hydrographic branch and the establishment of the reclamation service. The general administration of both divisions is the same, and much of the work is carried on in cooperation.

With the exception of limited studies on Potomac River at Chain Bridge, D. C., until the fall of 1894 the work of the hydrographic division had been confined to those districts where irrigation investigations were being carried on. With the expansion incident to the increased appropriation of that year it became necessary to reorganize the division on a more permanent basis. To employ salaried hydrographers to carry on all the field work was evidently impracticable in view of the smallness of the appropriation. The difficulty was overcome by securing gratuitous or inexpensive cooperation from men who had not only a strong personal interest in and inclination toward investigations of this character, but also some permanent occupation or position, so that they were not dependent upon remuneration from stream-gaging funds. Assistance of this kind was given by professors of geology or of hydraulic engineering, and by local and civil engineers who had practical acquaintance with the difficulties and methods of water measurements and with the behavior of streams and underground sources of supply in their respective localities. For convenience in administration the States and Territories were grouped into hydrographic districts, each under the care of a division hydrographer who looked after the work done by the men in his section. The data collected in each section were transmitted to the Washingtor office, where the material was prepared for publication.

Although a large amount of data was collected and much good work was done by the cooperative system, it was found to have the disadvantage that the aids were occupied with other duties at the times when it was most desirable that measurements should be made. Therefore, as the appropriations have warranted, the temporary employees have received permanent appointments or have been replaced by men who are able to devote their whole time to the work.

With the increasing appropriations the stream-measurement work has been extended from year to year, so that at present measurements have been or are being made on practically all the principal rivers in the United States; and in connection with these records of flow other hydrographic data, such as river profiles, extent of and damage done by floods, water-power data, etc., have been collected. During last year (1903) regular stations were maintained at about 500 points, distributed so as to cover the greatest needs of the various States and Territories. Figs. 2 and 3 show the locations of these stations.

Under the present organization of the division of hydrography the work is divided between the field and the Washington office. In the field every effort is put forth to collect as much information as possible. This is transmitted through the local offices, where it is examined, to the Washington office. The plan of dividing the country into hydrographic districts has been continued, and the present division is as follows: New England, New York, northern Atlantic States, southern

Atlantic States, Mississippi Valley States, Texas, and the Western or reclamation States.

The work in the Western or reclamation States is carried on in connection with investigations by the resident engineers of the reclama-

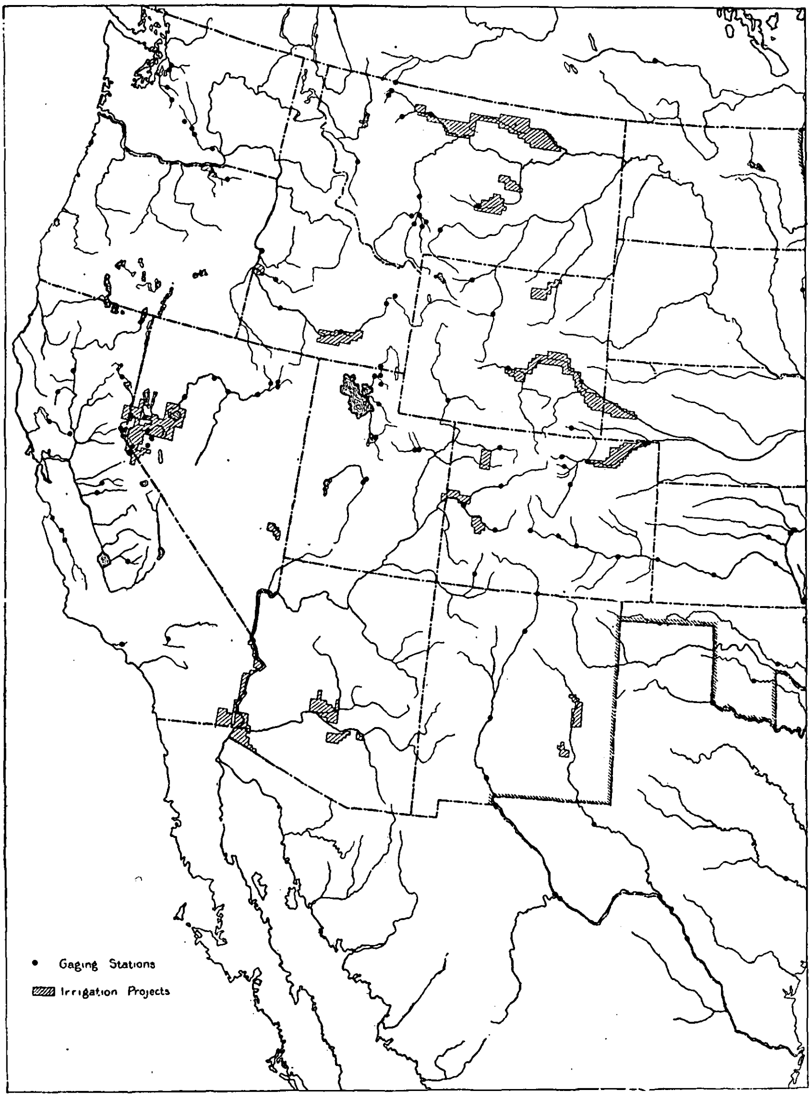


FIG. 2.—Map showing locations of river stations and principal irrigation projects in western half of United States in 1903-4.

tion service. There is a general inspector of field work, who, with each resident hydrographer, visits at intervals the various stations in his district. At the times of these visits the equipment is examined, measurements are made, and such suggestions and recommendations are given as will bring the work in each district to a uniform standard.

The Washington office looks after the general administration of the work, cares for the supplies and accounts, receives the original data as collected by the resident hydrographers, and prepares the material for publication. The Washington office comprises the following four

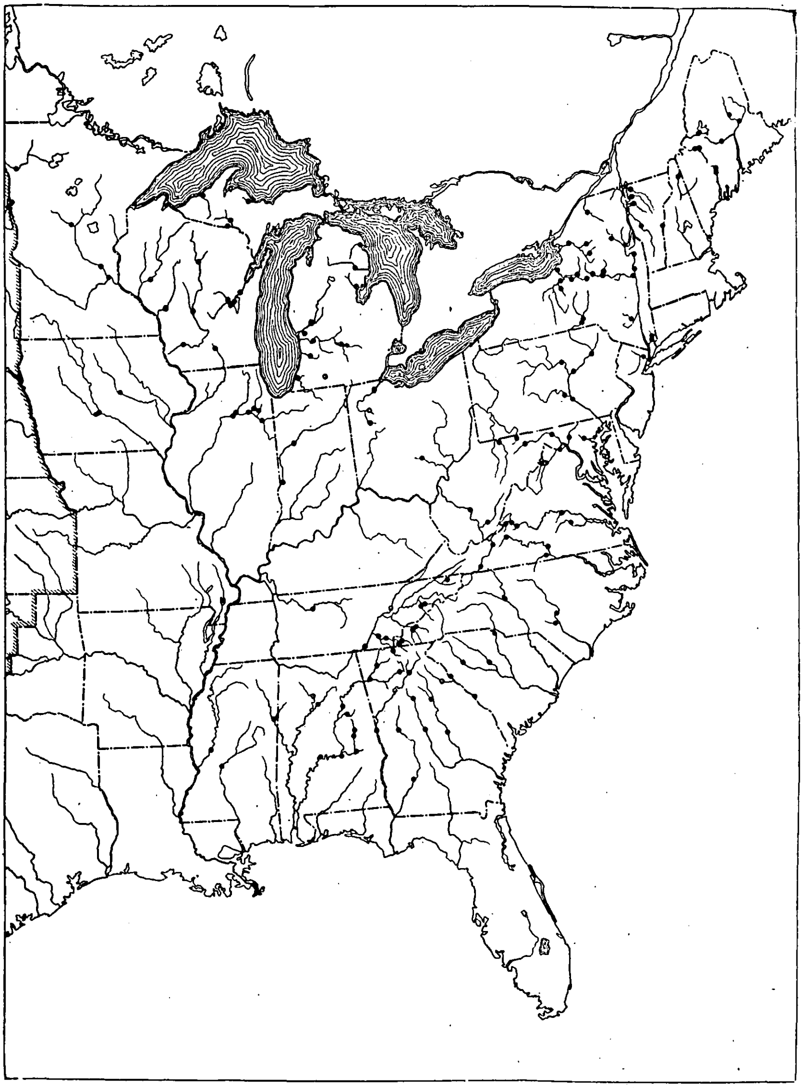


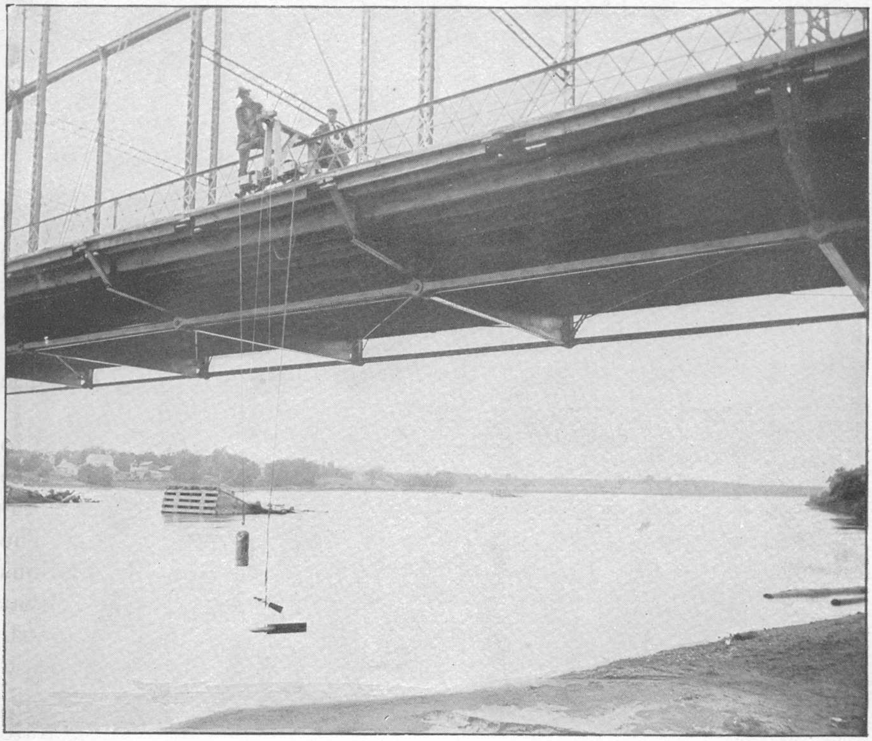
FIG. 3.—Map showing locations of river stations in eastern half of United States in 1903-4.

sections: (1) The executive office, which looks after appointments, assignments to duty, general correspondence, approval of accounts, bookkeeping, and other matters in connection with the administration of the work. All material passes through and is inspected by this office before it is submitted to the hydrographer. (2) The computing section, which has charge of the files that contain all original records. It inspects the data that come into the office from the field, makes the computations necessary for preparing the material for publication, and compiles the annual report, which contains the data collected. To this section all requests are referred for information in regard to stream-measurement data. (3) The section of instruments and supplies, which attends to the purchase and distribution of all the material used in the hydrographic branch. (4) The publicity section, which reviews all the data and correspondence that come into the office and extracts such portions as may be of immediate interest to the public at large. Visitors to the office are received by this section and directed where to obtain such information as they may desire.

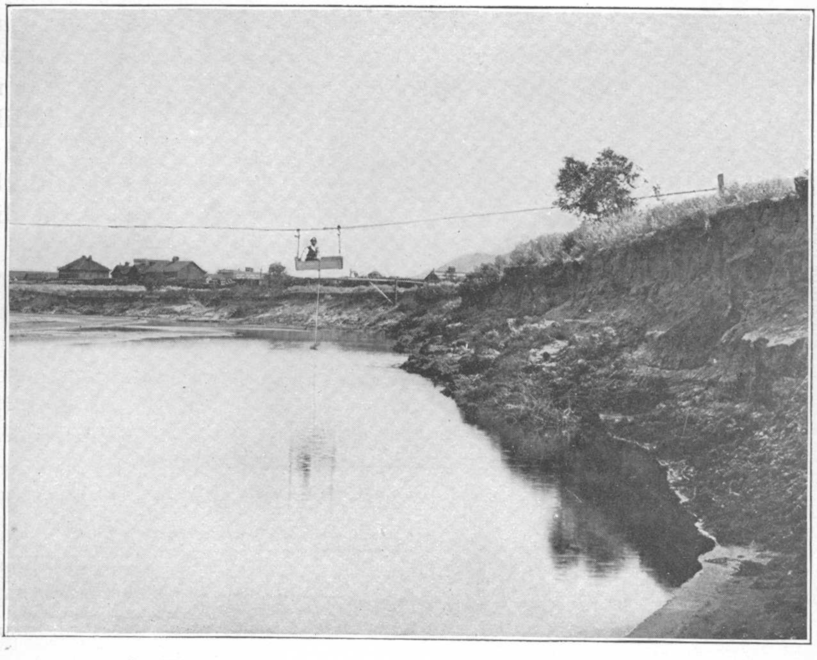
The stream-measurement work done prior to 1888 was confined to particular localities and to short periods of time. Such results were of limited value, and it was necessary for the Survey to devise methods whereby data could be collected, as it were, by wholesale. The entire country had to be studied, and it was essential that observations should be extended over a considerable period of time, in order that both the total flow and the seasonal distribution could be determined. It was held by those organizing the service that, in work involving so many disturbing factors, observations of a fair degree of accuracy, covering a long period, were of much more value than more accurate observations covering short periods.

In order to fulfill the required conditions it was found necessary to measure and record from time to time two variable quantities. The first of these was the mean daily height of the river, referred to some arbitrary datum; the second, the discharges to correspond to these heights. With these data, assuming that the discharge is a function of the gage height, and that like gage heights will have like discharges, it is possible to construct a rating table which will give the discharge for each stage of the river. From this table, with the daily gage heights, there may be compiled a table showing the discharge for each day during the year.

In carrying out this work, gaging stations were established at carefully selected points on the various streams. In the East results are wanted mainly for water-supply and power purposes; in the central part of the United States, for water-supply and sanitary purposes; and in the West, for irrigation. Some stations in each section of the country are needed for general statistical purposes, and all the records are valuable in studying flood conditions. Therefore, the endeavor is made so to locate the stations that it is possible to procure the requisite data with the proper degree of accuracy and at reasonable cost. Data for low and ordinary stages are more valuable for power purposes than are the data for higher stages, hence low-water conditions govern in selecting stations for this purpose. Where the data are to be used



A. TYPICAL BRIDGE STATION—MISSISSIPPI RIVER AT ANOKA, MINN.



B. TYPICAL CABLE STATION—MILK RIVER AT HAVRE, MONT.

mainly for storage projects the stations are so located that both the high-water and the low-water conditions can be studied with equal accuracy. The equipment at the stations consists of a gage for measuring heights of the water surface, and some support from which the meter measurements can be made.

The gage is either a fixed wooden staff or is of the standard chain type. Gage heights are read daily by some person living in the vicinity, who is employed for the purpose, and the records are transmitted to the resident hydrographer on postal-card forms prepared for that purpose.

Measurements of the flow or discharge are made with current meters from a bridge, boat, cable, or by wading. (See Pl. VII.) Whenever possible, stations are established at bridges, where stations can be equipped at little expense. The measurement, which is usually made by the resident hydrographer or an assistant, consists in dividing the cross section of the stream at the gaging station into an arbitrary number of parts and determining the area and mean velocity for each part; the product of these two factors gives the discharge for each part, and the total discharge is the sum of these partial discharges. An effort is made to take the measurements at different stages, so that when they are plotted on cross-section paper enough points will be had to construct a discharge curve that will extend from extreme high to extreme low water.

Aside from the meter stations, a few determinations of flow are made by small weirs and at mill dams.

The current meter is an instrument for determining the velocity of flow of streams. In general it consists of a wheel carrying a series of cups which rotate about a horizontal or a vertical axis. Connected with this axis is either an electric or an acoustic appliance for counting the number of revolutions. The velocity per second is indicated by the number of revolutions per second. This relation is determined separately for each meter by drawing the meter through still water. The length and time of the run and the number of revolutions are recorded by automatic devices, and from these factors the velocity in feet per second, to correspond to any number of revolutions, is determined. Pl. VIII, *A*, shows the equipment at meter-rating stations. In operation the meter is held in the water and headed against the current, which causes the wheel to rotate. Since the organization of the work five types of meters have been used—Fteley, Ellis, Haskell, Bailey, and Price. Each of these has its good points, but the Price meter best fulfils the demands of the work and is in general use.

The Price meter is made in two sizes. It consists of a wheel containing five conical cups, rotating about a vertical axis, which is connected by a copper-wire cable to a small battery buzzer, and is so arranged as to make and break contact with each revolution of the wheel.

(See Pl. IX.) This is indicated by a buzz. The cable serves the double purpose of supporting the meter and of transmitting the current from the battery. A tail keeps the meter headed against the current, and leaden weights hold it at the proper depth. With the exception of the conical cups the various parts and appliances of this meter have been modified by hydrographers of the Geological Survey.

The data collected by this division have formed the basis of all reclamation investigations, and the success of the reclamation service is largely dependent upon the hydrographic studies of the last fifteen years. In the East, where the data are principally used in estimates for water-power developments, power plants costing in the aggregate millions of dollars have been built, based upon information furnished by the hydrographic division.

The records of the division have been of great value in estimating available water supplies for large cities, and the data have proved of great importance in lawsuits or arbitration for settling satisfactorily the relative rights of various claimants on the basis of the physical facts. Information in regard to floods is a later but no less important feature of its investigations.

For publications prepared by this division see the Survey's list of publications.

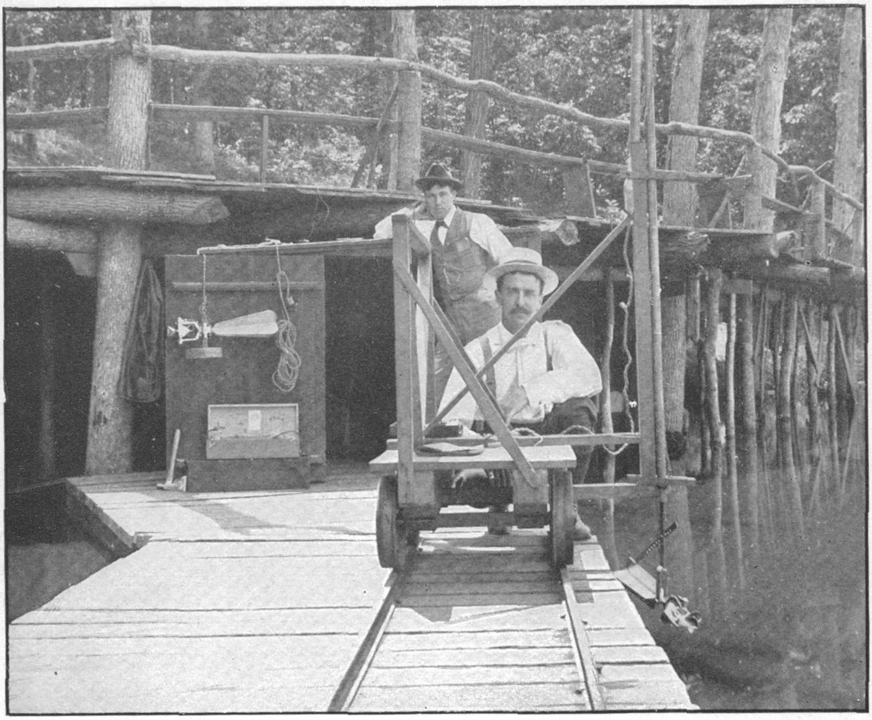
DIVISION OF HYDROLOGY.

Eastern and Western Sections.

The division of hydrology deals with underground waters, in the same manner that the division of hydrography deals with surface waters, the aim being to obtain and publish for the benefit of the people information relating to the occurrence, movements, methods of obtaining, and uses of artesian and other underground waters, including those reaching the surface both in wells and in springs.

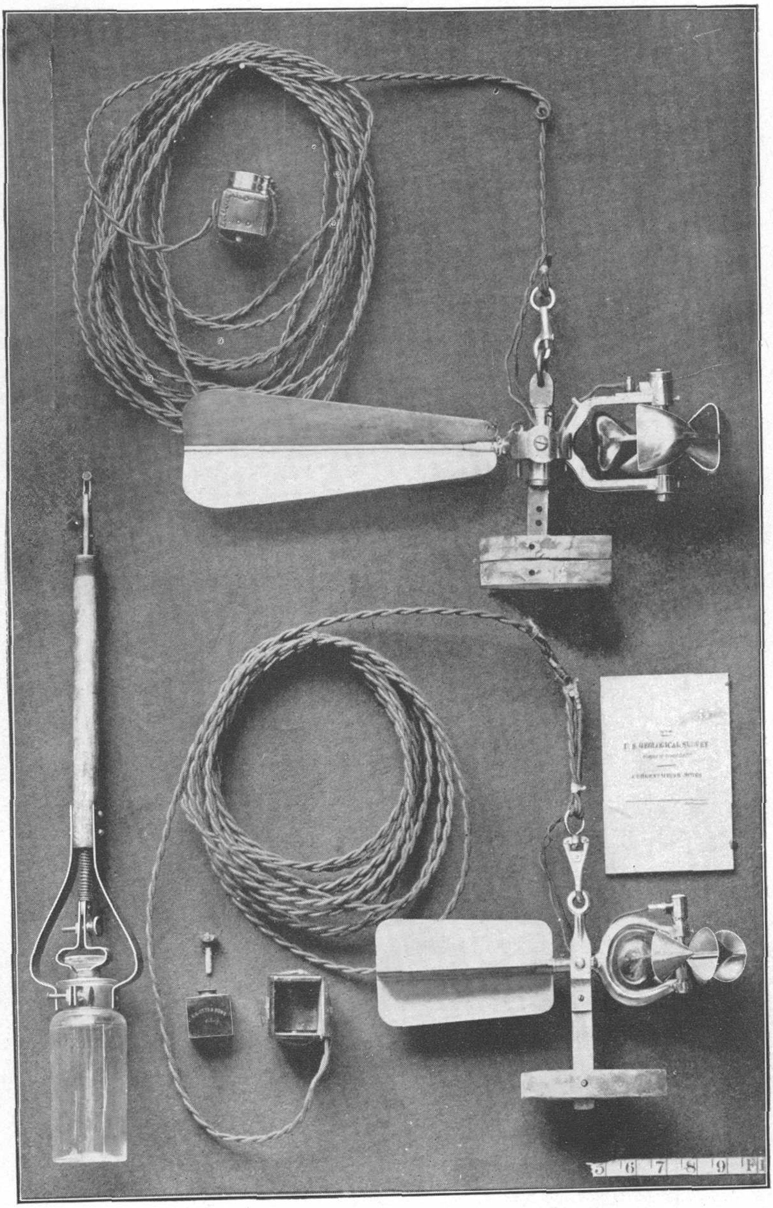
As underground waters are intimately connected with many geologic features, more or less attention has been given to them throughout the existence of the Survey, but mostly in connection with the investigation of other problems. Two special reports, one on the conditions of artesian wells and another on the hot-spring deposits of the Yellowstone National Park, were published in the Fifth and Ninth annual reports, respectively; and papers on potable waters and on natural mineral waters appeared in the Fourteenth Annual Report.

To carry out the provision of the act of October 2, 1888, previously quoted (p. 75), the hydrographic work of the Survey was organized, and during the first year some progress was made in the investigation of underground water supplies. Every year since 1888 more or less hydrologic work has been done, by field investigations in both the West and the East. These have yielded a number of reports on underground-water resources, and a large collection of data is preserved in the office for future reference and elaboration.



A. APPARATUS FOR RATING METERS AT CHEVY CHASE, MD.

B. TYPICAL WEIR STATION, LOS ANGELES RIVER, CALIFORNIA.



PRICE ELECTRIC CURRENT METERS, WITH BUZZERS.

It was found that the results of the investigation of underground waters were of great interest to the public, and the rapid development of many areas in the West through the use of underground water for irrigation, the application of well waters to the irrigation of rice in the Southern States, and the ever-growing importance of deep well waters as sources of public water supplies have led in the last few years to a great increase in the work involved in their investigation. In order satisfactorily to meet the new demands and to develop, specialize, and systematize the work, the investigations relating to underground waters were segregated from the division of hydrography and grouped into a distinct organization known as the division of hydro-geology, or hydrology. This organization was made at the beginning of 1903, with two sections, western and eastern, the first including the so-called reclamation States and Territories and Texas, and the second embracing the States east of the Mississippi and those bordering that river on the west. Each of these sections was placed in charge of a geologist assigned from the division of geology and working under the general supervision of the chief hydrographer.

In the western section there are three assistant geologists, two field assistants engaged throughout the year, and five field assistants engaged for a portion of each season. Special investigations are being conducted by several other geologists, in most cases State geologists and professors of geology at the State universities. In the eastern section there are several assistant geologists and many temporary field assistants. Arrangements have been made for cooperation by a number of local geologists, and several members of the geologic branch are giving special attention to restricted areas.

The work of the division includes the gathering, filing, and publication of statistical information relating to the occurrence of water in artesian and other deep wells; the gathering and publication of data pertaining to springs; the investigation of the geologic occurrence, from both stratigraphic and structural standpoints, of underground waters and springs; a study of the laws governing the variations due to tidal, temperature, and barometric fluctuations; direct measurements of rate of underflow; detailed surveys of regions in which water problems are of great importance and urgency, and the publication of reports on irrigation, city water supplies, and other important uses of underground waters.

To serve as a basis in outlining plans for field work, it was found desirable to undertake a preliminary correspondence by means of printed requests for the addresses of drillers, well owners, spring owners, etc., and for information relating to town water supplies, wells, and springs. Requests for addresses are first sent to postmasters, and to the addresses thus obtained special blanks are sent. The same system is used in gathering information from scattered points which it is impracticable to visit on account of expense. The information thus obtained has been found to be of great value and assistance in carrying out the work of the division. The data are recorded on printed cards of three types, designed for information

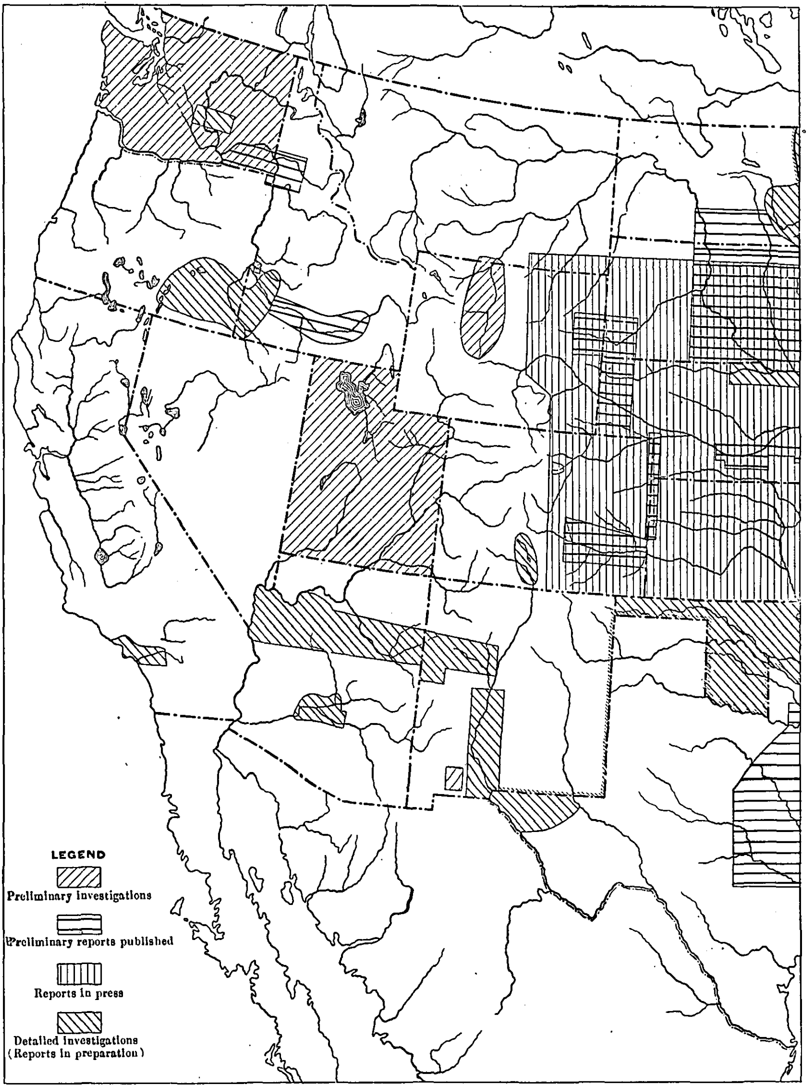


FIG. 4.—Map showing progress of work on underground waters in western half of United States in 1903-4.

relating to city or town water supplies, deep wells, and springs. The cards are so arranged that they can be submitted directly to the printer as copy for tabular reports. Plans have been made whereby bibliographies covering hydrography and hydrology, similar to those which have proved of so much value to geologists, will be prepared annually.

Arrangements have also been made for cooperation of both geologists and topographers in furnishing information of new water developments and such facts relating to the occurrence of underground waters as come to their attention.

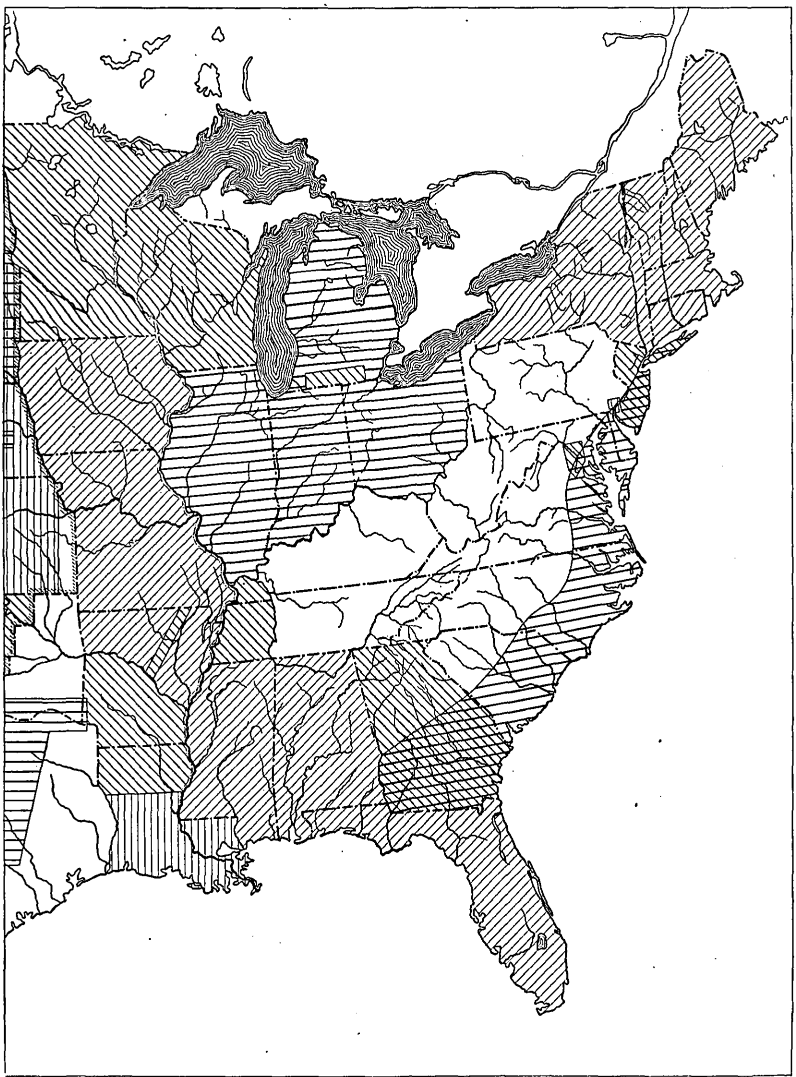


FIG. 5.—Map showing progress of work on underground waters in eastern half of United States in 1903–4.

During the last few years hydrologic work has been done, either directly in the field or through cooperation with State officials or by correspondence, in practically every State and Territory. Among the more important investigations under way may be enumerated the following:

In the eastern section, geology and water resources of Long Island, New York; measurement of velocity of underflow of water in sands and gravels; springs of New York State; underground water supplies of New Jersey; pollution of underground waters of Georgia; underground water resources of Louisiana and Arkansas; springs of Missouri; and artesian waters of Minnesota and Wisconsin.

In part the field work has consisted of the running of levels connecting wells with railroad levels, thereby establishing a basis for determining the structure of water-bearing formations. Such work has been conducted with success in southern Arkansas and Louisiana, where it is expected that it will aid in determining the most available water horizons for the supply of towns and cities, and perhaps lead to more extended use of underground water for the irrigation of rice. In Missouri promising results include the discovery of new artesian areas and the relations of temperatures of cavern and surface springs at similar horizons, the development of caves and sinks by underground drainage, and surface modifications resulting therefrom; and, in general, the origin, flow, and temperature of all underground waters and their economic uses.

In the western section, among the more important results so far obtained are the amounts of variation in water levels at localities where water is being extensively utilized for irrigation, as in Salt River Valley in Arizona and San Joaquin Valley in California. In these and similar areas tests to determine the movements of underground waters have been made, and much light has already been thrown upon these obscure phenomena.

In the Dakotas much attention has been given to special geologic work, with a view to ascertaining the relations of underground waters to the geologic structure. Reports and maps have been prepared giving a review of the artesian conditions in the great central plains.

Figs. 4 and 5 show the progress of the hydrologic work.

For publications on hydrologic subjects see the Survey's list of publications.

DIVISION OF HYDRO-ECONOMICS.

The entire hydrographic work of the Survey is, to a more or less extent, of an economic character. The special work of the division of hydro-economics may, however, be said to have been started with the gaging of rivers in the eastern portion of the United States, as the reason for this development was the need of data for water-power and other economic purposes. The first investigation of this nature was a study of the Potomac drainage basin, begun in April, 1891.

Another development took place in 1895 with a general reconnaissance and establishment of gaging stations in the southern Atlantic drainage basins in the States of Virginia, West Virginia, North Carolina, and Georgia. The work has since constantly enlarged from year to year, until it now includes every State in the humid region.

A special department of the work, and one of a distinctly economic character, was established in 1897, when a detailed study of the sources of pollution of the Potomac Basin was undertaken. Samples of water for bacteriologic examination were collected in sterilized bottles at the mouths of all important tributaries, and at such other points along the river as were of special interest, as at locations of sawmills, tanneries, and immediately below important towns.

At about this time in the New England States, especially in Maine, the study of water powers was commenced. In four years the subject was fairly well covered, and the results were published in Water-Supply Paper No. 69.

During 1895, 1896, and 1898 a study of the hydrography of the streams of New York State was undertaken by the State engineer's office and the United States Board of Engineers on Deep Waterways. During 1900 the Geological Survey assumed charge of the stations, and, in cooperation with the State engineer and surveyor, extended and continued the work.

In 1901, at the request of the water-supply department of the city of New York, a detailed study of the hydrography of the streams that might possibly furnish a water supply for the city was undertaken by this Survey, and has been continued to date.

Owing to the increased demand for information on water powers, municipal water supplies, sanitary conditions of rivers, flood preventions, and other allied questions, the division of hydro-economics was established in January, 1902. At that time its work was confined to reviewing chemical and board-of-health reports and extracting therefrom such matter as applied directly to the quality of natural waters. From the results of this work there was prepared a report entitled "Normal and Polluted Waters in Northeastern United States," which has been issued as Water-Supply and Irrigation Paper No. 79.

Subsequently cooperative relations with various laboratories throughout the country were established. The arrangements involve the study of important problems concerning river pollution, river purification, and municipal water supply. The laboratories partaking in the initial scheme of cooperation were: Bowdoin College, Brunswick, Me.; Massachusetts Institute of Technology, Boston, Mass.; Rensselaer Polytechnic Institute, Troy, N. Y.; Cornell University, Ithaca, N. Y.; University of Rochester, Rochester, N. Y.; Dickinson College, Carlisle, Pa.; Earlham College, Richmond, Ind.; Central University of Kentucky, Danville, Ky.; University of St. Louis, St. Louis, Mo.; University of Missouri, School of Mines, Rolla, Mo.; University of Kansas, Lawrence, Kans.

Cooperative relations were arranged also with the boards of health of Minnesota and Ohio. In the former case an agreement was entered into between the State board of health and the University of Minnesota and the Geological Survey, whereby certain work was to be performed and paid for by appropriations agreed upon. It is the purpose of those in charge of the division to make arrangements of this character in all possible cases.

When it was proposed to devise methods for water analysis those in charge of the chemical departments of the important railroads of the country were asked to submit their ideas on the subject, as well as the results of experience gained in their various laboratories. In this way there was brought together a large amount of valuable information which has been used in devising these methods. Among the roads which have been of assistance in this way are the Pennsylvania Railroad, Lake Shore and Michigan Southern, Chicago and Northwestern, Milwaukee and St. Paul, Atchison, Topeka and Santa Fe, Union Pacific, Baltimore and Ohio, Norfolk and Western, Philadelphia and Reading, New York Central and Hudson River.

The work of the division of hydro-economics, although recently established, has already afforded practical results. Among the most important of these are:

Determinations of sources of water suitable for industrial and boiler purposes in West Virginia, western Pennsylvania, and southeastern Ohio.

Character of water supplies of southeastern Kansas.

A chemical survey of waters in Florida, with special reference to their suitability for use in steam boilers.

Sulphite wood-pulp waste; its damage to natural waters and the prevention thereof on Androscoggin River, Maine.

Coal-mine wastes; their character and value and their effect upon the waters of Susquehanna and Lehigh rivers, Pennsylvania.

Straw-board waste in Indiana and Ohio; its damage to water resources, the prevention thereof, and its profitable recovery.

Character of waters in Minnesota and Iowa, with special reference to the possibility of their being used as city supplies.

Determination of alkaline and saline constituents in waters of the arid States which it is proposed to conserve for irrigation purposes.

Character of normal waters in Kentucky and their value in municipal and industrial lines.

Interstate pollution of Hoosic River, in Vermont, Massachusetts, and New York, and the damage caused thereby to riparian owners in New York.

For publications on hydro-economic subjects see the Survey's list of publications.

RECLAMATION SERVICE.

The reclamation service is an outgrowth of the early investigations of the arid region begun by Maj. J. W. Powell, and continued by authority of Congress under a resolution approved March 27, 1888, and an appropriation made October 2, 1888 (see p. 75). Systematic examination of the streams of the arid region were then begun by the Geological Survey, and have been carried on continuously in connection with topographic surveys or by means of various appropriations and allotments made for gaging streams and determining the water supply, as described in the preceding pages.

The act approved June 17, 1902, known as the reclamation law, creates a fund in the Treasury from the disposal of public lands in 13 States and 3 Territories. This fund is to be expended by the Secretary of the Interior in the reclamation of arid lands.

In order to carry into effect the purpose of the law, the Secretary authorized the creation of a division in the Geological Survey designated the "reclamation service," utilizing, for this purpose, the men who had previously been investigating the extent to which the arid lands might be reclaimed, and adding to these, through civil-service examinations, other men experienced in construction of reclamation works or in the administration of water laws.

The reclamation service now consists of about 250 engineers, assistant engineers, and engineering aids, organized under a chief engineer, who is assisted by supervising, consulting, and district engineers. Each of the district engineers is in charge of the operations in a State or a large drainage basin, and conducts the general examinations and directs the assistant engineers and engineering aids in work on definite projects. When these projects have been brought to a point where conclusions can be reached, the facts and recommendations are submitted to the chief engineer, who in turn refers them to a board of consulting engineers to pass upon the adequacy of the work, the completeness of the designs, and all facts which bear upon the feasibility of the project. If additional information or any modifications are desired by the board, the matter is referred back to the district engineer for further consideration. Ultimately the plans perfected and approved by the consulting engineers are submitted, with suitable recommendations, through the Director of the Geological Survey, to the Secretary of the Interior. When the plans are passed upon and approved by the Secretary, if the work is to be done by contract, advertisements and specifications are prepared and bids invited for the work, these being so arranged as to permit as great competition as possible. If it is decided that any part or all of the work shall be done by the Government, instructions to that effect are given.

Such surveys and examinations for specific construction have been begun at important points in the various States and Territories. Construction is in progress in Nevada and Arizona, and plans leading to early construction in several other States are in hand. For locations of the principal irrigation projects see fig. 2, p. 80.

The States and Territories in which reclamation works may be built and which include public land from which a revenue is derived are Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming.

The amount of available funds derived under the law from the different States differs widely, as the largest amount of land is being disposed of in those States where the climatic conditions favor farming without irrigation or where there are considerable bodies of timber land. Thus it happens that the States which have the largest amount of arid land and the development of which under irrigation is most important contribute the smallest amount to the fund.

The works must be so designed as to reclaim arid land whose value will be so great that the cost of the water can be readily repaid by the settlers living on the land. The cost of the works is apportioned with a view to returning to the reclamation fund the cost of construction, and thus it is necessary not merely to conserve and regulate the flow of the streams, but to do this in such way that there can be no question as to the ability of the settlers to repay the cost to the Government. The money thus returned to the Treasury is added to the reclamation fund for subsequent use. Payments are made by the settlers in ten annual installments.

The irrigation of arid lands has already advanced, through private enterprise, to a point where the easily available waters have been utilized. There remain large rivers and the erratic floods which must be controlled for the reclamation of tracts of land which are partly in public and partly in private ownership, but to which water can not be brought by ordinary effort.

Nearly all the projects of reclamation involve not merely engineering difficulties, but legal and social questions dealing with acquired rights and with individuals having diverse views and conflicting interests. Thus it is necessary to employ not only engineering ability, but also a certain amount of legal skill, and, with these, tact and judgment in adjusting conflicting interests.

The thorough study which is being made of the opportunities for reclamation of the arid West, especially for the construction of large works of irrigation, will result in great changes in, and rapid development of the resources of, the western half of the United States. It will make available for use hundreds of thousands of acres of land now sterile and waste, and will indirectly result in giving increased value to all property, whether directly connected with agriculture and stock raising or not. The mining and manufacturing industries will be stimulated by the opportunities of utilizing the mineral wealth which now lies dorment because of the scarcity of labor and the high prices of food stuffs. But more than all, opportunities will be offered for the establishment of prosperous homes on the national domain. The law is so drawn as to encourage the making of small farms and to prevent the monopolization of lands. Not more than 160 acres in the hands of one person can receive water from the Government works; and every effort is made to promote settlement in small tracts by men who will obtain their living from the cultivation of the soil.

Bringing to the West and establishing on small tracts thousands of industrious farmers will mean prosperity not merely to the individuals directly concerned, but to the manufacturing, jobbing, and transporting interests of the whole country. These farmers purchase their supplies from the East, and for every self-supporting home on the public domain there must be an increased demand for labor in the mills and factories of the East.

For reports by the reclamation service, see the Survey's list of publications.

PUBLICATION BRANCH.

EDITORIAL DIVISION.

Though the literary and cartographic output of the United States Geological Survey has now become large, exceeding that of most other Government bureaus, its publications during the first few years following the establishment of the Survey, in 1879, were, naturally, not numerous; the appropriations and the organization were small, and time was necessary for work and investigations to progress to a stage sufficiently advanced to justify publication. During those early years editorial supervision was exercised by the Director and the chief clerk. By the year 1884, however, the amount of manuscript currently submitted had grown so large that these officers could no longer perform this work in addition to their other duties. In that year, therefore, an editor was appointed, and since then there has been maintained in the Survey an editorial corps, which has been strengthened and specialized as necessity arose.

At first the publications consisted almost wholly of books and pamphlets—annual reports and a few monographs and bulletins; but it was not long until the topographic maps ready for engraving had become so numerous that they demanded systematic editorial supervision; and a few years later, when sufficient geologic information had been acquired to warrant the issue of the first folios of the Geologic Atlas of the United States, they too required technical editorial oversight. Moreover, the publications of the Survey necessarily contain numerous illustrations of topographic, geologic, and other phenomena and principles, and the preparation of drawings, sketches, maps, and photographic views for these requires the services of skilled draftsmen and photographers. The editorial division of the Survey therefore comprises five sections, whose work relates to texts, topographic maps, geologic maps, illustrations, and photography.

Section of Texts.

In the section of texts there are now employed five persons—an editor and four assistants. To them is assigned the supervision of all matter to be put in type, after it has been transmitted by the author and approved by the Director for publication. The ordinary work of the section falls into three classes—(1) preparation of manuscripts for printing, (2) correction of proofs, and (3) making of indexes.

(1) All papers are carefully read in this section, typographic details are indicated for the printer's guidance, and an attempt is made to improve the literary character of the paper if it is not already good. The work of this section therefore relates chiefly to literary expression and form—the "dress" of thought rather than the ideas themselves—and to the mechanical details connected with printing and bookmaking. Papers are supposed to be appropriate for publication, sufficient in substance, and scientifically valid before they are approved by the Director; if he has any doubt that a paper is satisfactory in these respects he refers it to a specialist for criticism, and does not approve it for publication until it is pronounced worthy. Nevertheless, the editor and his assistants are expected to be watchful for errors of fact as well as for faults of expression. When a manuscript has been thus prepared for printing, and the drawings, photographs, etc. (if any are to be used), illustrating features treated in the paper are ready for reproduction, the whole is transmitted to the Secretary of the Interior, who forwards it to the Public Printer, the official in charge of the great Government Printing Office. In that office all the work on the text is done, but, under the law, the illustrations are reproduced by private parties through the system of competitive bids.

(2) With proofs the ordinary practice is followed. Comparison of galley proof with the manuscript, with the aid of a reader, is carefully made at the Government Printing Office, and that labor is not usually duplicated by the Survey editors. They either read critically or examine carefully the galley proof, and then transmit it to the author, who is expected to do the same. It is then returned to the printer, the necessary corrections are made in the types, the matter is made up in page form, and page proof is sent to the Survey. This is carefully read by a member of the textual section—if practicable by one who did not read the manuscript or the galley proof—and is then submitted to the author, in order that he may be assured that all the important changes he desired have been made, and that he may have another opportunity to make important corrections if they involve only slight disturbance of the types. This first page proof is then

returned to the printer, the corrections are made, and a second and final page proof is sent to the Survey. This also is submitted to the author if he is in or near Washington, but it is not his privilege to make further changes.

(3) When the proof reading has been finished it is necessary in most cases to prepare an index to the paper. Occasionally an author prefers to make the index, but usually he is more than willing that this tedious work should be done in the Survey office. A good index is held in high esteem by scientific men, and a large part of the energy of the textual force goes into index making. Besides the detailed indexes to the individual papers, the textual section prepares and publishes a catalogue and general index of all the Survey publications.

In addition to the work noted in the foregoing paragraphs, which relates to the regular series of publications—annual reports (Director's, mineral resources, reclamation service), monographs, professional papers, bulletins, water-supply and irrigation papers, and geologic folios—the textual section edits and reads the proof of all office and field circulars and printed forms, which are numerous.

The following summarized list of the publications of the Survey, by years, affords a conspectus of the literary output and of the growth thereof during the existence of the Survey:

Publications of the United States Geological Survey, by years.

	Printed pages.		Plates and maps.	
1880.				
1 annual report (1st)	....	79	....	1
1882.				
1 annual report (2d)	643		63	
2 monographs (II, III)	715		94	
		1,358		157
1883.				
1 annual report (3d)	582		67	
3 monographs (IV, V, VI)	1,169		86	
2 bulletins (1, 2)	50		2	
1 report on mineral resources (for 1882)	830		....	
		2,631		155
1884.				
1 annual report (4th)	505		85	
2 monographs (VII, VIII)	548		40	
10 bulletins (3, 4, 5, 6, 7, 8, 9, 10, 11, 12)	894		34	
		1,947		159
1885.				
2 annual reports (5th and 6th)	1,104		123	
2 monographs (IX, XI)	660		82	
14 bulletins (13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26)	1,397		34	
1 report on mineral resources (for 1883-84)	1,030		....	
		4,191		239
1886.				
2 monographs (X, XII)	1,116		136	
10 bulletins (27, 28, 29, 30, 31, 32, 33, 34, 35, 36)	1,124		46	
1 report on mineral resources (for 1885)	583		....	
		2,823		182

Publications of the United States Geological Survey, by years—Continued.

	Printed pages.		Plates and maps.	
1887.				
9 bulletins (37, 38, 39, 40, 41, 42, 43, 44, 45)	1,073		89	
1 report on mineral resources (for 1886)	821	1,894	....	89
1888.				
1 annual report (7th)	676		71	
2 monographs (XIII, XIV)	671		47	
3 bulletins (46, 47, 48)	315		3	
1 report on mineral resources (for 1887)	839		....	
1 special report (Johnson's iron regions of Louisiana and Texas)	54	2,555	1	122
1889.				
2 annual reports (8th and 9th)	1,826		164	
2 monographs (XV, XVI)	731		233	
8 bulletins (49, 50, 51, 52, 53, 54, 55, 56)	960		37	
1 special report (Digest of decisions concerning water)	59	3,576	....	434
1890.				
1 annual report (10th)	920		98	
1 monograph (I)	458		52	
13 bulletins (57, 58, 59, 60, 61, 62, 63, 64, 66, 67, 68, 69, 70)	1,219		36	
1 report on mineral resources (for 1888)	659	3,256	....	186
1891.				
2 annual reports (11th and 12th)	2,463		242	
2 monographs (XVII, XVIII)	802		116	
15 bulletins (65, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 91)	3,496	6,761	46	404
1892.				
1 annual report (13th, part of)	247		2	
2 monographs (XIX, XX)	989		45	
10 bulletins (84, 85, 86, 90, 92, 93, 94, 95, 96, 99)	1,792		68	
1 report on mineral resources (for 1889–90)	679	3,707	....	115
1893.				
2 annual reports (13th and 14th, parts of)	1,206		183	
2 monographs (XXI, XXII)	531		30	
16 bulletins (97, 98, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113)	2,262		165	
2 reports on mineral resources (for 1891–92)	1,494	5,493	....	378
1894.				
1 annual report (14th, part of)	617		73	
2 monographs (XXIII, XXIV)	413		47	
9 bulletins (114, 115, 116, 117, 118, 119, 120, 121, 122)	1,194		23	
1 report on mineral resources (for 1893)	818		....	
14 geologic folios (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)	73	3,115	61	204
1895.				
2 annual reports (15th and 16th, part of)	1,377		91	
3 monographs (XXV, XXVI, XXVIII)	1,550		170	
8 bulletins (123, 124, 125, 126, 128, 129, 131, 133)	1,039		45	
1 report on mineral resources (for 1894)	1,415		29	
8 geologic folios (15, 16, 17, 18, 19, 20, 21, 22)	36	5,417	32	367

Publications of the United States Geological Survey, by years—Continued.

	Printed pages.		Plates and maps.	
1896.				
2 annual reports (16th, part of, and 17th)	2,919		297	
1 monograph (XXVII)	556		31	
17 bulletins (127, 130, 132, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147)	3,100		160	
1 water-supply and irrigation paper (1)	57		9	
1 report on mineral resources (for 1895)	1,084		13	
13 geologic folios (23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35)	79		63	
		7,795		573
1897.				
1 annual report (18th, part of)	1,206		106	
3 bulletins (87, 148, 149)	922		1	
9 water-supply and irrigation papers (2, 3, 4, 5, 6, 7, 8, 9, 11)	687		98	
1 report on mineral resources (for 1896)	1,412		1	
6 geologic folios (36, 37, 38, 39, 40, 41)	43		27	
		4,270		233
1898.				
2 annual reports (18th and 19th, parts of)	2,768		343	
4 monographs (XXIX, XXX, XXXI, XXXV)	1,629		223	
9 bulletins (88, 89, 150, 151, 152, 153, 154, 155, 156)	2,025		105	
8 water-supply and irrigation papers (10, 12, 13, 14, 15, 16, 17, 18)	656		73	
1 report on mineral resources (for 1897)	1,373		11	
10 geologic folios (42, 43, 44, 45, 46, 47, 48, 49, 50, 51)	59		40	
1 special report on Alaska	44		1	
1 topographic folio (1)	4		10	
		8,558		806
1899.				
2 annual reports (19th and 20th, parts of)	2,721		383	
6 monographs (XXXII, XXXIII, XXXIV, XXXVI, XXXVII, XXXVIII)	3,708		354	
6 bulletins (157, 158, 159, 160, 161, 162)	1,445		64	
14 water-supply and irrigation papers (19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32)	1,190		119	
1 report on mineral resources (for 1898)	1,437		1	
10 geologic folios (52, 53, 54, 55, 56, 57, 58, 59, 60, 61)	103		48	
1 special report on Alaska	138		10	
		10,742		979
1900.				
2 annual reports (20th and 21st, parts of)	5,097		782	
2 monographs (XXXIX, XL)	411		35	
14 bulletins (163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176)	2,306		114	
8 water-supply and irrigation papers (33, 34, 35, 36, 37, 38, 39, 40)	654		59	
8 geologic folios (62, 63, 64, 65, 66, 67, 68, 69)	76		38	
1 special report (Preliminary report on the Cape Nome gold region, Alaska, 1900)	56		22	
2 topographic folios (2, 3)	24		20	
		8,624		1,070
1901.				
2 annual reports (21st and 22d, parts of)	3,430		435	
10 bulletins (177, 178, 180, 181, 182, 183, 184, 185, 186, 187)	2,306		42	
16 water-supply and irrigation papers (41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56)	1,273		89	
2 reports on mineral resources (for 1899–1900)	2,233		....	

Publications of the United States Geological Survey, by years—Continued.

	Printed pages.		Plates and maps.	
1901—Continued.				
6 geologic folios (70, 71, 72, 73, 74, 75)	49		28	
2 special reports on Alaska (Reconnaissances in the Cape Nome and Norton Bay regions in 1900; and Report on the Copper River district)	316		36	
		9,607		630
1902.				
2 annual reports (22d, part of, and 23d)	1,670		144	
1 monograph (XLI)	802		26	
9 professional papers (1, 2, 3, 4, 5, 6, 7, 8, 10)	845		93	
18 bulletins (179, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 207)	3,959		85	
18 water-supply and irrigation papers (57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74)	1,965		188	
1 report on mineral resources (for 1901)	996		....	
10 geologic folios (76, 77, 78, 79, 80, 81, 82, 83, 84, 85)	119		67	
		10,356		603
1903.				
1 annual report (24th)	302		26	
1 reclamation annual (1st)	317		47	
4 monographs (XLII, XLIII, XLIV, XLV)	1,341		148	
10 professional papers (9, 11, 12, 13, 14, 15, 16, 17, 18, 19)	2,255		171	
16 bulletins (205, 206, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221)	2,693		89	
14 water-supply and irrigation papers (75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88)	2,562		90	
1 report on mineral resources (for 1902) about	1,000		5	
15 geologic folios (86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)	128		65	
		10,598		641
Grand total	....	119,353	....	8,727

Section of Geologic Maps.

The classification and geologic nomenclature adopted by the United States Geological Survey on its organization was based on the works of such eminent geologists as Dana and Le Conte, and has been the foundation of all later systems of the Survey. A scheme of colors for use on maps was provisionally adopted in 1881. It consisted of a limited number of colors, each representing a definite period of geologic time, and of a few patterns, which were used indiscriminately for all classes of rock.

The printing of geologic maps in colors was at that time an experiment, and the plan adopted by the Survey was tentative. It was soon found inadequate, and but few geologic maps were printed before 1889. Such as were published prior to that date have since been reissued upon a more comprehensive plan which was adopted in that year as a result of a conference of geologists.

This conference adopted rules of geologic nomenclature and a system of classification which accorded with the progress made in the science of geology to that time. The method of publishing the Geologic Atlas of the United States was thoroughly revised. The engraving division of the Survey having been established, it was possible, with the aid of the chief of that division, to prepare color patterns and tints, and the geologists in charge were enabled to exercise closer supervision of the engraving and printing of geologic maps. Thus greater accuracy of engraving and better register of the intricate colors were obtained. It was not until 1892, however, that any of the final maps of the atlas could be issued.

To supervise the editing of this material and to devise and apply rules and regulations, a geologist was selected to act as editor of geologic maps, and from this beginning the section of geologic map editing has developed.

These rules and plan of publication remained in force until December, 1903, when the growth of the science demanded further changes, and new rules were formulated and put into effect in January, 1904. As the number and intricacy of the folios increased, the work of the section also increased and the force was enlarged. At present it consists of a geologist acting as editor, assisted by three draftsmen.

The section of geologic maps has charge of the publication of the geologic folios. Its duties are to examine geologic maps and other illustrations to see that they are adequate for publication, and, if not, to properly prepare them; to read the proofs and compare them with the manuscripts; and to select the colors and patterns chosen for the representation of geologic formations. Errors and inaccuracies occurring in the manuscript or on the proof sheets are eliminated, and by careful study and selection the most effective and pleasing results of colors and patterns are obtained. The folios, which are portions of a great geologic atlas, are thus made uniform in style and form, whereas they would otherwise vary as widely as the temperaments of the various authors.

A standard geologic folio comprises a descriptive text, in which the geography, topography, and geology of the area are described; a topographic map; a geologic map, printed in colors, showing the areal distribution of the geologic formations; a geologic map showing the deposits of economic value in stronger or more brilliant colors; a geologic map on which the underground structure of the rocks is exhibited by vertical sections representing what would be seen in deep trenches across the area; and a columnar section, in which the rocks are represented in a vertical column in their normal relation one to another, accompanied by a condensed description of their composition, thickness, and relations.

For special areas other maps or illustrations are included. Often it is desirable to present with the description a page of illustrations reproduced from photographs or sketches. For artesian-water areas the distribution of the water-bearing strata, the areas where flowing water may be obtained, and the depths to the water horizon are shown on a special sheet. For active mining regions a map on a scale sufficiently large to show important details of the geology, mines, and ore deposits is inserted. For coal regions of economic importance special methods are used to show the structure or lay of the coal beds—of so much importance to the mine worker. This is done by means of contour lines which show the elevation above sea of the coal bed throughout its occurrence in the area, and thus furnish the data for determining the depth of the coal below the surface at any point. Sections of coal beds which have been opened or worked are shown on a large scale and their relation to one another is indicated.

The folio maps are generally published on the standard scale of 1:125000, or nearly 2 miles to the inch, a scale used for most of the area of the United States. In certain localities, chiefly about cities, the scale of 1:62500, or nearly 1 mile to the inch, is employed; while in a few cases the scale of 1:250000, or nearly 4 miles to the inch, is adopted. The folios are of uniform size, 19 by 22 inches, and consequently those on the 1-mile scale represent an area one-fourth of that shown on the 2-mile scale and one-sixteenth of that shown on the 4-mile scale.

In the preparation of the geologic map the black or "culture" plate of the topographic map is electrotyped, and on the electrotype are engraved the geologic boundaries, faults, letter symbols, mines, and explanation—that is, everything that is to appear in black on the geologic map.

In the classification adopted in 1904, which is essentially that adopted in 1889 with minor modifications, there are recognized three kinds of rocks—sedimentary, igneous, and metamorphic. These classes are distinguished on the maps by colors and patterns. Of the sedimentary rocks, those which were deposited under water are represented by patterns of parallel straight lines. Eleven such patterns are in use, and other variations are produced by inclining the lines at different angles—horizontal, vertical, or oblique. Glacial, alluvial, and eolian deposits are represented by patterns of dots and circles, comprising 17 designs of different density or size. The igneous rocks are represented by patterns of crossed lines forming triangles and rhombs, of which 14 designs are in use. For metamorphic rocks of unknown origin, intricate designs of short dashes or hachures are used, of which 8 patterns have been made; and for schistose rocks these dashes may be made parallel and wavy, simulating the structure. Metamorphic rocks known to have been derived from sedimentary or from igneous rocks are indicated by suitable combination patterns.

The igneous rocks are represented by bright colors of any hue, which contrast with those used to denote surrounding formations, and indicate their intruded or extraneous character. The surficial and metamorphic rocks are also printed in any colors, but of less brilliant tints. The water-laid sedimentary rocks are represented according to a systematic color scheme whereby the age of the beds may be recognized by the color used. These colors are more somber than those of the igneous rocks and are arranged in somewhat prismatic order, from orange at the top to brown at the base. The various systems into which the sedimentary rocks are divided according to age (the most recent at the top) and the corresponding colors are as follows:

Quaternary	Brownish yellow.
Tertiary	Yellow ocher.
Cretaceous	Olive-green.
Jurassic	Blue-green.
Triassic	Peacock-blue.
Carboniferous	Blue.
Devonian	Blue-gray.
Silurian	Blue-purple.
Ordovician	Red-purple.
Cambrian	Brick-red.
Algonkian	Brownish red.
Archean	Gray-brown.

Manuscript maps and other sheets pertaining to a folio, when completed by the author, are referred to the section of geologic maps for critical examination. The text is referred to the section of stratigraphic geology for critical reading, and is then read and prepared for the printer by the editor of texts. The maps and sections are carefully examined by the editor of geologic maps for errors, discrepancies, or omissions of any kind. Such errors may consist of either incorrect geologic interpretations or errors in drafting. Sometimes the geologic boundaries do not conform to the contours as the structure sections indicate that they should, or the sections do not accord with the map, or areas are colored incorrectly. Such errors can be detected only by one acquainted with geologic processes.

After the map is carefully examined from a geologic point of view it is scanned by a draftsman, who corrects imperfections in the drawing. This map, from which the engraving is to be made, must not be colored, as the application of color would distort the paper, and the engraving made from it would not fit the topographic base as it should. The colored geologic map, which is made for the editor's use only, is prepared on a photograph or other copy of the original map. The boundaries and faults and the mine, dip, and letter symbols are then engraved on the copper plate and proof is read in this section. In the plate-proof reading great care is taken to avoid omissions and other errors, as it is much easier to make corrections on the plate than on the stone, and the results of changes on the stone are usually not satisfactory and may necessitate the retransfer of the map. The legend is prepared and engraved separately and often requires much attention. If the explanation appearing in the legend is not clear the map is worthless. The legend must be precise and yet concise, as the space allotted to it is limited. Besides naming and describing the formations, it must show their age and their relation to one another as far as practicable.

When engraved the map and legend are transferred to stone and the combined proof is carefully compared with the manuscript map to see that the boundaries fit the contours properly. The colors and patterns which are to represent the geologic formations are next selected. The colors for the water-laid sedimentary rocks are predetermined by the color scheme and are the same throughout the United States for rocks of the same age. Formations of the same age are distinguished from one another by their patterns. No set rules are followed in selecting these, but the distinctions are better if dense and light patterns are alternated. It is desirable also to give the larger area the lighter patterns and the smaller ones the denser patterns. This practice can not always be followed, however, because the pattern selected for a formation in one area is used for that formation wherever it occurs, although relations may be different. The direction of the lines forming the line patterns is also a means of distinction, but though the same direction is maintained for a considerable area, yet a change is made to conform with some distinct change in sedimentation, such as an unconformity, if possible. For the igneous and the surficial sedimentary rocks there is greater freedom in selecting the colors, and it is on the skillful use of this liberty that variety of color in the map and pleasing effect largely depend.

After the colors to be used are determined, sheets are prepared for the guidance of the engraver, each sheet representing a stone from which a color is to be printed. On each sheet are shown in water colors the areas which are to be printed from this particular stone, different colors being used for the various patterns to be employed. If the areas are complicated the sheets are copied on a combined or check sheet in order to avoid omissions or duplications, as any change in pattern or area requires the modification of the stone—a difficult and often impossible task.

The color stones are then prepared and the proof in colors is read and compared with the sheets previously made. It is often found desirable to change some of the colors, to bring out distinctions or to harmonize harsh combinations which appear in the color proof. The precision of register, or fitting of the colors, on this map is little less than marvelous when one realizes the possibilities of error. On some maps as many as 27 colors are printed, and a slip in one of the printings would spoil the sheet. Among the sources of faults in register, change in the size of sheets of paper due to humidity is one of the most trying to overcome, as in a month—the time it takes to run through the printing presses a sheet with 27 colors, averaging about one color a day—the changes in humidity may be very great and are known to have caused a change of one-eighth of an inch in the length of a sheet. To overcome this trouble as far as possible the room in which the partly printed sheets are stored is kept at uniform temperature, the windows being closed the year round. A humidity-recording instrument is also kept in the room as an indicator of conditions.

The structure and columnar sections are usually prepared by the draftsmen of this section of the Survey, who copy the outlines of the draft submitted by the authors, but use a definite system of lithologic symbols to represent the kinds of rock, in this way obtaining uniformity of style and symbols. Thus, dots represent sand, sandstone, and quartzite, the coarseness being indicated by the size of the dots; parallel dashes represent clay, shale, and slate; parallel lines united here and there by short perpendicular lines to form rectangles represent limestone; irregularly placed dashes represent igneous rocks. For rocks intermediate between these types the appropriate patterns are combined.

The structure sections are engraved and transferred to blank strips left for them on the structure-section sheet, the outcrop of the formations on the sections corresponding with the boundaries on the map along the lines of the sections. Small strips of the lithologic symbols used in the sections are engraved in the corresponding blocks of the legend. Sheets are then colored for the sections similar to those prepared for the maps, and the color proofs are read. A portion of one of the geologic maps with section is shown in Pl. II (p. 30).

The cover of the folio not only serves the purpose of protecting the contained sheets, but bears on its front page an index map showing the location of the area mapped, and on its inside pages a description of the topographic map and a brief outline of geologic processes, intended to prepare the lay reader to understand the more detailed and somewhat technical description within.

The first of the final series of folios was completed in 1894. In the succeeding ten years 106 folios have been published, an average of over ten a year. Three of the folios each include maps representing four contiguous areas, and eight folios embrace two such contiguous areas each, so that in labor and time they represent a correspondingly larger number of ordinary folios. Seven folios contain special detailed maps of mining regions, and two more are in process of publication; eleven have special artesian-water maps. Three folios embracing large cities (New York, Chicago, and Washington) have been published.

A table of the published folios is given in the list of Survey publications.

Section of Topographic Maps.

When reading proofs, the author of a map which he has prepared without special editorial assistance, be he surveyor or compiler, like the author of a text, is apt to discover that he has omitted important data and that his manuscript is more or less indefinite, ambiguous, and inaccurate. Correction of engraved plates is more difficult and expensive than correction of ordinary type. Moreover, a cartographic output so large as that of the Geological Survey should exhibit uniformity and system as well as clearness and accuracy. For these reasons all topographic maps to be published by the Survey are critically examined by the editor of topographic maps before they are placed in the hands of the engraver.

At the beginning the Survey established a standard form and size for its atlas sheets. In a general way it prescribed the information which the sheets should bear and the manner of its expression, but the topographers of the small force exercised wide discretion as to details. As time went on and the organization grew in size and complexity the necessity increased for prescribing in greater detail the classes of facts which the maps should portray, for greater differentiation in the symbolism, and for closer adherence to the standards thus established. At first such editing as the topographic maps received was given them by the chiefs of the various sections of the topographic branch. Naturally there was lack of uniformity, and it was not long until the need of systematic editing became apparent. This resulted in 1894 in the appointment of an editor of topographic maps, to whom all manuscript atlas sheets were submitted before they were transmitted to the engraving division. Gradually, with more careful and systematic editing and proof reading, this section has grown until its personnel includes an editor and five assistants.

The routine at present is as follows: The topographic section chief transmits the manuscript topographic map, through the Director, to the editor of topographic maps, who becomes the custodian of such manuscript both before and after publication. In his office the manuscript receives systematic examination, after which it is returned to the chief of the topographic section for revision and the supply of further information where necessary. The editor also proofreads the prints from the copperplates, comparing them in detail with the manuscript, and transmits the final proof to the topographic branch for revision and approval before printing.

In order that nothing shall be overlooked in the editing of the topographic atlas sheets, a printed schedule is followed, which shows the subjects of examination ranged in the order of procedure. The examiner also provides himself with a photograph of the manuscript, on the scale of publication, on which he marks with red ink all changes, corrections, explanatory notes, and notes of instruction to the engravers.

He notes, first, whether the manuscript atlas sheet conforms to the standard in form, dimensions, scale, contents, and symbols. On the margins of the atlas sheet are printed certain explanatory names, notes, figures, legends, and diagrams, each of which must have its prescribed form and position. The matching of the sheet in hand with the adjoining sheets is next scrutinized in detail. When two or more atlas sheets of adjoining quadrangles are placed on a flat surface with their corresponding projection lines in contact they should form a continuous map without overlapping. Each line of the map extending from one sheet across the other should be continuous, and on each the same natural feature, public work, or political division should presumably bear the same name.

The editor rarely has available the data necessary to enable him to form a judgment as to the accuracy of the map in respect to topography, drainage, and culture. That would require field inspection. Often, however, by comparison with existing maps of the locality and other publications, he is able to criticise its correctness in some particulars and to detect the omission of certain public works which should be shown. By careful inspection of the drawing he may sometimes detect details of topography or drainage apparently improbable or impossible. The examination of these features of the map, however, is mainly for the purposes of seeing that the map is consistent within itself, of improving the placing and distribution of contour figures if advisable, and of interpreting in advance for the engravers details that might be obscure or doubtful.

For the verification of post-offices, railroads, and railway stations comparison is made with the United States post-route maps and Postal Guide, with railway guides and railway time-tables, and with other available sources of information. The United States land-survey system of township, range, and section lines and numbers, and to some extent the boundaries and names of land grants and reservations, are verified by comparison with the maps and plats in the General Land Office. The names and boundaries of Indian reservations, military reservations, forest reserves, and national-park reservations must be shown, and are verified by comparison with the Presidential proclamations establishing them and with such later ones as modify their boundaries.

The sources of information concerning the names and boundaries of the civil divisions include such official publications as reports and maps issued by boundary surveys and Census reports, as well as county atlases and maps and gazetteers.

The geographic nomenclature receives special attention. The editor sees that none of the prescribed nomenclature has been omitted and that all names are properly applied and correctly spelled. Then the placing of the names is examined, and such changes as will improve the appearance of the map and add to its clearness are indicated. When one compares a number of maps of the same region, made at different dates covering a considerable period of time, he will find that the same geographic name appears in variant forms and that different names are applied to the same feature. Concerning many of these, it will be found that, while the earlier maps display divergent usage, it is manifest from the more modern that usage has concentrated on some particular form or name. In other cases no evidence of an established usage will be found. The editor seeks to verify every geographic name. The various authorities available for this purpose are the maps, charts, and publications of the different Government surveys and bureaus, past and present, reports of exploring expeditions, railroad surveys, geologic reports, maps and reports of State geologic surveys and mining bureaus, local histories, reports of local historical societies, etc. When uncertainty arises as to the name of a feature or as to the form which the name should take, the different names and variant forms are compiled and the authorities cited. The origin or meaning of the name is sought and recorded, information concerning local usage is obtained through correspondence with local officials and residents, and the whole is referred to the United States Board on Geographic Names for a decision. The names of many minor geographic features are published for the first time on these atlas sheets. No effort is made to verify such a name unless by reason of its unusual form or other circumstance it excites distrust; then correspondence is opened to determine its correctness. Again, a natural feature of such size and importance as to justify the assumption that it has a name may be unnamed on the atlas sheet. Correspondence is the means by which this is determined.

An exhibit of the information gathered concerning a geographic name recently investigated in editing an atlas sheet will serve to illustrate the method pursued and the research necessary before a decision can be made intelligently. It also illustrates one phase of cooperation between the Survey and the Board on Geographic Names.

A cape on the eastern shore of Penobscot Bay, in Hancock County, Me., was named on the manuscript "Rosier;" and a post-office near by, "Cape Rosier." It took but little investigation to discover that the various maps of the region were not in accord as to the spelling of the name. Some spelled it Rosier, while others gave the form Rozier. A more searching examination and compilation of authorities resulted as follows:

ROSIER.—U. S. Geological Survey manuscript Castine sheet, 1900.
U. S. Coast and Geodetic Survey charts 104 and 310.
U. S. Coast and Geodetic Survey, Atlantic Coast Pilot, Part I, pp. 84, 85, 87, etc.
U. S. Light-House Board, List of Beacons, Buoys, and Day Marks, 1900.

ROZIER.—U. S. post-route map and Postal Guide (current).
Varney's Gazetteer of Maine, 1886, pp. 137, 138.
Colby's Atlas of Maine, 1885.

It was also learned that the cape was named in honor of a companion of Weymouth and the chronicler of his expedition to the coast of Maine in 1605. A search for his name was successful, as follows:

JAMES ROSIER.—Ancient Dominions of Maine, Sewall, 1859, pp. 35, 36, 60.
A Brief History of Maine, in Colby's Atlas, Dr. W. C. Lapham, 1885.
Narrative and Critical History of America, Winsor, Vol. III, pp. 81 and 191.
JAMES ROZIER.—Varney's Gazetteer of Maine, 1886, p. 137.

Correspondence with local authorities elicited the information that local usuage is very evenly divided between Rosier and Rozier; and one of the parties addressed cited the following additional authorities:

ROSIER.—Walling's Map of Maine, 1860.
Bangor Historical Society Magazine, Vol. II, No. 11.
ROZIER.—Maine Register.
JAMES ROSIER.—Bangor Historical Society Magazine, Vol. V, No. 12, p. 222.
Abbott's History of Maine, pp. 33, 35, 40, etc.
Maine Historical Society, series 2, vol. 2, index; 21 references.

This information was properly scheduled and submitted to the Board on Geographic Names for a decision. The Board adopted Rosier as the name of the cape and Cape Rosier as the name of the post-office.

The special and general maps made by the Survey receive a similar examination before engraving, and the necessary proof reading before publication. All of the maps intended to illustrate the various publications of the Survey in book form, whether made from its own surveys or compiled, are examined by the editor of topographic maps, with special reference to the geographic names thereon. During the calendar year 1903 there were 223 of these maps examined, this work involving the verification of about 35,000 names, in addition to other cultural and topographic features.

In the beginning the proof reading of prints from the engraved plates was done by various persons in the intervals of other work. On the appointment of an editor of topographic maps this work was placed under his supervision and has since been performed by a corps of trained proof readers. When the engraving of an atlas sheet has been completed a separate print is made from each of the three plates, and each of these is in turn compared, detail by detail, with the manuscript map. Errors and omissions are marked on the proofs, which are then returned to the engravers for correction of the plates. After correction another set of plate prints is made. On these the proof reader notes errors that may have been overlooked in the first proof reading or in the first correction of the plates. These also are returned to the engravers and the plates are again corrected. The engraving is then lithographed and proofs are printed with the three colors combined on one sheet. The combined proof is examined in detail by the proof readers, to see that the three colors are properly registered—that is, that the relative positions of the various details in the three colors are exactly as on the manuscript. Discrepancies are noted, and when satisfactory adjustment has been made the sheet is approved for printing.

Section of Illustrations.

Clear presentation of the subjects with which most scientific papers deal demands the use of illustrations, and many appear in the reports of the Survey. These illustrations are not selected for their pictorial value, but because they assist the reader to understand the text and the subject treated. In works on paleontology, for example, the need of illustrations is so great that it is necessary to figure each type, and often each species, in order to adequately describe its characteristics. For similar reasons the geologist illustrates his paper with structure sections, maps, and landscapes, in order that the reader may see, almost as well as if he were on the spot, the phenomena under consideration.

Prior to the beginning of the fiscal year 1884–85 no corps of artists or draftsmen was permanently employed in the Survey. The illustrations were prepared, suitable processes of reproduction were selected, and proofs were examined by one of the geologists (who was also an artist of exceptional ability), either personally or under his direct supervision, or by contract with persons specially qualified. In a few instances the geologists and paleontologists made their own drawings.

In a report to the Director dated July 13, 1885, the geologist in charge of illustrations stated: "During past years it has been the practice of the Survey to give out a large portion of the work of preparing illustrations to competent draftsmen not connected with the office. This method seemed to be open to objection, and, acting in accordance with instructions from you, I have, within the fiscal year, selected a number of draftsmen having especial qualifications for the work who have been regularly attached to the Survey. The results appear to be entirely satisfactory." This report led to the organization in 1885 of the section of illustrations.

At this time there were four draftsmen, including the chief, regularly employed. Other draftsmen were temporarily engaged under the direction of the persons for whom the drawings were made. The number of draftsmen now regularly employed is ten, including the chief. When there is exceptional demand, work is occasionally given out to draftsmen not connected with the Survey.

The section of illustrations and the section of texts necessarily cooperate during the preparation of the manuscript and the illustrations for a paper, in order to adjust the two parts. The originals from which illustrations are to be prepared generally consist of material of one or more of the following classes: Diagrammatic drawings (sections, etc.), geologic and other maps, photographic prints, geologic and paleontologic specimens, thin sections, and references or citations. The material belonging to the first and second classes is generally crude, and is used merely as a guide in preparing more elaborate and finished drawings. Each illustration is prepared with the twofold purpose of expressing the fact intended by the author and securing the best possible result in its reproduction by one of the numerous processes in use. This section decides upon the most suitable process of reproduction, writes specifications for the reproduction of each class, examines critically all proofs, keeps complete records and files, and gives attention to all other matters that pertain to the illustration of the various reports of the Survey.

In the early days of the section, as at the present time, drawings were prepared in accordance with the demands of the various reproductive processes in vogue. Photography had not reached its present perfection, and up to the year 1884 the majority of such illustrations were engraved on wood. On referring to any of the reports published prior to that date one will observe a marked deficiency in the scientific value of the illustrations engraved by that process, as compared with more recent reproductions of similar subjects—a lack of value due to the fact that hand work entered too largely into the former. Moreover, the woodcut process was relatively expensive. The 76 woodcuts used in the Seventh Annual Report of the Survey cost $4,825, whereas similar illustrations reproduced by the half-tone process would probably cost less than $600. But as artistic illustrations in the broader sense, many of the woodcuts in the earlier reports stand as examples of exceptional merit in selection and execution.

The half-tone process began to be used for the reproduction of photographs and drawings in 1884. This process has gradually worked into favor, and has revolutionized the illustration of all kinds of literature. Its use has also effected many changes in methods of preparation, and at the present time photographs are used (whenever suitable prints can be obtained) in preference to drawings. It is also used in numerous ways when drawings must be made, and is not only a timesaver, but adds to the element of accuracy in the finished drawing. In other words, new conditions have so modified methods of preparation of illustrations that complete new drawings of certain classes of subjects rarely become necessary. There is still, however, abundant need for skill in the artistic treatment of illustrations, whether in preparing new designs or in "building up" or retouching photographic prints.

During the calendar year 1903 illustrations were prepared and transmitted for the following publications: Three annual reports, 2 monographs, 9 bulletins, 10 water-supply papers, 12 professional papers, and 2 volumes on mineral resources; in all, 1,168 illustrations, many of which represented groups of separate drawings. In addition to these, hundreds of drawings were prepared within the year which still await transmittal to the engravers.

The processes at present used for the reproduction of illustrations for Survey reports are chromolithography, photolithography, photogelatin, half-tone, zinc etching, wax engraving, and the three-color process. In the preparation of illustrations both economy in preparation and economy in reproduction must be considered. Some processes call for carefully prepared drawings, while others require only the crudest kind of copy. The total cost to the Government is approximately the same whether the drawing is elaborated and refined in the office or the elaboration is left to the reproducer. In deciding the question in any given case the points considered are urgency in getting out the report, quality of result desired, and character of subject.

An important feature in connection with illustrations is that of censorship. An author, thoroughly imbued with his subject, is apt to submit originals, especially photographs, in excess of the needs of his paper. In order to correct this tendency, a committee composed of officers of the Survey, and of which the chief of the section of illustrations is chairman, examines the original material submitted by authors, with a view to the elimination of all superfluous or irrelevant matter.

Section of Photography.

Photography has always been an important adjunct in the work of the United States Geological Survey, and its scope and usefulness have constantly increased. Before dry plates and paper films came into use the work in photography was largely that of recording exploratory and scenic views. The wet-plate process required such bulky apparatus, so much time and labor, and such skill in manipulation of camera and chemicals that its use was practically confined to large parties and to comparatively accessible localities. However, in spite of these disadvantages, a large amount of valuable work, both in field and in office, was done. Indeed, it is not too much to say that many of these early negatives are unsurpassed in scenic value.

With the advent of dry plates and small cameras the use of photography in the field work of both geologist and topographer rapidly increased. Instead of the one photographer with his glass plates and his array of bottles and pans and cumbrous developing tent or box—barely tolerated in a geologic party and abominated in a topographic party—almost every party chief now has his dry-plate or film camera, and is encouraged to photograph every subject germane to his work, thus adding immensely to the volume, accuracy, and value of his field observations.

As great improvement has been made in office or laboratory methods as in field. This is especially the case in the development of negatives, by which an almost hopeless field exposure can be made to give creditable results, a dim pencil sketch be reproduced on any desired scale, or a fossil brought out so as to eliminate all effects of color and show only its form and markings.

The photographic laboratory of the Geological Survey is equipped with the most modern appliances. Daylight exposures are no longer made, so that the work of copying maps progresses regardless of sunshine. Two large cameras are used in this work. The maps to be copied are stretched on adjustable frames attached to the walls, each illuminated by two powerful arc lamps which are operated by the photographer from his position at the camera. The camera rolls on tracks and may be elevated or depressed or moved forward or backward for focusing or for procuring reductions to fixed scale, all from one position behind the instrument. In like manner, printing is no longer dependent upon sunlight, but the negative to be printed is held under pressure in a quick-acting frame on trucks, on which it is tilted so as to expose it to an electric light for a few seconds, after which the frame falls back into position and flies open, when the print is removed and a new sensitized sheet is inserted. This process is so rapid that as many as 150 prints from a negative have been made in an hour.

In the Geological Survey photography readily groups itself into field work and laboratory work. It is all under control of a chief photographer, whose powers differ in each branch of the work. To the person using a camera in the field he gives instruction and advice, sees that the instruments purchased are such as are best adapted to the desired work, and that they are kept in repair and issued on proper requisitions. Here his functions cease. He can neither select the views, place the camera, nor time the exposure. He must accept the results brought to him by the field force of the Survey, upon whom the only restriction placed is that the subjects photographed shall be germane to the work in hand. Generally the exposed negatives are sent to the Survey laboratory for developing, but frequently the user of a camera develops his negatives in the field, or has them developed by a local photographer, in order that the results may be immediately known. It often happens that such work is poor, judged by the standard established in the laboratory, but probably the advantage of immediately knowing whether a negative of sufficient value to be used has been procured more than compensates for the inferior quality.

A record of all exposures made in the field is kept according to forms arranged for the purpose. These forms give a brief description of the locality and subject, condition of light, length of exposure, aperture of lens, and the field number of the negative, and must accompany all plates or films sent to the laboratory from parties in the field or turned in on their return. They furnish the data from which is made a permanent office record of all negatives that are of sufficient value to be preserved.

All work in the laboratory is done in pursuance of card requisitions made by the division or section chief, countersigned by the chief clerk. This requisition specifies the character and amount of work to be done and the use for which the thing required is intended, and must be accompanied by the subject to be photographed. Upon its receipt by the photographic section the card is given a serial number and filed, and the requisition is then referred to the proper subsection, to await its turn. When the work is completed the card is returned to the person making the requisition, accompanied by the thing required, who inspects it and receipts for it on the card, which is then filed for a permanent record.

The work done in the laboratory falls into four general classes—map, dry plate, specimen work, and printing—and to each of these classes experts are assigned.

If the requisition calls for the reproduction, on either the same, an enlarged, or a reduced scale, of a field map, a county or State map, or some rare chart of early explorations, it is assigned to the map section. Here cameras accommodating plates up to 34 by 34 inches in size are used, and the negatives are made by the wet process. These cameras are mounted on tracks and are worked by slow movement, so that prints of the exact size required can be obtained. In this section two men are constantly employed in making negatives and one in washing and preparing glass. If the requisition calls for the developing of plates or films, it goes to the dry-plate section, where two men are engaged in this work. If a fossil or mineral is to be photographed, it is referred to the specimen section, where photo-micrographic and other special apparatus is used. After negatives are made or developed they are turned over to the printing section, where the specified number of prints are made upon the paper desired. If a negative is of sufficient importance to be preserved, a permanent number is given it and it is filed for future use. Prints from such negatives are preserved for ready inspection in indexed albums, and more copies are made as desired.

The photographic section has now on file about 25,000 negatives and nearly 4,000 lantern slides. A considerable number of the negatives were made by the Powell and Hayden surveys, and constitute an invaluable record of early explorations. The remainder were made by the Geological Survey, by far the larger part since the introduction of the dry-plate process. At the organization of the Geological Survey one photographer and one assistant were employed, and these were engaged almost exclusively in field work. In 1903 the force consisted of a section chief and 8 assistants, employed almost exclusively in the laboratory, while about 75 cameras were used in the field. To obtain a just conception of the present use of photography in the Geological Survey, this increase of force must be considered in connection with the immense advantage gained by the use of electric light.

DIVISION OF ENGRAVING AND PRINTING.

At first the appropriations for engraving and printing the topographic and geologic maps were under the control of the Public Printer, and the work was done under contract by the lowest responsible bidders. This practice was never entirely satisfactory. It not only resulted in lack of uniformity in the maps, but the system of letting contracts to the lowest bidder tended toward a low standard and poor work. When, in 1887, it became evident that the old classification and color symbolism for the geologic maps must be abandoned, the necessity for extensive study of and experimentation with colors and processes became manifest, in order that a satisfactory and enduring scheme might be devised and established. To such purpose the contract system could not be adapted, and it was seen to be necessary to establish within the Survey a division of engraving and printing.

The first legislative step in this direction was taken when Congress, by act of March 2, 1889, made an appropriation of $45,000 for engraving and printing the maps of the Geological Survey and placed the same under the control of the Director. The next step was the selection and appointment, in February, 1890, of a chief engraver, to organize within the Survey a division of engraving and printing.

At the end of the first year the division employed 6 persons and occupied one room on the fifth floor of the office building and a small room on the fourth floor for printing purposes. Its machinery consisted of two hand lithographic presses and one copperplate press. Within two years it had become necessary for it to occupy the greater part of the fifth floor, for the number of its employees had increased to 12, and the machinery of the plant had increased correspondingly. At the end of the fourth year the plant had grown to such proportions that it required a separate building, and in September, 1893, it became possible to secure one. In ten years the appropriation had increased to $60,000, and the number of employees to 68, and the building had been enlarged to double its original size. At present the appropriation is $100,000 per annum and the number of employees is 85, consisting of copperplate engravers, stone engravers, electrotypers, lithographers, lithographic printers, photolithographers, typesetters and type printers, and experts in the various processes of color printing, together with necessary assistants and laborers. The building occupied contains 18,540 square feet of floor space, and is equipped with the most modern machinery, each machine being operated by its own electric motor.

The plant consists of 7 power lithographic presses, 2 type presses, 10 hand lithographic presses, stone planer, paper cutter, stitching machine, standing press, and a full equipment of tools and instruments necessary in the work.

During the present year (1904) expansion of the division is once more in progress because of the increased work and appropriation. To gain time for proper reorganization and the selection of the additional expert workmen necessary, and, in the meantime, to meet largely increased demands, it has once more become necessary to have the engraving of a small number of topographic atlas sheets done by private parties, but in every respect the plates will be uniform with those engraved in the office. The expedient is but temporary, and it is expected that at the end of a few months the office force will again be equal to all demands.

Copperplate engraving is the fundamental and chief art or process employed in reproducing the topographic maps, and to this all the others are auxiliary. Though its first cost is greatest, it is the most accurate and the only method of reproduction which admits of multiplication by electrotyping. As the topographic atlas sheets are printed in three colors—blue, brown and black—representing respectively drainage, relief, and culture features, the engraving must be done in part on each of three copper plates.

The manuscript drawing, which is to be reproduced on the plates, is usually in three colors and on a scale somewhat larger than that of the engraving. Preliminary to engraving a sheet, a true copy on the scale of publication must in some way be transferred to each of the three copper plates. There are several methods by which this may be done. That formerly in use required that a thin sheet of transparent celluloid or gelatine be placed over the drawing—provided it were on the scale of publication, otherwise, over a photograph reduced to scale—and that an expert trace every line, cutting it into the celluloid or gelatine. These lines were filled with sulphur, and by burnishing, were stained on the copperplates. The process was tedious and comparatively expensive, and, like all manual work, was subject to errors and omissions.

The process now in use is photomechanical and was devised a few years ago by employees of this office. By this process the lines from a photographic negative of the manuscript map are stained on the copper plates and an absolutely accurate reproduction of the original is produced at a cost which is trifling in comparison with hand tracing. When the engraving has been completed an impression of each of the engraved plates is transferred to a lithographic stone, and from these stones the maps are printed. These arts and processes—photographing, engraving, lithographing, and printing—are all applied within the division.

The base of the geologic map is the topographic map. The topographic base once engraved, the additional copperplate engraving required for the geologic folio is comparatively small. At first it was necessary to engrave many plates of designs for color printing. But the number of these designs is limited, and, once engraved, the pattern plates may be used indefinitely by transferring to lithographic stones areas to fit any required boundaries and printing in any desired colors. For the geologic atlas sheet, however, the cultural or black plate of the topographic sheet is electrotyped, and upon this electrotype are engraved geologic boundaries, symbols, formation letters, and other data. The structure sections and columnar sections also are engraved. Each folio includes, besides these, descriptive text, which requires the application of the typesetting and type-printing art. Therefore, in producing a geologic folio, recourse is had to the arts of photography, engraving, electrotyping, type setting and type printing, stone engraving, stone transferring, photolithography, and other similar arts, the greatest portion of the work falling upon the lithographic branch.

At various times different processes have been tried for map reproducing, but the only important one to become permanent is photolithography. This is used to great advantage in making available new maps prior to their engraving, in publishing maps for special purposes, in reproducing land plats, and in aiding topographers and draftsmen to make reductions and compilations, as well as for many other purposes.

When appointed, the chief engraver was made the custodian of the engraved copperplates for 240 topographic atlas sheets, the plates of a wall map of the United States, and those of a wall map of Massachusetts, which had been engraved under the contract system. The first of these contracts was awarded to a New York firm for the engraving of 100 atlas sheets, in 1884, and during the next five years these 240 sheets were engraved.

The energies of the new division were at first devoted largely to correcting the plates already engraved, to engraving color-pattern plates, and to experimentation for the geologic maps. Though the engraving of topographic atlas sheets by contract was continued for five years more, the proportion engraved in the office grew rapidly from year to year. In the first year of its organization only two atlas sheets were engraved in the office; during the third year one-third of all the engraving was done in the office; at the end of five years (July 1, 1894) the last contract had been completed, and since then practically all the work has been done in the division.

In the fiscal year 1889–90 there were engraved by the division 2 topographic atlas sheets; ten years later, in 1899–1900, there were engraved 72 sheets; last year (1902–3), 101. The total number of such plates engraved by contractors and office force to date is 1,450.

The cost of printing from the engraved plates is comparatively small, yet for a number of years there was no provision of law by which the topographic atlas sheets could be published for general distribution. Only small editions for office use could be printed, and under this authority an office edition of 250 copies of each sheet was printed as soon as the plate had been engraved. This condition existed, with a growing demand, until February 18, 1897, when Congress authorized the publication and distribution by sale of the topographic atlas sheets at a price which would cover the cost of printing and materials. Since that time, under a stimulating demand, the size of the editions has been increased to 3,000. Even these large editions are rapidly exhausted and frequent reprints are necessary to supply the demand.

The first year after the organization of this division 26,000 copies of all topographic sheets were printed. Ten years later the number of printed copies had increased to 533,655. The total printed to date has been 3,434,424.

The first folios of the Geologic Atlas of the United States were published in the fiscal year 1892–93, which was the fourth year of the existence of the division. These four years were devoted largely to study and experimentation with colors, patterns, symbols, and processes of geologic notation. At the time mentioned the necessary pattern plates had been engraved, six folios had been published, and others were under way. A folio contains several pages of text, a topographic atlas sheet, an areal geology sheet, an economic geology sheet, a sheet of (geologic) structure sections, and a sheet of columnar sections; and sometimes an artesian-water sheet, a soil sheet, a forestry sheet, or a special illustration sheet, the latter consisting usually of half-tone prints from nature illustrative of geologic phenomena.

Each geologic map is a topographic map which has been overprinted with from 3 to 27 colors, either in flat tints or in patterns. During the year 1902–3, or ten years after the issuance of the first geologic folios, there were 14 published. The total number published to date is 100.

The total number of copies of all geologic folios printed in 1892–93 was 3,000. In 1902–3 there were printed 73,080 copies. The total number printed to date is 484,958.

Incidental to the publication of the topographic and geologic atlas sheets, which is the main function of the division, a large and growing volume of miscellaneous engraving and printing has been done. Much of this is intended for general distribution, but some part of it is designed primarily for office use. It includes index maps, notices and circulars in ordinary type and with map illustrations, pamphlets, photolithographs of maps enlarged or reduced for various purposes, Land Office plats, maps of the entire United States on different scales, the supplying of transfers from engraved plates to contracting firms for illustrating Survey papers, and the printing of special editions of maps for States cooperating with the Geological Survey. The total number of copies of this miscellaneous matter printed in 1903 was 220,000.

DIVISION OF DOCUMENTS.

All Survey publications, when delivered by the printer, are received by the chief of the division of documents, who receipts for and is custodian of them, and distributes them in accordance with law.

The chief clerk assumed charge of documents—principally those of former surveys—until 1882, when this duty was assigned to the librarian. In 1893, owing to the growth of the library, a division of documents and stationery was created, under the direction of a chief, aided by several assistants. This organization continued until May, 1901. when the present division of documents was established.

At first the stock of publications was stored on the top floor of the northeast tower of the National Museum, in which the Survey offices were located. In 1883 additional quarters were obtained in the attic of a business building. Since 1884, when the Geological Survey first occupied its present quarters, all documents have been stored in the basement of the same building.

The law requires that some of the Survey publications shall be sold and the money be turned into the Treasury; that others may be exchanged for the scientific publications of individuals and institutions; that others shall be sent to designated public libraries and institutions; and that still others shall be distributed free. The record of all these transactions is voluminous. Excepting topographic maps and geologic folios, Members of Congress receive and distribute their quotas of Survey documents through the Congressional folding and document rooms.

The growth of the Survey, its value as a factor in the development of the economic resources of the country, and the service it renders the people are shown by the many thousand letters received yearly requesting the publications of the Survey; and the number is constantly increasing. Through this correspondence the office comes directly in contact with the public. As it is the unvarying practice to answer all communications, the correspondence and other duties of this section, which at first occupied but a small portion of the time of the chief clerk, now require the services of a chief of division and 11 assistants. During the fiscal year 1881–82 about 3,700 communications were answered, while in 1902–3 the number mailed was 109,686.

In 1897 Congress enacted laws providing for the distribution, by sale, of the map sheets of the topographic atlas of the United States. Since that time the number of maps distributed yearly has rapidly increased. In the fiscal year 1896–97 returns from sales of topographic maps amounted to $505.77; in the year 1902–3 the sum was $7,071.50.

Over 1,300 maps are now carried in stock. The maps are stored according to geographic sections, so as to facilitate the filling of orders. Many of the orders are vague and uncertain, and frequent recourse must be made to gazetteers, guides, and other reference books to locate the regions for which maps are wanted.

At the beginning a card-index system of record was devised. On the cards are recorded, as required by law, the addresses of those to whom documents have been sent, what documents were sent, dates of sending, etc.

To facilitate the distribution of the topographic maps, and for the convenience of the public, the Survey has appointed agents in the different States. These now number 76. The agents agree to carry in stock maps of areas in their immediate vicinity. This enables persons who have need of maps to make personal examination of them before purchasing, and to procure copies at once, avoiding the delay incident to correspondence.

To give adequate publicity regarding the documents and maps issued by the Survey, card notices and circulars were formerly prepared and mailed to correspondents, scientists, and others interested, the mailing occupying a considerable portion of the time of one clerk. It was soon learned, however, that the press of the country would be glad to print news items and short notices of publications, and since 1902 the Survey has prepared and issued weekly a press bulletin. The work connected therewith was assigned to the document division, and an editorial clerk was appointed to prepare the news notes and review notices.

Prior to June 30, 1903, nearly 4,000,000 copies of publications, folios, and maps were distributed by the document division. Of that number 2,716,652 were distributed during the last five years, while in the five years prior the number was 966,875, a total of 3,683,527 for ten years, or 92 per cent of the entire distribution during the twenty-five years the Survey has been in existence. During the fiscal years 1899–1903, a period of four years, 346,119 letters were mailed by the document division, this being over 50 per cent of the entire number sent prior thereto. These statements attest the growing public interest in the work of and the results achieved by the Survey.

PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY.

Following are complete lists, to date, of the serial publications of the United States Geological Survey, which consist of (1) Annual Reports, (2) Monographs, (3) Professional Papers, (4) Bulletins, (5) Mineral Resources, (6) Water-Supply and Irrigation Papers, (7) Topographic Atlas of United States—folios and separate sheets thereof, (8) Geologic Atlas of United States—folios thereof.

The Bulletins, Professional Papers, and Water-Supply Papers treat of a variety of subjects, and the total number issued is large. They have therefore been classified into the following series: A, Economic geology; B, Descriptive geology; C, Systematic geology and paleontology; D, Petrography and mineralogy; E, Chemistry and physics; F, Geography; G, Miscellaneous; H, Forestry; I, Irrigation; J, Water storage; K, Pumping water; L, Quality of water; M, General hydrographic investigations; N, Water power; O, Underground waters; P, Hydrographic progress reports. A table showing the papers of each series is given on pages 148 and 149.

The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. It is impossible to comply with general demands for the publications which are distributed free, such as to have all of any series sent, but requests for a certain paper are granted whenever practicable. No person will be given more than one copy of any publication. Many of the publications of the Survey are out of print, but these can usually be obtained from dealers in second-hand books in any large city.

For publications to which prices are affixed prepayment is required, and should be made in cash (exact amount) or by postal or express money order payable to the Director of the United States Geological Survey. Checks, stamps, or foreign coin can not be accepted. Full address, including *county*, should be given. Address all communications to THE DIRECTOR, U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C.

ANNUAL REPORTS.

First Annual Report of the United States Geological Survey, by Clarence King, Director. 1880. 8°. 79 pp. 1 map. (Out of stock.)

A preliminary report, describing plan of organization and publications.

Second Annual Report of the United States Geological Survey, 1880–81, J. W. Powell, Director. 1882. 8°. lv, 588 pp., 62 pls., 1 map. (Out of stock.)

Report of the Director, pp. xi–lv, pls. i–vii.
Administrative reports by heads of divisions, pp. 3–46, pls. viii–ix.
Physical geology of Grand Canyon district, by C. E. Dutton, pp. 47–166, pls. x–xxxvi.
Contributions to history of Lake Bonneville, by G. K. Gilbert, pp. 167–200, pls. xxxvii–xliii.
Abstract of report on geology and mining industry of Leadville, Colo., by S. F. Emmons, pp. 201–290, pls. xliv–xlv.
Summary of geology of Comstock lode and Washoe district, by G. F. Becker, pp. 291–330, pls. xlvi–xlvii.
Production of precious metals in the United States, by Clarence King, pp. 331–401, pls. xlviii–liii.
A new method of measuring heights by means of the barometer, by G. K. Gilbert, pp. 403–566, pls. liv–lxii.
Index, pp. 567–588.

Third Annual Report of the United States Geological Survey, 1881–82, J. W. Powell, Director. 1883. 8°. xviii, 564 pp., 67 pls. (Out of stock.)

Report of the Director, pp. xv–xviii.
Administrative reports of chiefs of divisions, pp. 1–41, pls. i–ii.
Birds with teeth, by O. C. Marsh, pp. 45–88.
Copper-bearing rocks of Lake Superior, by R. D. Irving, pp. 89–188, pls. iii–xvii.
Sketch of geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada, by I. C. Russell, pp. 189–235, pls. xviii–xxiii.
Abstract of report on geology of Eureka district, Nevada, by Arnold Hague, pp. 237–290, pls. xxiv–xxv.
Preliminary paper on terminal moraine of second Glacial epoch, by T. C. Chamberlin, pp. 291–402, pls. xxvi–xxxv.
A review of the nonmarine fossil Mollusca of North America, by C. A. White, pp. 403–550, pls. 1–32.
Index, pp. 551–564.

Fourth Annual Report of the United States Geological Survey, 1882–83, J. W. Powell, Director. 1884. 8°. xxxii, 473 pp., 85 pls. (Out of stock.)

Report of Director, pp. xiii–xxxii, pl. i.
Administrative reports of chiefs of divisions, pp. 1–72.
Hawaiian volcanoes, by C. E. Dutton, pp. 75–219, pls. ii–xxx.
Abstract of report on mining geology of Eureka district, Nevada, by J. S. Curtis, pp. 221–251, pls. xxxi–xxxiii.
Popular fallacies regarding precious-metal ore deposits, by Albert Williams, jr., pp. 253–271.
Review of the fossil Ostreidæ of North America; and a comparison of the fossil with the living forms, by C. A. White, with appendixes by Angelo Heilprin and John A. Ryder, pp. 273–430, pls. xxxiv–lxxxii.
Geological reconnaissance in southern Oregon, by I. C. Russell, pp. 431–464, pls. lxxxiii–lxxxv.
Index, pp. 465–473.

Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. 8°. xxxvi, 469 pp., 58 pls. (Out of stock.)

Report of the Director, pp. xvii–xxxvi, pls. i–ii.
Administrative reports of chiefs of divisions, pp. 1–66.
Topographic features of lake shores, by G. K. Gilbert, pp. 69–123, pls. iii–xx.

Fifth Annual Report of the United States Geological Survey—Continued.

Requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. xxi.
Preliminary paper on an investigation of Archean formations of Northwestern States, by R. D. Irving, pp. 175–242, pls. xxii–xxxi.
The gigantic mammals of the order Dinocerata, by O. C. Marsh, pp. 243–302.
Existing glaciers of the United States, by I. C. Russell, pp. 303–355, pls. xxxii–lv.
Sketch of paleobotany, by L. F. Ward, pp. 357–452, pls. lvi–lviii.
Index, pp. 453–469.

Sixth Annual Report of the United States Geological Survey, 1884–85, J. W. Powell, Director. 1885. 8°. xxix, 570 pp., 65 pls. (Out of stock.)

Report of the Director, pp. xv–xxix, pls. i–iii.
Administrative reports of chiefs of divisions, pp. 1–101, pls. iv–x.
Mount Taylor and the Zuñi Plateau, by C. E. Dutton, pp. 105–198, pls. xi–xxii.
Preliminary paper on driftless area of upper Mississippi Valley, by T. C. Chamberlin and R. D. Salisbury, pp. 199–322, pls. xxiii–xxix.
Quantitative determination of silver by means of the microscope, by J. S. Curtis, pp. 323–352, pl. xxx.
Preliminary report on seacoast swamps of eastern United States, by N. S. Shaler, pp. 353–398.
Synopsis of flora of Laramie group, by L. F. Ward, pp. 399–557, pls. xxxi–lxv.
Index, pp. 559–570.

Seventh Annual Report of the United States Geological Survey, 1885–86, J. W. Powell, Director. 1888. 8°. xx, 656 pp., 71 pls. (Out of stock.)

Report of the Director, pp. 3–42.
Administrative reports of chiefs of divisions, pp. 43–143, pls. i–vii.
Rock-scorings of the great ice invasions, by T. C. Chamberlin, pp. 147–248, pl. viii.
Obsidian Cliff, Yellowstone National Park, by J. P. Iddings, pp. 249–295, pls. ix–xviii.
Report on geology of Marthas Vineyard, by N. S. Shaler, pp. 297–363, pls. xix–xxix.
On classification of early Cambrian and pre-Cambrian formations, by R. D. Irving, pp. 365–454, pls. xxx–li.
Structure of Triassic formation of Connecticut Valley, by W. M. Davis, pp. 455–490, pl. lii.
Salt-making processes in the United States, by T. M. Chatard, pp. 491–535, pls. liii–lv.
Geology of head of Chesapeake Bay, by W J McGee, pp. 537–646, pls. lvi–lxxi.
Index, pp. 647–656.

Eighth Annual Report of the United States Geological Survey, 1886–87, J. W. Powell, Director. 1889. 8°. 2 pt. xix, 474, xii pp., 53 pls.; ii, 475–1063 pp., 23 pls. (Out of stock.)

Pt. I. Report of the Director, pp. 1–93, pl. i.
Administrative reports of chiefs of divisions, pp. 95–257, pls. ii–xv.
Quaternary history of Mono Valley, California, by I. C. Russell, pp. 261–394, pls. xvi–xliv.
Geology of Lassen Peak district, by J. S. Diller, pp. 395–432, pls. xlv–li.
Fossil butterflies of Florissant, by S. H. Scudder, pp. 433–474, pls. lii, liii.
Index, pp. i–xii.

Pt. II. The Trenton limestone as a source of petroleum and inflammable gas in Ohio and Indiana, by Edward Orton pp. 475–662, pls. liv–lx.
Geographical distribution of fossil plants, by L. F. Ward, pp. 663–960, pl. lxi.
Summary of geology of quicksilver deposits of Pacific slope, by G. F. Becker, pp. 961–985, pls. lxii–lxiii.
Geology of the island of Mount Desert, Maine, by N. S. Shaler, pp. 987–1061, pls. lxiv–lxxvi.
Index, p. 1063.

Ninth Annual Report of the United States Geological Survey, 1887–88, J. W. Powell, Director. 1889. 8°. xiii, 717 pp., 88 pls. (Out of stock.)

Report of the Director, pp. 1–46.
Administrative reports of chiefs of divisions, pp. 47–199, pls. i–vi.
The Charleston earthquake of August 31, 1886, by C. E. Dutton, pp. 203–528, pls. vii–xxxi.
Geology of Cape Ann, Massachusetts, by N. S. Shaler, pp. 529–611, pls. xxxii–lxxvii.
Formation of travertine and siliceous sinter by the vegetation of thermal springs, by W. H. Weed, pp. 613–676, pls. lxxviii–lxxxvii.
On geology and physiography of a portion of northwestern Colorado and adjacents parts of Utah and Wyoming, by C. A. White, pp. 677–712, pl. lxxxviii.
Index, pp. 713–717.

Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 8°. 2 pt. (Out of stock.)

Pt. I. Geology, xv, 774 pp., 98 pls.
Report of the Director, pp. 1–80, pls. i–v.
Administrative reports of chiefs of divisions, pp. 81–252.
General account of the fresh-water morasses of the United States, with a description of the Dismal Swamp district of Virginia and North Carolina, by N. S. Shaler, pp. 255–339, pls. vi–xix.
The Penokee iron-bearing series of Michigan and Wisconsin, by R. D. Irving and C. R. Van Hise, pp. 341–507, pls. xx–xlii.
Fauna of the Lower Cambrian or Olenellus zone, by C. D. Walcott, pp. 509–763, pls. xliii–xcviii.
Index, pp. 765–774.
Pt. II. Irrigation, viii, 123 pp.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 8°. 2 pt. (Out of stock.)

Pt. I. Geology, xv, 757 pp., 66 pls.
Report of the Director, pp. 1–30, pl. i.
Administrative reports of chiefs of divisions, pp. 31–185.
Pleistocene history of northeastern Iowa, by W J McGee, pp. 189–577, pls. ii–lxi.
Natural gas field of Indiana, by A. J. Phinney, with an introduction by W J McGee, pp. 579–742, pls. lxii–lxvi.
Index, pp. 743–757.
Pt. II. Irrigation, xiv, 395 pp., 30 pls. and maps.
Hydrography, pp. 1–110, pl. lxvii–xcvi.
Engineering, pp. 111–200.
The arid lands, pp. 201–289.
Topography, pp. 291–343.
Irrigation literature, pp. 345–388.
Index, pp. 389–395.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 8°. 2 pt. (Out of stock.)

Pt. I. Geology, xiii, 675 pp., 53 pls.
Report of the Director, pp. 1–19, pl. i.
Administrative reports of chiefs of divisions, pp. 21–210.
Origin and nature of soils, by N. S. Shaler, pp. 213–345, pls. ii–xxxi.
The Lafayette formation, by W J McGee, pp. 347–521, pls. xxxii–xli.
The North American continent during Cambrian time, by C. D. Walcott, pp. 523–568, pls. xlii–xlv.
Eruptive rocks of Electric Peak and Sepulchre Mountain, Yellowstone National Park, by J. P. Iddings, pp. 569–664, pls. xlvi–liii.
Index, pp. 665–675.
Pt. II. Irrigation, xviii, 576 pp., 93 pls.
Location and survey of reservoir sites, by A. H. Thompson, pp. 1–212, pls. liv–lvii.
Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. lviii–cvi.
Irrigation in India, by H. M. Wilson, pp. 363–561, pls. cvii–cxlvi.
Financial statement, pp. 562–568.
Index, pp. 569–576.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. [Pts. II and III, 1893.] 8°. 3 pt. (Out of stock.)

Pt. I. Director's report and report of chiefs of divisions, vii, 240 pp., 2 pl.
Report of the Director, pp. i–vii, 1–66, pls. i–ii.
Administrative reports of chiefs of divisions, pp. 67–235.
Index, pp. 237–240.
Pt. II. Geology, x, 372 pp., 105 pls.
Second expedition to Mount St. Elias, by I. C. Russell, pp. 1–91, pls. iii–xxi.
Geological history of harbors, by N. S. Shaler, pp. 93–209, pls. xxii–xlv.
Mechanics of Appalachian structure, by Bailey Willis, pp. 211–281, pls. xlvi–xcvi.
Average elevation of the United States, by Henry Gannett, pp. 283–289, pl. cvii.
The Rensselaer grit plateau in New York, by T. N. Dale, pp. 291–340, pls. xcvii–ci.
American Tertiary Aphidæ, by S. H. Scudder, pp. 341–366, pls. cii–cvi.
Index, pp. 367–372.

Thirteenth Annual Report of the U. S. Geological Survey, etc.—Continued.

Pt. III. Irrigation, xi, 486 pp., 77 pl.

Water supply for irrigation, by F. H. Newell, pp. 1-99, pls. cviii-cx.

Results of operations of engineering branch of irrigation survey for fiscal year ending June 30, 1890, by H. M. Wilson, pp. 101-349, pls. cxi-cxlvi.

American irrigation engineering, by H. M. Wilson, pp. 351-427, pls. cxlvii-clxxxii.

Report upon construction of topographic maps and selection of reservoir sites in basin of Arkansas River, by A. H. Thompson, pp. 429-444.

Report upon location and survey of reservoir sites during fiscal year ending June 30, 1892, by A. H. Thompson, pp. 445-478, pls. clxxxiii-clxxxiv.

Index, pp. 479-486.

Fourteenth Annual Report of the United States Geological Survey, 1892-93, J. W. Powell, Director. 1893. [Pt. II, 1894.] 8°. 2 pt. (Out of stock.)

Pt. I. Director's report and report of chiefs of divisions, vi, 321 pp., 1 map.

Report of the Director, pp. 11-165, 1 map (in pocket).

Administrative reports of chiefs of divisions, pp. 167-318.

Index, pp. 319-321.

Pt. II. Accompanying papers, xx, 597 pp., 73 pls.

Potable waters of Eastern United States, by W J McGee, pp. 1-47.

Natural mineral waters of the United States, by A. C. Peale, pp. 49-88, pl. iii-iv.

Results of stream measurements, by F. H. Newell, pp. 89-155, pl. v-vi.

Laccolitic mountain groups of Colorado, Utah, and Arizona, by Whitman Cross, pp. 157-241, pls. vii-xvi.

Gold-silver veins of Ophir, California, by Waldemar Lindgren, pp. 243-284, pls. xvii-xviii.

Geology of the Catoctin belt, by Arthur Keith, pp. 285-395, pls. xix-xxxix.

Tertiary revolution in topography of Pacific coast, by J. S. Diller, pp. 397-434, pls. xl-xlvii.

Rocks of Sierra Nevada, by H. W. Turner, pp. 435-495, pls. xlviii-lix.

Pre-Cambrian igneous rocks of the Unkar terrane, Grand Canyon of the Colorado, Arizona, by C. D. Walcott; with notes on the petrographic character of the lavas, by J. P. Iddings, pp. 497-524, pls. lx-lxv.

On the structure of the ridge between the Taconic and Green Mountain ranges, Vermont, by T. N. Dale, pp. 525-549, pls. lxvi-lxx.

Structure of Monument Mountain, Great Barrington, Mass., by T. N. Dale, pp. 551-565, pls. lxxi-lxxii.

The Potomac and Roaring Creek coal fields in West Virginia, by J. D. Weeks, pp. 567-590, pls. lxxiii-lxxiv.

Index, pp. 591-597.

NOTE.—A pocket in the cover of Part 2 carries a reconnaissance map of the United States showing the distribution of the geologic systems as far as known, compiled from data in the possession of the United States Geological Survey, by W J McGee, 1893.

Fifteenth Annual Report of the United States Geological Survey, 1893-94, J. W. Powell, Director. 1895. 8°. v, 755 pp., 48 pls. (Out of stock.)

Report of the Director, pp. 1-110, pl. i.

Administrative reports, pp. 111-258.

Preliminary report on geology of common roads of United States, by N. S. Shaler, pp. 259-306.

The Potomac formation, by L. F. Ward, pp. 307-397, pls. ii-iv.

Sketch of geology of San Francisco Peninsula, by A. C. Lawson, pp. 399-476, pls. v-xii.

Preliminary report on Marquette iron-bearing district of Michigan, by C. R. Van Hise and W. S. Bayley; with a chapter on Republic trough, by H. L. Smyth, pp. 477-650, pls. xiii-xxvi.

General relations of granitic rocks in the Middle Atlantic Piedmont Plateau, by G. H. Williams, pp. 651-684, pls. xvii-xxxv.

Origin and relations of central Maryland granites, by C. R. Keyes, pp. 685-740, pls. xxxvi-xlviii.

Index, pp. 741-755.

Sixteenth Annual Report of the United States Geological Survey, 1894-95, Charles D. Walcott, Director. 1896. [Pts. II, III, and IV, 1895.] 8°. 4 pt. (Out of stock.)

Pt. I. Director's report and papers of a theoretic nature, xxii, 910 pp., 117 pls.

Report of Director, pp. 1-130, pl. i.

Dinosaurs of North America, by O. C. Marsh, pp. 131-414, pls. ii-lxxxv.

Glacier Bay and its glaciers, Alaska, by H. F. Reid, pp. 415-461, pls. lxxxvi-xcvi.

Some analogies in the Lower Cretaceous of Europe and America, by L. F. Ward, pp. 463-542, pls. xcvii-cvii.

Structural details in the Green Mountain region and in eastern New York, by T. N. Dale, pp. 543-570.

Sixteenth Annual Report of the U. S. Geological Survey, etc.—Continued.

Pt. I. Principles of pre-Cambrian North American geology, by C. R. Van Hise, with an appendix on flow and fracture of rocks as related to structure, by L. M. Hoskins, pp. 571-874, pls. cviii-cxvii.

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Index, pp. 589-598.

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Index, pp. 851-864.

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Index, pp. 423-440.

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Index, pp. 947-958.

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Index, pp. 389-400.

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Index, pp. 931-953.

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Index, pp. 583-595.

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Index, pp. 479-498.

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Index, pp. 495-509.

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Index, pp. 511-522.

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Index, pp. 627-644.

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Index, pp. 691-711.

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Index, pp. 867-888.

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Index, pp. 743-763.

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Index, pp. 671-690.

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90. Geology and water resources of a part of the James River Valley, South Dakota, by J. E. Todd and C. M. Hall.
91. Natural features and economic development of Sandusky, Maumee, Muskingum, and Miami drainage areas in Ohio, by Benjamin H. and Margaret S. Flynn.
92. The Passaic flood of 1903, by M. O. Leighton.
93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer.
94. Hydrographic manual of the United States Geological Survey, by E. C. Murphy, J. C. Hoyt, and G. B. Hollister.
95. Accuracy of stream measurements (second edition), by E. C. Murphy.
96. Destructive floods in the United States in 1903, by E. C. Murphy.
97. Report of progress of stream measurements for the calendar year 1903, by J. C. Hoyt. Part I, Northern Atlantic and Great Lakes drainage.
98. Report of progress of stream measurements for the calendar year 1903, by J. C. Hoyt. Part II, Southern Atlantic, eastern Gulf of Mexico, and eastern Mississippi River drainage.
99. Report of progress of stream measurements for the calendar year 1903, by J. C. Hoyt. Part III, Western Mississippi River and western Gulf of Mexico drainage.
100. Report of progress of stream measurements for the calendar year 1903, by J. C. Hoyt. Part IV, Interior Basin, Pacific, and Hudson Bay drainage.
101. Underground waters of southern Louisiana, by Gilbert D. Harris; with discussions of their uses for water supplies and for rice irrigation, by M. L. Fuller.
102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge.
103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell.
104. The underground waters of Gila Valley, by W. T. Lee.

— Water powers of the State of Alabama, and water supply of Tombigbee, Yazoo, Pearl, and other rivers in the State of Mississippi, by B. M. Hall.
— Water resources of the Philadelphia district, by Florence Bascom.
— Water powers of Texas, by T. U. Taylor.
— Strawboard waste, its damage to water resources and its economic disposal, by R. L. Sackett; and Disposal of oil wastes at Marion, Ind., by Isaiah Bowman.
— Hydro-economics of Susquehanna River drainage basin: Quality of water, by M. O. Leighton; with introductory chapter on physiographic features, by G. B. Hollister.
— Hydrography of Susquehanna River drainage basin, by J. C. Hoyt.
— Underflow tests in the drainage basin of Los Angeles River, by Homer Hamlin.
— Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge.

Classification of Professional Papers, Bulletins, and Water-Supply Papers.

[PP=Professional Paper; B=Bulletin; WS=Water-Supply Paper.]

Series number.	A. Economic geology.	B. Descriptive geology.	C. Systematic geology and paleontology.	D. Petrography and mineralogy.	E. Chemistry and physics.	F. Geography.	G. Miscellaneous.	H. Forestry.	I. Irrigation.	J. Water storage.	K. Pumping water.	L. Quality of water.	M. General hydrographic investigations.	N. Water power.	O. Underground waters.	P. Hydrographic progress reports.
1	B21	B23	B3	B1	B9	B5	B2	PP4	WS2	WS33	WS1	WS3	WS56	WS24	WS4	WS11
2	B46	B33	B4	B8	B14	B6	B7	PP5	WS5	WS40	WS8	WS22	WS64	WS25	WS6	WS15
3	B65	B39	B10	B12	B27	B13	B25	PP6	WS9	WS45	WS14	WS72	WS76	WS44	WS7	WS16
4	B111	B40	B11	B17	B32	B48	B26	PP7	WS10	WS46	WS20	WS76	WS80	WS62	WS12	WS27
5	B132	B45	B15	B20	B35	B49	B44	PP8	WS13	WS58	WS29	WS79	WS81	WS63	WS21	WS28
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35	PP27	PP21	B98	...	B186	B216	...	...	...	...	...	...	...	...	...	...
36	B229	WS90	B101	...	B207	B224	...	...	...	...	...	...	...	...	...	...
37	...	PP25	B102	...	PP14	B226	...	...	...	...	...	...	...	...	...	...
38	...	PP26	B105	...	PP18	...	...	...	...	...	...	...	...	...	...	...
39	...	PP27	B106	...	B220	...	...	...	...	...	...	...	...	...	...	...
40	...	...	B110	...	B228	...	...	...	...	...	...	...	...	...	...	...
41	...	...	B120	...	PP28	...	...	...	...	...	...	...	...	...	...	...
42	...	...	B121	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	B124	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	B128	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	B133	...	...	...	...	...	...	...	...	...	...	...	...	...
46	...	...	B134	...	...	...	...	...	...	...	...	...	...	...	...	...
47	...	...	B141	...	...	...	...	...	...	...	...	...	...	...	...	...
48	...	...	B142	...	...	...	...	...	...	...	...	...	...	...	...	...
49	...	...	B145	...	...	...	...	...	...	...	...	...	...	...	...	...
50	...	...	B151	...	...	...	...	...	...	...	...	...	...	...	...	...
51	...	...	B152	...	...	...	...	...	...	...	...	...	...	...	...	...
52	...	...	B153	...	...	...	...	...	...	...	...	...	...	...	...	...
53	...	...	B163	...	...	...	...	...	...	...	...	...	...	...	...	...
54	...	...	B173	...	...	...	...	...	...	...	...	...	...	...	...	...
55	...	...	B179	...	...	...	...	...	...	...	...	...	...	...	...	...
56	...	...	B191	...	...	...	...	...	...	...	...	...	...	...	...	...
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59	...	...	B205	...	...	...	...	...	...	...	...	...	...	...	...	...
60	...	...	B206	...	...	...	...	...	...	...	...	...	...	...	...	...
61	...	...	B210	...	...	...	...	...	...	...	...	...	...	...	...	...
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64	...	...	PP19	...	...	...	...	...	...	...	...	...	...	...	...	...
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MINERAL RESOURCES.

Mineral Resources of the United States, 1882, Albert Williams, jr., chief of division. 1883. 8°. xvii, 813 pp. Price, 50 cents. (Out of stock.)

Mineral Resources of the United States, 1883 and 1884, Albert Williams, jr., chief of division. 1885. 8°. xiv, 1016 pp. Price, 60 cents. (Out of stock.)

Mineral Resources of the United States, 1885. Division of Mining Statistics and Technology. 1886. 8°. vii, 576 pp. Price, 40 cents.

Mineral Resources of the United States, 1886, David T. Day, chief of division. 1887. 8°. viii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1887, David T. Day, chief of division. 1888. 8°. vii, 832 pp. Price, 50 cents. (Out of stock.)

Mineral Resources of the United States, 1888, David T. Day, chief of division. 1890. 8°. vii, 652 pp. Price, 50 cents.

Mineral Resources of the United States, 1889 and 1890, David T. Day, chief of division. 1892. 8°. viii, 671 pp. Price, 50 cents.

Mineral Resources of the United States, 1891, David T. Day, chief of division. 1893. 8°. vii, 630 pp. Price, 50 cents.

Mineral Resources of the United States, 1892, David T. Day, chief of division. 1893. 8°. vii, 850 pp. Price, 50 cents.

Mineral Resources of the United States, 1893, David T. Day, chief of division. 1894. 8°. viii, 810 pp. Price, 50 cents.

On March 2, 1895, the following provision was included in an act of Congress:

"*Provided*, That hereafter the report of the mineral resources of the United States shall be issued as a part of the report of the Director of the Geological Survey."

In compliance with this legislation the following reports were published:

Mineral Resources of the United States, 1894, David T. Day, chief of division. 1895. 8°. xv, 646 pp., 23 pls.; xix, 735 pp., 6 pls. Being Parts III and IV of the Sixteenth Annual Report. (Out of stock.)

Mineral Resources of the United States, 1895, David T. Day, chief of division. 1896. 8°. xxiii, 542 pp., 8 pls.; iii, 543–1058 pp., 9–13 pls. Being Part III (in 2 vols.) of the Seventeenth Annual Report. (Out of stock.)

Mineral Resources of the United States, 1896, David T. Day, chief of division. 1897. 8°. xii, 642 pp., 1 pl.; 643–1400 pp. Being Part V (in 2 vols.) of the Eighteenth Annual Report. (Out of stock.)

Mineral Resources of the United States, 1897, David T. Day, chief of division. 1898. 8°. viii, 651 pp., 11 pls.; viii, 706 pp. Being Part VI (in 2 vols.) of the Nineteenth Annual Report. (Out of stock.)

Mineral Resources of the United States, 1898, David T. Day, chief of division. 1899. 8°. viii, 616 pp.; ix, 804 pp., 1 pl. Being Part VI (in two vols.) of the Twentieth Annual Report. (Out of stock.)

Mineral resources of the United States, 1899, David T. Day, chief of division. 1901. 8°. viii, 656 pp.; viii, 634 pp. Being Part VI (in 2 vols.) of the Twenty-first Annual Report.

By act of Congress approved March 3, 1901, the report on mineral resources was again made a distinct publication. In compliance with this legislation the following reports have been published:

Mineral Resources of the United States, 1900, David T. Day, chief of division. 1901. 8°. 927 pp.

Mineral resources of the United States, 1901, David T. Day, chief of division. 1902. 8°. 996 pp.

Mineral Resources of the United States, 1902, David T. Day, chief of division. 1904. 8°. 1038 pp.

ANNUAL REPORTS OF RECLAMATION SERVICE.

First Annual Report of the Reclamation Service, F. H. Newell, Chief Engineer. 1903. 8°. 317 pp., 47 pls.

This report is House Document No. 79, Fifty-seventh Congress, second session. Application for it should be made to members of Congress.

In preparation:

Second Annual Report of the Reclamation Service, F. H. Newell, Chief Engineer.

This report is House Document No. 44, Fifty-eighth Congress, second session.

GEOLOGIC ATLAS OF THE UNITED STATES.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small *quadrangles*, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped. The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute a Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. It comprises topographic, geologic, economic, and structural maps of the quadrangle, and occasionally other illustrations, together with a general description.

The general distribution is through sale, at *twenty-five cents* each, except such as contain an unusual amount of matter, which are priced accordingly. Prepayment is required. The published folios are listed herewith.

Folios of the Geologic Atlas of the United States.

No.[a]	Name of folio.	State.	Limiting meridians.	Limiting parallels.	Area.	Price.[b]
					Sq. miles.	*Cents.*
1	Livingston	Montana	110°–111°	45°–46°	3,354	25
2	Ringgold	Georgia Tennessee	85°–85° 30′	34° 30′–35°	980	25
3	Placerville	California	120° 30′–121°	38° 30′–39°	932	25
c 4	Kingston	Tennessee	84° 30′–85°	35° 30′–36°	969	25
5	Sacramento	California	121°–121° 30′	38° 30′–39°	932	25
c 6	Chattanooga	Tennessee	85°–85° 30′	35°–35° 30′	975	25
c 7	Pikes Peak	Colorado	105°–105° 30′	38° 30′–39°	932	25
8	Sewanee	Tennessee	85° 30′–86′	35°–35° 30′	975	25
c 9	Anthracite-Crested Butte	Colorado	106° 45′–107° 15′	38° 45′–39°	465	50
10	Harpers Ferry	Virginia West Virginia Maryland	77° 30′–78°	39°–39° 30′	925	25
11	Jackson	California	120° 30′–121°	38°–38° 30′	938	25
12	Estillville	Virginia Kentucky Tennessee	82° 30′–83°	36° 30′–37°	957	25
13	Fredericksburg	Maryland Virginia	77°–77° 30′	38°–38° 30′	938	25
14	Staunton	Virginia West Virginia	79°–79° 30′	38°–38° 30′	938	25
15	Lassen Peak	California	121°–122°	40°–41°	3,634	25
16	Knoxville	Tennessee North Carolina	83° 30′–84°	35° 30′–36°	969	25
17	Marysville	California	121° 30′–122°	39°–39° 30′	925	25
18	Smartsville	California	121°–121° 30′	39°–39° 30′	925	25
19	Stevenson	Alabama Georgia Tennessee	85° 30′–86°	34° 30′–35°	980	25
20	Cleveland	Tennessee	84° 30′–85°	35°–35° 30′	975	25

a Order by number.
b Postage stamps or checks can not be accepted.
c The Kingston, Chattanooga, Pikes Peak, and Anthracite-Crested Butte folios are out of stock.

Folios of the Geologic Atlas of the United States—Continued.

No.	Name of folio.	State.	Limiting meridians.	Limiting parallels.	Area.	Price.
					Sq. miles.	*Cents.*
21	Pikeville	Tennessee	85°-85° 30′	35° 30′-36°	969	25
22	McMinnville	Tennessee	85° 30′-86°	35° 30′-36°	969	25
23	Nomini	Maryland Virginia	76° 30′-77°	38°-38° 30′	938	25
24	Three Forks	Montana	111°-112°	45°-46°	3,354	50
25	Loudon	Tennessee	84°-84° 30′	35° 30′-36°	969	25
26	Pocahontas	Virginia West Virginia	81°-81° 30′	37°-37° 30′	950	25
27	Morristown	Tennessee	83°-83° 30′	36°-36° 30′	963	25
28	Piedmont	Maryland West Virginia	79°-79° 30′	39°-39° 30′	925	25
29	Nevada City Special	California	3 rectangular areas.		35.39	50
30	Yellowstone National Park	Wyoming	110°-111°	44°-45°	3,412	75
31	Pyramid Peak	California	120°-120° 30′	38° 30′-39°	932	25
32	Franklin	Virginia West Virginia	79°-79° 30′	38° 30′-39°	932	25
33	Briceville	Tennessee	84°-84° 30′	36°-36° 30′	963	25
34	Buckhannon	West Virginia	80°-80° 30′	38° 30′-39°	932	25
35	Gadsden	Alabama	86°-86° 30′	34°-34° 30′	986	25
36	Pueblo	Colorado	104° 30′-105°	38°-38° 30′	938	50
37	Downieville	California	120° 30′-121°	39° 30′-40°	919	25
38	Butte Special	Montana	112° 29′ 30″-112° 36′ 42″.	45° 59′ 28″-46° 02′ 54″.	22.8	50
39	Truckee	California	120°-120° 30′	39°-39° 30′	925	25
40	Wartburg	Tennessee	84° 30′-85°	36°-36° 30′	963	25
41	Sonora	California	120°-120° 30′	37° 30′-38°	944	25
42	Nueces	Texas	100°-100° 30′	29° 30′-30°	1,035	25
43	Bidwell Bar	California	121°-121° 30′	39° 30′-40°	919	25
44	Tazewell	Virginia West Virginia	81° 30′-82°	37°-37° 30′	950	25
45	Boise	Idaho	116°-116° 30′	43° 30′-44°	864	25
46	Richmond	Kentucky	84°-84° 30′	37° 30′-38°	944	25
47	London	Kentucky	84°-84° 30′	37°-37° 30′	950	25
48	Tenmile District Special	Colorado	106° 08′-106° 16′ 08″.	39° 22′ 57″-37° 30′ 25″.	62.2	25
49	Roseburg	Oregon	123°-123° 30′	43°-43° 30′	871	25
50	Holyoke	Massachusetts Connecticut	72° 30′-73°	42°-42° 30′	885	50
51	Big Trees	California	120°-120° 30′	38°-38° 30′	938	25
52	Absaroka	Wyoming	109° 30′-110°	44°-45°	1,706	25
53	Standingstone	Tennessee	85°-85° 30′	36°-36° 30′	963	25
54	Tacoma	Washington	122°-122° 30′	47°-47° 30′	812	25
55	Fort Benton	Montana	110°-111°	47°-48°	3,234	25
56	Little Belt Mountains	Montana	110°-111°	46°-47°	3,295	25
57	Telluride	Colorado	107° 45′-108°	37° 45′-38°	236	25
58	Elmoro	Colorado	104°-104° 30′	37°-37° 30′	950	25
59	Bristol	Virginia Tennessee	82°-82° 30′	36° 30′-37°	957	25
60	La Plata	Colorado	108°-108° 15′	37° 15′-37° 30′	237	25
61	Monterey	Virginia West Virginia	79° 30′-80°	38°-38° 30′	938	25
62	Menominee Special	Michigan	An irregular area about 20 miles long.		125	25
63	Mother Lode District	California	NW.-SE. rectangle, about 70 miles long and 6 miles wide.		428	50
64	Uvalde	Texas	99° 30′-100°	29°-29° 30′	1,040	25

Folios of the Geologic Atlas of the United States—Continued.

No.	Name of folio.	State.	Limiting meridians.	Limiting parallels.	Area.	Price.
					Sq. miles.	*Cents.*
65	Tintic Special	Utah	111° 55′–112° 10′	39° 45′–40°	229	25
66	Colfax	California	120° 30′–121°	39°–39° 30′	925	25
67	Danville	Illinois Indiana	87° 30′–87° 45′	40°–40° 15′	228	25
68	Walsenburg	Colorado	104° 30′–105°	37° 30′–38°	944	25
69	Huntington	West Virginia Ohio	82°–82° 30′	38°–38° 30′	938	25
70	Washington	District of Columbia. Virginia Maryland	76° 45′–77° 15′	38° 45′–39°	465	50
71	Spanish Peaks	Colorado	104° 30′–105°	37°–37° 30′	950	25
72	Charleston	West Virginia	81° 30′–82°	38°–38° 30′	938	25
73	Coos Bay	Oregon	124°–124° 30′	43°–43° 30′	871	25
74	Coalgate	Indian Territory	96°–96° 30′	34° 30′–35°	980	25
75	Maynardville	Tennessee	83° 30′–84°	36°–36° 30′	963	25
76	Austin	Texas	97° 30′–98°	30°–30° 30′	1,030	25
77	Raleigh	West Virginia	81°–81° 30′	37° 30′–38°	944	25
78	Rome	Georgia Alabama	85°–85° 30′	34°–34° 30′	986	25
79	Atoka	Indian Territory	96°–96° 30′	34°–34° 30′	986	25
80	Norfolk	Virginia North Carolina	75° 30′–76° 30′	36° 30′–37°	1,913	25
81	Chicago	Illinois Indiana	87° 30′–88°	41° 30′–42°	892	50
82	Masontown-Uniontown	Pennsylvania	79° 30′–80°	39° 45′–40°	458	25
83	New York City	New York New Jersey	73° 45′–74° 15′	40° 30′–41°	906	50
84	Ditney	Indiana	87°–87° 30′	38°–38° 30′	938	25
85	Oelrichs	South Dakota Nebraska	103°–103° 30′	43°–43° 30′	871	25
86	Ellensburg	Washington	120° 30′–121°	46° 30′–47°	820	25
87	Camp Clarke	Nebraska	103°–103° 30′	41° 30′–42°	892	25
88	Scotts Bluff	Nebraska	103° 30′–104°	41° 30′–42°	892	25
89	Port Orford	Oregon	124°–124° 30′	42° 30′–43°	878	25
90	Cranberry	Tennessee	81° 30′–82°	36°–36° 30′	963	25
91	Hartville	Wyoming	104° 30′–105°	42°–42° 30′	885	25
92	Gaines	Pennsylvania New York	77° 30′–77° 45′	41° 45′–42°	223	25
93	Elkland-Tioga	Pennsylvania	77°–77° 30′	41° 45′–42°	445	25
94	Brownsville-Connellsville	Pennsylvania	79° 30′–80°	40°–40° 15′	457	25
95	Columbia	Tennessee	87°–87° 30′	35° 30′–36°	969	25
96	Olivet	South Dakota	97° 30′–98°	43°–43° 30′	871	25
97	Parker	South Dakota	97°–97° 30′	43°–43° 30′	871	25
98	Tishomingo	Indian Territory	96° 30′–97°	34°–34° 30′	986	25
99	Mitchell	South Dakota	98°–98° 30′	43° 30′–44°	864	25
100	Alexandria	South Dakota	97° 30′–98°	43° 30′–44°	864	25
101	San Luis	California	120° 30′–121°	35°–35° 30′	975	25
102	Indiana	Pennsylvania	79°–79° 15′	40° 30′–40° 45′	227	25
103	Nampa	Idaho Oregon	116° 30′–117°	43° 30′–44°	864	25
104	Silver City	Idaho	116° 30′–117°	43°–43° 30′	871	25
105	Patoka	Indiana Illinois	87° 30′–88°	38°–38° 30′	938	25
106	Mount Stuart	Washington	120° 30′–121°	47°–47° 30′	805	25

TOPOGRAPHIC MAPS AND FOLIOS.

Topographic Atlas Sheets.

When, in 1882, the Geological Survey was directed by law to make a geologic map of the United States, there was in existence no suitable topographic map to serve as a base for the geologic map. The preparation of such a topographic map was therefore immediately begun. About one-third of the area of the country, excluding Alaska, has now been thus mapped. The map is published in atlas sheets, each sheet representing a small quadrangular district, as explained on page 60. The separate sheets are sold at 5 cents each when fewer than 100 copies are purchased, but when they are ordered in lots of 100 or more copies, whether of the same sheet or of different sheets, the price is 2 cents each. The mapped areas are widely scattered, nearly every State being represented. About 1,325 sheets have been engraved and printed; they are tabulated below, by States.

Published topographic atlas sheets, arranged by States.[a]

ALABAMA.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		Feet.		Cents.
Anniston	33 30	85 30	¼ degree	50	1:125000	5
Ashland	33 00	85 30	do	100	1:125000	5
Bessemer	33 00	86 30	do	100	1:125000	5
Birmingham	33 30	86 30	do	100	1:125000	5
Brookwood	33 00	87 00	do	50	1:125000	5
Clanton	32 30	86 30	do	50	1:125000	5
Cullman	34 00	86 30	do	100	1:125000	5
Fort Payne (Ala.-Ga.)	34 00	85 30	do	50	1:125000	5
Gadsden	34 00	86 00	do	100	1:125000	5
Huntsville (Ala.-Tenn.)	34 30	86 30	do	100	1:125000	5
Jasper	33 30	87 00	do	50	1:125000	5
Rome (Ga.-Ala.)	34 00	85 00	do	100	1:125000	5
Scottsboro (Ala.-Tenn.)	34 30	86 00	do	100	1:125000	5
Springville	33 30	86 00	do	100	1:125000	5
Stevenson (Ala.-Ga.-Tenn.)	34 30	85 30	do	100	1:125000	5
Talladega	33 00	86 00	do	100	1:125000	5
Tallapoosa (Ga.-Ala.)	33 30	85 00	do	100	1:125000	5
Wedowee (Ala.-Ga.)	33 00	85 00	do	50	1:125000	5
Wetumka	32 30	86 00	do	50	1:125000	5

ALASKA.

Fortymile	64 00	141 00	1 degree	50	1:250000	5

[a] The Survey has issued a sheet of "Conventional signs" used on its topographic maps; price, 5 cents a single sheet; 2 cents each in lots of 100 or more.

Published topographic atlas sheets, arranged by States—Continued.

ARIZONA.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Bisbee	31	15	109	45	1/16 degree	50	1:62500	5
Bradshaw Mountains[a]	34	00	112	00	1/4 degree	100	1:125000	5
Camp Mohave (Ariz.-Nev.-Cal.)	35	00	114	00	1 degree	250	1:250000	5
Canyon de Chelly (Ariz.-N. Mex.)	36	00	109	00	do	200	1:250000	5
Chino	35	00	112	00	do	250	1:250000	5
Clifton	33	00	109	15	1/16 degree	100	1:62500	5
Diamond Creek	35	00	113	00	1 degree	250	1:250000	5
Echo Cliffs	36	00	111	00	do	250	1:250000	5
Florence	33	00	111	00	1/4 degree	100	1:125000	5
Fort Defiance (Ariz.-N. Mex.)	35	00	109	00	1 degree	200	1:250000	5
Globe	33	15	110	45	1/16 degree	50	1:62500	5
Holbrook	34	00	110	00	1 degree	200	1:250000	5
Kaibab	36	00	112	00	do	250	1:250000	5
Marsh Pass	36	00	110	00	do	200	1:250000	5
Mount Trumbull	36	00	113	00	do	250	1:250000	5
Prescott[a]	34	00	112	00	do	200	1:250000	5
St. Johns (Ariz.-N. Mex.)	34	00	109	00	do	200	1:250000	5
St. Thomas (Nev.-Ariz.)	36	00	114	00	do	250	1:250000	5
San Francisco Mountain	35	00	111	00	do	250	1:250000	5
Tusayan	35	00	110	00	do	200	1:250000	5
Verde	34	00	111	00	do	200	1:250000	5
(See also special maps, p. 196.)								

ARKANSAS.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Batesville	35	30	91	30	1/4 degree	50	1:125000	5
Benton	34	30	92	30	do	50	1:125000	5
Camden	33	30	92	30	do	50	1:125000	5
Dardanelle	35	00	93	00	do	50	1:125000	5
Eureka Springs (Ark.-Mo.)	36	00	93	30	do	50	1:125000	5
Fayetteville (Ark.-Mo.)	35	00	94	00	do	50	1:125000	5
Fort Smith (Ark.-Ind. T.)	35	00	94	00	do	50	1:125000	5
Gurdon	33	30	93	00	do	50	1:125000	5
Hot Springs	34	30	93	00	do	50	1:125000	5
Little Rock	34	30	92	00	do	50	1:125000	5
Magazine Mountain	35	00	93	30	do	50	1:125000	5
Marshall	35	30	92	30	do	50	1:125000	5
Morrillton	35	00	92	30	do	50	1:125000	5
Mount Ida	34	30	93	30	do	50	1:125000	5
Mountain Home (Ark.-Mo.)	36	00	92	00	do	50	1:125000	5
Mountain View	35	30	92	00	do	50	1:125000	5
Poteau Mountain (Ark.-Ind. T.)	34	30	94	00	do	50	1:125000	5
Siloam Springs (Ind. T.-Ark.)	36	00	94	30	do	50	1:125000	5
Tahlequah (Ind. T.-Ark.)	35	30	94	30	do	50	1:125000	5
Winslow (Ark.-Ind. T.)	35	30	94	00	do	50	1:125000	5
Yellville (Ark.-Mo.)	36	00	92	30	do	50	1:125000	5
(See also special maps, p. 196.)								

[a] Bradshaw Mountains sheet shows part of Prescott quadrangle on larger scale.

Published topographic atlas sheets, arranged by States—Continued.

CALIFORNIA.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Alturas	41	00	120	00	1 degree	200	1:250000	5
Anaheim [a]	33	45	117	45	1/16 degree	25	1:62500	5
Arroyo Grande [b]	35	00	120	30	do	50	1:62500	5
Bidwell Bar	39	30	121	00	1/4 degree	100	1:125000	5
Big Trees	38	00	120	00	do	100	1:125000	5
Calabasas	34	00	118	30	1/16 degree	50	1:62500	5
Camp Mohave (Ariz.-Nev.-Cal.)	35	00	114	00	1 degree	250	1:250000	5
Camulos [c]	34	00	118	30	1/4 degree	100	1:125000	5
Capistrano	33	00	117	30	do	100	1:125000	5
Cayucos [b]	35	15	120	45	1/16 degree	50	1:62500	5
Chico	39	30	121	30	1/4 degree	100	1:125000	5
Colfax	39	00	120	30	do	100	1:125000	5
Concord	37	45	122	00	1/16 degree	25	1:62500	5
Corona [a]	33	30	117	30	1/4 degree	100	1:125000	5
Cucamonga	34	00	117	30	1/16 degree	50	1:62500	5
Cuyamaca [d]	32	30	116	30	1/4 degree	100	1:125000	5
Dardanelles	38	00	119	30	1/4 degree	100	1:125000	5
Deep Creek	34	15	117	00	1/16 degree	50	1:62500	5
Downey	33	45	118	00	do	25	1:62500	5
Downieville	39	30	120	30	1/4 degree	100	1:125000	5
Elcajon	32	45	116	45	1/16 degree	25	1:62500	5
Elsinore [e]	33	30	117	00	1/4 degree	100	1:125000	5
Escondido [f]	33	00	117	00	1/16 degree	25	1:62500	5
Fairoaks [g]	38	30	121	15	do	10	1:62500	5
Fernando	34	15	118	15	do	50	1:62500	5
Haywards	37	30	122	00	do	25	1:62500	5
Hesperia	34	15	117	15	do	50	1:62500	5
Honey Lake	40	00	120	00	1 degree	200	1:250000	5
Hueneme	34	00	119	00	1/16 degree	50	1:62500	5
Jackson	38	00	120	30	1/4 degree	100	1:125000	5
Karquines [h]	38	00	122	00	1/16 degree	25	1:62500	5
La Jolla	32	45	117	00	do	25	1:62500	5
Lake Tahoe and Vicinity (Cal.-Nev.) [i]	38	30	119	30	1 degree	100	1:125000	20
Las Bolsas	33	30	118	00	1/16 degree	25	1:62500	5
Lassen Peak	40	00	121	00	1 degree	200	1:250000	5
Lodi	38	00	121	00	1/4 degree	50, 100	1:125000	5
Los Angeles (double sheet) [j]					1/8 degree	50	1:62500	10
Markleeville (Cal.-Nev.) [i]	38	30	119	30	1/4 degree	100	1:125000	5
Marysville	39	00	121	30	do	100	1:125000	5
Modoc Lava Bed	41	00	121	00	1 degree	200	1:250000	5
Mount Diablo	37	45	121	45	1/16 degree	50	1:62500	5

[a] Anaheim and Santa Ana sheets, on scale of 1:62500, have been reduced and form parts of Corona sheet, on scale of 1:125000.

[b] Arroyo Grande, Cayucos, Port Harford, and San Luis Obispo sheets, on scale of 1:62500, have been reduced and form parts of San Luis sheet, on scale of 1:125000.

[c] Calabasas and Santa Susana sheets, on scale of 1:62500, have been reduced and form parts of Camulos sheet, on scale of 1:125000.

[d] Elcajon sheet, on scale of 1:62500, has been reduced and forms part of Cuyamaca sheet, on scale of 1:125000.

[e] Riverside sheet, on scale of 1:62500, has been reduced and forms part of Elsinore sheet, on scale of 1:125000.

[f] Escondido and Oceanside sheets, on scale of 1:62500, have been reduced and form parts of San Luis Rey sheet, on scale of 1:125000.

[g] Fairoaks sheet shows part of Sacramento quadrangle on larger scale.

[h] Karquines sheet, on scale of 1:62500, has been reduced and forms part of Napa sheet, on scale of 1:125000.

[i] Lake Tahoe and Vicinity includes Carson, Markleeville, Pyramid Peak, and Truckee sheets.

[j] Los Angeles includes Pasadena and Santa Monica sheets.

Published topographic atlas sheets, arranged by States—Continued.

CALIFORNIA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Mount Hamilton	37	15	121	30	1/16 degree	50	1:62500	5
Mount Lyell	37	30	119	00	1/4 degree	100	1:125000	5
Mount Pinos	34	30	119	00	do	100	1:125000	5
Napa [a]	38	00	122	00	do	100	1:125000	5
Oceanside [b]	33	00	117	15	1/16 degree	25	1:62500	5
Palo Alto [c]	37	15	122	00	do	25	1:62500	5
Pasadena [d]	34	00	118	00	do	50	1:62500	5
Placerville	38	30	120	30	1/4 degree	100	1:125000	5
Pomona	34	00	117	45	1/16 degree	50	1:62500	5
Port Harford [e]	35	00	120	45	do	50	1:62500	5
Pyramid Peak [f]	38	30	120	00	1/4 degree	100	1:125000	5
Ramona	33	00	116	30	do	100	1:125000	5
Randsburg	35	15	117	30	1/16 degree	50	1:62500	5
Red Bluff [g]	40	00	122	00	1 degree	200	1:250000	5
Redding [g]	40	30	122	00	1/4 degree	100	1:125000	5
Redlands	34	00	117	00	1/16 degree	50	1:62500	5
Redondo	33	45	118	15	do	25	1:62500	5
Riverside [h]	33	45	117	15	do	25	1:62500	5
Rock Creek	34	15	117	45	do	50	1:62500	5
Sacramento [i]	38	30	121	00	1/4 degree	100	1:125000	5
San Antonio	34	15	117	30	do	50	1:62500	5
San Bernardino	34	00	117	15	1/16 degree	50	1:62500	5
San Francisco	37	45	122	15	do	25	1:62500	5
San Gorgonio	34	00	116	30	1/4 degree	100	1:125000	5
San Jacinto	33	30	116	30	do	100	1:125000	5
San Jose	37	15	121	45	1/16 degree	25	1:62500	5
San Luis [e]	35	00	120	30	1/4 degree	100	1:125000	5
San Luis Obispo [e]	35	15	120	30	1/16 degree	50	1:62500	5
San Luis Rey [j]	33	00	117	00	1/4 degree	100	1:125000	5
San Mateo	37	30	122	15	1/16 degree	25	1:62500	5
San Pedro	33	30	118	15	do	25	1:62500	5
Santa Ana [k]	33	30	117	45	do	25	1:62500	5
Santa Cruz [c]	37	00	122	00	1/4 degree	100	1:125000	5
Santa Monica [d]	34	00	118	15	1/16 degree	50	1:62500	5
Santa Paula	34	15	119	00	do	50	1:62500	5
Santa Susana [l]	34	15	118	30	do	50	1:62500	5

[a] Karquines sheet, on scale of 1:62500, has been reduced and forms part of Napa sheet, on scale of 1:125000.

[b] Escondido and Oceanside sheets, on scale of 1:62500, have been reduced and form parts of San Luis Rey sheet, on scale of 1:125000.

[c] Palo Alto sheet, on scale of 1:62500, has been reduced and forms part of Santa Cruz sheet, on scale of 1:125000.

[d] Los Angeles includes Pasadena and Santa Monica sheets.

[e] Arroyo Grande, Cayucos, Port Harford, and San Luis Obispo sheets, on scale of 1:62500, have been reduced and form parts of San Luis sheet, on scale of 1:125000.

[f] Lake Tahoe and Vicinity includes Carson, Markleeville, Pyramid Peak, and Truckee sheets.

[g] Redding sheet shows part of Red Bluff quadrangle on larger scale.

[h] Riverside sheet, on scale of 1:62500, has been reduced and forms part of Elsinore sheet, on scale of 1:125000.

[i] Fairoaks sheet shows part of Sacramento quadrangle on larger scale.

[j] Escondido and Oceanside sheets, on scale of 1:62500, have been reduced and form parts of San Luis Rey sheet, on scale of 1:125000.

[k] Anaheim and Santa Ana sheets, on scale of 1:62500, have been reduced and form parts of Corona sheet, on scale of 1:125000.

[l] Calabasas and Santa Susana sheets, on scale of 1:62500, have been reduced and form parts of Camulos sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

CALIFORNIA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Shasta	41 00	122 00	1 degree	200	1:250000	5
Sierraville	39 30	120 00	$\frac{1}{4}$ degree	100	1:125000	5
Silver Peak (Nev.-Cal.)	37 30	117 30	.....do	100	1:125000	5
Smartsville	39 00	121 00	.....do	100	1:125000	5
Sonora	37 30	120 00	.....do	50, 100	1:125000	5
Tamalpais	37 45	122 30	$\frac{1}{16}$ degree	25	1:62500	5
Tejon	34 30	118 30	$\frac{1}{4}$ degree	100	1:125000	5
Truckee[a]	39 00	120 00	.....do	100	1:125000	5
Tujunga	34 15	118 00	$\frac{1}{16}$ degree	50	1:62500	5
Ventura	34 15	119 15	.....do	20	1:62500	5
Wellington (Cal.-Nev.)	38 30	119 00	$\frac{1}{4}$ degree	100	1:125000	5
Yosemite	37 30	119 30	.....do	100	1:125000	5
(See also combined and special maps, pp. 195–196.)						

COLORADO.

Abajo (Utah-Colo.)	37 00	109 00	1 degree	250	1:250000	5
Albany (Colo.-Kans.)	37 30	102 00	$\frac{1}{4}$ degree	25	1:125000	5
Anthracite	38 45	107 00	$\frac{1}{16}$ degree	100	1:62500	5
Apishapa	37 30	104 00	$\frac{1}{4}$ degree	25	1:125000	5
Arroyo	38 30	103 00	.....do	25	1:125000	5
Ashley (Utah-Colo.)	40 00	109 00	1 degree	250	1:250000	5
Aspen	39 00	106 45	$\frac{1}{16}$ degree	100	1:62500	5
Big Springs	38 30	104 00	$\frac{1}{4}$ degree	25	1:125000	5
Canyon City	38 00	105 00	.....do	25, 50, 100	1:125000	5
Castle Rock	39 00	104 30	.....do	50, 100	1:125000	5
Catlin	38 00	103 30	.....do	25	1:125000	5
Cheyenne Wells (Colo.-Kans.)	38 30	102 00	$\frac{1}{4}$ degree	25	1:125000	5
Colorado Springs	38 30	104 30	.....do	25, 50, 100	1:125000	5
Crested Butte	38 45	106 45	$\frac{1}{16}$ degree	100	1:62500	5
Denver (double sheet)	39 30	104 30	$\frac{1}{2}$ degree	50, 100	1:125000	10
Durango	37 15	107 45	$\frac{1}{16}$ degree	100	1:62500	5
East Tavaputs (Utah-Colo.)	39 00	109 00	1 degree	250	1:250000	5
Elmoro	37 00	104 00	$\frac{1}{4}$ degree	50	1:125000	5
Engineer Mountain	37 30	107 45	$\frac{1}{16}$ degree	100	1:62500	5
Granada (Colo.-Kans.)	38 00	102 00	$\frac{1}{4}$ degree	25	1:125000	5
Greeley	40 00	104 30	.....do	20	1:125000	5
Higbee	37 30	103 00	.....do	25, 50	1:125000	5
Huerfano Park	37 30	105 00	.....do	25, 50, 100	1:125000	5
Kit Carson	38 30	102 30	.....do	25	1:125000	5
La Plata	37 15	108 00	$\frac{1}{16}$ degree	100	1:62500	5
La Sal (Utah-Colo.)	38 00	109 00	1 degree	250	1:250000	5
Lamar	38 00	102 30	.....do	25	1:125000	5
Las Animas	38 00	103 00	$\frac{1}{4}$ degree	25	1:125000	5
Leadville	39 00	106 00	.....do	25, 50, 100	1:125000	5
Limon	39 00	103 30	.....do	25	1:125000	5
Mesa de Maya	37 00	103 30	.....do	25, 50, 100	1:125000	5
Mount Carrizo	37 00	103 00	.....do	25, 50, 100	1:125000	5
Needle Mountains	37 30	107 30	$\frac{1}{16}$ degree	100	1:62500	5

[a] Lake Tahoe and Vicinity includes Carson, Markleeville, Pyramid Peak, and Truckee sheets.

Published topographic atlas sheets, arranged by States—Continued.

COLORADO—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Nepesta	38	00	104	00	¼ degree	25	1:125000	5
Pikes Peak	38	30	105	00	do	100	1:125000	5
Platte Canyon	39	00	105	00	do	25, 50, 100	1:125000	5
Pueblo	38	00	104	30	do	50	1:125000	5
Rico	37	30	108	00	1/16 degree	100	1:62500	5
Sanborn	38	30	103	30	¼ degree	25	1:125000	5
Silverton	37	45	107	30	1/16 degree	100	1:62500	5
Spanish Peaks	37	00	104	30	¼ degree	100	1:125000	5
Springfield	37	00	102	30	do	25, 50	1:125000	5
Telluride	37	45	107	45	1/16 degree	100	1:62500	5
Timpas	37	30	103	30	¼ degree	25, 50	1:125000	5
Two Butte	37	30	102	30	do	25, 50	1:125000	5
Vilas (Colo.-Kans.)	37	00	102	00	do	25	1:125000	5
Walsenburg	37	30	104	30	do	50	1:125000	5
(See also special maps, p. 196.)								

CONNECTICUT.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Bridgeport	41	00	73	00	1/16 degree	20	1:62500	5
Brookfield (Mass.-Conn.)	42	00	72	00	do	20	1:62500	5
Carmel (N. Y.-Conn.)	41	15	73	30	do	20	1:62500	5
Clove (N. Y.-Conn.)	41	30	73	30	do	20	1:62500	5
Cornwall (Conn.-N. Y.)	41	45	73	15	do	20	1:62500	5
Danbury	41	15	73	15	do	20	1:62500	5
Derby	41	15	73	00	do	20	1:62500	5
Gilead	41	30	72	15	do	20	1:62500	5
Granby	41	45	72	45	do	20	1:62500	5
Granville (Mass.-Conn.) [a]	42	00	72	45	do	20	1:62500	5
Guilford	41	15	72	30	do	20	1:62500	5
Hartford	41	45	72	30	do	20	1:62500	5
Holyoke (Mass.-Conn.) [a]	42	00	72	30	¼ degree	40	1:125000	5
Housatonic (Mass.-Conn.-N. Y.) [b]	42	00	73	00	do	40	1:125000	5
Meriden	41	30	72	45	1/16 degree	20	1:62500	5
Middletown	41	30	72	30	do	20	1:62500	5
Millbrook (N. Y.-Conn.)	41	45	73	30	do	20	1:62500	5
Moosup (Conn.-R. I.)	41	30	71	45	do	20	1:62500	5
New Haven	41	15	72	45	do	20	1:62500	5
New London (Conn.-N. Y.)	41	15	72	00	do	20	1:62500	5
New Milford	41	30	73	15	do	20	1:62500	5
Norwalk (Conn.-N. Y.)	41	00	73	15	do	20	1:62500	5
Norwich	41	30	72	00	do	20	1:62500	5
Oyster Bay (N. Y.-Conn.)	40	45	73	30	do	20	1:62500	5
Palmer (Mass.-Conn.)	42	00	72	15	do	20	1:62500	5
Putnam (Conn.-R. I.)	41	45	71	45	do	20	1:62500	5
Sandisfield (Mass.-Conn.) [b]	42	00	73	00	do	20	1:62500	5
Saybrook	41	15	72	15	do	20	1:62500	5
Sheffield (Mass.-Conn.-N. Y.) [b]	42	00	73	15	do	20	1:62500	5
Springfield (Mass.-Conn.) [a]	42	00	72	30	do	20	1:62500	5

[a] Granville and Springfield sheets, on scale of 1:62500, have been reduced and form parts of Holyoke sheet, on scale of 1:125000.

[b] Sandisfield and Sheffield sheets, on scale of 1:62500, have been reduced and form parts of Housatonic sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

CONNECTICUT—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
	° ′	° ′		*Feet.*		*Cents.*
Stamford (Conn.-N. Y.)	41 00	73 30	$\frac{1}{16}$ degree	20	1:62500	5
Stonington (Conn.-R. I.-N. Y.)	41 15	71 45	do	20	1:62500	5
Tolland	41 45	72 15	do	20	1:62500	5
Waterbury	41 30	73 00	do	20	1:62500	5
Webster (Mass.-Conn.-R. I.)	42 00	71 45	do	20	1:62500	5
Winsted	41 45	73 00	do	20	1:62500	5
Woodstock	41 45	72 00	do	20	1:62500	5
(See also general maps, p. 195.)						

DELAWARE.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Bayside (N. J.-Del.) [a]	39 15	75 15	$\frac{1}{16}$ degree	10	1:62500	5
Camden (N. J.-Penn.-Del.) [b]	39 30	75 00	$\frac{1}{4}$ degree	20	1:125000	5
Cecilton (Md.-Del.) [c]	39 15	75 45	$\frac{1}{16}$ degree	20	1:62500	5
Chester (Pa.-Del.-N. J.) [d a]	39 45	75 15	do	20	1:62500	5
Dover (Del.-Md.-N. J.) [c]	39 00	75 30	$\frac{1}{4}$ degree	20	1:125000	5
Elkton (Md.-Pa.-Del.)	39 30	75 45	$\frac{1}{16}$ degree	20	1:62500	5
Ocean City (Md.-Del.)	38 15	75 00	do	10	1:62500	5
Philadelphia and Vicinity (Pa.-N. J.-Del.). [d]	39 45	75 00	$\frac{1}{4}$ degree	20	1:62500	20
Pittsville (Md.-Del.)	38 15	75 15	$\frac{1}{16}$ degree	10	1:62500	5
Salem (N. J.-Del.) [b]	39 30	75 15	do	10	1:62500	5
Salisbury (Md.-Del.)	38 15	75 30	do	10	1:62500	5
Vineland (N. J.-Del.) [a]	39 00	75 00	$\frac{1}{4}$ degree	20	1:125000	5

DISTRICT OF COLUMBIA.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Mount Vernon (Va.-Md.-D. C.) [e]	38 30	77 00	$\frac{1}{4}$ degree	50	1:125000	5
Patuxent (Md.-D. C.) [f]	38 30	76 30	do	20	1:125000	5
Washington (D. C.-Md.-Va., double sheet). [f e]	38 45	76 45	$\frac{1}{8}$ degree	20	1:62500	10

FLORIDA.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Arredondo	29 30	82 15	$\frac{1}{16}$ degree	10	1:62500	5
Citra	29 15	82 00	do	10	1:62500	5
Dunnellon	29 00	82 15	do	10	1:62500	5
Ocala	29 00	82 00	do	10	1:62500	5
Panasoffkee	28 45	82 00	do	10	1:62500	5
Tsala Apopka	28 45	82 15	do	10	1:62500	5
Williston	29 15	82 15	do	10	1:62500	5

[a] Bayside sheet, on scale of 1:62500, has been reduced and forms part of Vineland sheet, on scale of 1:125000.
[b] Chester and Salem sheets, on scale of 1:62500, have been reduced and form parts of Camden sheet, on scale of 1:125000.
[c] Cecilton sheet, on scale of 1:62500, has been reduced and forms part of Dover sheet, on scale of 1:125000.
[d] Philadelphia and Vicinity includes Chester, Germantown, Norristown, and Philadelphia sheets.
[e] The west half of Washington sheet shows part of Mount Vernon quadrangle on larger scale.
[f] East Washington sheet, on scale of 1:62500, has been reduced and forms part of Patuxent sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

GEORGIA.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Atlanta	33	30	84	00	¼ degree	50	1:125000	5
Carnesville (Ga.-S. C.)	34	00	83	00	do	50	1:125000	5
Cartersville	34	00	84	30	do	100	1:125000	5
Dahlonega (Ga.-N. C.)	34	30	83	30	do	100	1:125000	5
Dalton (Ga.-Tenn.)	34	30	84	30	do	100	1:125000	5
Elberton (Ga.-S. C.)	34	00	82	30	do	50	1:125000	5
Ellijay (Ga.-N. C.-Tenn.)	34	30	84	00	do	100	1:125000	5
Fort Payne (Ala.-Ga.)	34	00	85	30	do	50	1:125000	5
Gainesville[a]	34	00	83	30	do	100	1:125000	5
McCormick (Ga.-S. C.)	33	30	82	00	do	50	1:125000	5
Marietta	33	30	84	30	do	50	1:125000	5
Monroe	33	30	83	30	do	50	1:125000	5
Ringgold (Ga.-Tenn.)	34	30	85	00	do	100	1:125000	5
Rome (Ga.-Ala.)	34	00	85	00	do	100	1:125000	5
Stevenson (Ala.-Ga.-Tenn.)	34	30	85	30	do	100	1:125000	5
Suwanee	34	00	84	00	do	100	1:125000	5
Tallapoosa (Ga.-Ala.)	33	30	85	00	do	100	1:125000	5
Walhalla (Ga.-S. C.-N. C.)	34	30	83	00	do	100	1:125000	5
Wedowee (Ala.-Ga.)	33	00	85	00	do	50	1:125000	5

IDAHO.

Bear Valley	44	00	115	00	¼ degree	100	1:125000	5
Bisuka	43	00	116	00	do	25, 50, 100	1:125000	5
Boise	43	30	116	00	do	100	1:125000	5
Camas Prairie	43	00	115	00	do	50, 100	1:125000	5
Hailey	43	30	114	00	do	100	1:125000	5
Hamilton (Mont.-Idaho)	46	00	114	00	do	100	1:125000	5
Idaho Basin	43	30	115	30	do	100	1:125000	5
Mountain Home	43	00	115	30	do	50, 100	1:125000	5
Nampa (Idaho-Oreg.)	43	30	116	30	do	100	1:125000	5
Rathdrum	47	30	116	30	do	100	1:125000	5
Rocky Bar	43	30	115	00	do	100	1:125000	5
Sandpoint	48	00	116	30	do	100	1:125000	5
Sawtooth	43	30	114	30	do	100	1:125000	5
Silver City	43	00	116	30	do	100	1:125000	5
Spokane (Wash.-Idaho)	47	30	117	00	do	100	1:125000	5
Squaw Creek	44	00	116	00	do	100	1:125000	5
Weiser (Idaho-Oreg.)	44	00	116	30	do	100	1:125000	5
(See also special maps, p. 196.)								

ILLINOIS.

Calumet (Ill.-Ind.)	41	30	87	30	1/16 degree	10	1:62500	5
Chicago	41	45	87	30	do	5	1:62500	5
Clinton (Iowa-Ill.)[b]	41	45	90	00	do	20	1:62500	5
Cordova (Iowa-Ill.)[b]	41	30	90	00	¼ degree	20	1:125000	5
Danville (Ill.-Ind.)	40	00	87	30	1/16 degree	10	1:62500	5

[a] Out of stock.

[b] Clinton, Goose Lake, and Leclaire sheets on scale of 1:62500, have been reduced and form parts of Cordova sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

ILLINOIS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Davenport (Iowa-Ill.)[a]	41 30	90 30	1/16 degree	20	1:62500	5
Desplaines	41 30	87 45	.....do	10	1:62500	5
Dunlap	40 45	89 30	.....do	10	1:62500	5
Evanston	42 00	87 30	.....do	10	1:62500	5
Goose Lake (Iowa-Ill.)[b]	41 45	90 15	.....do	20	1:62500	5
Hennepin	41 15	89 15	.....do	10	1:62500	5
Highwood	42 00	87 45	.....do	10	1:62500	5
Joliet	41 30	88 00	.....do	10	1:62500	5
Kahoka (Mo.-Iowa-Ill.)	40 00	91 30	¼ degree	20	1:125000	5
Lacon	41 00	89 15	1/16 degree	20	1:62500	5
Lancaster (Wis.-Iowa-Ill.)	42 30	90 30	¼ degree	20	1:125000	5
Lasalle	41 15	89 00	1/16 degree	10	1:62500	5
Leclaire (Iowa-Ill.)[b]	41 30	90 15	.....do	20	1:62500	5
Louisiana (Mo.-Ill.)	39 00	91 00	¼ degree	50	1:125000	5
Marseilles	41 15	88 30	1/16 degree	10	1:62500	5
Metamora	40 45	89 15	.....do	10	1:62500	5
Mineral Point (Wis.-Ill.)	42 30	90 00	¼ degree	20	1:125000	5
Morris	41 15	88 15	1/16 degree	10	1:62500	5
Mount Carmel (Ill.-Ind.)[c]	35 15	87 45	.....do	20	1:62500	5
New Harmony (Ind.-Ill.)[c]	38 00	87 45	.....do	20	1:62500	5
O'Fallon (Mo.-Ill.)	38 30	90 30	¼ degree	50	1:125000	5
Ottawa	41 15	88 45	1/16 degree	10	1:62500	5
Patoka (Ill.-Ind.)[c]	38 00	87 30	¼ degree	20	1:125000	5
Peosta (Iowa-Ill.)	42 00	90 30	.....do	20	1:125000	5
Riverside	41 45	87 45	1/16 degree	10	1:62500	5
Rock Island (Iowa-Ill.)[a]	41 30	90 30	¼ degree	20	1:125000	5
St. Louis (Mo.-Ill.), double sheet	38 30	90 00	⅛ degree	20	1:62500	10
Savanna (Iowa-Ill.)	42 00	90 00	1/16 degree	20	1:62500	5
Wilmington	41 15	88 00	.....do	10	1:62500	5

INDIAN TERRITORY.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Addington	34 00	97 30	¼ degree	50	1:125000	5
Alikchi	34 00	95 00	.....do	50	1:125000	5
Antlers	34 00	95 30	.....do	50	1:125000	5
Ardmore	34 00	97 00	.....do	50	1:125000	5
Atoka	34 00	96 00	.....do	50	1:125000	5
Canadian	35 00	95 30	.....do	50	1:125000	5
Claremore	36 00	95 30	.....do	50	1:125000	5
Coalgate	34 30	96 00	.....do	50	1:125000	5
Denison (Tex.-Ind. T.)	33 30	96 30	.....do	50	1:125000	5
Fort Smith (Ark.-Ind. T.)	35 00	94 00	.....do	50	1:125000	5
Gainesville (Tex.-Ind. T.)	33 30	97 00	.....do	50	1:125000	5
Joplin (Kans.-Mo.-Ind. T.)	37 00	94 30	.....do	50	1:125000	5
Lukfata	34 00	94 30	.....do	50	1:125000	5
McAlester	34 30	95 30	.....do	50	1:125000	5

[a] Davenport sheet, on scale of 1:62500, has been reduced and forms part of Rock Island sheet, on scale of 1:125000.

[b] Clinton, Goose Lake, and Leclaire sheets, on scale of 1:62500, have been reduced and form parts of Cordova sheet, on scale of 1:125000.

[c] Mount Carmel and New Harmony sheets, on scale of 1:62500, have been reduced and form parts of Patoka sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

INDIAN TERRITORY—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		Feet.		Cents.
Muscogee	35	30	95	00	¼ degree	50	1:125000	5
Nowata	36	30	95	30	do	50	1:125000	5
Nuyaka	35	30	96	00	do	50	1:125000	5
Okmulgee	35	30	95	30	do	50	1:125000	5
Pauls Valley	34	30	97	00	do	50	1:125000	5
Poteau Mountain (Ark.-Ind. T.)	34	30	94	00	do	50	1:125000	5
Pryor	36	00	95	00	do	50	1:125000	5
Rush Springs	34	30	97	30	do	50	1:125000	5
Sallisaw	35	00	94	30	do	50	1:125000	5
Sansbois	35	00	95	00	do	50	1:125000	5
Siloam Springs (Ind. T.-Ark.)	36	00	94	30	do	50	1:125000	5
Stonewall (Ind. T.)	34	30	96	30	do	50	1:125000	5
Tahlequah (Ind. T.-Ark.)	35	30	94	30	do	50	1:125000	5
Tishomingo	34	00	96	30	do	50	1:125000	5
Tuskahoma	34	30	95	00	do	50	1:125000	5
Vinita	36	30	95	00	do	50	1:125000	5
Wewoka	35	00	96	00	do	50	1:125000	5
Winding Stair	34	30	94	30	do	50	1:125000	5
Winslow (Ark.-Ind. T.)	35	30	94	00	do	50	1:125000	5
(See also general maps, p. 195.)								

INDIANA.

Boonville[a]	38	00	87	15	1/16 degree	20	1:62500	5
Calumet (Ill.-Ind.)	41	30	87	30	do	10	1:62500	5
Danville (Ill.-Ind.)	40	00	87	30	do	10	1:62500	5
Degonia Springs[a]	38	00	87	00	do	20	1:62500	5
Ditney[a]	38	00	87	00	¼ degree	20	1:125000	5
Haubstadt[b]	38	00	87	30	1/16 degree	20	1:62500	5
Mount Carmel (Ill.-Ind.)[b]	35	15	87	45	do	20	1:62500	5
New Harmony (Ill.-Ind.)[b]	38	00	87	45	do	20	1:62500	5
Owensboro (Ind.-Ky.)	37	45	87	00	do	20	1:62500	5
Patoka (Ill.-Ind.)[b]	38	00	87	30	¼ degree	20	1:125000	5
Petersburg[a]	38	15	87	15	1/16 degree	20	1:62500	5
Princeton[b]	38	15	87	30	do	20	1:62500	5
St. Meinrad	38	00	86	45	do	20	1:62500	5
Tell City (Ky.-Ind.)	37	45	86	45	do	20	1:62500	5
Toleston	41	30	87	15	do	10	1:62500	5
Velpen[a]	38	15	87	00	do	20	1:62500	5

IOWA.

Amana[c]	41	45	91	45	1/16 degree	20	1:62500	5
Anamosa[d]	42	00	91	15	do	20	1:62500	5

[a] Boonville, Degonia Springs, Petersburg, and Velpen sheets, on scale of 1:62500, have been reduced and form Ditney sheet, on scale of 1:125000.

[b] Haubstadt, Mount Carmel, New Harmony, and Princeton sheets, on scale of 1:62500, have been reduced and form Patoka sheet, on scale of 1:125000.

[c] Amana, Cedar Rapids, Iowa City, and Oxford sheets, on scale of 1:62500, have been reduced and form Fairfax sheet, on scale of 1:125000.

[d] Anamosa and Monticello sheets, on scale of 1:62500, have been reduced and form parts of Farley sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

IOWA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Baldwin[a]	42 00	90 45	$\frac{1}{16}$ degree	20	1:62500	5
Canton (S. Dak.-Iowa)	43 00	96 30	.....do	20	1:62500	5
Cedar Rapids[b]	41 45	91 30	.....do	20	1:62500	5
Clinton (Iowa-Ill.)[c]	41 45	90 00	.....do	20	1:62500	5
Cordova (Iowa-Ill.)[c]	41 30	90 00	$\frac{1}{4}$ degree	20	1:125000	5
Davenport (Iowa-Ill.)[d]	41 30	90 30	$\frac{1}{16}$ degree	20	1:62500	5
Dewitt[d]	41 45	90 30	.....do	20	1:62500	5
Durant[d]	41 30	90 45	.....do	20	1:62500	5
Elk Point (S. Dak.-Nebr.-Iowa)	42 30	96 30	$\frac{1}{4}$ degree	20	1:125000	5
Elkader (Iowa-Wis.)	42 30	91 00	.....do	20	1:125000	5
Fairfax[b]	41 30	91 30	.....do	20	1:125000	5
Farley[e]	42 00	91 00	.....do	20	1:125000	5
Goose Lake (Iowa-Ill.)[c]	41 45	90 15	$\frac{1}{16}$ degree	20	1:62500	5
Iowa City[b]	41 30	91 30	.....do	20	1:62500	5
Kahoka (Mo.-Iowa-Ill.)	40 00	91 30	$\frac{1}{4}$ degree	20	1:125000	5
Lancaster (Wis.-Iowa-Ill.)	42 30	90 30	.....do	20	1:125000	5
Leclaire (Iowa-Ill.)[c]	41 30	90 15	$\frac{1}{16}$ degree	20	1:62500	5
Maquoketa[a]	42 00	90 30	.....do	20	1:62500	5
Marion[f]	42 00	91 30	.....do	20	1:62500	5
Mechanicsville[g]	41 45	91 15	.....do	20	1:62500	5
Monticello[e]	42 00	91 00	.....do	20	1:62500	5
Oelwein	42 30	91 30	$\frac{1}{4}$ degree	20	1:125000	5
Omaha and Vicinity (Nebr.-Iowa)	41 00	95 45	$\frac{23}{180}$ degree	20	1:62500	10
Oxford[b]	41 30	91 45	$\frac{1}{16}$ degree	20	1:62500	5
Peosta (Iowa-Ill.)[a]	42 00	90 30	$\frac{1}{4}$ degree	20	1:125000	5
Rock Island (Ill.-Iowa)[d]	41 30	90 30	.....do	20	1:125000	5
Savanna (Iowa-Ill.)	42 00	90 00	$\frac{1}{16}$ degree	20	1:62500	5
Shellsburg[f]	42 00	91 45	.....do	20	1:62500	5
Stanwood[g]	41 30	91 00	$\frac{1}{4}$ degree	20	1:125000	5
Tipton[g]	41 45	91 00	$\frac{1}{16}$ degree	20	1:62500	5
Waukon (Iowa-Wis.)	43 00	91 00	$\frac{1}{4}$ degree	20	1:125000	5
West Liberty[g]	41 30	91 15	$\frac{1}{16}$ degree	20	1:62500	5
Wheatland[d]	41 45	90 45	.....do	20	1:62500	5
Wilton[g]	41 30	91 00	.....do	20	1:62500	5
Winthrop[f]	42 00	91 30	$\frac{1}{4}$ degree	20	1:125000	5

KANSAS.

Abilene	38 30	97 00	$\frac{1}{4}$ degree	50	1:125000	5
Albany (Colo.-Kans.)	37 30	102 00	.....do	25	1:125000	5
Anthony	37 00	98 00	.....do	20	1:125000	5
Arapahoe (Nebr.-Kans.)	40 00	99 30	.....do	20	1:125000	5
Ashland[h]	37 00	99 30	.....do	20	1:125000	5

[a] Baldwin and Maquoketa sheets, on scale of 1 : 62500, have been reduced and form parts of Peosta sheet, on scale of 1 : 125000.

[b] Amana, Cedar Rapids, Iowa City, and Oxford sheets, on scale of 1 : 62500 have been reduced and form Fairfax sheet, on scale of 1 : 125000.

[c] Clinton, Goose Lake, and Leclaire sheets, on scale of 1 : 62500, have been reduced and form parts of Cordova sheet, on scale of 1 : 125000.

[d] Davenport, Dewitt, Durant, and Wheatland sheets, on scale of 1 : 62500, have been reduced and form Rock Island sheet, on scale of 1 : 125000.

[e] Anamosa and Monticello sheets, on scale of 1 : 62500, have been reduced and form parts of Farley sheet, on scale of 1 : 125000.

[f] Shellsburg and Marion sheets, on scale of 1 : 62500, have been reduced and form parts of Winthrop sheet, on scale of 1 : 125000.

[g] Mechanicsville, Tipton, West Liberty, and Wilton sheets, on scale of 1 : 625000, have been reduced and form Stanwood sheet, on scale of 1 : 125000.

[h] Sitka, on scale of 1 : 62500, has been reduced and forms part of Ashland sheet, on scale of 1 : 125000.

Published topographic atlas sheets, arranged by States—Continued.

KANSAS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		Feet.		Cents.
Atchison (Kans.-Mo.)	39	30	95	00	¼ degree	50	1:125000	5
Beloit	39	00	98	00	do	20	1:125000	5
Burden	37	00	96	30	do	50	1:125000	5
Burlingame	38	30	95	30	do	50	1:125000	5
Burlington	38	00	95	30	do	50	1:125000	5
Caldwell	37	00	97	30	do	20	1:125000	5
Cheney	37	30	97	30	do	20	1:125000	5
Cheyenne Wells (Colo.-Kans.)	38	30	102	00	do	25	1:125000	5
Clay Center	39	00	97	00	do	20	1:125000	5
Coldwater	37	00	99	00	do	20	1:125000	5
Concordia	39	30	97	30	do	20	1:125000	5
Cottonwood Falls	38	00	96	30	do	20	1:125000	5
Dodge	37	30	00	00	do	20	1:125000	5
Eldorado	37	30	96	30	do	50	1:125000	5
Ellis	38	30	99	30	do	20	1:125000	5
Ellsworth	38	30	98	00	do	20	1:125000	5
Emporia	38	00	96	00	do	50	1:125000	5
Eskridge	38	30	96	00	do	50	1:125000	5
Eureka	37	30	96	00	do	50	1:125000	5
Fort Scott (Kans.-Mo.)	37	30	94	30	do	50	1:125000	5
Fredonia	37	30	95	30	do	50	1:125000	5
Garden	37	30	100	30	do	20	1:125000	5
Garnett	38	00	95	00	do	50	1:125000	5
Granada (Colo.-Kans.)	38	00	102	00	do	25	1:125000	5
Great Bend	38	00	98	30	do	20	1:125000	5
Hays	38	30	99	00	do	20	1:125000	5
Hebron (Nebr.-Kans.)	40	00	97	30	do	20	1:125000	5
Hiawatha	39	30	95	30	do	50	1:125000	5
Hill	39	00	99	30	do	20	1;125000	5
Holdredge (Nebr.-Kans.)	40	00	99	00	do	20	1:125000	5
Hutchinson	38	00	97	30	do	20	1:125000	5
Independence	37	00	95	30	do	50	1:125000	5
Iola	37	30	95	00	do	50	1:125000	5
Joplin (Kans.-Mo.-Ind. T.)	37	00	94	30	do	50	1:125000	5
Junction City	39	00	96	30	do	50	1:125000	5
Kansas City (Kans.-Mo.)	39	00	94	30	do	50	1:125000	5
Kingman	37	30	98	00	do	20	1:125000	5
Kinsley	37	30	99	00	do	20	1:125000	5
Lakin	37	30	101	00	do	20	1:125000	5
Larned	38	00	99	00	do	20	1:125000	5
Lawrence	38	30	95	00	do	50	1:125000	5
Lyons	38	00	98	00	do	20	1:125000	5
Mankato	39	30	98	00	do	20	1:125000	5
Marysville	39	30	96	30	do	50	1:125000	5
Meade	37	00	100	00	do	20	1:125000	5
Medicine Lodge	37	00	98	30	do	20	1:125000	5
Minneapolis	39	00	97	30	do	20	1:125000	5
Mound City (Kans.-Mo.)	38	00	94	30	do	50	1:125000	5
Ness	38	00	99	30	do	20	1:125000	5
Newton	38	00	97	00	do	50	1:125000	5
Norton	39	30	99	30	do	20	1:125000	5

Published topographic atlas sheets, arranged by States—Continued.

KANSAS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat. °	′	Long. °	′	Area covered.	Contour interval.	Scale.	Price.
						Feet.		*Cents.*
Olathe (Kans.-Mo.)	38	30	94	30	$\frac{1}{4}$ degree	50	1:125000	5
Osborne	39	00	98	30	.....do	20	1:125000	5
Oskaloosa (Kans.-Mo.)	39	00	95	00	.....do	50	1:125000	5
Parkerville	38	30	96	30	.....do	50	1:125000	5
Parsons	37	00	95	00	.....do	50	1:125000	5
Phillipsburg	39	30	99	00	.....do	20	1:125000	5
Plainville	39	00	99	00	.....do	20	1:125000	5
Pratt	37	30	98	30	.....do	20	1:125000	5
Redcloud (Nebr.-Kans.)	40	00	98	30	.....do	20	1:125000	5
Russell	38	30	98	30	.....do	20	1:125000	5
Salina	38	30	97	30	.....do	20	1:125000	5
Sedan	37	00	96	00	.....do	50	1:125000	5
Seneca	39	30	96	00	.....do	50	1:125000	5
Sitka[a]	37	00	99	30	$\frac{1}{16}$ degree	20	1:62500	5
Smith Center	39	30	98	30	$\frac{1}{4}$ degree	20	1:125000	5
Spearville	37	30	99	30	.....do	20	1:125000	5
Superior (Nebr.-Kans.)	40	00	98	00	.....do	20	1:125000	5
Syracuse	37	30	101	30	.....do	20	1:125000	5
Topeka	39	00	95	30	.....do	50	1:125000	5
Vilas (Colo.-Kans.)	37	00	102	00	.....do	25	1:125000	5
Wamego	39	00	96	00	.....do	50	1:125000	5
Washington	39	30	97	00	.....do	20	1:125000	5
Wellington	37	00	97	00	.....do	50	1:125000	5
Wichita	37	30	97	00	.....do	50	1:125000	5

KENTUCKY.

Name of atlas sheet.	Lat. °	′	Long. °	′	Area covered.	Contour interval.	Scale.	Price.
Beattyville	37	30	83	30	$\frac{1}{4}$ degree	100	1:125000	5
Cincinnati (Ohio-Ky.) double sheet[b]	39	00	84	15	$\frac{1}{8}$ degree	20	1:62500	10
Cumberland Gap (Ky.-Va.-Tenn.)	36	30	83	30	$\frac{1}{4}$ degree	100	1:125000	5
East Cincinnati (Ohio-Ky.)[b]	39	00	84	15	$\frac{1}{16}$ degree	20	1:62500	5
Estillville (Va.-Ky.-Tenn.)	36	30	82	30	$\frac{1}{4}$ degree	100	1:125000	5
Grundy (Va.-Ky.)	37	00	82	00	.....do	100	1:125000	5
Hazard	37	00	83	00	.....do	100	1:125000	5
Huntington (W. Va.-Ohio-Ky.)	38	00	82	00	.....do	100	1:125000	5
Ironton (Ohio-Ky.)	38	30	82	30	$\frac{1}{16}$ degree	20	1:62500	5
Jonesville (Ky.-Va.-Tenn.)	36	30	83	00	$\frac{1}{4}$ degree	100	1:125000	5
Kenova (Ky.-W. Va.-Ohio)	38	00	82	30	.....do	100	1:125000	5
London	37	00	84	00	.....do	100	1:125000	5
Manchester	37	00	83	30	.....do	100	1:125000	5
Oceana (W. Va.-Va.-Ky.)	37	30	81	30	.....do	100	1:125000	5
Owensboro (Ind.-Ky.)	37	45	87	00	$\frac{1}{16}$ degree	20	1:62500	5
Prestonsburg	37	30	82	30	$\frac{1}{4}$ degree	100	1:125000	5
Richmond	37	30	84	00	.....do	100	1:125000	5
Salyersville	37	30	83	00	.....do	100	1:125000	5
Tell City (Ky.-Ind.)	37	45	86	45	$\frac{1}{16}$ degree	20	1:62500	5
Warfield (W. Va.-Ky.-Va.)	37	30	82	00	$\frac{1}{4}$ degree	100	1:125000	5
West Cincinnati (Ohio-Ky.)[b]	39	00	84	30	$\frac{1}{16}$ degree	20	1:62500	5
Whitesburg (Ky.-Va.)	37	00	82	30	$\frac{1}{4}$ degree	100	1:125000	5
Williamsburg (Ky.-Tenn.)	36	30	84	00	.....do	100	1:125000	5

[a] Sitka, on scale of 1:62500, has been reduced and forms part of Ashland sheet, on scale of 1:125000.
[b] Cincinnati (double sheet) includes East Cincinnati and West Cincinnati sheets.

Published topographic atlas sheets, arranged by States—Continued.

LOUISIANA.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Barataria	29	30	90	00	$\frac{1}{16}$ degree	5	1:62500	5
Bayou de Large	29	15	90	45	do	None.	1:62500	5
Bodreau	29	45	89	15	do	None.	1:62500	5
Bonnet Carre	30	00	90	15	do	5	1:62500	5
Cat Island (La.-Miss.)	30	00	89	00	do	None.	1:62500	5
Chandeleur	29	45	89	00	do	None.	1:62500	5
Chef Menteur	30	00	89	45	do	None.	1:62500	5
Cheniere Caminada	29	00	90	00	do	None.	1:62500	5
Creole	29	15	90	00	do	None.	1:62500	5
Cut Off	29	30	90	15	do	5	1:62500	5
Dime	29	30	89	30	do	5	1:62500	5
Donaldsonville	30	00	90	45	do	5	1:62500	5
Dulac	29	15	90	30	do	5	1:62500	5
East Delta	29	00	89	00	do	None.	1:62500	5
Fort Livingston	29	15	89	45	do	None.	1:62500	5
Forts	29	15	89	15	do	None.	1:62500	5
Gibson	29	30	90	45	do	5	1:62500	5
Hahnville	29	45	90	15	do	5	1:62500	5
Houma	29	30	90	30	do	5	1:62500	5
La Fortuna	29	30	89	15	do	None.	1:62500	5
Lac des Allemands	29	45	90	30	do	5	1:62500	5
Lake Felicity	29	15	90	15	do	5	1:62500	5
Mount Airy	30	00	90	30	do	5	1:62500	5
New Orleans	29	45	90	00	do	5	1:62500	5
Pointe a la Hache	29	30	89	45	do	5	1:62500	5
Quarantine	29	15	89	30	do	5	1:62500	5
Rigolets (La.-Miss.)	30	00	89	30	do	None.	1:62500	5
St. Bernard	29	45	89	45	do	5	1:62500	5
Shell Beach	29	45	89	30	do	None.	1:62500	5
Spanish Fort	30	00	90	00	do	None.	1:62500	5
Thibodeaux	29	45	90	45	do	5	1:62500	5
Timbalier	29	00	90	15	do	None.	1:62500	5
Toulme (La.-Miss.)	30	00	89	15	do	None.	1:62500	5
West Delta	29	00	89	15	do	None.	1:62500	5

MAINE.

Augusta	44	15	69	45	$\frac{1}{16}$ degree	20	1:62500	5
Bath	43	45	69	45	do	20	1:62500	5
Bangor	45	45	68	45	do	20	1:62500	5
Bar Harbor	44	15	68	00	do	20	1:62500	5
Berwick (Me.-N. H.)	43	15	70	45	do	20	1:62500	5
Biddeford	43	15	70	15	do	20	1:62500	5
Bluehill	44	15	68	30	do	20	1:62500	5
Boothbay	43	45	69	30	do	20	1:62500	5
Bucksport	44	30	68	45	do	20	1:62500	5
Buxton	43	30	70	30	do	20	1:62500	5
Casco Bay	43	30	70	00	do	20	1:62500	5
Castine	44	15	68	45	do	20	1:62500	5
Dover (N. H.-Me.)	43	00	70	45	do	20	1:62500	5
Freeport	43	45	70	00	do	20	1:62500	5

Published topographic atlas sheets, arranged by States—Continued.

MAINE—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.		Long.		Area covered.	Contour interval.	Scale.	Price.
	°	′	°	′		*Feet.*		*Cents.*
Gardiner	44	00	69	45	1/16 degree	20	1:62500	5
Gorham (N. H.-Me.) [a]	44	15	71	00	do	20	1:62500	5
Gray	43	45	70	15	do	20	1:62500	5
Kennebunk	43	15	70	30	do	20	1:62500	5
Mount Desert	44	15	68	15	do	20	1:62500	5
Mount Washington and Vicinity (N. H.-Me.) [a].	44	00	71	00	1/4 degree	20	1:62500	20
Newfield (Me.-N. H.)	43	30	70	45	1/16 degree	20	1:62500	5
Norridgewock	44	30	69	45	do	20	1:62500	5
North Conway (N. H.-Me.) [a]	44	00	71	00	do	20	1:62500	5
Norway	44	00	70	30	do	20	1:62500	5
Orland	44	30	68	30	do	20	1:62500	5
Orono	44	45	68	30	do	20	1:62500	5
Petit Manan	44	15	67	45	do	20	1:62500	5
Portland	43	30	70	15	do	20	1:62500	5
Sebago	43	45	70	30	do	20	1:62500	5
Small Point	43	30	69	45	do	20	1:62500	5
Swan Island	44	00	68	15	do	20	1:62500	5
Vassalboro	44	15	69	30	do	20	1:62500	5
Vinalhaven	44	00	68	45	do	20	1:62500	5
Waterville	44	30	69	30	do	20	1:62500	5
Wiscasset	44	00	69	30	do	20	1:62500	5
York (Me.-N. H.)	43	00	70	30	do	20	1:62500	5

MARYLAND.

Name of atlas sheet.	Lat. °	′	Long. °	′	Area covered.	Contour interval.	Scale.	Price.
Accident (Md.-Pa.-W. Va.)	39	30	79	15	1/16 degree	20	1:62500	5
Annapolis [b]	38	45	76	15	do	20	1:62500	5
Baltimore	39	15	76	30	do	20	1:62500	5
Belair (Md.-Pa.)	39	30	76	15	do	20	1:62500	5
Betterton [c]	39	15	76	00	do	20	1:62500	5
Bloodsworth Island [d]	38	00	76	00	do		1:62500	5
Brandywine [e]	38	30	76	45	do	20	1:62500	5
Cecilton (Md.-Del.) [f]	39	15	75	45	do	20	1:62500	5
Choptank	38	30	76	00	1/4 degree	20	1:125000	5
Chestertown [c]	39	00	76	00	1/16 degree	20	1:62500	5
Crisfield (Md.-Va.)	37	45	75	45	do		1:62500	5
Deal Island	38	00	75	45	do	10	1:62500	5
Dover (Del.-Md.-N. J.) [f]	39	00	75	30	1/4 degree	20	1:125000	5
Drum Point [d]	38	15	76	15	1/16 degree	20	1:62500	5
Elkton (Md.-Pa.-Del.)	39	30	75	45	do	20	1:62500	5
Ellicott	39	15	76	45	do	20	1:62500	5
Flintstone (W. Va.-Md.-Pa.)	39	30	78	30	do	20	1:62500	5

[a] Mount Washington and Vicinity sheet includes Gorham and North Conway sheets, together with the Crawford Notch and Mount Washington sheets, New Hampshire.

[b] Annapolis, St. Michaels, and Sharps Island sheets show part of Chopstank quadrangle on larger scale.

[c] Betterton, Chestertown, Gunpowder, and North Point sheets, on scale of 1:62500, have been reduced and form Tolchester sheet, on scale of 1:125000.

[d] Bloodsworth Island, Drum Point, and Point Lookout sheets, on scale of 1:62500, have been reduced and form parts of St. Mary sheet, on scale of 1:125000.

[e] Brandywine, East Washington, Owensville, and Prince Frederick sheets, on scale of 1:62500, have been reduced and form Patuxent sheet, on scale of 1:125000.

[f] Cecilton sheet, on scale of 1:62500, has been reduced and forms part of Dover sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

MARYLAND—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Frederick (Md.-Va.)	39 00	77 00	¼ degree	50	1:125000	5
Fredericksburg (Va.-Md.)	38 00	77 00	....do	50	1:125000	5
Frostburg (Md.-W. Va.-Pa.)	39 30	78 45	1/16 degree	20	1:62500	5
Grantsville (Md.-Pa.)	39 30	79 00	....do	20	1:62500	5
Green Run (Md.-Va.)	38 00	75 00	....do	10	1:62500	5
Gunpowder [a]	39 15	76 15	....do	20	1:62500	5
Hancock (Md.-W. Va.-Pa.)	39 30	78 00	....do	20	1:62500	5
Harpers Ferry (Va.-W. Va.-Md.)	39 00	77 30	¼ degree	100	1:125000	5
Havre de Grace (Md.-Pa.)	39 30	76 00	1/16 degree	20	1:62500	5
Laurel	39 00	76 45	....do	20	1:62500	5
Leonardtown [b]	38 15	76 30	....do	20	1:62500	5
Montross (Va.-Md.) [b]	38 00	76 45	....do	20	1:62500	5
Mount Vernon (Va.-Md.-D. C.) [c]	38 30	77 00	¼ degree	50	1:125000	5
Nanticoke	38 15	75 45	1/16 degree	10	1:62500	5
Nomini (Md.-Va.) [b]	38 00	76 30	¼ degree	20	1:125000	5
North Point [a]	39 00	76 15	1/16 degree	20	1:62500	5
Oakland (Md.-W. Va.) [c]	39 15	79 15	....do	20	1:62500	5
Ocean City (Md.-Del.)	38 15	75 00	....do	10	1:62500	5
Owensville [d]	38 45	76 30	....do	20	1:62500	5
Parkton (Md.-Pa.)	39 30	76 30	....do	20	1:62500	5
Patuxent (Md.-D. C.) [d]	38 30	76 30	¼ degree	20	1:125000	5
Pawpaw (Md.-W. Va.-Pa.)	39 30	78 15	1/16 degree	20	1:62500	5
Piedmont (W. Va.-Md.) [c]	39 00	79 00	¼ degree	100	1:125000	5
Piney Point (Md.-Va.) [b]	38 00	76 30	1/16 degree	20	1:62500	5
Pittsville (Md.-Del.)	38 15	75 15	....do	10	1:62500	5
Point Lookout (Md.-Va.) [e]	38 00	76 15	....do	20	1:62500	5
Prince Frederick [d]	38 30	76 30	....do	20	1:62500	5
Princess Anne (Md.-Va.)	38 00	75 30	....do	10	1:62500	5
Relay	39 00	76 30	....do	20	1:62500	5
Romney (W. Va.-Va.-Md.)	39 00	78 30	¼ degree	100	1:125000	5
Salisbury (Md.-Del.)	38 15	75 30	1/16 degree	10	1:62500	5
St. Mary (Md.-Va.) [e]	38 00	76 00	¼ degree	20	1:125000	5
St. Michaels [f]	38 45	76 00	1/16 degree	20	1:62500	5
Sharps Island [f]	38 30	76 15	....do	None.	1:62500	5
Snow Hill (Md.-Va.)	38 00	75 15	....do	10	1:62500	5
Tolchester [a]	39 00	76 00	¼ degree	20	1:125000	5
Washington (D. C.-Md.-Va.) (double sheet). [d]	38 45	76 45	⅛ degree	20	1:62500	10
Wicomico (Md.-Va.) [b]	38 15	76 45	1/16 degree	20	1:62500	5

MASSACHUSETTS.

Abington	42 00	70 45	1/16 degree	20	1:62500	5
Barnstable	41 32	70 15	....do	20	1:62500	5
Barre	42 15	72 00	....do	20	1:62500	5

[a] Betterton, Chestertown, Gunpowder, and North Point sheets, on scale of 1:62500, have been reduced and form Tolchester sheet, on scale of 1:125000.

[b] Leonardtown, Montross, Piney Point, and Wicomico sheets, on scale of 1:62500, have been reduced and form Nomini sheet, on scale of 1:125000.

[c] The west half of Washington sheet shows part of Mount Vernon quadrangle on larger scale; Oakland sheet shows part of Piedmont quadrangle on larger scale.

[d] Brandywine, East Washington, Owensville, and Prince Frederick sheets, on scale of 1:62500, have been reduced and form Patuxent sheet, on scale of 1:125000.

[e] Bloodsworth Island, Drum Point, and Point Lookout sheets, on scale of 1:62500, have been reduced and form parts of St. Mary sheet, on scale of 1:125000.

[f] Annapolis, St. Michaels, and Sharps Island sheets show parts of Choptank quadrangle on larger scale.

Published topographic atlas sheets, arranged by States—Continued.

MASSACHUSETTS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Becket[a]	42	15	73	00	$\frac{1}{16}$ degree	20	1:62500	5
Belchertown	42	15	72	15	....do	20	1:62500	5
Berlin (N. Y.-Mass.-Vt.)[b]	42	30	73	15	....do	20	1:62500	5
Blackstone (Mass.-R. I.)	42	00	71	30	....do	20	1:62500	5
Boston	42	15	71	00	....do	20	1:62500	5
Boston and Vicinity (double sheet)	42	15	70	45	$\frac{1}{8}$ degree	20	1:62500	10
Boston Bay	42	15	70	45	$\frac{1}{16}$ degree	20	1:62500	5
Brookfield (Mass.-Conn.)	42	00	72	00	....do	20	1:62500	5
Chatham	41	30	69	45	....do	20	1:62500	5
Chesterfield[c]	42	15	72	45	....do	20	1:62500	5
Dedham	42	00	71	00	....do	20	1:62500	5
Duxbury	42	00	70	30	....do	20	1:62500	5
Fall River (Mass.-R. I.)	41	30	71	00	....do	20	1:62500	5
Falmouth	41	30	70	30	....do	20	1:62500	5
Fitchburg (Mass.-N. H.)	42	30	71	45	....do	20	1:62500	5
Framingham	42	15	71	15	....do	20	1:62500	5
Franklin (Mass.-R. I.)	42	00	71	15	....do	20	1:62500	5
Gay Head	41	15	70	42	....do	20	1:62500	5
Gloucester	42	30	70	30	....do	20	1:62500	5
Granville (Mass.-Conn.)[c]	42	00	72	45	....do	20	1:62500	5
Greenfield (Mass.-Vt.)	42	30	72	30	....do	20	1:62500	5
Greylock (Mass.-Vt.)[b]	42	30	73	00	....do	20	1:62500	5
Groton (Mass.-N. H.)	42	30	71	30	....do	20	1:62500	5
Haverhill (Mass.-N. H.)	42	45	71	00	....do	20	1:62500	5
Hawley (Mass.-Vt.)	42	30	72	45	....do	20	1:62500	5
Holyoke (Mass.-Conn.)[c]	42	00	72	30	$\frac{1}{4}$ degree	40	1:125000	5
Housatonic (Mass.-Conn.-N. Y.)[a]	42	00	73	00	....do	40	1:125000	5
Lawrence (Mass.-N. H.)	42	30	71	00	$\frac{1}{16}$ degree	20	1:62500	5
Lowell (Mass.-N. H.)	42	30	71	15	....do	20	1:62500	5
Marlboro	42	15	71	30	....do	20	1:62500	5
Marthas Vineyard	41	15	70	27	....do	20	1:62500	5
Middleboro	41	45	70	45	....do	20	1:62500	5
Muskeget	41	15	70	12	....do	20	1:62500	5
Nantucket	41	13	69	57	....do	20	1:62500	5
Narragansett Bay (R. I.-Mass.)	41	30	71	15	....do	20	1:62500	5
New Bedford	41	30	70	45	....do	20	1:62500	5
Newburyport (Mass.-N. H.)	42	45	70	45	....do	20	1:62500	5
Northampton[c]	42	15	72	30	....do	20	1:62500	5
Palmer (Mass.-Conn.)	42	00	72	15	....do	20	1:62500	5
Pittsfield (Mass.-N. Y.)[a]	42	15	73	15	....do	20	1:62500	5
Plymouth	41	45	70	30	....do	20	1:62500	5
Providence (Mass.-R. I.)	41	45	71	15	....do	20	1:62500	5
Provincetown	42	00	70	00	....do	20	1:62500	5
Sakonnet (R. I.-Mass.)	41	15	71	00	....do	20	1:62500	5
Salem	42	30	70	45	....do	20	1:62500	5
Sandisfield (Mass.-Conn.)[a]	42	00	73	00	....do	20	1:62500	5
Sheffield (Mass.-Conn.-N. Y.)[a]	42	00	73	15	....do	20	1:62500	5
Springfield (Mass.-Conn.)[c]	42	00	72	30	....do	20	1:62500	5

[a] Becket, Pittsfield, Sandisfield, and Sheffield sheets, on scale of 1:62500, have been reduced and form Housatonic sheet, on scale of 1:125000.

[b] Berlin and Greylock sheets, on scale of 1:62500, have been reduced and form parts of Taconic sheet, on scale of 1:125000.

[c] Chesterfield, Granville, Northampton, and Springfield sheets, on scale of 1:62500, have been reduced and form Holyoke sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

MASSACHUSETTS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Taconic (N. Y.-Mass.-Vt.) *a*	42 30	73 00	$\frac{1}{4}$ degree	40	1:125000	5
Taunton	41 45	71 00	$\frac{1}{16}$ degree	20	1:62500	5
Warwick (Mass.-N. H.-Vt.)	42 30	72 15	do	20	1:62500	5
Webster (Mass.-Conn.-R. I.)	42 00	71 45	do	20	1:62500	5
Wellfleet	41 45	69 55	do	20	1:62500	5
Winchendon (Mass.-N. H.)	42 30	72 00	do	20	1:62500	5
Worcester	42 15	71 45	do	20	1:62500	5
Yarmouth	41 30	70 00	do	20	1:62500	5
(See also general maps, p. 195.)						

MICHIGAN.

Crystal Falls	46 00	88 15	$\frac{1}{16}$ degree	20	1:62500	5
Iron River (Mich.-Wis.)	46 00	88 30	do	20	1:62500	5
Maumee Bay (O.-Mich.)	41 30	83 15	do	20	1:62500	5
Ned Lake	46 15	88 15	do	20	1:62500	5
Passage Island	48 00	88 15	do	20	1:62500	5
Perch Lake	46 15	88 30	do	20	1:62500	5
Sagola	46 00	88 00	do	20	1:62500	5
Toledo (O.-Mich.)	41 30	83 30	do	20	1:62500	5
Witbeck	46 15	88 00	do	20	1:62500	5
(See also special maps, p. 196.)						

MINNESOTA.

Anoka	45 00	93 15	$\frac{1}{16}$ degree	20	1:62500	5
Duluth	46 45	92 00	do	20	1:62500	5
Fargo (N. Dak.-Minn.)	46 30	96 30	$\frac{1}{4}$ degree	20	1:125000	5
Minneapolis	44 45	93 15	$\frac{1}{16}$ degree	20	1:62500	5
St. Croix Dalles (Wis.-Minn.)	45 15	92 30	do	20	1:62500	5
St. Paul	44 45	93 00	do	20	1:62500	5
White Bear	45 00	93 00	do	20	1:62500	5

MISSISSIPPI.

Cat Island (La.-Miss.)	30 00	89 00	$\frac{1}{16}$ degree	None.	1:62500	5
Rigolets (La.-Miss.)	30 00	89 30	do	None.	1:62500	5
Toulme (La.-Miss.)	30 00	89 15	do	None.	1:62500	5

MISSOURI.

Atchison (Kans.-Mo.)	39 30	95 00	$\frac{1}{4}$ degree	50	1:125000	5
Bolivar	37 30	93 00	do	50	1:125000	5
Boonville	38 30	92 30	do	50	1:125000	5
Butler	38 00	94 00	do	50	1:125000	5
Carthage	37 00	94 00	do	50	1:125000	5
Clinton	38 00	93 30	do	50	1:125000	5

a Berlin and Greylock sheets, on scale of 1:62500, have been reduced and form parts of Taconic sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

MISSOURI—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.		Position of SE. corner of sheet. Long.		Area covered.	Contour interval.	Scale.	Price.
	°	′	°	′		*Feet.*		*Cents.*
De Soto	38	00	93	30	¼ degree	50	1:125000	5
Edina	40	00	92	00	....do	20	1:125000	5
Eureka Springs (Ark.-Mo.)	36	00	93	30	....do	50	1:125000	5
Fayetteville (Ark.-Mo.)	36	00	94	00	....do	50	1:125000	5
Fort Scott (Kans.-Mo.)	37	30	94	30	....do	50	1:125000	5
Fulton	38	30	91	30	....do	50	1:125000	5
Glasgow	39	00	92	30	....do	50	1:125000	5
Greenfield	37	00	93	30	....do	50	1:125000	5
Harrisonville	38	30	94	00	....do	50	1:125000	5
Hermann	38	30	91	00	....do	50	1:125000	5
Independence	39	00	94	00	....do	50	1:125000	5
Jefferson City	38	30	92	00	....do	50	1:125000	5
Joplin (Kans.-Mo.-Ind. T)	37	00	94	30	....do	50	1:125000	5
Kahoka (Mo.-Iowa-Ill.)	40	00	91	30	....do	20	1:125000	5
Kansas City (Kans.-Mo.)	39	00	94	30	....do	50	1:125000	5
Lexington	39	00	93	30	....do	50	1:125000	5
Louisiana (Mo.-Ill.)	39	00	91	00	....do	50	1:125000	5
Marshall	39	00	93	00	....do	50	1:125000	5
Mexico	39	00	91	30	....do	50	1:125000	5
Moberly	39	00	92	00	....do	50	1:125000	5
Mound City (Kans.-Mo.)	38	00	94	30	....do	50	1:125000	5
Mountain Home (Ark.-Mo.)	36	00	92	00	....do	50	1:125000	5
Nevada	37	30	94	00	....do	50	1:125000	5
O'Fallon (Mo.-Ill.)	38	30	90	30	....do	50	1:125000	5
Olathe (Kans.-Mo.)	38	30	94	30	....do	50	1:125000	5
Oskaloosa (Kans.-Mo.)	39	00	95	00	....do	50	1:125000	5
Palmyra	39	30	91	30	....do	20	1:125000	5
St. Louis (Mo.-Ill.) (double sheet)	38	30	90	00	⅛ degree	50	1:62500	10
Sedalia	38	30	93	00	¼ degree	50	1:125000	5
Springfield	37	00	93	00	....do	50	1:125000	5
Stockton	37	30	93	30	....do	50	1:125000	5
Sullivan	38	00	91	00	....do	50	1:125000	5
Tuscumbia	38	00	92	00	....do	50	1:125000	5
Versailles	38	00	92	30	....do	50	1:125000	5
Warrensburg	38	30	93	30	....do	50	1:125000	5
Warsaw	38	00	93	00	....do	50	1:125000	5
Yellville (Ark.-Mo.)	36	00	92	30	....do	50	1:125000	5
(See also special maps, p. 196.)								

MONTANA.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Aladdin (Wyo.-S. Dak.-Mont.)	44	30	104	00	¼ degree	50	1:125000	5
Big Snowy Mountain	46	00	109	00	1 degree	200	1:250000	5
Big Timber	45	30	109	30	¼ degree	50	1:125000	5
Boulder	46	00	112	00	....do	100	1:125000	5
Bonner	46	30	113	30	....do	100	1:125000	5
Browning	48	30	113	00	....do	100	1:125000	5
Coopers Lake	47	00	112	30	....do	100	1:125000	5
Dillon	45	00	112	00	1 degree	200	1:250000	5
Fort Benton	47	00	110	00	....do	200	1:250000	5

Published topographic atlas sheets, arranged by States—Continued.

MONTANA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.		Long.		Area covered.	Contour interval.	Scale.	Price.
	°	′	°	′		*Feet.*		*Cents.*
Fort Custer	45	30	107	30	¼ degree	50	1:125000	5
Fort Logan	46	00	111	00	1 degree	200	1:250000	5
Great Falls	47	00	111	00	do	200	1:250000	5
Hamilton (Mont.-Idaho)	46	00	114	00	¼ degree	100	1:125000	5
Helena	46	00	112	00	1 degree	200	1:250000	5
Huntley	45	30	108	00	¼ degree	50	1:125000	5
Little Belt Mountains	46	00	110	00	1 degree	200	1:250000	5
Livingston (Mont.-Yellowstone Nat. Park).	45	00	110	00	do	200	1:250000	5
Rosebud	45	00	107	00	¼ degree	50	1:125000	5
St. Xavier	45	00	107	30	do	50, 100	1:125000	5
Saypo	47	30	112	30	do	100	1:125000	5
Stillwater	45	30	109	00	do	50	1:125000	5
Threeforks (Mont.-Yellowstone Nat. Park).	45	00	111	00	1 degree	200	1:250000	5
(See also combined and special maps, pp. 195–196.)								

NEBRASKA.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Arapahoe (Nebr.-Kans.)	40	00	99	30	¼ degree	20	1 : 125000	5
Browns Creek	41	30	102	30	do	20	1 : 125000	5
Camp Clarke	41	30	103	00	do	20	1 : 125000	5
Chappell	41	00	102	00	do	20	1 : 125000	5
David City	41	00	97	00	do	20	1 : 125000	5
Elk Point (S. Dak.-Nebr.-Iowa)	42	30	96	30	do	20	1 : 125000	5
Fremont	41	00	96	00	do	20	1 : 125000	5
Goshen Hole (Wyo.-Nebr.)	41	30	104	00	do	20	1 : 125000	5
Gothenburg	40	30	100	00	do	20	1 : 125000	5
Grand Island [a]	40	30	98	00	do	20	1 : 125000	5
Grand Island [a]	40	45	98	15	$\frac{1}{16}$ degree	20	1 : 62500	5
Hebron (Nebr.-Kans.)	40	00	97	30	¼ degree	20	1 : 125000	5
Holdredge (Nebr.-Kans.)	40	00	99	00	do	20	1 : 125000	5
Kearney [b]	40	30	99	00	do	20	1 : 125000	5
Kearney [b]	40	30	99	00	$\frac{1}{16}$ degree	20	1 : 62500	5
Kenesaw [c]	40	30	98	30	do	20	1 : 62500	5
Lexington	40	30	99	30	¼ degree	20	1 : 125000	5
Lincoln	40	30	96	30	do	20	1 : 125000	5
Loup	41	00	98	30	do	20	1 : 125000	5
Minden [c]	40	30	98	45	$\frac{1}{16}$ degree	20	1 : 62500	5
North Platte	41	00	100	30	¼ degree	20	1 : 125000	5
Oelrichs (S. Dak.-Nebr.)	43	00	103	00	do	50	1 : 125000	5
Ogalalla	41	00	101	30	do	20	1 : 125000	5
Omaha and Vicinity (Nebr.-Iowa)	41	00	95	45	$\frac{23}{180}$ degree	20	1 : 62500	10

[a] Grand Island sheet, on scale of 1 : 62500, has been reduced and forms part of Grand Island sheet, on scale of 1 : 125000.
[b] Kearney sheet, on scale of 1 : 62500, has been reduced and forms part of Kearney sheet, on scale of 1 : 125000.
[c] Kenesaw, Minden, and Wood River sheets, on scale of 1 : 62500, have been reduced and form parts of Wood River sheet, on scale of 1 : 125000.

Published topographic atlas sheets, arranged by States—Continued.

NEBRASKA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Patrick (Wyo.-Nebr.)	42	00	104	00	$\frac{1}{4}$ degree	20	1 : 125000	5
Paxton	41	00	101	00	.....do.....	20	1 : 125000	5
Red Cloud (Nebr.-Kans.)	40	00	98	30	.....do.....	20	1 : 125000	5
St. Paul	41	00	98	00	.....do.....	20	1 : 125000	5
Scotts Bluff	41	30	103	30	.....do.....	20	1 : 125000	5
Sidney	41	00	102	30	.....do.....	20	1 : 125000	5
Stromsburg	41	00	97	30	.....do.....	20	1 : 125000	5
Superior (Nebr.-Kans.)	41	00	98	00	.....do.....	20	1 : 125000	5
Wahoo	41	00	96	30	.....do.....	20	1 : 125000	5
Weeping Water	40	30	96	00	.....do.....	20	1 : 125000	5
Whistle Creek	42	00	103	30	.....do.....	20	1 : 125000	5
Wood River[a]	40	30	98	30	.....do.....	20	1 : 125000	5
Wood River[a]	40	45	98	30	$\frac{1}{16}$ degree	20	1 : 62500	5
York	40	30	97	30	$\frac{1}{4}$ degree	20	1 : 125000	5

NEVADA.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Camp Mohave (Ariz.-Nev.-Cal.)	35	00	114	00	1 degree	250	1 : 250000	5
Carson[b]	39	00	119	30	$\frac{1}{4}$ degree	100	1 : 125000	5
Disaster	41	00	118	00	1 degree	200	1 : 250000	5
Granite Range	40	00	119	00	.....do.....	200	1 : 250000	5
Lake Tahoe and Vicinity (Cal.-Nev.)[b]	38	30	119	30	.....do.....	100	1 : 125000	20
Long Valley	41	00	119	00	.....do.....	200	1 : 250000	5
Markleeville (Cal.-Nev.)[b]	38	30	119	30	$\frac{1}{4}$ degree	100	1 : 125000	5
Paradise	41	00	117	00	1 degree	200	1 : 250000	5
Pioche (Nev.-Utah)	37	00	114	00	.....do.....	250	1 : 250000	5
Reno	39	30	119	30	$\frac{1}{4}$ degree	100	1 : 125000	5
St. Thomas (Nev.-Ariz.)	36	00	114	00	1 degree	250	1 : 250000	5
Silver Peak (Nev.-Cal.)	37	30	117	30	$\frac{1}{4}$ degree	100	1 : 125000	5
Wabuska	39	00	119	00	.....do.....	100	1 : 125000	5
Wadsworth	39	30	119	00	.....do.....	100	1 : 125000	5
Wellington (Cal.-Nev.)	38	30	119	00	.....do.....	100	1 : 125000	5
(See also special maps, p. 196.)								

NEW HAMPSHIRE.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Berwick (Me.-N. H.)	43	15	70	45	$\frac{1}{16}$ degree	20	1 : 62500	5
Brattleboro (Vt.-N. H.)	42	45	72	30	.....do.....	20	1 : 62500	5
Crawford Notch[c]	44	00	71	15	.....do.....	20	1 : 62500	5
Dover (N. H.-Me.)	43	00	70	45	.....do.....	20	1 : 62500	5
Fitchburg (Mass.-N. H.)	42	30	71	45	.....do.....	20	1 : 62500	5
Gorham (N. H.-Me.)[c]	44	15	71	00	.....do.....	20	1 : 62500	5
Groton (Mass.-N. H.)	42	30	71	30	.....do.....	20	1 : 62500	5
Haverhill (Mass.-N. H.)	42	45	71	00	.....do.....	20	1 : 62500	5
Keene (N. H.-Vt.)	42	45	72	15	.....do.....	20	1 : 62500	5
Lawrence (Mass.-N. H.)	42	30	71	00	.....do.....	20	1 : 62500	5
Lowell (Mass.-N.H.)	42	30	71	15	.....do.....	20	1 : 62500	5
Monadnock	42	45	72	00	.....do.....	20	1 : 62500	5

[a] Kenesaw, Minden, and Wood River sheets, on scale of 1 : 62500, have been reduced and form parts of Wood River on scale of 1 : 125000.

[b] Lake Tahoe and Vicinity includes Carson, Markleeville, Pyramid Peak, and Truckee sheets.

[c] Mount Washington and Vicinity includes Crawford Notch, Gorham, Mount Washington, and North Conway sheets.

Published topographic atlas sheets, arranged by States—Continued.

NEW HAMPSHIRE—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		Feet.		Cents.
Mount Washington[a]	44 15	71 15	1/16 degree	20	1 : 62500	5
Mount Washington and Vicinity (N. H.-Me.)[a]	44 00	71 00	1/4 degree	20	1 : 62500	20
Newburyport (Mass.-N. H.)	42 45	70 45	1/16 degree	20	1 : 62500	5
Newfield (Me.-N. H.)	43 30	70 45	do	20	1 : 62500	5
North Conway (N. H.-Me.)[a]	44 00	71 00	do	20	1 : 62500	5
Peterboro	42 45	71 45	do	20	1 : 62500	5
Warwick (Mass.-N. H.-Vt.)	42 30	72 15	do	20	1 : 62500	5
Whitefield (N. H.-Vt.)	44 15	71 30	do	20	1 : 62500	5
Winchendon (Mass.-N. H.)	42 30	72 00	do	20	1 : 62500	5
York (Me.-N. H.)	43 00	70 30	do	20	1 : 62500	5

NEW JERSEY.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Asbury Park[b]	40 00	74 00	1/16 degree	10	1 : 62500	5
Atlantic City	39 15	74 15	do	10	1 : 62500	5
Barnegat	39 45	74 00	do	10	1 : 62500	5
Bayside (N. J.-Del.)[c]	39 15	75 15	do	10	1 : 62500	5
Bordentown (N. J.-Pa.)	40 00	74 30	do	10	1 : 62500	5
Bridgeton[c]	39 15	75 00	do	10	1 : 62500	5
Burlington (Pa.-N. J.)	40 00	74 45	do	20	1 : 62500	5
Camden (N. J.-Pa.-Del.)[d]	39 30	75 00	1/4 degree	20	1 : 125000	5
Cape May	38 45	74 45	1/16 degree	10	1 : 62500	5
Cassville[b]	40 00	74 15	do	10	1 : 62500	5
Chester (Pa.-Del.-N. J.)[d e]	39 45	75 15	do	20	1 : 62500	5
Delaware Water Gap (Pa.-N. J.)	40 45	75 00	do	20	1 : 62500	5
Dennisville	39 00	74 45	do	10	1 : 62500	5
Dover (Del.-Md.-N. J.)	39 00	75 30	1/4 degree	20	1 : 125000	5
Doylestown (Pa.-N. J.)	40 15	75 00	1/16 degree	20	1 : 62500	5
Easton (Pa.-N. J.)	40 30	75 00	do	20	1 : 62500	5
Franklin	41 00	74 30	do	20	1 : 62500	5
Germantown (Pa.-N. J.)[e]	40 00	75 00	do	20	1 : 62500	5
Glassboro[d]	39 30	75 00	do	10	1 : 62500	5
Great Egg Harbor	39 15	74 30	do	10	1 : 62500	5
Greenwood Lake (N. J.-N. Y.)	41 00	74 15	do	20	1 : 62500	5
Hackettstown[f]	40 45	74 45	do	20	1 : 62500	5
Hammonton[g]	39 30	74 45	do	10	1 : 62500	5
Harlem (N. Y.-N. J.)[h]	40 45	73 45	do	20	1 : 62500	5
High Bridge[f]	40 30	74 45	do	20	1 : 62500	5
Lake Hopatcong[f]	40 45	74 30	do	20	1 : 62500	5
Lambertville (Pa.-N. J.)	40 15	74 45	do	20	1 : 62500	5
Little Egg Harbor	39 30	74 15	do	10	1 : 62500	5

[a] Mount Washington and Vicinity includes Crawford Notch, Gorham, Mount Washington, and North Conway sheets.

[b] Asbury Park, Cassville, New Brunswick, and Sandy Hook sheets, on scale of 1 : 62500, have been reduced and form Navesink sheet, on scale of 1 : 125000.

[c] Bayside, Bridgeton, and Maurice Cove sheets, on scale of 1 : 62500, have been reduced and form parts of Vineland sheet, on scale of 1 : 125000.

[d] Chester, Glassboro, Philadelphia, and Salem sheets, on scale of 1 : 62500, have been reduced and form Camden sheet, on scale of 1 : 125000.

[e] Philadelphia and Vicinity includes Chester, Germantown, Norristown, and Philadelphia sheets.

[f] Hackettstown, High Bridge, Lake Hopatcong, and Somerville sheets, on scale of 1 : 62500, have been reduced and form Raritan sheet, on scale of 1 : 125000.

[g] Hammonton, Mount Holly, Mullica, and Pemberton sheets, on scale of 1 : 62500, have been reduced and form Rancocas sheet, on scale of 1 : 125000.

[h] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hempstead, Oyster Bay, and Sandy Hook sheets.

Published topographic atlas sheets, arranged by States—Continued.

NEW JERSEY—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		Feet.		Cents.
Long Beach	39 30	74 00	1/16 degree	10	1:62500	5
Maurice Cove[a]	39 00	75 00	do	10	1:62500	5
Morristown[b]	40 45	74 15	do	20	1:62500	5
Mount Holly[c]	39 45	74 45	do	10	1:62500	5
Mullica[c]	39 30	74 30	do	10	1:62500	5
Navesink (N.J.-N.Y.)[d]	40 00	74 00	1/4 degree	20	1:125000	5
New Brunswick[d]	40 15	74 15	1/16 degree	10	1:62500	5
New York City and Vicinity (N.Y.-N.J.).[e]	40 22	73 40	35/96 degree	20	1:62500	25
Passaic (N.J.-N.Y.)[b]	40 30	74 00	1/4 degree	20	1:125000	5
Paterson (N.J.-N.Y.)[be]	40 45	74 00	1/16 degree	20	1:62500	5
Pemberton[c]	39 45	74 30	do	10	1:62500	5
Philadelphia (Pa.-N.J.)[fg]	39 45	75 00	do	20	1:62500	5
Philadelphia and Vicinity (Pa.-N.J.-Del.).[g]	39 45	75 00	1/4 degree	20	1:62500	20
Plainfield[b]	40 30	74 15	1/16 degree	20	1:62500	5
Princeton	40 15	74 30	do	10	1:62500	5
Ramapo (N.J.-N.Y.)	41 00	74 00	do	20	1:62500	5
Rancocas[c]	39 30	74 30	1/4 degree	10	1:125000	5
Raritan[h]	40 30	74 30	do	20	1:125000	5
Salem (N.J.-Del.)[f]	39 30	75 15	1/16 degree	10	1:62500	5
Sandy Hook (N.J.-N.Y.)[de]	40 15	74 00	do	10	1:62500	5
Sea Isle	39 00	74 30	do	10	1:62500	5
Somerville[h]	40 30	74 30	do	20	1:62500	5
Staten Island (N.J.-N.Y.)[be]	40 30	74 00	do	20	1:62500	5
Tarrytown (N.Y.-N.J.)	41 00	73 45	do	20	1:62500	5
Tuckahoe	39 15	74 45	do	10	1:62500	5
Vineland (N.J.-Del.)[a]	39 00	75 00	1/4 degree	20	1:125000	5
Wallpack (N.J.-Pa.)	41 00	74 45	1/16 degree	20	1:62500	5
Whiting	39 45	74 15	do	10	1:62500	5
(See also special maps, p. 196.)						

NEW MEXICO.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Albuquerque	35 00	106 30	1/4 degree	50	1:125000	5
Bernal	35 00	105 00	do	50	1:125000	5
Canyon de Chelly (Ariz.-N. Mex.)	36 00	109 00	1 degree	200	1:250000	5
Chaco	36 00	108 00	do	200	1:250000	5
Corazon	35 00	104 30	1/4 degree	50	1:125000	5
Deming	32 00	107 30	do	100	1:125000	5
Fort Defiance (Ariz.-N. Mex.)	35 00	109 00	1 degree	200	1:250000	5

[a] Bayside, Bridgeton, and Maurice Cove sheets, on scale of 1:62500, have been reduced and form parts of Vineland sheet, on scale of 1:125000.
[b] Morristown, Paterson, Plainfield, and Staten Island sheets, on scale of 1:62500, have been reduced and form Passaic sheet, on scale of 1:125000.
[c] Hammonton, Mount Holly, Mullica, and Pemberton sheets, on scale of 1:62500 have been reduced and form Rancocas sheet, on scale of 1:125000.
[d] Asbury Park, Cassville, New Brunswick, and Sandy Hook sheets, on scale of 1:62500, have been reduced and form Navesink sheet, on scale of 1:125000.
[e] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hempstead, Oyster Bay, and Sandy Hook sheets.
[f] Chester, Glassboro, Philadelphia, and Salem sheets, on scale of 1:62500, have been reduced and form Camden sheet, on scale of 1:125000.
[g] Philadelphia and Vicinity includes Chester, Germantown, Norristown, and Philadelphia sheets.
[h] Hackettstown, High Bridge, Lake Hopatcong, and Somerville sheets, on scale of 1:62500, have been reduced and form Raritan sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

NEW MEXICO—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Jemes	35 30	106 30	$\frac{1}{4}$ degree	100	1:125000	5
Lamy	35 00	105 30	....do	50, 100	1:125000	5
Largo	36 00	107 00	1 degree	200	1:250000	5
Las Cruces	32 00	106 30	$\frac{1}{4}$ degree	25, 50	1:125000	5
Las Vegas	35 30	105 00	....do	50	1:125000	5
Mount Taylor	35 00	107 00	1 degree	200	1:250000	5
St. Johns (Ariz.-N. Mex.)	34 00	109 00	....do	200	1:250000	5
San Pedro	35 00	106 00	$\frac{1}{4}$ degree	50, 100	1:125000	5
Santa Clara	35 30	106 00	....do	100	1:125000	5
Santa Fe	35 30	105 30	....do	100	1:125000	5
Watrous	35 30	104 30	....do	50	1:125000	5
Wingate	35 00	108 00	1 degree	200	1:250000	5

NEW YORK.

Albany[a]	42 30	73 45	$\frac{1}{16}$ degree	20	1:62500	5
Albany and Vicinity[a]	42 30	73 30	$\frac{1}{4}$ degree	20	1:62500	20
Albion	43 00	78 00	$\frac{1}{16}$ degree	20	1:62500	5
Alexandria Bay	44 15	75 45	....do	20	1:62500	5
Amsterdam	42 45	74 00	....do	20	1:62500	5
Apalachin	42 00	76 00	....do	20	1:62500	5
Auburn	42 45	76 30	....do	20	1:62500	5
Ausable	44 15	73 30	....do	20	1:62500	5
Babylon[b]	40 30	73 15	....do	20	1:62500	5
Baldwinsville	43 00	76 13	....do	20	1:62500	5
Berlin (N. Y.-Mass.-Vt.)[c]	42 30	73 15	....do	20	1:62500	5
Berne	42 30	74 00	....do	20	1:62500	5
Big Moose	43 45	74 45	....do	20	1:62500	5
Binghamton	42 00	75 45	....do	20	1:62500	5
Blue Mountain	43 45	74 15	....do	20	1:62500	5
Bolton	43 30	73 30	....do	20	1:62500	5
Broadalbin	43 00	74 00	....do	20	1:62500	5
Brockport	43 00	77 45	....do	20	1:62500	5
Brooklyn[d]	42 30	73 45	....do	20	1:62500	5
Buffalo (N. Y.)	42 45	78 45	....do	20	1:62500	5
Cambridge (N. Y.-Vt.)[e]	43 00	73 15	....do	20	1:62500	5
Canandaigua	42 45	77 15	....do	20	1:62500	5
Canajoharie	42 45	74 30	....do	20	1:62500	5
Cape Vincent (N. Y.)	44 00	76 15	....do	20	1:62500	5
Carmel (N. Y.-Conn.)	41 15	73 30	....do	20	1:62500	5
Castleton (Vt.-N. Y.)	43 30	73 00	....do	20	1:62500	5
Catskill	42 00	73 45	....do	20	1:62500	5
Cazenovia	42 45	75 45	....do	20	1:62500	5
Cherry Creek	42 15	79 00	....do	20	1:62500	5
Chittenango	43 00	75 45	....do	20	1:62500	5
Clayton	44 00	76 00	....do	20	1:62500	5

[a] Albany and Vicinity includes Albany, Cohoes, Schenectady, and Troy sheets.
[b] Babylon, Fire Island, Northport, and Seatauket, on scale of 1 : 62500, have been reduced and form Islip sheet, on scale of 1 : 125000.
[c] Berlin and Hoosick sheets, on scale of 1:62500, have been reduced and form parts of Taconic sheet, on scale of 1:125000.
[d] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hempstead, Oyster Bay, and Sandy Hook sheets.
[e] Cambridge, Fort Ann, and Pawlet sheets, on scale of 1:62500, have been reduced and form parts of Mettawee sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

NEW YORK—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Clove (N. Y.-Conn.)	41	30	73	30	$\frac{1}{16}$ degree	20	1:62500	5
Clyde	43	00	76	45	....do	20	1:62500	5
Cohoes [a]	42	45	73	30	....do	20	1:62500	5
Cornwall (Conn.-N. Y.)	41	45	73	15	....do	20	1:62500	5
Cortland	42	30	76	00	....do	20	1:62500	5
Coxsackie	42	15	73	45	....do	20	1:62500	5
Dryden	42	15	76	15	....do	20	1:62500	5
Dunkirk	42	15	79	15	....do	20	1:62500	5
Durham	42	15	74	00	....do	20	1:62500	5
Elizabethtown	44	00	73	30	....do	20	1:62500	5
Elmira (N. Y.-Pa.)	42	00	76	45	....do	20	1:62500	5
Fire Island [b]	40	30	73	00	....do	20	1:62500	5
Fonda	42	45	74	15	....do	20	1:62500	5
Fort Ann (N. Y.-Vt.) [c]	43	15	73	15	....do	20	1:62500	5
Fulton	43	15	76	15	....do	20	1:62500	5
Geneva	42	45	76	45	....do	20	1:62500	5
Genoa	42	30	76	30	....do	20	1:62500	5
Glens Falls	43	15	73	30	....do	20	1:62500	5
Gloversville	43	00	74	15	....do	20	1:62500	5
Greenwood Lake (N. J.-N. Y.)	41	00	74	15	....do	20	1:62500	5
Grindstone	44	15	76	00	....do	20	1:62500	5
Hamlin	43	15	77	45	....do	20	1:62500	5
Hammondsport	42	15	77	00	....do	20	1:62500	5
Harford	42	15	76	00	....do	20	1:62500	5
Harlem (N. Y.-N. J.) [d]	40	45	73	45	....do	20	1:62500	5
Hempstead [d]	40	30	73	30	....do	20	1:62500	5
Honeoye	42	45	77	30	....do	20	1:62500	5
Hoosick (N. Y.-Vt.) [e]	42	45	73	15	....do	20	1:62500	5
Housatonic (Mass.-Conn.-N. Y.) [f]	42	00	73	00	$\frac{1}{4}$ degree	40	1:125000	5
Indian Lake	43	30	74	15	$\frac{1}{16}$ degree	20	1:62500	5
Islip	40	30	73	00	$\frac{1}{4}$ degree	20	1:125000	5
Ithaca	42	15	76	30	$\frac{1}{16}$ degree	20	1:62500	5
Kaaterskill	42	00	74	00	....do	20	1:62500	5
Kinderhook	42	15	73	30	....do	20	1:62500	5
Lake Placid	44	15	73	45	....do	20	1:62500	5
Lassellsville	43	00	74	30	....do	20	1:62500	5
Little Falls	43	00	74	45	....do	20	1:62500	5
Lockport [g]	43	00	78	30	....do	20	1:62500	5
Luzerne	43	15	73	45	....do	20	1:62500	5
Macedon	43	00	77	15	....do	20	1:62500	5
Margaretville	42	00	74	30	....do	20	1.62500	5
Medina	43	00	78	15	....do	20	1:62500	5
Mettawee (N. Y.-Vt.) [c]	43	00	73	00	$\frac{1}{4}$ degree	40	1:125000	5
Millbrook (N. Y.-Conn.)	41	45	73	30	$\frac{1}{16}$ degree	20	1:62500	5

[a] Albany and Vicinity includes Albany, Cohoes, Schenectady, and Troy sheets.

[b] Babylon, Fire Island, Northport, and Setauket have been reduced and form Islip sheet, on scale of 1:125000.

[c] Cambridge, Fort Ann, and Pawlet sheets, on scale of 1:62500, have been reduced and form parts of Mattawee sheet, on scale of 1:125000.

[d] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hempstead, Oyster Bay, and Sandy Hook sheets.

[e] Berlin and Hoosick sheets, on scale of 1:62500, have been reduced and form parts of Taconic sheet, on scale of 1:125000.

[f] Pittsfield and Sheffield sheets, on scale of 1:62500, have been reduced and form parts of Housatonic sheet, on scale of 1:125000.

[g] Lockport, Niagara Falls, Olcott, Tonawanda, and Wilson sheets, on scale of 1:62500, have been reduced and form parts of Niagara sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

NEW YORK—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Mooers	44	45	73	30	1/16 degree	20	1:62500	5
Moravia	42	30	76	15	do	20	1:62500	5
Morrisville	42	45	75	30	do	20	1:62500	5
Mount Marcy	44	00	73	45	do	20	1:62500	5
Naples	42	30	77	15	do	20	1:62500	5
Navesink (N. J.-N. Y.)	40	00	74	00	1/4 degree	20	1:125000	5
New Brunswick (N. J.-N. Y.)	40	15	74	15	1/16 degree	10	1:62500	5
New London (Conn.-N. Y.)	41	15	73	00	do	20	1:62500	5
New York City and Vicinity (N. Y.-N. J.). [a]	40	22	73	40	35/64 degree	20	1:62500	25
Newburg	41	30	74	00	1/16 degree	20	1:62500	5
Newcomb	43	45	74	00	do	20	1:62500	5
Niagara [b]	43	00	78	30	1/4 degree	20	1:125000	5
Niagara Falls (N. Y.-Canada) [b c]	43	00	79	00	1/16 degree	20	1:62500	5
Niagara Falls and Vicinity [c]	43	00	78	45	5/16 degree	20	1:62500	10
North Creek	43	30	73	45	1/16 degree	20	1:62500	5
Northport [d]	40	45	73	15	do	20	1:62500	5
Norwalk (Conn.-N. Y.)	41	00	73	15	do	20	1:62500	5
Norwich	42	30	75	30	do	20	1:62500	5
Oak Orchard	43	15	78	00	do	20	1:62500	5
Olcott [b]	43	15	78	30	do	20	1:62500	5
Old Forge	43	30	74	45	do	20	1:62500	5
Olean	42	00	78	15	do	20	1:62500	5
Oneida	43	00	75	30	do	20	1:62500	5
Ontario Beach	43	15	77	30	do	20	1:62500	5
Oriskany	43	00	75	15	do	20	1:62500	5
Oswego	43	15	76	30	do	20	1:62500	5
Owego	42	00	76	15	do	20	1:62500	5
Oyster Bay (N. Y.-Conn.) [a]	40	45	73	30	do	20	1:62500	5
Paradox Lake	43	45	73	30	do	20	1:62500	5
Passaic (N. J.-N. Y.) [e]	40	30	74	00	1/4 degree	20	1:125000	5
Paterson (N. J.-N. Y.) [a e]	40	45	74	00	1/16 degree	20	1:62500	5
Pawlet (Vt.-N. Y.) [f]	43	15	73	00	do	20	1:62500	5
Penn Yan	42	30	77	00	do	20	1:62500	5
Phelps	42	45	77	00	do	20	1:62500	5
Phoenicia	42	00	74	15	do	20	1:62500	5
Pitcher	42	30	75	45	do	20	1:62500	5
Pittsfield (Mass.-N. Y.) [g]	42	15	73	15	do	20	1:62500	5
Plattsburg (N. Y.-Vt.)	44	30	73	15	do	20	1:62500	5
Port Henry (N. Y.-Vt.)	44	00	73	15	do	20	1:62500	5
Poughkeepsie	41	30	73	45	do	20	1:62500	5
Pulaski	43	30	76	00	do	20	1:62500	5
Pultneyville	43	15	77	00	do	20	1:62500	5

[a] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hempstead, Oyster Bay, and Sandy Hook sheets.
[b] Lockport, Niagara Falls, Olcott, Tonawanda, and Wilson sheets, on scale of 1:62500, have been reduced and form parts of Niagara sheet, on scale of 1:125000.
[c] Niagara Falls and Vicinity includes Niagara Falls, Tonawanda, and Wilson sheets.
[d] Babylon, Fire Island, Northport, and Setauket, on scale of 1:62500 have been reduced and form Islip sheet, on scale of 1:125000.
[e] Paterson and Staten Island sheets, on scale of 1:62500, have been reduced and form parts of Passaic sheet, on scale of 1:125000.
[f] Cambridge, Fort Ann, and Pawlet sheets, on scale of 1:62500 have been reduced and form parts of Mettawee sheet, on scale of 1:125000.
[g] Pittsfield and Sheffield sheets, on scale of 1:62500, have been reduced and form parts of Housatonic sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

NEW YORK—Continued.

Names of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Ramapo (N. J.-N. Y.)	41	00	74	00	$\frac{1}{16}$ degree	20	1:62500	5
Raquette Lake	43	45	74	30	....do	20	1:62500	5
Remsen	43	15	75	00	....do	20	1:62500	5
Rhinebeck	41	45	73	45	....do	20	1:62500	5
Richfield Springs	42	45	74	45	....do	20	1:62500	5
Ridgeway	43	15	78	15	....do	20	1:62500	5
Rochester	43	00	77	30	....do	20	1:62500	5
Rosendale	41	45	74	00	....do	20	1:62500	5
Rouse Point (N. Y.-Vt.)	44	45	73	15	....do	20	1:62500	5
Sacketts Harbor	43	45	76	00	....do	20	1:62500	5
Salamanca	42	00	78	30	....do	20	1:62500	5
Sandy Hook (N. J.-N. Y.) [a]	40	15	74	00	....do	10	1:62500	5
Santanoni	44	00	74	00	....do	20	1:62500	5
Saratoga	43	00	73	45	....do	20	1:62500	5
Schenectady [a]	42	45	73	45	....do	20	1:62500	
Schoharie	42	30	74	15	....do	20	1:62500	5
Schroon Lake	43	45	73	45	....do	20	1:62500	5
Schunemunk	41	15	74	00	....do	20	1:62500	5
Schuylerville	43	00	73	30	....do	20	1:62500	5
Setauket [b]	40	45	73	00	....do	20	1:62500	5
Sheffield (Mass.-Conn.-N. Y.) [c]	42	00	73	15	....do	20	1:62500	5
Silver Creek	42	30	79	00	....do	20	1:62500	5
Skaneateles	42	45	76	15	....do	20	1:62500	5
Sodus Bay	43	15	76	45	....do	20	1:62500	5
Stamford (Conn.-N. Y.)	41	00	73	30	....do	20	1:62500	5
Staten Island (N. J.-N. Y.) [d e]	40	30	74	00	....do	20	1:62500	5
Stonington (Conn.-R. I.-N. Y.)	41	15	71	45	....do	20	1:62500	5
Stony Island	43	45	76	15	....do	20	1:62500	5
Syracuse	43	00	76	00	....do	20	1:62500	5
Taconic (N. Y.-Mass.-Vt.) [f]	42	30	73	00	$\frac{1}{4}$ degree	40	1:125000	5
Tarrytown (N. Y.-N. J.)	41	00	73	45	$\frac{1}{16}$ degree	20	1:62500	5
Theresa	44	00	75	45	....do	20	1:62500	5
Thirteenth Lake	43	30	74	00	....do	20	1:62500	5
Ticonderoga (N. Y.-Vt.)	43	45	73	15	....do	20	1:62500	5
Tonawanda [g h]	43	00	78	45	....do	20	1:62500	5
Troy [a]	42	30	73	30	....do	20	1:62500	5
Tully	42	45	76	00	....do	20	1:62500	5
Utica	43	00	75	00	....do	20	1:62500	5
Watertown	43	45	75	45	....do	20	1:62500	5
Watkins	42	15	76	45	....do	20	1:62500	5
Waverly	42	00	76	30	....do	20	1:62500	5
Weedsport	43	00	76	30	....do	20	1:62500	5
West Canada Lakes	43	30	74	30	....do	20	1:62500	5

[a] Albany and Vicinity includes Albany, Cohoes, Schenectady, and Troy sheets.

[b] Babylon, Fire Island, Northport and Setauket, on scale of 1:62500, have been reduced and form Islip sheet, on scale of 1:12500.

[c] Pittsfield and Sheffield sheets, on scale of 1:62500, have been reduced and form parts of Housatonic sheet, on scale of 1:125000.

[d] Paterson and Staten Island sheets, on scale of 1:62500, have been reduced and form parts of Passaic sheet, on scale of 1:125000.

[e] New York City and Vicinity includes Brooklyn, Harlem, Paterson, Staten Island, and parts of Hampstead, Oyster Bay, and Sandy Hook sheets.

[f] Berlin and Hoosick sheets, on scale of 1:62500, have been reduced and form parts of Taconic sheet, on scale of 1:125000.

[g] Lockport, Niagara Falls, Olcott, Tonawanda, and Wilson sheets, on scale of 1:62500, have been reduced and form parts of Niagara sheet, on scale of 1:125000.

[h] Niagara Falls and Vicinity includes Niagara Falls, Tonawanda, and Wilson sheets.

Published topographic atlas sheets, arranged by States—Continued.

NEW YORK—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
West Point	41 15	73 45	$\frac{1}{16}$ degree	20	1 : 62500	5
Westfield	42 15	79 30	....do	20	1 : 62500	5
Whitehall (N. Y.-Vt.)	43 30	73 15	....do	20	1 : 62500	5
Willsboro (N. Y.-Vt.)	44 15	73 15	....do	20	1 : 62500	5
Wilmurt	43 15	74 45	....do	20	1 : 62500	5
Wilson [a,b]	43 15	78 45	....do	20	1 : 62500	5
(See also combined sheets, p. 195.)						

NORTH CAROLINA.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Abingdon (Tenn.-Va.-N. C.)	36 30	81 30	¼ degree	100	1 : 125000	5
Asheville (N. C.-Tenn.)	35 30	82 30	....do	100	1 : 122000	5
Ayden	35 15	77 15	$\frac{1}{16}$ degree	10	1 : 62500	5
Cowee (N. C.-S. C.)	35 00	83 00	¼ degree	100	1 : 125000	5
Cranberry (N. C.-Tenn.)	36 00	81 30	....do	100	1 : 125000	5
Dahlonega (Ga.-N. C.)	34 30	83 30	....do	100	1 : 125000	5
Ellijay (Ga.-N. C.-Tenn.)	34 30	84 00	....do	100	1 : 125000	5
Greeneville (Tenn.-N. C.)	36 00	82 30	....do	100	1 : 125000	5
Hickory	35 30	81 00	....do	50	1 : 125000	5
Hillsville (Va.-N. C.)	36 30	80 30	....do	100	1 : 125000	5
Kenly	35 30	78 00	$\frac{1}{16}$ degree	20	1 : 62500	5
Knoxville (Tenn.-N. C.)	35 30	83 30	¼ degree	100	1 : 125000	5
Morganton	35 30	81 30	....do	100	1 : 125000	5
Mount Guyot (Tenn.-N. C.)	35 30	83 00	....do	100	1 : 125000	5
Mount Mitchell (N. C.-Tenn.)	35 30	82 00	....do	100	1 : 125000	5
Murphy (Tenn.-N. C.)	35 00	84 00	....do	100	1 : 125000	5
Nantahala (N. C.-Tenn.)	35 00	83 30	....do	100	1 : 125000	5
Newbern	35 00	77 00	$\frac{1}{16}$ degree	10	1 : 62500	5
Norfolk (Va.-N. C.)	36 30	75 45	½ degree	5	1 : 125000	10
Parmele	35 45	77 15	$\frac{1}{16}$ degree	10	1 : 62500	5
Pisgah (N. C.-S. C.)	35 00	82 30	¼ degree	100	1 : 125000	5
Roan Mountain (Tenn.-N. C.)	36 00	82 00	....do	100	1 : 125000	5
Saluda (N. C.-S. C.)	35 00	82 00	....do	100	1 : 125000	5
Statesville	35 30	80 30	....do	50	1 : 125000	5
Tarboro	35 45	77 30	$\frac{1}{16}$ degree	10	1 : 62500	5
Walhalla (Ga.-S. C.-N. C.)	34 30	83 00	¼ degree	100	1 : 125000	5
Wilkesboro	36 00	81 00	....do	100	1 : 125000	5
Williamston	35 45	77 00	$\frac{1}{16}$ degree	10	1 : 62500	5
Wytheville (Va.-N. C.)	36 30	81 00	¼ degree	100	1 : 125000	5
Yadkinville	36 00	80 30	....do	100	1 : 125000	5

NORTH DAKOTA.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Casselton	46 30	97 00	¼ degree	20	1 : 125000	5
Columbia (S. Dak.-N. Dak.) [c]	45 30	98 00	....do	20	1 : 125000	5
Eckelson	46 30	98 00	....do	20	1 : 125000	5
Edgeley [d]	46 00	98 30	....do	20	1 : 125000	5

[a] Lockport, Niagara Falls, Olcott, Tonawanda, and Wilson sheets, on scale of 1 : 62500, have been reduced and form parts of Niagara sheet, on scale of 1 : 12500.

[b] Niagara Falls and Vicinity includes Niagara Falls, Tonawanda, and Wilson sheets.

[c] Hecla and Savo sheets, on scale of 1 : 62500, have been reduced and form parts of Columbia sheet, on scale of 1 : 125000.

[d] Monango sheet, on scale of 1 : 62500, has been reduced and forms part of Edgeley sheet, on scale of 1 : 125000.

Published topographic atlas sheets, arranged by States—Continued.

NORTH DAKOTA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Ellendale (S. Dak.-N. Dak.) [a]	45 30	98 30	$\frac{1}{4}$ degree	20	1:125000	5
Ellendale (S. Dak.-N. Dak.) [a]	45 45	98 30	$\frac{1}{16}$ degree	20	1:62500	5
Fargo (N. Dak.-Minn.)	46 30	96 30	$\frac{1}{4}$ degree	20	1:125000	5
Fullerton [b]	46 00	98 15	$\frac{1}{16}$ degree	20	1:62500	5
Hecla (S. Dak.-N. Dak.) [c]	45 45	98 00	.....do	20	1:62500	5
Jamestown	46 30	98 30	$\frac{1}{4}$ degree	20	1:125000	5
Lamoure [b]	46 00	98 00	.....do	20	1:125000	5
Lamoure [b]	46 15	98 15	$\frac{1}{16}$ degree	20	1:62500	5
Monango [d]	46 00	98 30	.....do	20	1:62500	5
Oakes [b]	46 00	98 00	.....do	20	1:62500	5
Pingree	47 00	98 30	$\frac{1}{4}$ degree	20	1:125000	5
Savo (S. Dak.-N. Dak.) [c]	45 45	98 15	$\frac{1}{16}$ degree	20	1:62500	5
Tower	46 30	97 30	$\frac{1}{4}$ degree	20	1:125000	5

OHIO.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Bellevue	41 15	82 45	$\frac{1}{16}$ degree	10	1:62500	5
Bowling Green	41 15	83 30	.....do	10	1:62500	5
Cadiz	40 15	80 45	.....do	20	1:62500	5
Canton	40 45	81 15	.....do	20	1:62500	5
Cincinnati (Ohio-Ky.), double sheet [e]	39 00	84 15	$\frac{1}{8}$ degree	20	1:62500	10
Cleveland	41 15	81 30	$\frac{1}{16}$ degree	20	1:62500	5
Delaware	40 15	83 00	.....do	10	1:62500	5
Dublin	40 00	83 00	.....do	10	1:62500	5
East Cincinnati (Ohio-Ky.) [e]	39 00	84 15	.....do	20	1:62500	5
East Columbus	39 45	82 45	.....do	20	1:62500	5
Elmore	41 15	83 15	.....do	10	1:62500	5
Euclid	41 30	81 30	.....do	20	1:62500	5
Findlay	41 00	83 30	.....do	10	1:62500	5
Fremont	41 15	83 00	.....do	10	1:62500	5
Fostoria	41 00	83 15	.....do	10	1:62500	5
Guyandot (W. Va.-Ohio) [f]	38 15	82 15	.....do	20	1:62500	5
Huntington (W. Va.-Ohio-Ky.) [f]	38 00	82 00	$\frac{1}{4}$ degree	100	1:125000	5
Ironton (Ohio-Ky.)	38 30	82 30	$\frac{1}{16}$ degree	20	1:62500	5
Kenova (Ky.-W. Va.-Ohio)	38 00	82 30	$\frac{1}{4}$ degree	100	1:125000	5
Massillon	40 45	81 30	$\frac{1}{16}$ degree	20	1:62500	5
Maumee Bay (Ohio-Mich.)	41 30	83 15	.....do	20	1:62500	5
Oak Harbor	41 30	83 00	.....do	20	1:62500	5
Oberlin	41 15	82 00	.....do	10	1:62500	5
Put-in-Bay	41 30	82 45	.....do	10	1:62500	5
Sandusky	41 15	82 30	.....do	10	1:62500	5
Toledo (Ohio-Mich.)	41 30	83 30	.....do	20	1:62500	5
Vermilion	41 15	82 15	.....do	10	1:62500	5
West Cincinnati (Ohio-Ky.) [e]	39 00	84 30	.....do	20	1:62500	5

[a] Ellendale sheet, on scale of 1:62500, has been reduced and forms part of Ellendale sheet, on scale of 1:125000.
[b] Oakes, Fullerton, and Lamoure sheets, on scale of 1:62500, have been reduced and form parts of Lamoure sheet, on scale of 1:125000.
[c] Hecla and Savo sheets, on scale of 1:62500, have been reduced and form parts of Columbia sheet, on scale of 1:125000.
[d] Monango sheet, on scale of 1:62500, has been reduced and forms part of Edgeley sheet, on scale of 1:125000.
[e] Cincinnati (double sheet) includes East Cincinnati and West Cincinnati sheets.
[f] Guyandot sheet shows part of Huntington quadrangle on larger scale.

Published topographic atlas sheets, arranged by States—Continued.

OHIO—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
West Columbus	39	45	83	00	$\frac{1}{16}$ degree	20	1:62500	5
Wheeling (W. Va.-Ohio-Pa.)	40	00	80	30	....do	20	1:62500	5
Wooster	40	45	81	45	....do	20	1:62500	5

OKLAHOMA.

Kingfisher	35	30	97	30	$\frac{1}{4}$ degree	20	1:125000	5

OREGON.

Ashland	42	00	122	00	1 degree	200	1:250000	5
Baker City	44	30	117	30	$\frac{1}{4}$ degree	100	1:125000	5
Coos Bay	43	00	124	00	....do	100	1:125000	5
Klamath	42	00	121	00	1 degree	200	1:250000	5
Nampa (Idaho-Oreg.)	43	30	116	30	$\frac{1}{4}$ degree	100	1:125000	5
Port Orford	42	30	124	00	....do	100	1:125000	5
Portland (Oreg.-Wash.)	45	30	122	30	$\frac{1}{16}$ degree	25	1:62500	5
Roseburg	43	00	123	00	$\frac{1}{4}$ degree	100	1:125000	5
Sumpter	44	30	118	00	....do	100	1:125000	5
Weiser (Idaho-Oreg.)	44	00	116	30	....do	100	1:125000	5
(See also special maps, p. 196.)								

PENNSYLVANIA.

Accident (Md.-Pa.-W. Va.)	39	30	79	15	$\frac{1}{16}$ degree	20	1:62500	5
Allentown	40	30	75	15	....do	20	1:62500	5
Barnesboro	40	30	78	45	....do	20	1:62500	5
Beaver	40	30	80	15	....do	20	1:62500	5
Belair (Md.-Pa.)	39	30	76	15	....do	20	1:62500	5
Bloomsburg	41	00	76	15	....do	20	1:62500	5
Bordentown (N. J.-Pa.)	40	00	74	30	....do	10	1:62500	5
Boyertown	40	15	75	30	....do	20	1:62500	5
Brownsville	40	00	79	45	....do	20	1:62500	5
Burlington (Pa.-N. J.)	40	00	74	45	....do	20	1:62500	5
Carlisle	40	00	77	00	....do	20	1:62500	5
Camden (N. J.-Pa.-Del.) [a]	39	30	75	00	$\frac{1}{4}$ degree	20	1:125000	5
Catawissa	40	45	76	15	$\frac{1}{16}$ degree	20	1:62500	5
Chambersburg	39	45	77	30	....do	20	1:62500	5
Chester (Pa.-Del.-N. J.) [a b]	39	45	75	15	....do	20	1:62500	5
Connellsville	40	00	79	30	....do	20	1:62500	5
Curwensville	40	45	78	30	....do	20	1:62500	5
Delaware Water Gap (Pa.-N. J.)	40	45	75	00	....do	20	1:62500	5
Doylestown (Pa.-N. J.)	40	15	75	00	....do	20	1:62500	5
Dundaff	41	30	75	30	....do	20	1:62500	5
Easton (Pa.-N. J.)	40	30	75	00	....do	20	1:62500	5
Ebensburg	40	15	78	30	....do	20	1:62500	5

[a] Chester and Philadelphia sheets, on scale of 1:62500, have been reduced and form parts of Camden sheet, on scale of 1:125000.

[b] Philadelphia and Vicinity includes Chester, Germantown, Norristown, and Philadelphia sheets.

Published topographic atlas sheets, arranged by States—Continued.

PENNSYLVANIA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Elkland	41	45	77	15	$\frac{1}{16}$ degree	20	1:62500	5
Elkton (Md.-Pa.-Del.)	39	30	75	45	do	20	1:62500	5
Elmira (N. Y.-Pa.)	42	00	76	45	do	20	1:62500	5
Erie	42	00	80	00	do	20	1:62500	5
Everett	40	00	78	15	do	20	1:62500	5
Fairview	42	00	80	15	do	20	1:62500	5
Flintstone (Md.-W. Va.-Pa.)	39	30	78	30	do	20	1:62500	5
Frostburg (Md.-W. Va.-Pa.)	39	30	78	45	do	20	1:62500	5
Gaines	41	45	77	30	do	20	1:62500	5
Germantown (Pa.-N. J.) [a]	40	00	75	00	do	20	1:62500	5
Girard	41	45	80	15	do	20	1:62500	5
Grantsville (Md.-Pa.)	39	30	79	00	do	20	1:62500	5
Hancock (W. Va.-Md.-Pa.)	39	30	78	00	do	20	1:62500	5
Harrisburg	40	15	76	45	do	20	1:62500	5
Harvey Lake	41	15	76	00	do	20	1:62500	5
Havre de Grace (Md.-Pa.)	39	30	76	00	do	20	1:62500	5
Hazleton	40	45	75	45	do	20	1:62500	5
Hollidaysburg	40	15	78	15	do	20	1:62500	5
Honesdale	41	30	75	15	do	20	1:62500	5
Hummelstown	40	15	76	30	do	20	1:62500	5
Huntingdon	40	15	78	00	do	20	1:62500	5
Indiana	40	30	79	00	do	20	1:62500	5
Kittanning	40	45	79	30	do	20	1:62500	5
Lambertville (Pa.-N. J.)	40	15	74	15	do	20	1:62500	5
Latrobe	40	15	79	15	do	20	1:62500	5
Lebanon	40	15	76	15	do	20	1:62500	5
Lykens	40	30	76	30	do	20	1:62200	5
Mahanoy	40	45	76	00	do	20	1:62500	5
Masontown	39	45	79	45	do	20	1:62500	5
Mercersburg	39	45	77	45	do	20	1:62500	5
Millersburg	40	30	76	45	do	20	1:62500	5
Morgantown (W. Va.-Pa.)	39	30	79	45	do	20	1:62500	5
Norristown [a]	40	00	75	15	do	20	1:62500	5
Parkton (Md.-Pa.)	39	30	76	30	do	20	1:62500	5
Patton	40	30	78	30	do	20	1:62500	5
Pawpaw (Md.-W. Va.-Pa.)	39	30	78	15	do	20	1:62500	5
Philadelphia (Pa.-N. J.) [a b]	39	45	75	00	do	20	1:62500	5
Philadelphia and Vicinity (Pa.-N. J.-Del.) [b]	39	45	75	00	$\frac{1}{4}$ degree	20	1:62500	20
Pinegrove	40	30	76	15	$\frac{1}{16}$ degree	20	1:62500	5
Pittston	41	15	75	45	do	20	1:62500	5
Pottsville	40	30	76	00	do	20	1:62500	5
Quakertown	40	15	75	15	do	20	1:62500	5
Reading	40	15	75	45	do	20	1:62500	5
Rural Valley	40	45	79	15	do	20	1:62500	5
Scranton	41	15	75	30	do	20	1:62500	5
Shamokin	40	45	76	30	do	20	1:62500	5
Shickshinny	41	00	76	00	do	20	1:62500	5
Slatington	40	30	75	30	do	20	1:62500	5
Sunbury	40	45	76	45	do	20	1:62500	5

[a] Philadelphia and Vicinity includes Chester, Germantown, Norristown, and Philadelphia sheets.
[b] Chester and Philadelphia sheets, on scale of 1:62500, have been reduced and form parts of Camden sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

PENNSYLVANIA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Tioga	41 45	77 00	$\frac{1}{16}$ degree	20	1:62500	5
Uniontown	39 45	79 30	....do	20	1:62500	5
Wallpack (N.J.-Pa.)	41 00	74 45	....do	20	1:62500	5
Waynesburg	39 45	80 00	....do	20	1:62500	5
Wernersville	40 15	76 00	....do	20	1:62500	5
Wheeling (W. Va.-Ohio-Pa.)	40 00	80 30	....do	20	1:62500	5
Wilkesbarre	41 00	75 45	....do	20	1:62500	5

RHODE ISLAND.

Blackstone (Mass.-R. I.)	42 00	71 30	$\frac{1}{16}$ degree	20	1:62500	5
Block Island	41 00	71 30	....do	20	1:62500	5
Burrillville	41 45	71 30	....do	20	1:62500	5
Charlestown	41 15	71 30	....do	20	1:62500	5
Fall River (Mass.-R. I.)	41 30	71 00	....do	20	1:62500	5
Franklin (Mass.-R. I.)	42 00	71 15	....do	20	1:62500	5
Kent	41 30	71 30	....do	20	1:62500	5
Moosup (Conn.-R. I.)	41 30	71 45	....do	20	1:62500	5
Narragansett Bay (R. I.-Mass.)	41 30	71 15	....do	20	1:62500	5
Newport	41 15	71 15	....do	20	1:62500	5
Providence (Mass.-R. I.)	41 45	71 15	....do	20	1:62500	5
Putnam (Conn.-R. I.)	41 45	71 45	....do	20	1:62500	5
Sakonnet (R. I.-Mass.)	41 15	71 00	....do	20	1:62500	5
Stonington (Conn.-R. I.-N. Y.)	41 15	71 45	....do	20	1:62500	5
Webster (Mass.-Conn.-R. I.)	42 00	71 45	....do	20	1:62500	5

SOUTH CAROLINA.

Abbeville	34 00	82 00	$\frac{1}{4}$ degree	50	1:125000	5
Carnesville (Ga.-S. C.)	34 00	83 00	....do	50	1:125000	5
Cowee (N. C.-S. C.)	35 00	83 00	....do	100	1:125000	5
Elberton (Ga.-S. C.)	34 00	82 30	....do	50	1:125000	5
McCormick (Ga.-S. C.)	33 30	82 00	....do	50	1:125000	5
Pickens	34 30	82 30	....do	100	1:125000	5
Pisgah (N. C.-S. C.)	35 00	82 30	....do	100	1:125000	5
Saluda (N. C.-S. C.)	35 00	82 00	....do	100	1:125000	5
Walhalla (Ga.-S. C.-N. C.)	34 30	83 00	....do	100	1:125000	5

SOUTH DAKOTA.

Aberdeen [a]	45 00	98 00	$\frac{1}{4}$ degree	20	1:125000	5
Aladdin (Wyo.-S. Dak.-Mont.)	44 30	104 00	....do	50	1:125000	5
Alexandria	43 30	97 30	....do	20	1:125000	5
Byron	44 30	98 00	....do	20	1:125000	5
Canton (S. Dak.-Iowa)	43 00	96 30	....do	20	1:125000	5
Columbia (S. Dak.-N. Dak.) [b]	45 30	98 00	....do	20	1:125000	5
Columbia [b]	45 30	98 15	$\frac{1}{16}$ degree	20	1:62500	5
Conde [a]	45 00	98 00	....do	20	1:62500	5

[a] Conde sheet, on scale of 1:62500, has been reduced and forms part of Aberdeen sheet, on scale of 1:125000.

[b] Columbia, Hecla, and Savo sheets, on scale of 1:62500, have been reduced and form parts of Columbia sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

SOUTH DAKOTA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
De Smet	44	00	97	30	¼ degree	20	1:125000	5
Deadwood [a]	44	00	103	30	do	100	1:125000	5
Edgemont	43	00	103	30	do	50	1:125000	5
Elk Point (S. Dak.-Nebr.-Iowa)	42	30	96	30	do	20	1:125000	5
Ellendale (S. Dak.-N. Dak.) [b]	45	30	98	30	do	20	1:125000	5
Ellendale (S. Dak.-N. Dak.) [b]	45	45	98	30	1/16 degree	20	1:62500	5
Harney Peak	43	30	103	30	¼ degree	100	1:125000	5
Hecla (S. Dak.-N. Dak.) [c]	45	45	98	00	1/16 degree	20	1:62500	5
Hermosa	43	30	103	00	¼ degree	100	1:125000	5
Huron	44	00	98	00	do	20	1:125000	5
Mitchell	43	30	98	00	do	20	1:125000	5
Newcastle (Wyo.-S. Dak.)	43	30	104	00	do	50	1:125000	5
Northville	45	00	98	30	do	20	1:125000	5
Oelrichs (S. Dak.-Nebr.)	43	00	103	00	do	50	1:125000	5
Olivet	43	00	97	30	do	20	1:125000	5
Parker	43	00	97	00	do	20	1:125000	5
Rapid	44	00	103	00	do	50	1:125000	5
Redfield	44	30	98	30	do	20	1:125000	5
Savo (S. Dak.-N. Dak.) [c]	45	45	98	15	1/16 degree	20	1:62500	5
Spearfish [a]	44	15	103	45	do	50	1:62500	5
Sturgis [a]	44	15	103	30	do	50	1:62500	5
Sundance (Wyo.-S. Dak.)	44	00	104	00	¼ degree	50	1:125000	5

TENNESSEE.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Abingdon (Tenn.-Va.-N. C.)	36	30	81	30	¼ degree	100	1:125000	5
Asheville (N. C.-Tenn.)	35	30	82	30	do	100	1:125000	5
Briceville	36	00	84	00	do	100	1:125000	5
Bristol (Va.-Tenn.)	36	30	82	00	do	100	1:125000	5
Chattanooga	35	00	85	00	do	100	1:125000	5
Cleveland	35	00	84	30	do	100	1:125000	5
Columbia	35	30	87	00	do	50	1:125000	5
Cranberry (N. C.-Tenn.)	36	00	81	30	do	100	1:125000	5
Cumberland Gap (Ky.-Va.-Tenn.)	36	30	83	30	do	100	1:125000	5
Dalton (Ga.-Tenn.)	34	30	84	30	do	100	1:125000	5
Ellijay (Ga.-N. C.-Tenn.)	34	30	84	00	do	100	1:125000	5
Estillville (Va.-Ky.-Tenn.)	36	30	82	30	do	100	1:125000	5
Greeneville (Tenn.-N. C.)	36	00	82	30	do	100	1:125000	5
Huntsville (Ala.-Tenn.)	34	30	86	30	do	100	1:125000	5
Jonesville (Ky.-Va.-Tenn.)	36	30	83	00	do	100	1:125000	5
Kingston	35	30	84	30	do	100	1:125000	5
Knoxville (Tenn.-N. C.)	35	30	83	30	do	100	1:125000	5
Loudon	35	30	84	00	do	100	1:125000	5
McMinnville	35	30	85	30	do	100	1:125000	5
Maynardville	36	00	83	30	do	100	1:125000	5
Morristown	36	00	83	00	do	100	1:125000	5
Mount Guyot (Tenn.-N. C.)	35	30	83	00	do	100	1:125000	5
Mount Mitchell (N. C.-Tenn.)	35	30	82	00	do	100	1:125000	5

[a] Spearfish and Sturgis sheets, on scale of 1:62500, have been reduced and form parts of Deadwood sheet, on scale of 1:125000.
[b] Ellendale sheet, on scale of 1:62500, has been reduced and forms part of Ellendale sheet, on scale of 1:125000.
[c] Columbia, Hecla, and Savo sheets, on scale of 1:62500, have been reduced and form parts of Columbia sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

TENNESSEE—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		Feet.		Cents.
Murphy (Tenn.-N. C.)	35	00	84	00	¼ degree	100	1:125000	5
Nantahala (N. C.-Tenn.)	35	00	83	30	.....do	100	1:125000	5
Nashville	36	00	86	30	.....do	50	1:125000	5
Pikeville	35	30	85	00	.....do	100	1:125000	5
Ringgold (Ga.-Tenn.)	34	30	85	00	.....do	100	1;125000	5
Roan Mountain (Tenn.-N. C.)	36	00	82	00	.....do	100	1:125000	5
Scottsboro (Ala.-Tenn.)	34	30	86	00	.....do	100	1:125000	5
Sewanee	35	00	85	30	.....do	100	1:125000	5
Standingstone	36	00	85	00	.....do	100	1:125000	5
Stevenson (Ala.-Ga.-Tenn.)	34	30	85	30	.....do	100	1:125000	5
Wartburg	36	00	84	30	.....do	100	1:125000	5
Williamsburg (Ky.-Tenn.)	36	30	84	00	.....do	100	1:125000	5

TEXAS.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Abilene	32	00	99	30	¼ degree	50	1:125000	5
Albany	32	30	99	00	.....do	50	1:125000	5
Alpine	30	00	103	30	.....do	50	1:125000	5
Anson	32	30	99	30	.....do	50	1:125000	5
Austin	30	00	97	30	.....do	25	1:125000	5
Ballinger	31	30	99	30	.....do	50	1:125000	5
Bastrop	30	00	97	00	.....do	50	1:125000	5
Blanco	30	00	98	00	.....do	50	1:125000	5
Brackett	29	00	100	00	.....do	50	1:125000	5
Brady	31	00	99	00	.....do	50	1:125000	5
Breckenridge	32	30	98	30	.....do	50	1:125000	5
Brownwood	31	30	98	30	.....do	50	1:125000	5
Burnet	30	30	98	00	.....do	50	1:125000	5
Cerro Alto	31	30	105	30	.....do	50	1:125000	5
Chispa	30	30	104	30	.....do	50	1:125000	5
Cleburne	32	00	97	00	.....do	50	1:125000	5
Coleman	31	30	99	00	.....do	50	1:125000	5
Dallas	32	30	96	30	.....do	50	1:125000	5
Denison (Tex.-Ind. T.)	33	30	96	30	.....do	50	1:125000	5
Eagle Mountain	30	30	105	00	.....do	100	1:125000	5
Eastland	32	00	98	30	.....do	50	1:125000	5
Eden	31	00	99	30	.....do	50	1:125000	5
El Paso	31	30	106	00	.....do	50	1:125000	5
Flatonia	29	30	97	00	.....do	25	1:125000	5
Fort Davis	30	30	103	30	.....do	100	1:125000	5
Fort Hancock	31	00	105	30	.....do	50	1:125000	5
Fort McKavett	30	30	100	00	.....do	25	1:125000	5
Fort Worth	32	30	97	00	.....do	50	1:125000	5
Fredericksburg	30	00	98	30	.....do	50	1:125000	5
Gainesville (Tex.-Ind. T.)	33	30	97	00	.....do	50	1:125000	5
Gatesville	31	00	97	30	.....do	50	1:125000	5
Georgetown	30	30	97	30	.....do	50	1:125000	5
Granbury	32	00	97	30	.....do	50	1:125000	5
Hamilton	31	30	98	00	.....do	50	1:125000	5
Hayrick	31	30	100	00	.....do	50	1:125000	5
Kerrville	30	00	99	00	.....do	50	1:125000	5
Lampasas	31	00	98	00	.....do	50	1:125000	5

Published topographic atlas sheets, arranged by States—Continued.

TEXAS—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Llano	30	30	98	30	¼ degree	50	1:125000	5
Marfa	30	00	104	00	....do	50	1:125000	5
Mason	30	30	99	00	....do	50	1:125000	5
Meridian	31	30	97	30	....do	50	1:125000	5
Nueces	29	30	100	00	....do	50	1:125000	5
Palo Pinto	32	30	98	00	....do	50	1:125000	5
Polvo	29	00	104	00	....do	100	1:125000	5
Rio Grande	31	00	106	00	....do	50	1:125000	5
Roby	32	30	100	00	....do	25	1:125000	5
Rock Springs	30	00	100	00	....do	25	1:125000	5
Ruidosa	29	30	104	30	....do	100	1:125000	5
Salt Basin	31	30	105	00	....do	50	1:125000	5
San Angelo	31	00	100	00	....do	50	1:125000	5
San Carlos	30	00	104	30	....do	100	1:125000	5
San Saba	31	00	98	30	....do	50	1:125000	5
Shafter	29	30	104	00	....do	100	1:125000	5
Sherwood	31	00	100	30	....do	25	1:125000	5
Sierra Blanca	31	00	105	00	....do	50	1:125000	5
Stephenville	32	00	98	00	....do	50	1:125000	5
Sweetwater	32	00	100	00	....do	25	1:125000	5
Taylor	30	30	97	00	....do	50	1:125000	5
Temple	31	00	97	00	....do	50	1:125000	5
Terlingua	40	30	110	30	....do	100	1:125000	5
Uvalde	29	00	99	30	....do	25	1:125000	5
Valentine	30	30	104	00	....do	100	1:125000	5
Waco	31	30	97	00	....do	50	1:125000	5
Weatherford	32	30	97	30	....do	50	1:125000	5
(See also special maps, p. 196.)								

UTAH.

Abajo (Utah-Colo.)	37	00	109	00	1 degree	250	1:250000	5
Ashley (Utah-Colo.)	40	00	109	00	....do	250	1:250000	5
Beaver	38	00	112	00	....do	250	1:250000	5
Coalville	40	30	111	00	¼ degree	100	1:125000	5
East Tavaputs (Utah-Colo.)	39	00	109	00	1 degree	250	1:250000	5
Escalante	37	00	111	00	....do	250	1:250000	5
Fish Lake	38	00	111	00	....do	250	1:250000	5
Hayden Peak (Utah-Wyo.)	40	30	110	30	¼ degree	100	1:125000	5
Henry Mountains	37	00	110	00	1 degree	250	1:250000	5
Kanab	37	00	112	00	....do	250	1:250000	5
La Sal (Utah-Colo.)	38	00	109	00	....do	250	1:250000	5
Manti	39	00	111	00	....do	250	1:250000	5
Pioche (Nev.-Utah)	37	00	114	00	....do	250	1:250000	5
Price River	39	00	110	00	....do	250	1:250000	5
St. George	37	00	113	00	....do	250	1:250000	5
Salt Lake	40	00	111	00	....do	250	1:250000	5
San Rafael	38	00	110	00	....do	250	1:250000	5
Sevier Desert	39	00	112	00	....do	250	1:250000	5
Tooele Valley	40	00	112	00	....do	250	1:250000	5
Uinta	40	00	110	00	....do	250	1:250000	5
(See also special maps, p. 196.)								

Published topographic atlas sheets, arranged by States—Continued.

VERMONT.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Bennington [a]	42	45	73	00	1/16 degree	20	1:62500	5
Berlin (N. Y.-Mass.-Vt.) [a]	42	30	73	15	do	20	1:62500	5
Brattleboro (Vt.-N. H.)	42	45	72	30	do	20	1:62500	5
Cambridge (N. Y.-Vt.) [b]	43	00	73	15	do	20	1:62500	5
Castleton (Vt.-N. Y.)	43	30	73	00	do	20	1:62500	5
Equinox [b]	43	00	73	00	do	20	1:62500	5
Fort Ann (N. Y.-Vt.) [b]	43	15	73	15	do	20	1:62500	5
Greenfield (Mass.-Vt.)	42	30	72	30	do	20	1:62500	5
Greylock (Mass.-Vt.) [a]	42	30	73	00	do	20	1:62500	5
Hawley (Mass.-Vt.)	42	30	72	45	do	20	1:62500	5
Hoosick (N. Y.-Vt.) [a]	42	45	73	15	do	20	1:62500	5
Keene (N. H.-Vt.)	42	45	72	15	do	20	1:62500	5
Londonderry	43	00	72	45	do	20	1:62500	5
Mettawee (N. Y.-Vt.) [b]	43	00	73	00	1/4 degree	40	1:125000	5
Pawlet (Vt.-N. Y.) [b]	43	15	73	00	1/16 degree	20	1:62500	5
Plattsburg (N. Y.-Vt.)	44	30	73	15	do	20	1:62500	5
Port Henry (N. Y.-Vt.)	44	00	73	15	do	20	1:62500	5
Rouse Point (N. Y.-Vt.)	44	45	73	15	do	20	1:62500	5
Rutland	43	30	72	45	do	20	1:62500	5
Strafford	43	45	72	15	do	20	1:62500	5
Taconic (N. Y.-Mass.-Vt.) [a]	42	30	73	00	1/4 degree	40	1:125000	5
Ticonderoga (N. Y.-Vt.)	43	45	73	15	1/16 degree	20	1:62500	5
Wallingford	43	15	72	45	do	20	1:62500	5
Warwick (Mass.-N. H.-Vt.)	42	30	72	15	do	20	1:62500	5
Whitefield (N. H.-Vt.)	44	15	71	30	do	20	1:62500	5
Whitehall (N. Y.-Vt.)	43	30	73	15	do	20	1:62500	5
Willsboro (N. Y.-Vt.)	44	15	73	15	do	20	1:62500	5
Wilmington	42	45	72	45	do	20	1:62500	5

VIRGINIA.

Abingdon (Tenn.-Va.-N. C.)	39	30	81	30	1/4 degree	100	1:125000	5
Amelia	37	00	77	30	do	50	1:125000	5
Appomattox	37	00	78	30	do	50	1:125000	5
Bermuda Hundred	37	15	77	15	1/16 degree	20	1:62500	5
Beverly (W. Va.-Va.)	38	30	79	30	1/4 degree	100	1:125000	5
Bristol (Va.-Tenn.)	36	30	82	00	do	100	1:125000	5
Buckingham	37	30	78	30	do	100	1:125000	5
Christiansburg (Va.-W. Va.)	37	00	80	00	do	100	1:125000	5
Crisfield (Md.-Va.)	37	45	75	45	1/16 degree	....	1:62500	5
Cumberland Gap (Ky.-Va.-Tenn.)	36	30	83	30	1/4 degree	100	1:125000	5
Dublin (Va.-W. Va.)	37	00	80	30	do	100	1:125000	5
Estillville (Va.-Ky.-Tenn.)	36	30	82	30	do	100	1:125000	5
Farmville	37	00	78	00	do	50	1:125000	5
Franklin (W. Va.-Va.)	38	30	79	00	do	100	1:125000	5
Frederick (Md.-Va.)	39	00	77	00	do	50	1:125000	5
Fredericksburg (Va.-Md.)	38	00	77	00	do	50	1:125000	5
Goochland	37	30	77	30	do	50	1:125000	5
Gordonsville	38	00	78	00	do	100	1:125000	5

[a] Bennington, Berlin, Greylock, and Hoosick sheets, on scale of 1:62500, have been reduced and form Taconic sheet, on scale of 1:125000.
[b] Cambridge, Equinox, Fort Ann, and Pawlet sheets, on scale of 1:62500, have been reduced and form Mettawee sheet, on a scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

VIRGINIA—Continued.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.		Long.		Area covered.	Contour interval.	Scale.	Price.
	°	′	°	′		*Feet.*		*Cents.*
Green Run (Md.-Va.)	38	00	75	00	1/16 degree	10	1:62500	5
Grundy (Va.-Ky.)	37	00	82	00	¼ degree	100	1:125000	5
Harpers Ferry (Va.-W. Va.-Md.)	39	00	77	30	do	100	1:125000	5
Harrisonburg	38	00	78	30	do	100	1:125000	5
Hillsville (Va.-N. C.)	36	30	80	30	do	100	1:125000	5
Jonesville (Ky.-Va.-Tenn.)	36	30	83	00	do	100	1:125000	5
Lewisburg (Va.-W. Va.)	37	30	80	00	do	100	1:125000	5
Lexington	37	30	79	00	do	100	1:125000	5
Luray	38	30	78	00	do	100	1:125000	5
Lynchburg	37	00	79	00	do	100	1:125000	5
Monterey (Va.-W. Va.)	38	00	79	30	do	100	1:125000	5
Montross (Va.-Md.)[a]	38	00	76	45	1/16 degree	20	1:62500	5
Mount Vernon (Va.-Md.-D. C.)[b]	38	30	77	00	¼ degree	50	1:125000	5
Natural Bridge	37	30	79	30	do	100	1:125000	5
Nomini (Md.-Va.)[a]	38	00	76	30	do	20	1:125000	5
Norfolk (Va.-N. C.)	36	30	75	45	½ degree	5	1:125000	10
Oceana (W. Va.-Va.-Ky.)	37	30	81	30	¼ degree	100	1:125000	5
Palmyra	37	30	78	00	do	50	1:125000	5
Petersburg	37	00	77	15	1/16 degree	20	1:62500	5
Piney Point (Md.-Va.)[a]	38	00	76	30	do	20	1:62500	5
Pocahontas (Va.-W. Va.)	37	00	81	00	¼ degree	100	1:125000	5
Point Lookout (Md.-Va.)[c]	38	00	76	15	1/16 degree	20	1:62500	5
Princess Anne (Md.-Va.)	38	00	75	30	do	10	1:62500	5
Richmond	37	30	77	15	do	20	1:62500	5
Roanoke	37	00	79	30	¼ degree	100	1:125000	5
Romney (W. Va.-Va.-Md.)	39	00	78	30	do	100	1:125000	5
St. Mary (Md.-Va.)[c]	38	00	76	00	do	20	1:125000	5
Snow Hill (Md.-Va.)	37	00	75	15	1/16 degree	10	1:62500	5
Spottsylvania	38	00	77	30	¼ degree	50	1:125000	5
Staunton (Va.-W. Va.)	38	00	79	00	do	100	1:125000	5
Tazewell (Va.-W. Va.)	37	00	81	30	do	100	1:125000	5
Warfield (W. Va.-Ky.-Va.)	37	30	82	00	do	100	1:125000	5
Warrenton	38	30	77	30	do	50	1:125000	5
Washington (D. C.-Md.-Va.) (double sheet).[b]	38	45	76	45	⅛ degree	20	1:62500	10
Whitesburg (Ky.-Va.)	37	00	82	30	¼ degree	100	1:125000	5
Wicomico (Md.-Va.)[a]	38	15	76	45	1/16 degree	20	1:62500	5
Winchester (Va.-W. Va.)	39	00	78	00	¼ degree	100	1:125000	5
Woodstock (Va.-W. Va.)	38	30	78	30	do	100	1:125000	5
Wytheville (Va.-N. C)	36	30	81	00	do	100	1:125000	5

WASHINGTON.

Chelan	47	30	120	00	¼ degree	100	1:125000	5
Chiwaukum	47	30	120	30	do	100	1:125000	5
Ellensburg	46	30	120	30	do	100	1:125000	5
Glacier Peak	48	00	121	00	do	100	1:125000	5
Methow	48	00	120	00	do	100	1:125000	5
Mount Stuart	47	00	120	30	do	100	1:125000	5

[a] Montross, Piney Point, and Wicomico sheets, on scale of 1:62500, have been reduced and form parts of Nomini sheet, on scale of 1:125000.
[b] The west half of Washington sheet shows part of Mount Vernon quadrangle on larger scale.
[c] Point Lookout sheet, on scale of 1:62500, has been reduced and forms part of St. Mary sheet, on scale of 1:125000.

Published topographic atlas sheets, arranged by States—Continued.

WASHINGTON—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.				Area covered.	Contour interval.	Scale.	Price.
	Lat.		Long.					
	°	′	°	′		*Feet.*		*Cents.*
Portland (Oreg.-Wash.)	45	30	122	30	1/16 degree	25	1:62500	5
Republic	48	30	118	30	1/4 degree	100	1:125000	5
Seattle[a]	47	30	122	00	.....do	50	1:125000	5
Seattle[a]	47	30	122	15	1/16 degree	25	1:62500	5
Snoqualmie	47	00	121	00	1/4 degree	100	1:125000	5
Spokane (Wash.-Idaho)	47	30	117	00	.....do	100	1:125000	5
Stilaguamish	48	00	121	30	.....do	100	1:125000	5
Tacoma	47	00	122	00	.....do	50	1:125000	5

WEST VIRGINIA.

Name of atlas sheet.	Lat. °	Lat. ′	Long. °	Long. ′	Area covered.	Contour interval.	Scale.	Price.
Accident (Md.-Pa.-W. Va.)	39	30	79	15	1/16 degree	20	1:62500	5
Beverly (W. Va.-Va.)	38	30	79	30	1/4 degree	100	1:125000	5
Buckhannon	38	30	80	00	.....do	100	1:125000	5
Charleston	38	00	81	30	.....do	100	1:125000	5
Christiansburg (Va.-W. Va.)	37	00	80	00	.....do	100	1:125000	5
Clarksburg	39	15	80	15	1/16 degree	20	1:62500	5
Dublin (Va.-W. Va.)	37	00	80	30	1/4 degree	100	1:125000	5
Fairmont	39	15	80	00	1/16 degree	20	1:62500	5
Flintstone (Md.-W. Va.-Pa.)	39	30	78	30	.....do	20	1:62500	5
Franklin (W. Va.-Va.)	38	30	79	00	1/4 degree	100	1:125000	5
Frostburg (Md.-W. Va.-Pa.)	39	30	78	45	1/16 degree	20	1:62500	5
Guyandot (W. Va.-Ohio)[b]	38	15	82	15	.....do	20	1:62500	5
Hancock (W. Va.-Md.-Pa.)	39	30	78	00	.....do	20	1:62500	5
Harpers Ferry (Va.-W. Va.-Md.)	39	00	77	30	1/4 degree	100	1:125000	5
Hinton	37	30	80	30	.....do	100	1:125000	5
Huntersville	38	00	80	00	.....do	100	1:125000	5
Huntington (W. Va.-Ohio-Ky.)[b]	38	00	82	00	.....do	100	1:125000	5
Kanawha Falls	38	00	81	00	.....do	100	1:125000	5
Kenova (Ky.-W. Va.-Ohio)	38	00	82	30	.....do	100	1:125000	5
Lewisburg (Va.-W. Va.)	37	30	80	00	.....do	100	1:125000	5
Milton[b]	38	15	82	00	1/16 degree	20	1:62500	5
Monterey (Va.-W. Va.)	38	00	79	30	1/4 degree	100	1:125000	5
Morgantown (W. Va.-Pa.)	39	30	79	45	1/16 degree	20	1:62500	5
Nicholas	38	00	80	30	1/4 degree	100	1:125000	5
Oakland (Md.-W. Va.)	39	15	79	15	1/16 degree	20	1:62500	5
Oceana (W. Va.-Va.-Ky.)	37	30	81	30	1/4 degree	100	1:125000	5
Pawpaw (Md.-W. Va.-Pa.)	39	30	78	15	1/16 degree	20	1:62500	5
Piedmont (W. Va.-Md.)	39	00	79	00	1/4 degree	100	1:125000	5
Pocahontas (Va.-W. Va.)	37	00	81	00	.....do	100	1:125000	5
Raleigh	37	30	81	00	.....do	100	1:125000	5
Romney (W. Va.-Va.Md.)	39	00	78	30	.....do	100	1:125000	5
St. George	39	00	79	30	.....do	100	1:125000	5
Staunton (Va.-W. Va.)	38	00	79	00	.....do	100	1:125000	5
Sutton	38	30	80	30	.....do	100	1:125000	5
Tazewell (Va.-W. Va.)	37	00	81	30	.....do	100	1:125000	5
Warfield (W. Va.-Ky.-Va.)	37	30	82	00	.....do	100	1:125000	5
Wheeling (W. Va.-Ohio-Pa.)	40	00	80	30	1/16 degree	20	1:62500	5
Winchester (Va.-W. Va.)	39	00	78	00	1/4 degree	100	1:125000	5
Woodstock (Va.-W. Va.)	38	30	78	30	.....do	100	1:125000	5

[a] Seattle sheet on scale of 1:62500 has been reduced and forms part of Seattle sheet on scale of 1:125000.
[b] Guyandot and Milton sheets show parts of Huntington quadrangle on larger scale.

Published topographic atlas sheets, arranged by States—Continued.

WISCONSIN.

Name of atlas sheet.	Position of SE. corner of sheet. Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
	° ′	° ′		*Feet.*		*Cents.*
Baraboo	43 15	89 30	1/16 degree	20	1:62500	5
Bayview	42 45	87 45	do	20	1:62500	5
Briggsville	43 30	89 30	do	20	1:62500	5
Brodhead	42 30	89 15	do	20	1:62500	5
Delavan	42 30	88 30	do	20	1:62500	5
Denzer	43 15	89 45	do	20	1:62500	5
Eagle	42 45	88 15	do	20	1:62500	5
Elkader (Iowa-Wis.)	42 30	91 00	1/4 degree	20	1:125000	5
Evansville	42 45	89 15	1/16 degree	20	1:62500	5
Geneva	42 30	88 15	do	20	1:62500	5
Hartford	43 15	88 15	do	20	1:62500	5
Iron River (Mich.-Wis.)	46 00	88 30	do	20	1:62500	5
Janesville	42 30	89 00	do	20	1:62500	5
Koshkonong	42 45	88 45	do	20	1:62500	5
Lancaster (Wis.-Iowa-Ill.)	42 30	90 30	1/4 degree	20	1:125000	5
Madison	43 00	89 15	1/16 degree	20	1:62500	5
Milwaukee	43 00	87 45	do	20	1:62500	5
Mineral Point (Wis.-Ill.)	42 30	90 00	1/4 degree	20	1:125000	5
Muskego	42 45	88 00	1/16 degree	20	1:62500	5
Oconomowoc	43 00	88 15	do	20	1:62500	5
Port Washington	43 15	87 45	do	20	1:62500	5
Portage	43 30	89 15	do	20	1:62500	5
Poynette	43 15	89 15	do	20	1:62500	5
Racine	42 30	87 45	do	20	1:62500	5
St. Croix Dalles (Wis.-Minn.)	45 15	92 30	do	20	1:62500	5
Shopiere	42 30	88 45	do	20	1:62500	5
Silver Lake	42 30	88 00	do	20	1:62500	5
Stoughton	42 45	89 00	do	20	1:62500	5
Sun Prairie	43 00	89 00	do	20	1:62500	5
The Dells	43 30	89 45	do	20	1:62500	5
Waterloo	43 00	88 45	do	20	1:62500	5
Watertown	43 00	88 30	do	20	1:62500	5
Waukesha	43 00	88 00	do	20	1:62500	5
Waukon (Iowa-Wis.)	43 00	91 00	1/4 degree	20	1:125000	5
West Bend	45 15	88 00	1/16 degree	20	1:62500	5
Whitewater	42 45	88 30	do	20	1:62500	5
(See also special maps, p. 196.)						

WYOMING.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Aladdin (Wyo.-S. Dak.-Mont.)	44 30	104 00	1/4 degree	50	1:125000	5
Bald Mountain	44 30	107 30	do	100	1:125000	5
Canyon (Yellowstone National Park-Wyo.). [a]	44 30	110 00	do	100	1:125000	5
Cloud Peak	44 00	107 00	do	100	1:125000	5
Crandall	44 30	109 30	do	100	1:125000	5
Dayton	44 30	107 00	do	100	1:125000	5
Fort McKinney	44 00	106 30	do	100	1:125000	5
Fort Steele	41 30	106 30	do	25, 50	1:125000	5

[a] Yellowstone National Park sheet includes Canyon, Gallatin, Lake, and Shoshone sheets.

Published topographic atlas sheets, arranged by States—Continued.

WYOMING—Continued.

Name of atlas sheet.	Position of SE. corner of sheet.		Area covered.	Contour interval.	Scale.	Price.
	Lat.	Long.				
	° ′	° ′		*Feet.*		*Cents.*
Gallatin (Yellowstone National Park-Wyo.). [a]	44 30	110 30	¼ degree	100	1:125000	5
Goshen Hole (Wyo.-Nebr.)	41 30	104 00	do	20	1:125000	5
Grand Teton	43 30	110 30	do	100	1:125000	5
Hartville	42 00	104 30	do	50	1:125000	5
Hayden Peak (Utah-Wyo.)	40 30	110 30	do	100	1:125000	5
Ishawooa	44 00	109 30	do	100	1:125000	5
Lake (Yellowstone National Park-Wyo.). [a]	44 00	110 00	do	100	1:125000	5
Laramie	41 00	105 30	do	50	1:125000	5
Mount Leidy	43 30	110 00	do	100	1:125000	5
Newcastle (S. Dak.-Wyo.)	43 30	104 00	do	50	1:125000	5
Patrick (Wyo.-Nebr.)	42 00	104 00	do	20	1:125000	5
Shoshone (Yellowstone National Park-Wyo.). [a]	44 00	110 30	do	100	1:125000	5
Sundance (Wyo.-S. Dak.)	44 00	104 00	do	50	1:125000	5
Yellowstone National Park (Y. N. P.-Wyo.). [a]	44 00	110 00	1 degree	100	1:125000	20
(See also special maps, p. 196.)						

YELLOWSTONE NATIONAL PARK.

Name of atlas sheet.	Lat.	Long.	Area covered.	Contour interval.	Scale.	Price.
Canyon (Yellowstone National Park, Wyo.). [a]	44 30	110 00	¼ degree	100	1:125000	5
Gallatin (Yellowstone National Park, Wyo.). [a]	44 30	110 30	do	100	1:125000	5
Lake (Yellowstone National Park-Wyo.). [a]	44 00	110 00	do	100	1:125000	5
Livingston (Mont.-Yellowstone National Park).	45 00	110 00	1 degree	200	1:250000	5
Shoshone (Yellowstone National Park-Wyo.). [a]	44 00	110 30	¼ degree	100	1:125000	5
Threeforks (Mont.-Yellowstone National Park).	45 00	111 00	1 degree	200	1:250000	5
Yellowstone National Park (Y. N. P.-Wyo.). [a]	44 00	110 00	do	100	1:125000	20

[a] Yellowstone National Park sheet includes Canyon, Gallatin, Lake, and Shoshone sheets.

GENERAL, COMBINED, SPECIAL, AND FORESTRY MAPS.

In addition to the topographic atlas sheets, the Survey has prepared and printed certain general maps needed in its work; maps made by combining certain topographic atlas sheets; special maps covering areas of peculiar economic importance; forestry maps.

General maps.

Locality.	Number of sheets.	Size.	Scale.		Price.	
			Fractional.	Miles to 1 inch.	Single.	100 or more.
		Inches.			*Cents.*	*Cents.*
Colorado:[a]						
Arkansas River, drainage basin of	2	30 × 47	1:380160	6	30	12
Connecticut:						
Contour map	2	43 × 54	1:125000	2	30	12
Indian Territory:						
Contour map[a]	1	30 × 33	1:500000	8	10	4
Massachusetts:						
Contour map[a]	4	32 × 50	1:250000	4	30	12
Texas:						
Contour map	1	31 × 34	1:1584000	25	15	6
United States:						
Base map	3	49 × 76	1:2500000	40	60	24
Base map	1	18 × 28	1:7033000	111	10	4
Base map	1	11 × 16	1:12925000	204	5	2
Contour map	3	49 × 76	1:2500000	40	60	24
Contour map	1	18 × 28	1:7033000	111	10	4
Hypsometric map	1	18 × 28	1:7033000	111	10	4

[a] Out of stock.

Sheets formed by combination of atlas sheets.

Locality.	Scale.	Contour interval.	Price.	
			Single.	100 or more.
		Feet.	*Cents.*	*Cents.*
California:				
Los Angeles	1:62500	50	10	4
California-Nevada:				
Lake Tahoe and vicinity[a]	1:125000	100	20	8
Massachusetts:				
Boston and vicinity	1:62500	20	10	4
Missouri-Illinois:				
St. Louis	1:62500	20	10	4
Nebraska-Iowa:				
Omaha and vicinity	1:62500	20	10	4
New Hampshire-Maine:				
Mount Washington and vicinity[a]	1:62500	20	20	8
New York:				
Albany and vicinity	1:62500	20	20	8
Niagara River and vicinity	1:62500	20	10	4
Oswego	1:62500	20	5	2
Rochester[a]	1:62500	20	5	2
Niagara Falls and vicinity	1:62500	20	10	4
New York-New Jersey:				
New York City and vicinity	1:62500	20	25	10
Ohio—Kentucky:				
Cincinnati	1:62500	20	10	4
Pennsylvania-New Jersey-Delaware:				
Philadelphia and vicinity	1:62500	20	20	8
Wyoming-Montana:				
Yellowstone National Park[a]	1:125000	100	20	8

[a] Out of stock.

Special maps of exceptional economic importance. [a]

Locality.	Scale.	Contour interval.	Price.	
			Single.	100 or more.
Arizona:		*Feet.*	*Cents.*	*Cents.*
Bisbee	1:12000	20	5	2
Globe	1:12000	20	5	2
Arkansas:				
Hot Springs	1:62500	20	5	2
California:				
Banner Hill	1:14400	20	5	2
Genesee	1:31680	50	5	2
Goleta	1:62500	50	5	2
Grass Valley	1:14400	20	5	2
Indian Valley	1:65500	100	5	2
Indio	1:125000	100	5	2
Mother Lode, district I	1:63360	100	5	2
Mother Lode, district II	1:63360	100	5	2
Nevada City	1:14400	20	5	2
Santa Barbara	1:62500	50	5	2
Shasta	1:62500	100	5	2
Southern, sheet I	1:250000	250	10	4
Southern, sheet II	1:250000	250	10	4
Taylorsville	1:31680	50	5	2
Colorado:				
Aspen	1:9600	25	5	2
Cripple Creek	1:25000	50	5	2
Rico	1:23600	50	5	2
Tenmile district	1:31680	100	5	2
Idaho-Montana:				
Coeur d'Alene	1:62500	50	10	4
Michigan:				
Menominee	1:62500	20	5	2
Missouri-Kansas:				
Joplin district	1:62500	10	10	4
Montana:				
Butte	1:15000	20	10	4
Helena	1:62500	50	5	2
Marysville	1:31250	50	5	2
Nevada:				
Tonopah	1:12000	20	5	2
New Jersey:				
Franklin Furnace	1:14400	10	5	2
Oregon:				
Crater Lake (with descriptive text dorso)	1:62500	100	5	[b]5
Texas:				
Terlingua	1:50000	25	5	2
Utah:				
Bingham (mining map)	1:20000	50	5	2
Park City	1:25000	50	5	2
Tintic	1:62500	50	5	2
Tintic (mining map)	1:9600	20	10	4
Wisconsin:				
Marathon	1:125000	20	5	2
Wausau	1:125000	20	5	2
Wyoming-Colorado:				
Encampment	1:90000	100	5	2

[a] The Survey has issued a sheet of "conventional signs" used on its topographic maps; price, 5 cents a single sheet; 2 cents each in lots of 100 or more.
[b] No wholesale rate for Crater Lake sheet.

Forestry maps.

Locality.	Scale.	Contour interval.	Price.	
			Single.	100 or more.
New York:		*Feet.*	*Cents.*	*Cents.*
Mount Marcy and vicinity[a]	1:62500	20	20	([b])
Washington:				
Seattle	1:125000	50	5	([b])
Tacoma	1:125000	50	5	([b])

[a] Out of stock. [b] No wholesale rate for forestry maps.

Topographic Folios.

The map sheets represent a great variety of topographic features, and with the aid of descriptive text they can be used to illustrate topographic forms. This has led to the projection of an educational series of topographic folios, for use wherever geography is taught in high schools, academies, and colleges. Of this series three folios have been issued, viz:

Folios Nos. 1 and 2, each entitled "Physiographic Types," by Henry Gannett, and Folio No. 3, entitled "Physical Geography of the Texas Region," by Robert T. Hill. The prices of the three published folios are as follows: Folio No. 1, *twenty-five cents;* Folio No. 2, *twenty-five cents;* Folio No. 3, *fifty cents.*

Contents of Topographic Folio No. 1:

A Region in Youth.............................Fargo, North Dakota-Minnesota.
A Region in Maturity...........................Charleston, West Virginia.
A Region in Old Age............................Caldwell, Kansas.
A Rejuvenated Region...........................Palmyra, Virginia.
A Young Volcanic Mountain......................Mount Shasta, California.
Moraines.......................................Eagle, Wisconsin.
Drumlins.......................................Sun Prairie, Wisconsin.
River Flood Plains.............................Donaldsonville, Louisiana.
A Fiord Coast..................................Boothbay, Maine.
A Barrier-Beach Coast..........................Atlantic City, New Jersey.

Contents of Topographic Folio No. 2:

A Coast Swamp..................................Norfolk, Virginia-North Carolina.
A Graded River.................................Marshall, Missouri.
An Overloaded Stream...........................Lexington, Nebraska.
Appalachian Ridges.............................Harrisburg, Pennsylvania.
Ozark Ridges...................................Poteau Mountain, Arkansas-Indian Territory.
Ozark Plateau..................................Marshall, Arkansas.
Hogbacks.......................................West Denver, Colorado.
Volcanic Peaks, Plateaus, and Necks............Mount Taylor, New Mexico.
Alluvial Cones.................................Cucamonga, California.
A Crater.......................................Crater Lake Special, Oregon.

Contents of Topographic Folio No. 3:

Descriptive Text...............................Pages 1-12.
Illustrations of Topographic Forms.............Sheets I-V.
Maps Showing Types of Mountains................Sheet VI.
Maps Showing Types of Plains and Scarps........Sheets VII-IX.
Maps Showing Types of Rivers and Canyons.......Sheet X.
Map of Texas and Parts of Adjoining Territories.....Sheet XI.

GEOLOGICAL SURVEY PUBLICATIONS ON ALASKA.

CHRONOLOGIC LIST OF PAPERS ON ALASKA.

1891.

RUSSELL, I. C. Account of an expedition to the Yukon Valley in 1889. In Eleventh Ann. Rept. U. S. Geol. Survey, pt. 1, 1891, pp. 57–58. Extract from Professor Russell's complete report in Bull. Geol. Soc. America, vol. 1, 1890, pp. 99–162.

—— Account of an expedition to the vicinity of Mount St. Elias in 1890. In Twelfth Ann. Rept. U. S. Geol. Survey, pt. 1, 1891, pp. 59–61. A full report of this expedition was published in Nat. Geog. Mag., vol. 3, 1892, pp. 53–203.

1892.

DALL, W. H., and HARRIS, G. D. Summary of knowledge of Neocene geology of Alaska. In Correlation Papers—Neocene: Bull. U. S. Geol. Survey No. 84, 1892, pp. 232–268.

HAYES, C. W. Account of an expedition through the Yukon district. In Thirteenth Ann. Rept. U. S. Geol. Survey, pt. 1, 1892, pp. 91–94. A complete report was published in Nat. Geog. Mag., vol. 4, 1892, pp. 117–162.

1893.

RUSSELL, I. C. Second expedition to Mount St. Elias, in 1891. In Thirteenth Ann. Rept. U. S. Geol. Survey, pt. 2, 1893, pp. 1–91.

1896.

DALL, W. H. Report on coal and lignite of Alaska. In Seventeenth Ann. Rept. U. S. Geol. Survey, pt. 1, 1896, pp. 763–906.

REID, H. F. Glacier Bay and its glaciers. In Sixteenth Ann. Rept. U. S. Geol. Survey, pt. 1, 1896, pp. 415–461.

WALCOTT, C. D., *Director*. Account of an investigation of the gold and coal deposits of southern Alaska. In Seventeenth Ann. Rept. U. S. Geol. Survey, pt. 1, 1896, pp. 56–59.

1897.

WALCOTT, C. D., *Director*. Account of a reconnaissance of the gold district of the Yukon region. In Eighteenth Ann. Rept. U. S. Geol. Survey, pt. 1, 1897, pp. 52–54.

1898.

BECKER, G. F. Reconnaissance of the gold fields of southern Alaska, with some notes on general geology. In Eighteenth Ann. Rept. U. S. Geol. Survey, pt. 3, 1898, pp. 1–86.

SPURR, J. E., and GOODRICH, H. B. Geology of the Yukon gold district, Alaska, by Josiah Edward Spurr; with an introductory chapter on the history and condition of the district to 1897, by Harold Beach Goodrich. In Eighteenth Ann. Rept. U. S. Geol. Survey, pt. 3, 1898, pp. 87–392.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1898. In Nineteenth Ann. Rept. U. S. Geol. Survey, pt. 2, 1898, pp. 20, 53, 116–117.

Map of Alaska, showing known gold-bearing rocks, with descriptive text containing sketches of the geography, geology, and gold deposits and routes to the gold fields. Prepared in accordance with Public Resolution No. 3 of the Fifty-fifth Congress, second session, approved January 20, 1898. Printed in the engraving and printing division of the United States Geological Survey, Washington, D. C., 1898. 44 pp., 1 map. A special publication. The data were brought together by S. F. Emmons, aided by W. H. Dall and F. C. Schrader. (Out of stock.)

1899.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1899. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 1, 1899, pp. 12, 52–53, 97, 126–134.

Maps and descriptions of routes of exploration in Alaska in 1898, with general information concerning the Territory. (Ten maps in accompanying envelope.) Prepared in accordance with Public Resolution No. 25 of the Fifty-fifth Congress, third session, approved March 1, 1899. Printed in the engraving and printing division of the United States Geological Survey, Washington, D. C., 1899. 138 pp., 10 maps in accompanying envelope. A special publication. Contributors: G. H. Eldridge, Robert Muldrow, J. E. Spurr, W. S. Post, W. C. Mendenhall, F. C. Schrader, W. J. Peters, A. H. Brooks, and E. C. Barnard. (Out of stock.)

1900.

BAKER, MARCUS. Alaskan geographic names. In Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 2, 1900, pp. 487–509.

BROOKS, A. H. A reconnaissance from Pyramid Harbor to Eagle City, Alaska, including a description of the copper deposits of the upper White and Tanana rivers. In Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 2, 1900, pp. 331–391.

—— A reconnaissance in the Tanana and White river basins, Alaska, in 1898. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 7, 1900, pp. 425–494.

ELDRIDGE, G. H. A reconnaissance in the Sushitna Basin and adjacent territory, Alaska, in 1898. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 7, 1900, pp. 1–29.

GANNETT, HENRY. Altitudes in Alaska. Bull. U. S. Geol. Survey No. 169, 1900, 13 pp.

MENDENHALL, W. C. A reconnaissance from Resurrection Bay to the Tanana River, Alaska, in 1898. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 7, 1900, pp. 265–340.

ROHN, OSCAR. A reconnaissance of the Chitina River and the Skolai Mountains, Alaska. In Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 2, 1900, pp. 393–440.

SCHRADER, F. C. A reconnaissance of a part of Prince William Sound and the Copper River district, Alaska, in 1898. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 7, 1900, pp. 341–423.

—— Preliminary report on a reconnaissance along the Chandlar and Koyukuk rivers, Alaska, in 1899. In Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 2, 1900, pp. 441–486.

—— and BROOKS, A. H. Preliminary report on the Cape Nome gold region, Alaska; with maps and illustrations. Washington, Government Printing Office, 1900. 56 pp., 3 maps, and 19 pls. A special publication of the United States Geological Survey.

SPURR, J. E. A reconnaissance in southwestern Alaska in 1898. In Twentieth Ann. Rept. U. S. Geol. Survey, pt. 7, 1900, pp. 31–264.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1900. In Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 1, 1900, pp. 17–18, 86, 145–149.

1901.

BROOKS, A. H. An occurrence of stream tin in the York region, Alaska. In Mineral Resources of the U. S. for 1900, U. S. Geol. Survey, 1901, pp. 267–271. Published also as a separate, Washington, Government Printing Office, 1901, cover and pp. 1–5.

—— The coal resources of Alaska. In Twenty-second Ann. Rept. U. S. Geol. Survey, pt. 3, 1901, pp. 515–571.

—— RICHARDSON, G. B., and COLLIER, A. J. A reconnaissance of the Cape Nome and adjacent gold fields of Seward Peninsula, Alaska, in 1900. In a special publication of the United States Geological Survey, entitled "Reconnaissances in the Cape Nome and Norton Bay regions, Alaska, in 1900," Washington, Government Printing Office, 1901, pp. 1–180.

MENDENHALL, W. C. A reconnaissance in the Norton Bay region, Alaska, in 1900. In a special publication of the United States Geological Survey, entitled, "Reconnaissances in the Cape Nome and Norton Bay regions, Alaska, in 1900," Washington, Government Printing Office, 1901, pp. 181–218.

SCHRADER, F. C., and SPENCER, A. C. The geology and mineral resources of a portion of the Copper River district, Alaska. A special publication of the United States Geological Survey, Washington, Government Printing Office, 1901, pp. 1–94.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1901. In Twenty-second Ann. Rept. U. S. Geol. Survey, pt. 1, 1901, pp. 35, 95–99, 144, 166–170.

1902.

BROOKS, A. H. Preliminary report on the Ketchikan mining district, Alaska, with an introductory sketch of the geology of southeastern Alaska. Professional Paper U. S. Geol. Survey No. 1, 1902, pp. 1–120.

COLLIER, A. J. A reconnaissance of the northwestern portion of Seward Peninsula, Alaska. Professional Paper U. S. Geol. Survey No. 2, 1902, pp. 1–70.

MENDENHALL, W. C. A reconnaissance from Fort Hamlin to Kotzebue Sound, Alaska, by way of Dall, Kanuti, Allen, and Kowak rivers. Professional Paper U. S. Geol. Survey No. 10, 1902, pp. 1–68.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1902. In Twenty-third Ann. Rept. U. S. Geol. Survey, 1902, pp. 20, 21, 57, 71–82, 161.

1903.

BAKER, MARCUS. Geographic dictionary of Alaska. Bull. U. S. Geol. Survey No. 187, 1902, pp. 1–446.

BROOKS, A. H. Placer gold mining in Alaska in 1902. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 41–48.

—— Stream tin in Alaska. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 92–93.

COLLIER, A. J. Coal resources of the Yukon Basin, Alaska. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 276–283.

—— The coal resources of the Yukon, Alaska. Bull. U. S. Geol. Survey No. 218, 1903, pp. 1–71.

COLLIER, A. J. The Glenn Creek gold mining district, Alaska. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 49–56.

MENDENHALL, W. C. The Chistochina gold field, Alaska. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 71–75.

—— and SCHRADER, F. C. Copper deposits of the Mount Wrangell region, Alaska. In Contributions to economic geology, 1902: Bull. U. S. Geol. Survey No. 213, 1903, pp. 141–148.

—— The mineral resources of the Mount Wrangell district, Alaska. Professional Paper U. S. Geol. Survey No. 15, 1903, pp. 1–71.

WALCOTT, C. D., *Director*. Account of operations in Alaska in 1903. In Twenty-fourth Ann. Rept. U. S. Geol. Survey, 1903, pp. 78–107, 167, 256.

1904.

BROOKS, A. H. Placer gold mining in Alaska in 1903. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 43–59.

COLLIER, A. J. Tin deposits of the York region, Alaska. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 154–167.

MARTIN, G. C. Petroleum fields of Alaska, and the Bering River coal field. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 365–382.

MOFFIT, F. H. The Kotzebue placer-gold field of Seward Peninsula, Alaska. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 74–80.

PRINDLE, L. M. Gold placers of the Fairbanks district, Alaska. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 64–73.

SCHRADER, F. C., and PETERS, W. J. A reconnaissance in northern Alaska across the Rocky Mountains, along the Koyukuk, John, Anaktuvuk, and Colville rivers, and the Arctic coast to Cape Lisburne, in 1901. Professional Paper U. S. Geol. Survey No. 20, 1904, pp. 1–139.

SPENCER, A. C. The Juneau gold belt, Alaska. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 28–42.

WRIGHT, C. W. The Porcupine placer mining district, Alaska. In Contributions to economic geology, 1903: Bull. U. S. Geol. Survey No. 225, 1904, pp. 60–63.

PAPERS ON ALASKA IN PREPARATION.

BROOKS, A. H. A reconnaissance in the Mount McKinley region, Alaska.

—— Geography of Alaska.

COLLIER, A. J. Placer mines of the Nome region, Alaska.

—— Tin ores of the York region, Alaska.

—— and HOLLICK, C. A. The geology of the Yukon.

MENDENHALL, W. C. The geology of the central Copper River Basin.

MOFFIT, F. H. A reconnaissance of the northwestern portion of Seward Peninsula.

PRINDLE, L. M. A reconnaissance of the Fortymile, Birch Creek, and Fairbanks gold placer districts, Alaska.

SCHRADER, F. C. The geology of the upper Copper and Tanana rivers.

SPENCER, A. C. The geology of the Treadwell mines, Alaska.

—— The Juneau gold belt, Alaska.

Topographic Maps of Alaska.

Cape Nome and adjacent gold fields; scale 1:250000. E. C. Barnard.

Chitina and lower Copper River region; scale 1:250000. T. G. Gerdine and D. C. Witherspoon.

Cook Inlet, head of, to the Tanana via Matanuska and Delta rivers, also part of Kenai Peninsula; scale 1:625000. W. C. Mendenhall.

Cook Inlet, region from head of, to Kuskokwim River and down the Kuskokwim to Bering Sea, Bristol Bay, and a part of Alaska Peninsula; scale 1:625000. W. S. Post.

Copper River region; scale 1:376000. Lieut. P. G. Lowe, Emil Mahlo, and F. C. Schrader.

Copper, upper, and Chistochina rivers; scale 1:250000. T. G. Gerdine.

Copper, Nabesna, and Chisana rivers, headwaters of; scale 1:250000. D. C. Witherspoon.

Fort Yukon to Kotzebue Sound, including Dall, Alatna, and Koyuk rivers and Old Man Creek; scale, 1:625000. D. L. Reaburn.

Fortymile quadrangle; scale, 1:250000. E. C. Barnard.

Koyukuk River to mouth of Colville River, including John River; scale, 1:625000. W. J. Peters.

Koyukuk and Chandlar rivers, portions of; scale, 1:625000. T. G. Gerdine.

Lynn Canal, routes from, via headwaters of White and Tanana rivers to Eagle City; scale, 1:625000. W. J. Peters.

Norton Bay region; scale, 1:625000. W. J. Peters.

Prince William Sound, sketch map of. Emil Mahlo.

Prince William Sound and vicinity; scale, about 1:376000. Emil Mahlo.

Seward Peninsula, northwestern part of; scale, 1:250000. T. G. Gerdine.

Sushitna River and adjacent territory; scale, 1:625000. Robert Muldrow.

Tanana and White rivers, portions of; scale, 1:625000. W. J. Peters.

York and Kugruk regions, sketch maps of. A. H. Brooks.

Topographic Maps of Alaska in Preparation.

General map of Alaska; scale, 1:2500000. R. U. Goode.

Eagle-Goodpaster region, Alaska; scale, 1:250000. T. G. Gerdine.

Fairbanks-Birch Creek region, Alaska; scale, 1:250000. T. G. Gerdine.

Mount McKinley region; scale, 1:625000. D. L. Reaburn.

Juneau Special district; scale, 1:62500. W. J. Peters.

Seward Peninsula, northeastern portion of, topographic reconnaissance of; scale, 1:250000. D. C. Witherspoon.

INDEX.

O

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

[Bulletin No. 227.]

The serial publications of the United States Geological Survey consist of (1) Annual Reports, (2) Monographs, (3) Professional Papers, (4) Bulletins, (5) Mineral Resources, (6) Water-Supply and Irrigation Papers, (7) Topographic Atlas of United States—folios and separate sheets thereof, (8) Geologic Atlas of United States—folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists may be had on application.

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BULLETINS, SERIES G, MISCELLANEOUS.

2. Gold and silver conversion tables, giving the coining values of troy ounces of fine metal, etc. computed by Albert Williams, jr. 1883. 8 pp.
7. Mapoteca geologica Americana: A catalogue of geological maps of America (North and South), 1752–1881, in geographic and chronologic order, by Jules Marcou and John Belknap Marcou. 1884. 184 pp.
25. The present technical condition of the steel industry of the United States, by Phineas Barnes. 1885. 85 pp.
26. Copper smelting, by Henry M. Howe. 1885. 107 pp.
44. Bibliography of North American geology for 1886, by Nelson Horatio Darton. 1887. 35 pp.
75. Record of North American geology for 1887–1889, inclusive, by Nelson Horatio Darton. 1891. 173 pp.
91. Record of North American geology for 1890, by Nelson Horatio Darton. 1891. 88 pp.
99. Record of North American geology for 1891, by Nelson Horatio Darton. 1892. 73 pp.
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127. Catalogue and index of contributions to North American geology, 1732–1891, by Nelson Horatio Darton. 1896. 1,045 pp.
130. Bibliography and index of North American geology, paleontology, petrology, and mineralogy for 1892 and 1893, by Fred Boughton Weeks. 1896. 210 pp.
131. Report of progress of the division of hydrography for the calendar years 1893 and 1894, by Frederick Haynes Newell. 1895. 126 pp.
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221. Bibliography and index of North American geology, paleontology, petrology, and mineralogy for the year 1902, by Fred Boughton Weeks. 1903. 200 pp.
222. Catalogue and index of the publications of the Hayden, King, Powell, and Wheeler surveys, by L. F. Schmeckebier. 1904. 208 pp.
227. The United States Geological Survey, its origin, development, organization, and operations. 1904. 205 pp.

Correspondence should be addressed to

The DIRECTOR,
UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D. C.

APRIL, 1904.

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