ANNUAL REPORT
OF THE
SECRETARY OF COMMERCE
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OF THE

SECRETARY OF COMMERCE.

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, October 30, 1916.

To the PRESIDENT:

I have the honor to submit herewith my fourth annual report, covering the operations and condition of the Department during the fiscal year which ended June 30, 1916, and tracing in a general way its history to October 1, 1916.

The organization of the Department was not altered during the fiscal year. Soon after the year closed, however, by the act approved September 8, 1916, the cost of production division of the Bureau of Foreign and Domestic Commerce was ordered to be transferred to the Tariff Commission created by that act. At this writing the transfer has not been made because the organization of the Tariff Commission is not completed.

Injustice to Traveling Employees.

The injustice to certain traveling employees of the Department, to which I referred in my last report, continues. They are still limited by law to $5 per diem for all subsistence expenses while required to travel in regions where it is impossible to subsist on that sum. The matter has been brought during the year before committees of both Houses of Congress without avail. It remains true to-day that employees, some of them but modestly paid, are required to pay out of their own pockets expenses incurred solely for Government purposes. The practice is wrong and, though required by law, is without excuse. It is a simple thing to remedy the evil while providing ample safeguards against extravagance. The law now takes an unfair advantage of faithful public servants, and I again enter my earnest protest against it. Publicity and responsibility are the surest safeguards against improper expenditure. The Department welcomes the strictest obligation

in both respects, but it protests against remedying one wrong by committing another and against the enforced docking of the salaries of men who must needs contribute out of modest personal means toward the expenses which a rich and powerful nation requires them in the course of their duty to it to incur for its account.

Space in Commerce Building.

An appropriation has been made by Congress, as recommended in my last report, to provide quarters for the Federal Trade Commission. At this writing that body is still housed in the Commerce Building, greatly to the detriment of the work of the Department of Commerce. It is my earnest hope that suitable quarters for the Federal Trade Commission may soon be found in order to permit this Department to utilize the space in the building it occupies which its work urgently requires. The Federal Trade Commission occupies 13,683 square feet. The Department needs for its own uses not less than 16,000 square feet more than it now has.

Attendance at Trade Conventions and Meetings.

I renew the protest in my last report against the provision of law which forbids the payment from any appropriation of "expenses of attendance of any person at any meeting or convention of members of any society or association, unless such fees, dues, or expenses are authorized to be paid by specific appropriations for such purposes or are provided for in express terms in some general appropriation." In my report for the year ended June 30, 1914, I said:

> It surely was not the intention that the law should prohibit the commercial representatives of the country from making known directly to business organizations the information which they have traveled far and labored hard to get, yet this is the effect of the restriction embodied in the law.

In my report of last year I said:

> It is absurd that an officer of the United States, having gathered at public cost valuable information for the benefit of manufacturers all over the land, should not be permitted to lay those facts before a convention of such manufacturers except at his own personal expense or when some other reason for his presence can be contrived.

It still remains true that, although we gather at public expense all over the world important facts which our merchants and manufacturers need to know, we are by law placed in the absurd position that having thus gathered this knowledge we are not permitted at public cost to go before "any meeting or convention" of any busi-

ness or trade organization to tell them what we have learned in their behalf. Here, again, to remedy an evil another and a worse one is done and one which goes far to nullify wise and progressive laws intended for the benefit of the business and scientific world. By special provision of law the Bureau of Standards is permitted to send representatives to such meetings and conventions. The same authorization should be given to the Bureau of Foreign and Domestic Commerce, the Coast and Geodetic Survey, the Bureau of Fisheries, and the Bureau of the Census.

Civilian Crews for Fisheries Vessels.

It is generally known that the Navy requires officers and men, yet, as I have previously recorded, the steamers *Albatross* and *Fish Hawk*, of the Fisheries Service, are operated by naval crews commanded by warrant officers of the Navy whose services are not required to operate those vessels. The work is well done, but it could be done much more cheaply than it now is. If the present naval crews were transferred to the regular work of the Navy Department, and civilian crews replaced them, there would be an annual saving to the Government of over $27,000 a year. The matter was brought before Congress during the fiscal year, but without result.

A wise increase in funds for the maintenance of vessels in the Fisheries Service has permitted the use of the *Albatross* in connection with the tuna fisheries during the fiscal year.

Vessels of the Department's Marine Services.

The construction of the lighthouse tender *Cedar*, at Long Beach, Cal., has been greatly delayed by a strike and by the difficulty in securing material. It is now expected that the vessel will be launched in December. The *Cedar* will be the largest steamer in the Service. The medium-draft tender *Rose* was launched February 19, 1916. Contract for the construction of the shallow-draft tender *Palmetto* was made on September 27, 1915. Contract has also been awarded for the construction of a relief light vessel, *No. 99*, for the Great Lakes, at East Boothbay Harbor, Me.

The new Coast Survey steamer *Surveyor*, under construction at Manitowoc, Wis., has been launched and will be completed by the close of the autumn. The steamers *Gedney* and *McArthur*, of the Coast Survey, have been condemned and sold as unfit for further use. In my last report I pointed out that the steamer *Patterson*, of this Service, will hardly last till a new steamer can replace her. She is 37 years old, weak, underpowered, worn out. The esti-

mates of the Department for the current fiscal year included two vessels to replace these old ships. No appropriation was made. It is certain that just as the *Gedney* and the *McArthur* had to be abandoned before their successors were authorized so the *Patterson* must go before a new vessel can be built to take her place. This, of course, means the holding over of survey work on that part of our coast which needs it most, namely, the coast of Alaska and the Pacific coast. Even the *Explorer*, on account of age, which has resulted in natural weakness, is unfit for any service except where she can work in protected waters. Our estimates for the coming year include the cost of two new ships to replace the *McArthur* and *Patterson*. The *Isis* has done more than five times as much work in the year as the vessel she replaced.

The alterations and repairs upon the steamship *Roosevelt*, bought last year for the Fisheries Service, have been prolonged by a strike, by the delay in securing the necessary material, and by studies to determine accurately the exact condition of the hull in order to learn what additional work, if any, was required. The vessel is now substantially completed. Under the Fisheries Service is given a detailed account of the outlay upon this vessel. The new steamer *Halcyon*, of the Fisheries Service, approaches completion at Boothbay Harbor, Me.

The work of the motor vessels *Tarragon* and *Dixie*, of the Navigation Service, has resulted in an increased revenue from mitigated fines for violations of navigation laws during the fiscal year of $12,000. This increase is one-third more than the cost of the *Dixie*. The total number of violations of the navigation laws reported was 7,825. This is 957 more than the number reported during the previous fiscal year, which till then was the record. This increase is principally due to the work of the *Dixie*, which went into commission July 1, 1915. Of the 7,825 violations reported, over 6,200 were for failures to have the equipment or crew necessary to the safe navigation of the vessel. In obtaining these results fully 60,000 separate inspections of vessels were made by the inspecting officers. The winter work of the motor vessel *Dixie* in Chesapeake Bay has resulted in a wonderful improvement of conditions, which until this work was vigorously taken up by us were inhuman and intolerable. The practice of shanghaiing men for the oyster fleet and that of forcing them to live in unhealthful quarters without sufficient food have been stopped, while cruel treatment of the crews and the villainous practice of placing them ashore without payment of their wages have also

been ended. The thanks of the Department are tendered to the officers of the Department of Justice, who, working in cooperation with us, have done a humane work for the benefit of oppressed sailors on the waters of Chesapeake Bay and its tributaries.

The Department had the following vessels in its marine services on October 1, 1916:

	In operation.	Not in operation.	Being built.	Total.
Coast and Geodetic Survey	8	1	1	10
Bureau of Navigation	2	.....	.....	2
Bureau of Lighthouses:				
Tenders	46	2	2	50
Light vessels	67	.....	2	69
Bureau of Fisheries	10	.....	1	11
Total	133	3	6	142

This is exclusive of 4 vessels loaned to the Coast and Geodetic Survey by the Philippine government and of 45 motor boats of all sizes operated by the Bureau of Fisheries.

Counting Passengers on Excursion Vessels.

The work of the Navigation Service in counting passengers when entering vessels has been done on a scale never before attempted. On 8,359 occasions the navigation inspectors counted 3,244,953 passengers. This is an increase of 3,298 counts and of 1,805,680 passengers over the previous year. The officers of the Customs Service ably cooperated in this matter, and on 5,451 occasions those officers counted 1,867,814 passengers. This is a decrease of 135 counts from the previous year, but an increase of 248,369 passengers. The total number of counts, 13,810, covering 5,114,351 passengers, is the largest on record and is an increase of over 2 million persons as compared with the previous year. On 167 separate occasions the inspectors found it necessary to stop passengers embarking after the capacity of the vessel had been reached. These cases involved the safety of 168,178 passengers. It is fair to assume that in a majority of these instances there would have been a violation of law if the Department had not made this careful inspection. It should be noted that the above counts are not estimates. The work is done by mechanical counters and the results are carefully compared and checked. Never before in the history of the country has this work been done as generally and as efficiently as during the last fiscal year. It is treated more fully under the Navigation Service.

Status of "Eastland" Inquiry.

The completion of the inquiry made pursuant to law (sec. 4450, Rev. Stat.) into the conduct of the licensed officers of the steamer *Eastland* was, as my last report stated, adjourned pending the action of the Federal grand jury. It is not practicable to pursue the inquiry until action shall have been taken by the State courts under the indictments pending therein. Indictments were found by the Federal grand jury against two local inspectors of the Steamboat-Inspection Service, of this Department, located at Grand Haven, Mich. The Federal authorities sought an order of removal of these officers to the jurisdiction of the Federal court in northern Illinois. Meanwhile the two inspectors were suspended without pay, subject to reinstatement with accumulated pay in the event of their exoneration by the court. Argument for the order of removal was heard at length by Justice Sessions of the District Court of the United States for the Western District of Michigan, Southern Division. His decision, rendered February 18, 1916, exonerated the inspectors and denied the order for their removal. They were restored to duty with accumulated pay. When the courts shall have acted in the matter of the licensed officers, the suspended inquiry into their conduct by the local board of inspectors of Milwaukee will be concluded.

The legislation recommended by the board of inquiry in the statement printed in my last report was drafted and placed before Congress. It is treated in detail herein.

I again urge the importance of placing the Steamboat-Inspection Service on a scientific as well as upon a practical basis through the establishment of the board of naval architects which the *Eastland* board of inquiry recommended, or by such other action to a similar effect as will provide a scientific staff, now lacking.

Inadequate Motor-Boat Laws.

Repeatedly the Department has stated the dangers to life arising under the present inadequate motor-boat laws. Three times before the following statement has been published. It is renewed now because the facts can not be made too plain.

The Department has no direct power over a motor vessel either as regards passengers or machinery. It can inspect the hull, tanks, and piping, but only when the vessel is of 15 tons measurement or more, and when it carries passengers or freight for hire. If, for example, the motor vessel is a private vessel of over 15 tons measurement, the Department can not inspect her in any way. Even if she is a towing motor vessel of this size, there exists no lawful power to inspect her.

The Department can not limit the number of passengers carried for hire on a motor vessel, however big, except by fixing the life-saving equipment. Over motor vessels

smaller than 15 tons the powers of the Department are limited to seeing them provided with the necessary life-saving equipment, lights, life preservers, and means of extinguishing gasoline fires. Here the present powers of the Government stop.

I wish to make this perfectly plain. If a Government inspector stands upon a dock watching a motor boat sail away with three times as many passengers as she ought to have and her machinery defective and her hull leaking, he would have no power in the premises, were she a motor boat under 15 tons measurement, except to see that there was a life preserver in good order provided for every passenger on board, that she had the proper lights and the proper means of extinguishing gasoline fires, with a whistle and a bell of standard dimensions. He could, indeed, require such a vessel to have a licensed operator, but for that license no examination is required. * * * At present a person may obtain a license as operator of motor vessels without being a citizen of the United States or without being 21 years of age, and while being unable to read or write. Under the law, licenses to operators of motor boats are issued without any examination whatever. Inspectors are without authority to ask whether the person applying for such motor-boat license is color blind or whether he understands or can read the pilot rules. Yet such persons, having a license so obtained, may, and in fact do, take charge of motor vessels carrying passengers for hire. Operators of motor boats should be required to show that they are not color blind and have good vision, that they can read the pilot rules and laws, and that they have a reasonable knowledge of them. *The existing conditions are a menace to the lives of innocent and unsuspecting passengers and should not be permitted to continue.*

For the FOURTH TIME the Department asks the authority which it now lacks to protect the lives of innocent passengers on motor vessels. Here and now it is pointed out that when the accident which is certain to happen if that authority is not given shall occur the responsibility for the loss of life will not rest with the Department.

Bills approved by the Department and by large motor-boat interests after a full discussion on the subject were introduced providing for the numbering and recording of undocumented vessels, for the licensing of operators of motor vessels after a written examination, and for a certificate of approval from the local inspectors of steam vessels, for all motor boats carrying 20 passengers or more for hire. Hearings were given on both measures, but the bills have not as yet been reported.

Another bill (H. R. 13831), to which reference is hereinafter made, gives the local inspectors of steam vessels power to regulate the number of passengers that may be carried on all inspected motor boats.

These measures will, if made law, do much to improve existing conditions.

Unprecedented Foreign Trade.

The balance of trade in favor of the United States on merchandise transactions for the fiscal year ended June 30, 1916, was $2,135,775,355. The total of our merchandise export trade was

$4,333,658,865 and of our import trade $2,197,883,510. These conditions have increased during the three months from the close of the fiscal year to October 1, in which period the merchandise exports have been $1,468,196,616, the imports $546,187,765, and the net visible balance $922,008,851.

Our foreign indebtedness has been reduced possibly 3 billions. We have loaned abroad a total sum since the war began on August 1, 1914, estimated at $1,500,000,000, and increasing. We are the wealthiest nation in the world and the most prosperous one. We have not wasted our men or our means in war. Relatively to our fiscal power to-day our debts are trifling. Nations less wealthy than some of our individual States bear a heavier burden of debt and interest than we. We are the only one of the great industrial peoples that is at peace. Nations turn to us for goods and for means with which to pay us for the goods. None of us in our wildest financial fancies would five years ago have dreamed that things could be as now they are. To protect our reserve of gold, which is the ultimate base on which our domestic credits rest, we must maintain our export trade and must continue and increase loans and investments abroad. The work of the Bureau of Foreign and Domestic Commerce is devoted to these important duties. The report of the chief of that service shows its extraordinary expansion and effectiveness. In thousands of business offices its aid is acknowledged and welcomed. Never has our Government put at the disposal of our business and industry the helpful facilities that are now provided.

It is of national importance that the great service which shows such practical results should be given the men and the money necessary to carry on its great work even more efficiently. The force of commercial attachés should be enlarged. Further sums should be provided for the foreign traveling service, and the supervising and clerical staff should be made adequate to meet the demands of commerce. The Department acknowledges with keen appreciation the aid which Congress has given. The funds for promoting the foreign trade of the country are now five times larger than they were four years ago. The results are many times greater than the increase in funds. A comparison of present conditions with those that existed four years ago is like comparing life with death. Then there were no branch or cooperating offices of the commercial service. Now in one of the eight offices 2,900 men called in a single month for business assistance. Then there were no commercial

attachés and a smaller force of traveling agents. Now from 10 attachés and 22 commercial agents knowledge comes constantly which results in orders, the profits upon which, estimated on a low basis, exceed many times the total cost of the entire service which promotes them.

Government-Owned Building for the Department.

The act of May 30, 1908 (35 Stat., 545), authorized and directed the Secretary of the Treasury to acquire land for the use and accommodation of the Departments of State, Justice, and Commerce and Labor, and the Secretary of the Treasury has done so. The act of June 25, 1910 (36 Stat., 698), authorized and directed the Secretary of the Treasury to prepare designs and estimates for a separate fireproof building for each of the Departments of State, Justice, and Commerce and Labor, to be erected upon the land acquired under the act of May 30, 1908 (supra), at a cost not to exceed $8,000,000. On March 3, 1913, the plans for the proposed building for the Department of *Commerce and Labor* were approved by my predecessor. These plans did not provide for the accommodation of the Bureau of Fisheries or the Coast and Geodetic Survey in the proposed new building. In view of the fact, however, that three bureaus which were to be housed in the proposed new building have been transferred to the Department of Labor and another bureau to the Federal Trade Commission, I am confident that the plans can be so revised that the building can accommodate the Coast and Geodetic Survey and the administrative offices of the Bureau of Fisheries.

As the lease for the Commerce Building, which the Department now occupies, will expire within two years, it will be necessary to proceed promptly in the matter of providing the new Government building for this Department if it is to be ready for occupancy by that time. The construction of such a building is urged not only in the interest of efficiency and good administration but also in the interest of economy. At the present time the Department is paying $65,500 for the rental of the enlarged building, which, although reasonable when compared with other rental rates in the District of Columbia, represents an income of 3 per cent on $2,183,333.

I have hitherto pointed out the desirability of having the bureaus of this Department, except the Bureau of Standards, housed in one Government building. The experience gained by having five of our bureaus housed in the same building with the

divisions of my own immediate office accentuates the loss of money and effectiveness in having the Bureau of Fisheries and the Coast and Geodetic Survey separated from the rest of the Department. It is never good business practice to scatter a department through several buildings located in different parts of the city. This is a cause of hourly waste, a producer of delays, and a creator of inefficiency. If poverty compels such a wasteful course to be pursued, it should at least be accepted only as a makeshift which common sense would end as soon as money could be found. I renew my protest against the policy of paying rent to private parties for buildings for the public service, especially when this requires the work of a department to be split into parts at enhanced cost for operation.

Development of New Fish Foods—Fisheries Laboratory and Aquarium.

The Bureau of Fisheries needs a practical working laboratory with an aquarium attached as a part thereof. This Service has introduced an entirely new food during the fiscal year in the tilefish. It was not known when the year began. Inquiry then in any fish market throughout the land would have failed to find one. The Fisheries Service began its work to develop the tilefish in October, 1915. By the beginning of November the fishery was actually begun. At the end of the fiscal year the fishery was eight months old. During that time 4,125,000 pounds of tilefish were sold, bringing to the fishermen over $200,000 from a source theretofore unknown. In July, 1916, 2,200,000 additional pounds of tilefish were taken into New York, 230,000 pounds into Boston, and smaller loads into Atlantic City, Newport, and elsewhere. The average catch of this new food fish for recent months is at the rate of 20 million pounds (10,000 net tons) per annum. This subject is covered in detail under the Bureau of Fisheries herein.

What the Fisheries Service has done with the tilefish it is doing with the grayfish. Over 2,000 persons ate this new food at the Eastport, Me., fish fair in August, 1916, without a single unfavorable comment. A similar work, though on a smaller scale, has been done in introducing the wholesome sea mussel. These are practical attacks upon the high cost of living. It is hard to imagine a more practical contribution than to find and furnish a new and cheap food, and it is to develop this work on a larger scale that the laboratory and aquarium are needed. The aquarium would indeed have large educational value. The public interest

in it appears in the throngs that visited the exhibit of the Bureau of Fisheries at the Panama-Pacific Exposition and in the urgency with which the request was pressed for the continued showing of that exhibit at San Diego. The small temporary aquaria of the Fisheries Service in Washington and in Woods Hole, Mass., delight a constant stream of visitors and the public aquaria in different cities witness to the same general interest. The purpose of the aquarium, however, would not be to furnish a place for amusement. It would be a working tool to provide new sources of food supply and to improve those now existing.

It is a singular thing that so practical a people as we talk so much about the cost of living and do so little about it. There are huge quantities and a large variety of unused fish foods of excellent quality of which we hardly know. An acre of water on a farm is equal to an acre of good land in food-producing value. We wisely establish agricultural experiment stations; why stop there? It is quite as possible to improve the breed of fishes in food value as it is to develop plants in like characteristics. What is true of plant life, of cattle and horses, as regards improving their quality and number is just as true of fishes, and the infinite variety of fishes far surpasses that of all other animals put together.

Three things are possible by the use of such an aquarium which without it will be long delayed. These are (1) new sources of food supplies; (2) the improvement of the food supplies now existing; and (3) the enlargement of the present supply.

A bill (H. R. 764) is now pending to provide a new building for the Bureau of Fisheries. An amendment has been suggested to make the bill provide "that the Secretary of Commerce be, and he is hereby, authorized to have prepared plans, specifications, and estimates of cost for the construction of a fireproof steel-frame building, to cost not to exceed seven hundred and fifty thousand dollars, for the use and accommodation of the Bureau of Fisheries, including aquarium and laboratory facilities and an experimental fish hatchery, to be erected, when appropriated for, on the north side of the Mall between Fourteenth and Fifteenth Streets; and there is hereby appropriated the sum of ten thousand dollars, or as much thereof as may be necessary, to carry into effect the provisions of this Act."

In my judgment the officers and clerical staff of the Bureau of Fisheries should be housed in a new Government building for the Department of Commerce, but the aquarium and its accompanying laboratories should be separately though conveniently located.

Safeguards Against Foreign Unfair Competition.

The recommendation in my report for last year that legislation be enacted providing safeguards against foreign unfair competition has been met by the passage of laws deemed adequate for that purpose. In that connection a revision of duties upon dyestuffs, made with the cooperation and approval of this Department, has also taken place. The two together provide a security, never before existing, for new industries necessary to our industrial independence. The recommendation in my annual report that business concerns should be allowed to cooperate in foreign trade has found result in the Webb bill, which has passed the House of Representatives and is now pending in the Senate. It is earnestly to be hoped that this will pass early in the coming session. It has the full approval of this Department. It is quite as essential for the support of our foreign trade as was the law against foreign unfair competition for our domestic trade. Both are far-seeing and wise safeguards for our business which can not be too soon provided.

I rejoice in the extension of American banks abroad and in the revision of the law which makes more easily possible the multiplying of such banks. I regard the extension of American investments abroad as a happy, indeed a necessary, thing for the business future of the country. With banks in foreign lands under American control and sympathetic with American commerce, with investments in foreign lands made by American capital and looking to America for purchases arising from their operations, with freedom for our producers to cooperate in the foreign field, we have three powerful tools long needed but never supplied until now. It is one thing to criticize and correct business evils. It is another and a happier thing to give to business a helping hand. It is well that the latter has come to be the prevailing practice.

Merchant Marine.

The American merchant marine, which is another great weapon needed for our foreign trade, has never before increased so fast as during the past two years. In that time we have doubled our shipping in the foreign trade—from 1,076,152 gross tons to 2,191,715 gross tons. No other nation ever in so short a time so increased its shipping in foreign trade. Under the Ship Registry Act admitting foreign-built ships to American registry for foreign trade, 182 vessels of 616,033 gross tons have been added to our

merchant marine. On July 1, 1915, our shipyards were building, or had under contract, 76 steel vessels of 310,089 gross tons. On October 1, 1916, this had grown to 417 steel merchant vessels of 1,454,270 gross tons. This does not include work in progress or under contract on wooden ships in many yards. The merchant shipbuilding thus in progress is not only the greatest in our own history but greater than any corresponding construction in the history of any other nation except Great Britain. It includes 195 ocean steel steamers of over 1,000 gross tons each, aggregating 1,037,103 gross tons.

Inspection of Foreign-Built Vessels Admitted to American Registry.

On August 31, 1916, a meeting was held in the office of the Acting Secretary, at which were present representatives of leading steamship companies of the United States, who desired to discuss the matter of inspecting the foreign-built vessels admitted to American registry, to which inspection they became subject on September 4, 1916, on the expiration of the term fixed by the President's proclamation admitting them to American registry. The matter was considered in all its phases and ended in the following Executive order, which was satisfactory to all concerned:

EXECUTIVE ORDER.

In pursuance of the authority conferred upon the President of the United States by Section 2 of the Act approved August 18, 1914, entitled "An Act to provide for the admission of foreign-built ships to American registry for the foreign trade, and for other purposes," it is hereby ordered:

1. That the provisions of the law prescribing that the watch officers of vessels of the United States registered for foreign trade shall be citizens of the United States, are hereby suspended so far and for such length of time as is herein provided, namely: All watch officers now employed on foreign-built ships which have been admitted to United States registry under said Act who, heretofore, have declared their intention to become citizens of the United States and watch officers on such ships who, within six months from this date, shall declare their intention to become such citizens shall be entitled to serve on foreign-built ships so registered until the time shall have expired within which they may become such citizens under their declarations, and shall be eligible for promotion upon any foreign-built ship so registered.

2. That the provisions of law requiring survey, inspection and measurement, by officers of the United States, of foreign-built ships admitted to United States registry under said Act are hereby suspended so far and for such length of time as is herein provided, namely: The said provisions shall not apply to any such foreign-built ship during the period of one year from this date provided the Secretary of Commerce is satisfied in the case of any such ship that the ship is safe and seaworthy and that proper effort is being made to comply with the said provisions.

WOODROW WILSON

THE WHITE HOUSE, *1 September, 1916.*
[No. 2448.]

Passenger Allowance for Excursion Steamers.

Continued study is being given to the problem of better controlling the passenger allowance for excursion steamers. The experience of the Department shows that the pressure to carry heavy loads comes quite as strongly from the public themselves, who seem to take little or no account of the limit of the number of passengers fixed, as it does from the desire of vessel owners and officers to crowd their boats. The problem is to determine a rule of general application which will not too severely restrict the opportunities for outdoor recreation eagerly sought by a large portion of our people, while at the same time it will provide an economic basis on which the excursion steamers can continue to run.

The matter is complicated because a rule applying to one portion of the country does not necessarily hold in another, and a rule for sheltered waters is not suitable for those that are more exposed. At present the matter lies in the hands of the different local boards of inspectors, so that even with the utmost care on the part of supervising inspectors to promote uniformity it is possible to have vessels in one district permitted loads differing from those in an adjoining district.

The Steamboat-Inspection Service expects to be able to develop by study of the problem a solution which will be found generally applicable. In the meantime, as is stated under the heading of the Bureau of Navigation, exceptional care is being taken to prevent loads in excess of the existing limits and to make these last as safe and uniform as possible.

Protection of Vessels Against Fire.

On May 3, 1916, an advisory conference was held in the office of the Secretary on the subject of making passenger vessels more secure from destruction by fire. The object of this conference was to bring out the latest thought of the best informed men upon the subject. There were present 35 persons other than the officers of the Department, representing constructing, operating, labor, and manufacturing interests. A stenographic report was taken of the proceedings and the statements made by each person taking part in the discussions were referred to him for correction or enlargement. The amended papers were printed in a pamphlet embodying the entire proceedings which has been widely circulated and contains the best opinion on this important subject.

At the conference a committee was appointed under whose auspices a further conference was held at the Department on May 22,

1916, on the subject of automatic sprinklers on vessels. This was attended by representatives of manufacturing and insuring interests, and the proceedings were fully published together with correspondence on the subject in another pamphlet which was given general circulation among parties interested.

It is believed that valuable results have followed and will hereafter follow from the interchange of ideas and from the presentation of the best modern thought on these important themes in available form to those interested in them. The Bureau of Standards is studying the subject of fire-resisting materials for steamboats, and at its suggestion the committee above named has been requested to appoint a subcommittee to cooperate with the Bureau of Standards in the development of the subject.

Load-Line and Bulkhead Regulation.

With a similar purpose a conference was held in the office of the Secretary on September 27, 1916, on the important subjects of load lines and of bulkhead legislation. That conference was attended by 40 persons representing shipbuilding and operating interests as well as by officers of the Navy Department and those of the Department of Commerce. The persons attending came from many parts of the country. The following committee has been designated as a result of the conference. They will consider the questions of bulkheads and load lines and report later to me or to the Shipping Board when it shall have been formed: Stevenson Taylor, of New York, president of the American Bureau of Shipping and of the American Society of Naval Architects and Marine Engineers; H. C. Sadler, Ann Arbor, Mich., professor of naval architecture, University of Michigan; H. M. Herriman, Cleveland, Ohio; C. J. Olson, San Francisco, Cal.; H. H. Raymond, New York, manager Clyde and Mallory Steamship Cos.; T. M. Cornbrooks, Sparrows Point, Md., chief engineer and naval architect, Bethlehem Steel Co.'s Maryland shipbuilding plant; William Gatewood, Newport News, Va., naval architect, Newport News Shipbuilding & Dry Dock Co.; W. A. Dobson, naval architect, Philadelphia, William Cramp & Sons Ship & Engine Building Co.; and J. W. Powell, Quincy, Mass., president Fore River Shipbuilding Co.

The proceedings of the conference were reported fully and will be printed for general use after full opportunity for correction and enlargement as in the former case.

In my last report I pointed out that the number of American cargo steamers has increased so rapidly that the subject of load-line regulation ought not to be postponed and that if our cargo

ships are to compete in foreign trade with those of other nations our rules should be similar to those adopted by other countries. I earnestly hope that as the result of the conference a beginning at least has been made of such study of this question as will lead at no distant date to definite legislation upon it.

Copies of the publications mentioned in connection with both conferences will be furnished to the appropriate committees of Congress.

Appropriations and Expenditures.

The itemized statement of the disbursements from the contingent fund of the Department of Commerce and the appropriation for "General expenses, Bureau of Standards," for the fiscal year ended June 30, 1916, required to be submitted to Congress by section 193 of the Revised Statutes of the United States; the itemized statement of expenditures under all appropriations for propagation of food fishes during the fiscal year ended June 30, 1916, required by the act of Congress approved March 3, 1887 (24 Stat., 523), and a statement showing travel on official business by officers and employees (other than the special agents, inspectors, and employees who, in the discharge of their regular duties, are required to travel constantly) from Washington to points outside of the District of Columbia during the fiscal year ended June 30, 1916, as required by the act of Congress approved May 22, 1908 (35 Stat., 244), will be transmitted to Congress in the usual form.

The following table shows the total amounts of all appropriations for the various bureaus and services of the Department of Commerce for the fiscal year ended June 30, 1916:

Bureau.	Legislative act.	Sundry civil act.	Deficiency act.	Special act.	Total.
Office of the Secretary	$293,980.00				$293,980.00
Bureau of Lighthouses	64,030.00	$5,100,000.00	$200,468.37		5,364,498.37
Bureau of the Census	1,198,740.00		25.09		1,198,765.09
Bureau of Foreign and Domestic Commerce	419,280.00		2,000.00		421,280.00
Steamboat-Inspection Service	539,140.00		20,000.00		559,140.00
Bureau of Navigation	187,130.00		2,625.00	$5,091.91	194,846.91
Bureau of Standards	644,780.00	90,000.00	160,447.57		895,227.57
Bureau of Fisheries		1,095,340.00	7,627.56		1,102,967.56
Coast and Geodetic Survey		1,365,620.00	5,000.00		1,370,620.00
Total	3,347,080.00	7,650,960.00	398,193.59	5,091.91	11,401,325.50
Allotment for printing and binding		390,000.00			390,000.00
Grand total		8,040,960.00			11,791,325.50

The disbursements by the Disbursing Clerk of the Department of Commerce during the fiscal year ended June 30, 1916, arranged according to items of appropriation, are as follows:

OFFICE OF THE SECRETARY.

Salaries, Office of Secretary of Commerce, 1915	$6,409.31
Salaries, Office of Secretary of Commerce, 1916	161,684.08
Contingent expenses, Department of Commerce, 1914	2.31
Contingent expenses, Department of Commerce, 1915	17,026.83
Contingent expenses, Department of Commerce, 1916	86,767.10
Rent, Department of Commerce, 1915	5,708.33
Rent, Department of Commerce, 1916	60,791.64
Total	338,389.60

BUREAU OF FOREIGN AND DOMESTIC COMMERCE.

Salaries, Bureau of Foreign and Domestic Commerce, 1915	5,096.03
Salaries, Bureau of Foreign and Domestic Commerce, 1916	113,737.82
Promoting commerce, Department of Commerce, 1914	.75
Promoting commerce, Department of Commerce, 1915	6,887.08
Promoting commerce, Department of Commerce, 1916	48,136.33
Promoting commerce, South and Central America, 1915	1,165.99
Promoting commerce, South and Central America, 1916	33,103.45
Investigating cost of production, Department of Commerce, 1915	1,979.12
Investigating cost of production, Department of Commerce, 1916	44,239.28
Commercial attachés, Department of Commerce, 1915	4,894.44
Commercial attachés, Department of Commerce, 1916	3,204.45
Total	262,444.74

BUREAU OF STANDARDS.

Salaries, Bureau of Standards, 1915	12,020.37
Salaries, Bureau of Standards, 1916	271,570.47
Laboratory, Bureau of Standards	594.75
Equipment, Bureau of Standards, 1914	335.80
Equipment, Bureau of Standards, 1915	17,245.28
Equipment, Bureau of Standards, 1916	28,824.92
General expenses, Bureau of Standards, 1914	209.84
General expenses, Bureau of Standards, 1915	3,292.00
General expenses, Bureau of Standards, 1916	20,295.81
Testing machines, Bureau of Standards, 1915	1,539.95
Testing machines, Bureau of Standards, 1916	26,727.42
Testing structural materials, Bureau of Standards, 1915	13,498.57
Testing structural materials, Bureau of Standards, 1916	90,932.41
Improvement and care of grounds, Bureau of Standards, 1915	356.80
Improvement and care of grounds, Bureau of Standards, 1916	5,117.71
Refrigeration constants, Bureau of Standards, 1914	8.86
Refrigeration constants, Bureau of Standards, 1915	1,001.44
Refrigeration constants, Bureau of Standards, 1916	13,903.43
Testing railroad scales, Bureau of Standards, 1914	2,628.64
Testing railroad scales, Bureau of Standards, 1915	21,161.13
Testing railroad scales, Bureau of Standards, 1916	24,010.68
Investigation of fire-resisting properties, Bureau of Standards, 1914	316.44
Investigation of fire-resisting properties, Bureau of Standards, 1915	8,968.72

Investigation of fire-resisting properties, Bureau of Standards, 1916	$21,070.64
High-potential investigations, Bureau of Standards, 1915	1,753.65
High-potential investigations, Bureau of Standards, 1916	13,647.09
Testing miscellaneous materials, Bureau of Standards, 1915	1,205.09
Testing miscellaneous materials, Bureau of Standards, 1916	17,401.06
Investigation of railway materials, Bureau of Standards, 1915	4,381.13
Investigation of railway materials, Bureau of Standards, 1916	11,494.70
Investigation of public-utility standards, Bureau of Standards, 1915	6,390.68
Investigation of public-utility standards, Bureau of Standards, 1916	22,949.31
Equipping chemical laboratory building, Bureau of Standards, 1916–17	60.92
Workshop and storehouse, Bureau of Standards	272.11
Chemical laboratory, Bureau of Standards	107,779.89
Current-meter testing tank, Bureau of Standards, 1916	2,998.34
Radio research, Bureau of Standards, 1916	7,709.58
Heating system, north laboratory, Bureau of Standards, 1916	2,095.35
Total	785,770.98

BUREAU OF NAVIGATION.

Salaries, Bureau of Navigation, 1915	1,386.71
Salaries, Bureau of Navigation, 1916	31,777.71
Salaries, Shipping Service, 1915	2,459.19
Salaries, Shipping Service, 1916	24,646.31
Clerk hire, Shipping Service, 1915	2,862.02
Clerk hire, Shipping Service, 1916	32,213.58
Contingent expenses, Shipping Service, 1915	806.68
Contingent expenses, Shipping Service, 1916	4,619.94
Enforcement of navigation laws, 1914	8.00
Enforcement of navigation laws, 1915	905.83
Enforcement of navigation laws, 1916	22,264.94
Enforcement of wireless-communication laws, 1914	16.04
Enforcement of wireless-communication laws, 1915	2,365.06
Enforcement of wireless-communication laws, 1916	39,601.71
Admeasurement of vessels, 1915	166.47
Admeasurement of vessels, 1916	2,341.95
Preventing overcrowding of passenger vessels, 1915	4,219.58
Preventing overcrowding of passenger vessels, 1916	14,116.97
Instruments for counting passengers, 1915	6.27
Total	186,784.96

STEAMBOAT-INSPECTION SERVICE.

Salaries, Office of Supervising Inspector General, Steamboat-Inspection Service, 1915	647.53
Salaries, Office of Supervising Inspector General, Steamboat-Inspection Service, 1916	14,767.48
Salaries, Steamboat-Inspection Service, 1915	29,066.20
Salaries, Steamboat-Inspection Service, 1916	326,264.99
Clerk hire, Steamboat-Inspection Service, 1915	6,868.41
Clerk hire, Steamboat-Inspection Service, 1916	76,987.00
Contingent expenses, Steamboat-Inspection Service, 1914	.35
Contingent expenses, Steamboat-Inspection Service, 1915	9,477.47
Contingent expenses, Steamboat-Inspection Service, 1916	83,210.52
Total	547,289.95

BUREAU OF FISHERIES.

Salaries, Bureau of Fisheries, 1915	$27,068.19
Salaries, Bureau of Fisheries, 1916	352,627.98
Miscellaneous expenses, Bureau of Fisheries, 1914	26.81
Miscellaneous expenses, Bureau of Fisheries, 1915	49,572.71
Miscellaneous expenses, Bureau of Fisheries, 1916	386,165.81
Protecting seal and salmon fisheries of Alaska, 1915	15,474.51
Protecting seal and salmon fisheries of Alaska, 1916	54,845.13
Payment to Great Britain and Japan under Art. XI of Fur-Seals Convention of 1911	20,000.00
Vessels and boats, Alaska fishery service, 1915	6,854.00
Marine biological station, Florida	6,020.10
Marine biological station, North Carolina, 1915	114.86
Vessels, fish hatchery, Boothbay Harbor, Me., 1915–16	469.35
Distribution cars, Bureau of Fisheries, 1915-16	19,193.00
Fish hatcheries:	
Cape Vincent, N. Y.	6,901.38
Clackamas, Oreg.	2,740.10
Cold Spring, Ga.	5,000.00
Edenton, N. C., 1915	2,888.96
Kentucky	14,459.35
Rhode Island	76.60
South Carolina	8,345.71
Upper Mississippi River Valley	764.49
Utah	11,183.62
Washington	3,249.46
Woods Hole, Mass., 1915	16,284.80
Wyoming	31,862.52
Cold-storage plant, fur-seal islands, Alaska, 1915–16	349.63
Total	1,042,539.07

BUREAU OF THE CENSUS.

Salaries, Bureau of the Census, 1915	28,146.85
Salaries, Bureau of the Census, 1916	636,968.68
Collecting statistics, Bureau of the Census, 1914	12.85
Collecting statistics, Bureau of the Census, 1915	63,079.74
Collecting statistics, Bureau of the Census, 1915–16	148,589.66
Collecting statistics, Bureau of the Census, 1916	353,303.18
Tabulating machines, Bureau of the Census, 1915	766.51
Tabulating machines, Bureau of the Census, 1916	10,364.88
Total	1,241,232.35

BUREAU OF LIGHTHOUSES.

Salaries, Bureau of Lighthouses, 1915	2,804.65
Salaries, Bureau of Lighthouses, 1916	60,605.50
General expenses, Lighthouse Service, 1914	493.30
General expenses, Lighthouse Service, 1915	48,837.14
General expenses, Lighthouse Service, 1916	63,073.64
Salaries, Lighthouse Service, 1915	281.25
Salaries, Lighthouse Service, 1916	11,356.42
Salaries, lighthouse vessels, 1915	42.20

Salaries, lighthouse vessels, 1916	$13,758.17
Salaries, keepers of lighthouses, 1914	14.67
Salaries, keepers of lighthouses, 1916	22,215.99
Aids to navigation:	
Alaska	290.09
Atchafalaya Entrance, La.	7.44
Ashtabula Harbor, Ohio	17.50
Manistique, Mich.	44.66
Puget Sound, Wash.	385.96
Lorain Harbor, Ohio	6.46
Cape Cod Canal lights, Mass.	135.87
Fort McHenry Channel range lights, Md	437.20
Point Judith Breakwater lights, R. I.	.73
Cape St. Elias Light Station, Alaska	7,329.95
Navassa Island Light Station, West Indies	8,249.30
Stonington Light Station, Conn.	6.74
Thimble Shoal Light Station, Va	3.30
Galveston Jetty Light Station, Tex	36.09
Tender for first lighthouse district	86,680.51
Tender for fifteenth lighthouse district	9,811.02
Tender for engineer, sixth lighthouse district	211.96
Lighthouse tender, general service	105,643.58
Point Abino Light Vessel, Lake Erie	8,894.50
Southwest Pass Light Vessel, Mississippi River, La	59,743.79
Light vessels for general service	64,385.86
Lighting Norfolk Harbor, Va	32.33
Repairing and rebuilding, aids to navigation, Gulf of Mexico	135.29
Cleveland Fog-Signal Station, Ohio	12.87
Total	575,985.93
Grand total	4,980,437.58

The following statement shows the expenditures during the fiscal year ended June 30, 1916, on account of all appropriations under the control of the Department, giving the total amounts disbursed by the various disbursing officers of the Department and miscellaneous receipts for the same period:

By the Disbursing Clerk, Department of Commerce, on account of salaries and expenses of the Office of the Secretary of Commerce, the Bureaus of Foreign and Domestic Commerce, Navigation, Standards, Fisheries, and Lighthouses, the Office of the Supervising Inspector General, Steamboat-Inspection Service, salaries and expenses of Steamboat-Inspection Service at large, and public works of the Lighthouse and Fisheries Services (shown in detail in the foregoing table of disbursements)	$4,980,437.58
By the authorized disbursing officers of the Lighthouse Service	5,051,414.82
By the special disbursing agent, Coast and Geodetic Survey, on account of salaries and expenses of the Coast and Geodetic Survey	1,142,632.96
By the commercial agents of the Department investigating trade conditions abroad, as special disbursing agents	142,053.98
By special disbursing agents, Bureau of Fisheries	34,331.20

By warrants drawn on the Treasurer of the United States to satisfy accounts settled by the Auditor for the State and Other Departments, classified as follows:		
Office of the Secretary	$404. 28	
Bureau of the Census	1, 028. 12	
Bureau of Foreign and Domestic Commerce	686. 76	
Bureau of Lighthouses	75, 104. 58	
Steamboat-Inspection Service	7. 45	
Bureau of Navigation	5, 442. 59	
Bureau of Fisheries	18, 639. 97	
Bureau of Standards	3, 272. 90	
Coast and Geodetic Survey	24, 045. 26	
		$128, 631. 91
Printing and binding		389, 805. 78
Total		11, 869, 308. 23

MISCELLANEOUS RECEIPTS, FISCAL YEAR 1916.

Coast and Geodetic Survey: Sale of charts, publications, old property, etc	$24, 692. 40
Bureau of the Census: Sale of publications, etc	363. 00
Bureau of Fisheries:	
Sale of fox skins	56, 396. 83
Sale of furs	781. 42
Sale of old property, etc	4, 468. 09
Bureau of Foreign and Domestic Commerce: Sale of old property, etc	72. 11
Bureau of Navigation:	
Sale of old property	3. 97
Annual yacht tax	19, 849. 71
Tonnage tax	1, 454, 565. 83
Navigation fees	158, 518. 08
Navigation fines	52, 381. 75
From deceased passengers	220. 00
Bureau of Lighthouses: Sale of public property, rentals, etc	35, 608. 09
Bureau of Standards: Standardizing and testing weights, etc	13, 857. 82
Office of the Secretary: Sale of condemned property, etc	829. 57
Total	1, 822, 608. 67

The following unexpended balances of appropriations were turned into the surplus fund June 30, 1916, in accordance with the act of June 20, 1874 (18 Stat., 110–111):

Office of the Secretary:	
Salaries, Office of the Secretary of Commerce, 1914	$1, 320. 04
Contingent expenses, Department of Commerce, 1914	726. 01
Bureau of the Census:	
Salaries, Bureau of the Census, 1914	18, 197. 04
Collecting statistics, Bureau of the Census, 1914	20, 037. 57
Rent, Bureau of the Census, 1914	1, 080. 00
Tabulating machines, Bureau of the Census, 1914	1, 606. 43
Bureau of Foreign and Domestic Commerce:	
Salaries, Bureau of Foreign and Domestic Commerce, 1914	1, 714. 45
Salaries and expenses, commercial agents, Department of Commerce and Labor, 1911	8. 28

Bureau of Foreign and Domestic Commerce—Continued.	
Salaries and expenses, commercial agents, Department of Commerce and Labor, 1912	$172.76
Collating tariffs of foreign countries, 1914	332.90
Promoting commerce, Department of Commerce, 1914	318.25
Investigating cost of production, Department of Commerce, 1914	1,106.64
Steamboat-Inspection Service:	
Salaries, Office of the Supervising Inspector General, Steamboat-Inspection Service, 1914	144.99
Salaries, Steamboat-Inspection Service, 1914	3,366.41
Clerk hire, Steamboat-Inspection Service, 1914	545.81
Contingent expenses, Steamboat-Inspection Service, 1914	5,447.31
Steamboat-Inspection Service, Los Angeles, Cal., 1914	3,193.67
Bureau of Navigation:	
Salaries, Bureau of Navigation, 1914	277.50
Salaries, Shipping Service, 1914	532.00
Clerk hire, Shipping Service, 1914	492.80
Contingent expenses, Shipping Service, 1914	206.26
Admeasurement of vessels, 1914	471.97
Enforcement of navigation laws, 1914	83.86
Enforcement of wireless-communication laws, 1914	140.30
Bureau of Standards:	
Salaries, Bureau of Standards, 1914	20,816.12
Equipment, Bureau of Standards, 1914	317.86
General expenses, Bureau of Standards, 1914	1,409.29
Improvement and care of grounds, Bureau of Standards, 1914	2.47
Electric laboratory equipment, Bureau of Standards, 1913–14	39.34
Investigation of fire-resisting properties, Bureau of Standards, 1914	1,359.07
High-potential investigation, Bureau of Standards, 1914	36.29
Refrigeration constants, Bureau of Standards, 1914	320.40
Testing machines, Pittsburgh, Pa	25.05
Testing machines, Bureau of Standards	129.77
Testing machines, Bureau of Standards, 1914	83.50
Testing railroad scales, etc., Bureau of Standards, 1914	56.30
Testing structural materials, Bureau of Standards, 1914	379.51
Coast and Geodetic Survey:	
Salaries, Coast and Geodetic Survey, 1914	3,507.03
Party expenses, Coast and Geodetic Survey, 1914	9,687.52
General expenses, Coast and Geodetic Survey, 1914	291.07
Pay, etc., of officers and men, vessels, Coast Survey, 1914	2,118.70
Repairs of vessels, Coast Survey, 1914	5,696.66
Bureau of Lighthouses:	
Salaries, Bureau of Lighthouses, 1914	1,637.51
General expenses, Lighthouse Service, 1913	191.98
General expenses, Lighthouse Service, 1914	21,133.51
Salaries, keepers of lighthouses, 1914	10,424.65
Salaries, lighthouse vessels, 1913	913.40
Salaries, lighthouse vessels, 1914	9,134.12
Salaries, Lighthouse Service, 1914	10,750.03
Light-keepers' dwellings	2.22
Point Judith Breakwater Lights, R. I	71.46
Stonington Light Station, Conn	.63
Buffalo Breakwater North End Light Station, N. Y	26.04
Staten Island Lighthouse Depot, N. Y	454.28

Bureau of Lighthouses—Continued.	
Miah Maul Shoal Light Station, Delaware River	$897.52
Chesapeake Bay lighted buoys	163.73
Point Abino Light Vessel, Lake Erie	1,197.32
Oconto Harbor lights, Wis.	315.65
Kauai Island Light Station, Hawaii	31.18
San Juan Lighthouse Depot, P. R.	.60
Tender for inspector, eighth lighthouse district	3,437.36
Repairs to lighthouse tender *Pansy*	1,131.38
Bureau of Fisheries:	
Salaries, Bureau of Fisheries, 1914	18,408.69
Miscellaneous expenses, Bureau of Fisheries, 1913	18.00
Miscellaneous expenses, Bureau of Fisheries, 1914	8,703.17
Distribution cars, Bureau of Fisheries, 1914	29,936.27
Philippine fisheries report	3.70
Protecting seal and salmon fisheries of Alaska, 1913–14	1,021.36
Protecting seal and salmon fisheries of Alaska, 1914	37.61
Steamer *Albatross*, repairs, 1914	99.35
Total	227,941.92

Estimates for the Fiscal Year Ending June 30, 1918.

The table below gives a comparison between the items of estimates submitted for the fiscal year 1918 and the appropriations actually made by Congress for the fiscal year 1917.

Item.	Estimates, 1918.	Appropriation, 1917.	Increase.
OFFICE OF THE SECRETARY.			
Salaries	$190,470	$179,340	
Contingent expenses	66,100	57,000	
Rent	66,500	66,500	
Rent of storage space	2,000	.....	
Total	325,070	302,840	$22,230
LIGHTHOUSE SERVICE.			
Salaries, Bureau of Lighthouses	64,030	64,030	
General expenses	2,850,000	2,790,000	
Salaries, keepers of lighthouses	950,000	940,000	
Salaries, lighthouse vessels	1,220,000	1,070,000	
Salaries, Lighthouse Service	394,600	375,000	
Public works:			
Tender for third lighthouse district	150,000	.....	
Cape Charles, Va., light vessel	130,000	.....	
Light vessels for general Lake service	150,000	.....	
Guantanamo, Cuba, aids to navigation	14,000	.....	
Pearl Harbor, Hawaii, aids to navigation	80,000	.....	
Sandy Hook, N. J., aids to navigation	20,000	.....	
Depot for second lighthouse district	85,000	.....	
Detroit, Mich., lighthouse depot	53,000	.....	
Staten Island, N. Y., lighthouse depot	21,000	.....	
Huron, Ohio, aids to navigation	4,500	.....	
Hawaiian Islands (Honolulu), lighthouse depot	5,000	.....	
Hawaiian Islands (nineteenth district), lighthouse depot	90,000	.....	

Item.	Estimates, 1918.	Appropriation, 1917.	Increase.
LIGHTHOUSE SERVICE—continued.			
Public works—Continued.			
Point Borinquen, P. R., light station	$85,000	.....	
Light-keepers' dwellings	75,000	.....	
Chicago Harbor, Ill., light station	88,000	.....	
Fairport, Ohio, aids to navigation	42,000	.....	
Sand Hills, Mich., light station	75,000	.....	
Manitowoc Breakwater, Wis., light station	21,000	.....	
East River, N. Y., aids to navigation	16,000	.....	
Keweenaw Waterway, Mich., aids to navigation	110,000	.....	
Cape Charles City, Va., aids to navigation	12,800	.....	
Chesapeake Bay, Md. and Va., aids to navigation	29,000	.....	
Aids to navigation, Alaska	60,000	.....	
Indiana Harbor, Ind., aids to navigation	100,000	.....	
Great Salt Pond, R. I., light station	25,000	.....	
Radio installations on lighthouse tenders	60,000	.....	
Washington and Oregon, aids to navigation	35,000	.....	
Gulf coast, La., light vessel	160,000	.....	
Sand Island, Ala., light station	45,000	.....	
Spectacle Reef, Mich., light station	28,000	.....	
Depot for fifth lighthouse district	275,000	.....	
Tender for third lighthouse district	180,000	.....	
Tender for fifth lighthouse district	180,000	.....	
Intercommunication	100,000	.....	
Point Vincente Light Station, Cal	.....	$80,000	
Aids to navigation, St. Johns River, Fla	.....	66,000	
Woods Hole Lighthouse Depot, Mass	.....	50,000	
Aids to navigation, Fighting Island Channel, Detroit River, Mich	.....	25,000	
Aids to navigation, Florida Reefs, Fla	.....	75,000	
Aids to navigation, Hudson River, N. Y	.....	100,000	
Aids to navigation, Mississippi River, La	.....	50,000	
Aids to navigation, Conneaut Harbor, Ohio	.....	63,500	
Kellett Bluff Light Station, Wash	.....	40,000	
Aids to navigation, Coquille River, Oreg	.....	6,000	
Aids to navigation, Toledo Harbor, Ohio	.....	15,000	
Dog Island Light, Me	.....	3,500	
Aids to navigation, Delaware River, Pa. and Del	.....	80,000	
Tender and barge for eighth lighthouse district	.....	20,000	
Repairing and rebuilding aids to navigation, Gulf of Mexico	.....	125,000	
Total	8,082,930	6,038,030	$2,044,900
BUREAU OF THE CENSUS.			
Salaries	683,060	673,460	
Collecting statistics	647,000	512,000	
Tabulating machines	30,000	25,000	
Development of integrating counter	50,000	.....	
Total	1,410,060	1,210,460	199,600
BUREAU OF FOREIGN AND DOMESTIC COMMERCE.			
Salaries	230,290	130,640	
Promoting commerce	250,000	125,000	
Commercial attachés	225,000	100,000	

Item.	Estimates, 1918.	Appropriation, 1917.	Increase.
BUREAU OF FOREIGN AND DOMESTIC COMMERCE—continued.			
Promoting commerce, North, South, and Central America, including Mexico, Cuba, and West Indies	$150,000	$100,000	
Investigating cost of production		50,000	
Total	855,290	505,640	$349,650
STEAMBOAT-INSPECTION SERVICE.			
Salaries, Office of Supervising Inspector General	21,640	16,440	
Salaries, Steamboat-Inspection Service	445,700	412,100	
Clerk hire	96,800	84,000	
Contingent expenses	130,000	100,000	
Total	694,140	612,540	81,600
BUREAU OF NAVIGATION.			
Salaries	41,180	37,780	
Salaries, Shipping Service	32,200	28,600	
Clerk hire, Shipping Service	48,300	38,400	
Contingent expenses, Shipping Service	10,300	6,300	
Admeasurement of vessels	3,500	3,000	
Instruments for counting passengers	250	250	
Enforcement of navigation laws	42,000	24,000	
Preventing overcrowding of passenger vessels	18,000	18,000	
Enforcement of wireless communication laws	57,000	45,000	
Total	252,730	201,330	51,400
BUREAU OF STANDARDS.			
Salaries	438,400	311,720	
Equipment	60,000	50,000	
Repairs and alterations	5,000	5,000	
General expenses	35,000	28,500	
Improvement and care of grounds	6,000	6,000	
High potential investigations	15,000	15,000	
Testing structural materials	150,000	100,000	
Testing machines	30,000	30,000	
Investigation of fire-resisting properties	60,000	25,000	
Investigation of public-utility standards	100,000	40,000	
Investigation of railway materials	15,000	15,000	
Testing miscellaneous materials	25,000	20,000	
Radio communication	10,000	10,000	
Color standards	10,000	10,000	
Investigation of clay products	10,000	10,000	
Determining physical constants	25,000	5,000	
Standardization and testing of mechanical appliances	25,000	10,000	
Testing railroad scales	40,000	40,000	
Radio laboratory		50,000	
Investigation of textiles, paper, leather, and rubber	15,000		
Standard materials	4,000		
Radium standardization	20,000		
Testing machine	25,000		
Site for testing laboratory	50,000		
Fireproof building for testing laboratory	25,000		
Investigation of optical glass	10,000		
Investigation of the electrodeposition of metals	10,000		

Item.	Estimates, 1918.	Appropriation, 1917.	Increase.
BUREAU OF STANDARDS—continued.			
Research fellowships	$15,000	.....	
Additional land	25,000	.....	
Refrigeration constants	.....	$15,000	
Total	1,258,400	796,220	$462,180
BUREAU OF FISHERIES.			
Salaries	489,560	427,350	
Fish hatcheries:			
Bozeman, Mont	15,000	.....	
Cape Vincent, N. Y	15,000	.....	
Duluth, Minn	3,000	2,000	
Edenton, N. C	3,500	.....	
Northville, Mich	3,000	.....	
Orangeburg, S. C	6,000	.....	
San Marcos, Tex	15,000	.....	
Saratoga, Wyo	7,000	.....	
Woods Hole, Mass	5,000	.....	
Motor vessel to replace launch Blue Wing	6,000	.....	
Yes Bay, Alaska	25,000	.....	
Motor launches at Yes Bay and Afognak	10,000	.....	
Vessel for use in waters of southeastern Alaska	50,000	.....	
Diffusion of fishery information	10,000	.....	
Gloucester, Mass	.....	3,000	
Miscellaneous expenses	572,000	502,500	
Protecting seal and salmon fisheries of Alaska	100,000	75,000	
Payments to Great Britain and Japan	20,000	20,000	
Distribution cars	15,000	40,000	
Lobster-rearing plant	.....	5,000	
Marine Biological Station, Fla	.....	25,000	
Motor launches, Alaska fisheries service	.....	10,000	
Buildings and improvements, fur-seal islands, Alaska	.....	20,000	
Investigating damages to fisheries	.....	25,000	
Total	1,370,060	1,154,850	215,210
COAST AND GEODETIC SURVEY.			
Party expenses	594,338	425,320	
Repairs of vessels	56,000	56,000	
Pay, etc., officers and men, vessels	337,500	285,000	
Salaries	571,540	398,320	
General expenses	72,500	62,500	
Lithographic presses	15,500	.....	
Paper-cutting machine	1,600	.....	
Fire protection	1,000	.....	
Waterproofing vaults	2,500	.....	
New vessels	833,000	.....	
Total	2,485,478	1,227,140	1,258,338
PRINTING AND BINDING.			
Printing and binding	450,000	400,000	50,000
Grand total	17,184,158	12,449,050	4,735,108

Personnel.

The number of the personnel of the Department has been changed but little during the past fiscal year. There has been a slight accretion, amounting to less than three-tenths of 1 per cent, though the work and activities of the Department have been considerably augmented.

The accompanying table shows, by bureaus, the number of permanent positions in the Department on July 1, 1916, and the increase or decrease in each bureau as compared with July 1, 1915. The figures do not include temporary appointments, nor do they include the following appointments or employments not made by the head of the Department: Persons engaged in rodding, chaining, recording, heliotroping, etc., in field parties of the Coast and Geodetic Survey; temporary employments in field operations of the Bureau of Fisheries; mechanics, skilled tradesmen, and laborers employed under authority of Schedule A, Subdivision I, section 12, of the civil-service rules in the Lighthouse Service. Enlisted men on vessels of the Coast Survey in the Philippine Islands and officers and men of the Navy Department employed on vessels of the Bureau of Fisheries are also excluded. The total of these excluded miscellaneous employments and enlistments is approximately 5,886. At the close of the fiscal year there were 486 employees in the service of the Department serving under temporary appointment or employment.

Bureau.	Statutory.	Non-statutory.	Total.	In District of Columbia.	Outside District of Columbia.	Increase (+) or decrease (−)
Office of the Secretary	171	.....	171	171	.....	+ 9
Bureau of the Census	562	698	1,260	[a] 592	[b] 668	−19
Bureau of Foreign and Domestic Commerce	97	101	198	120	78	+27
Bureau of Standards	252	171	423	369	54	+39
Bureau of Fisheries	413	21	434	80	354	+15
Bureau of Lighthouses	56	5,642	[c] 5,698	40	5,658	−94
Coast and Geodetic Survey	265	505	770	[a] 280	490	+27
Bureau of Navigation	[d] 43	118	161	34	127	− 8
Steamboat-Inspection Service	233	69	302	11	291	+32
Total	2,092	7,325	9,417	1,697	7,720	+28

[a] Employees engaged in work in the field for a part of each year, with headquarters in Washington, are treated as within the District of Columbia.

[b] Does not include 36 temporary special agents employed in connection with the census of vital statistics, statistics of cities, etc.

[c] Includes the following positions, appointment to which is not made by the head of the Department: 533 (254 classified competitive and 279 classified excepted) mechanics, skilled tradesmen, and laborers employed in field construction work in the Lighthouse Service and work of a similar character at the general lighthouse depot at Tompkinsville, N. Y., 1,522 (unclassified) laborers in charge of post lights, and 1,179 (unclassified) members of crews of vessels.

[d] Includes 2 stenographers and typewriters authorized by law not exceeding six months.

The following tables give a summary of changes in the personnel of the Department for the fiscal year ended June 30, 1916:

APPOINTMENTS, PROMOTIONS, AND REDUCTIONS.

Bureau.	Appointments.[a]						Promotions.	Reductions.
	Permanent.				Temporary.	Grand total.		
	Competitive.	Excepted.	Unclassified.	Total.				
Office of the Secretary	40	.....	8	48	5	53	20	2
Bureau of the Census	45	.....	142	187	176	363	76	6
Bureau of Foreign and Domestic Commerce	28	24	.....	52	102	154	43	9
Bureau of Standards	81	.....	5	86	53	139	138	.....
Bureau of Fisheries	52	11	14	77	18	95	36	6
Bureau of Lighthouses	225	49	.....	274	95	369	852	91
Coast and Geodetic Survey	38	2	2	42	12	54	144	5
Bureau of Navigation	17	7	2	26	30	56	40	.....
Steamboat-Inspection Service	32	.....	.....	32	11	43	27	2
Total	558	93	173	824	502	1,326	1,376	121

SEPARATIONS AND MISCELLANEOUS CHANGES.

Bureau.	Separations.[b]						Miscellaneous changes.[c]
	From permanent positions.				From temporary positions.	Grand total.	
	Competitive.	Excepted.	Unclassified.	Total.			
Office of the Secretary	19	.....	3	22	5	27	10
Bureau of the Census	50	.....	145	195	768	963	50
Bureau of Foreign and Domestic Commerce	11	17	.....	28	85	113	65
Bureau of Standards	75	.....	2	77	43	120	41
Bureau of Fisheries	37	8	15	60	11	71	25
Bureau of Lighthouses	246	51	.....	297	79	376	78
Coast and Geodetic Survey	29	4	.....	33	20	53	7
Bureau of Navigation	15	2	1	18	35	53	23
Steamboat-Inspection Service	24	.....	1	25	8	33	4
Total	506	82	167	755	1,054	1,809	303

[a] Includes appointments of the following character: Presidential, by selection from civil-service certificates, under Executive order, to excepted positions, by reinstatement, and by reason of transfer within the Department or from other departments or independent establishments.

[b] Includes separations by reason of resignations, discontinuances, removals, deaths, transfers within the Department, and transfers from the Department to other departments or independent establishments.

[c] Includes reappointments by reason of change of station, name, designation, or appropriation, extensions of temporary appointments, changes from temporary to permanent status, etc.

Among the 26 presidential positions in the Department there have been three changes, the vacancy in each case having been caused by resignation and filled by recess appointment, which

the President issued upon recommendation of the Department, and the appointees having been later nominated to and confirmed by the Senate. The Superintendent of the Coast and Geodetic Survey was commissioned under recess appointment March 11, 1915, confirmed by the Senate on December 16, 1915, and permanently commissioned December 18, 1915. The Deputy Commissioner of Fisheries was commissioned under recess appointment March 11, 1915, confirmed by the Senate February 7, 1916, and permanently commissioned February 10, 1916. The supervising inspector, third district, Steamboat-Inspection Service, was commissioned under recess appointment September 17, 1915, confirmed by the Senate on December 16, 1915, and permanently commissioned December 18, 1915.

It is the Department's definite policy, which in the final analysis acts favorably upon its work as a whole, to afford its employees every possible means of advancement within its own limits, and it is the general practice, publicly announced and well understood, not to fill vacancies in the higher grades by transfer from other branches of the service so long as there are any employees of its own who are eligible and capable of performing well the duties of the higher positions. In carrying out this policy the Department has expressed the desire that a knowledge of the operations of the various bureaus and offices be extended as broadly as possible among the entire staff of employees so as to encourage the junior members of the force to learn the work in all its forms and to endeavor to develop their natural abilities so as to become adequately equipped for the proper performance of the duties of the higher grade positions which may become vacant.

A study of the leave records of the employees of the Department for the calendar year 1915 indicates that the leave privilege is being exercised generally in a considerate manner. There is evidence of a desire to subserve personal convenience to the demands of the service, and of a spirit of self-sacrifice both as to leave and necessary overtime work that is most praiseworthy.

The following statement shows the extent to which leave was utilized during the calendar year 1915:

	Male.	Female.	All employees.
	Days.	*Days.*	*Days.*
Average annual leave taken	27.64	29.47	28.09
Average sick leave taken	5.87	10.16	6.91
Average total leave taken	33.51	39.63	35.00

One of the bureaus of the Department shows the remarkable record of having used during the year an average of less than one day of sick leave per employee.

In June, 1916, the National Guard of the District of Columbia and the Organized Militia of the several States were called out for duty in connection with the unsettled conditions in Mexico. Those employees of the Department who were members of such organizations and had not been discharged therefrom were granted 30 days of annual leave, and at the expiration of such leave their services were discontinued without prejudice, with the understanding that applications for reinstatement at the expiration of their military service will be given favorable consideration. Up to the close of July 31, 1916, the Department had discontinued the services of 18 such employees. It is the declared policy of the Department to give every proper privilege to those of its employees who have so readily responded to the call of the Government.

That the efficiency of the executive civil service is seriously impaired by reason of its superannuated employees, and that the prompt enactment of some equitable form of retirement law is one of its greatest needs, are facts conceded by practically all persons who are at all familiar with the problems of the service. Efficient service and justice to employees demand a comprehensive, wide-reaching, and effective scheme of retirement pensions, the advantage of which is being more and more widely recognized by progressive commercial establishments and by foreign governments. While doubtless the cost of a civil-service retirement scheme would for a few years add to the expense of administration, it would be a good investment, and in a short time the service would be recouped the additional outlay many times over by the saving it would render possible. The standard of efficiency would be raised, the work could be done with less force, and this would be accomplished without heartlessly throwing out of employment men and women who for decades have given their best service to the Government and who have no means of subsistence other than their decreasing salaries.

The efficiency of the service could be materially increased by a general reclassification of positions and readjustment of salaries. The duties required in a given position should be the measure of compensation attached to it, but such is not always the case under the present classification. The lack of uniformity in salaries of positions requiring practically the same qualifications

does not work to the benefit of the service. The service is embarrassed at times by the number of declinations of appointment received and resignations in the lower grade positions. It is believed that among other things the establishment of a standard minimum rate of compensation for all clerical positions would have a beneficial effect upon the service. A better qualified class of persons would be attracted to these positions and the resignations would be less numerous. Material increases in the wage scale have been made in recent years in practically all lines of work in the commercial world. This renders it more difficult for the Government to obtain persons of the type and qualifications desired for certain classes of positions. While increases in many cases are desirable, it is not believed that a horizontal increase all along the line would solve the problem. It certainly would not be equitable, for the salaries of some positions are relatively much less than in others. Before there is any general increase in salaries there should be a thorough reclassification of positions and readjustment of salaries so that existing inequalities would be eliminated.

I have already conveyed to you my approval of the suggestion that the Saturday half holiday be continued throughout the year. I urge that this be done. The best industrial opinion has ceased to estimate the productive value of employees by a mathematical statement of the total number of hours worked. The productiveness of human beings can not be confined within mathematical limits. The forces which control the productivity of men and women are not such as can be stated in figures. The responsiveness to leadership, the appreciation of just and considerate treatment, the energy which comes with freedom from fatigue—these are greater forces than the arbitrary number of hours of labor.

In a working force which has such a record as regards the taking of leave and overtime as that of this Department I believe it is beyond all question true that the granting of the Saturday half holiday would result in greater and not less production and in better rather than worse work.

The following compilation has interest in connection with the facts relating to the cost of living of Government employees in Washington. The present scale of wages for clerks in the Government service, grouping them into four classes and fixing a salary of $1,800, $1,600, $1,400, and $1,200, respectively, per annum, for each of these classes, was fixed by the act of Congress approved April 22, 1854 (10 Stat., 276; sec. 167, Rev. Stat.), and has not been changed since that time. For the subclerical grades

the rates of compensation were fixed by the acts of Congress approved July 23, 1866 (14 Stat., 207; sec. 167, Rev. Stat.), and July 12, 1870 (16 Stat., 250; sec. 167, Rev. Stat.).

For 60 years the rates of compensation to clerks have remained stationary, and for about 46 years to the subclerical grades. The available figures on file in the Bureau of Labor Statistics, based upon wages in selected industries, all of which, however, were not uniform for the entire period covered, but which can be accepted as typical, show an increase in daily average wage of 137.4 per cent from 1854 to 1915. In other words, daily wages in 1915 were 2⅓ times as much as in 1854. These figures were taken from Senate Report No. 1394, Fifty-second Congress, second session, Report of Senate Finance Committee on Wholesale Prices, Wages, and Transportation, which, on page 176, gives the average wage increase to 1891; Bulletin No. 77 of the Bureau of Labor Statistics, which, on page 7, gives the average wage scale from 1891 to 1907; and Bulletin No. 194 of the Bureau of Labor Statistics, which, on page 20, gives the average wage scale from 1907 to 1915. The reports on cost of living show that for the same period, 1854 to 1915, the increase has been 14.1 per cent. These figures are based on wholesale prices, and it is a fair assumption that the retail-price increases will very closely approximate those of the wholesale-price increases. Bringing the price figures up to the latest date for which they are available, the month of September, 1916, by using figures relating to retail prices of food, the increase over 1854 is 32.4 per cent. In other words, the increase from the average for 1915, to September 15, 1916, in price of food commodities as a group is greater than the increase of the average price for the whole period from 1854 to 1915. The increase during the nine months ended September 15, 1916, over the average price for the year 1915 is approximately 16 per cent.

For the last few years the figures showing wage increases are based on the union wage scale. It is a well-known fact that in many industries to-day wages in excess of the union scale are being paid.

Interesting in connection with this study are some pertinent figures shown by the General Review of Crop Conditions on October 1, 1916, issued by the Bureau of Crop Estimates of the Department of Agriculture. From this report it appears that the index figure of prices paid to the producers of the United States for principal crops on October 1, 1916, is about 27.6 per cent higher than a year ago, 19.9 per cent higher than two years ago, and 23.8 per cent higher than the average of the last eight years on

the same date. This report also shows that the corn crop is estimated to be 11 per cent below the yield of last year; wheat, 40 per cent; oats, 20 per cent; barley, 22 per cent; rye, 15 per cent; white potatoes, 16 per cent; and apples, 14 per cent. The index figures of meat animals on September 15, 1916, show prices paid to producers of about 23.7 per cent higher than the figures of a year ago; 10.5 per cent higher than two years ago; and 22.5 per cent higher than the average of the last six years on the same date. All these facts point to a still higher charge for food supplies.

Rather startling are the figures compiled by the Bureau of Labor Statistics relative to wheat and flour for the period from May to September, 1916. The report on this subject shows that the average retail price of flour increased from $7.62 per barrel in May, 1916, to $9.39 per barrel in September, 1916, and press reports since that time indicate that the retail price of flour has gone to $12 per barrel.

From the above statements it clearly appears that wages in all branches of industries have more than kept pace with the increased cost of living, but that no increase has been made in the wage scale of Government employees, notwithstanding the fact that since 1854 the daily task of all wage earners has been steadily decreasing, while the Government employee has received increased hours, with no consequent increase in compensation to offset, in a measure, the increased living cost.

That living costs in the last few years have gone up to an unprecedented extent is not shown by governmental reports alone. The Annalist states that in the year ended September 30, 1916, the increase in a selected group of commodities, arranged to represent a theoretical family's food budget, has gone from 135 to 185, or an increase of about 37 per cent. The percentage of increase in food commodities shown by the Annalist compares with the official figures of the Bureau of Labor Statistics compiled to June 30, 1916.

Printing and Binding.

The sundry civil act approved March 3, 1915, allotted to the Department $390,000 for printing and binding during the fiscal year 1916. Of this allotment $389,805.78 was expended, leaving an unused balance on June 30 of $194.22. The decrease in expenditures for printing and binding in 1916 compared with 1915 was $10,193.69 (or 2.55 per cent), the allotment in 1915 being $400,000 and the expenditures $399,999.47. In 1915, however, $17,000 was expended for the Bureau of Corporations, which has since been merged into the Federal Trade Commission. Deducting this

amount from the expenditures for that year, and comparing the remainder ($382,999.47) with expenditures for 1916, it will be seen that there was an increase for the Department, as at present constituted, of $6,806.31 (or 1.78 per cent).

The estimated cost of unbilled and uncompleted work of the Department at the Government Printing Office on July 1, 1916, was $65,718.12, while the actual cost of such work at the Printing Office on July 1, 1915, was $55,993.72.

During the fiscal year 1916 the Department issued on the Public Printer 3,709 requisitions for printing and binding, which was an increase of 618 over 1915. At the close of business June 30, 1916, there were at the Government Printing Office 379 requisitions on which deliveries of completed work had not been made, compared with 436 on the same date in 1915.

The following table gives the cost of printing and binding for each of the bureaus, offices, and services of the Department during the fiscal years 1915 and 1916, as well as the increase or decrease in 1916 for each bureau, office, and service and the estimated cost of the work on hand but not completed June 30, 1916:

Bureau, office, or service.	Cost of work delivered.		Increase (+) or decrease (—).		Estimated cost of work not completed June 30, 1916.
	1915	1916	Cost.	Per cent.	
Office of the Secretary (Secretary, Assistant Secretary, Solicitor, Chief Clerk, and Division of Publications)	$19,537.58	$16,581.71	—$2,955.87	—15.13	$1,411.39
Appointment Division	379.22	236.86	— 142.36	—37.54	.....
Disbursing Office	412.18	747.23	+ 335.05	+81.29	14.92
Division of Supplies	686.04	601.39	— 84.65	—12.34	.....
Bureau of the Census	122,302.82	84,766.94	—37,535.88	—30.69	35,496.35
Coast and Geodetic Survey	26,345.70	28,795.27	+ 2,449.57	+ 9.30	9,957.13
Bureau of Corporations	[a]17,000.00	.....	.....	.....	.....
Bureau of Fisheries	15,916.27	12,460.20	— 3,456.07	—21.71	903.35
Bureau of Foreign and Domestic Commerce	103,229.74	131,262.35	+28,032.61	+27.16	8,329.61
Bureau of Lighthouses	24,428.15	21,080.27	— 3,347.88	—13.71	637.00
Lighthouse Service	5,853.89	7,208.17	+ 1,354.28	+23.13	274.12
Bureau of Navigation	14,183.91	16,928.50	+ 2,744.59	+19.35	507.70
Shipping Service	2,272.30	4,478.48	+ 2,206.18	+97.09	138.84
Radio Service	705.67	894.76	+ 189.09	+26.80	71.34
Bureau of Standards	24,876.38	35,792.18	+10,915.80	+43.88	4,134.66
Office of the Supervising Inspector General, Steamboat-Inspection Service	2,801.64	2,335.03	— 466.61	—16.65	33.09
Steamboat-Inspection Service	9,780.49	14,466.86	+ 4,686.37	+47.92	1,839.73
Customs Service	9,287.49	11,169.58	+ 1,882.09	+20.26	1,968.89
Total	399,999.47	389,805.78	—10,193.69	— 2.55	65,718.12

[a] Includes $4,613.24 expended by the Department and $12,386.76 transferred to the Federal Trade Commission on Mar. 15, 1915, in accordance with the requirement of the act creating the Commission, approved Sept. 26, 1914.

The amount and cost of each class of work called for by requisitions on the Public Printer during the fiscal years 1915 and 1916 are comparable in the following statement:

Class.	1915	1916	Increase (+) or decrease (—).	
	Number.	*Number.*	*Number.*	*Per cent.*
Blank forms	15,559,663	15,859,014	+ 299,351	+ 1.92
Reports, pamphlets, etc	3,370,410	4,447,984	+ 1,077,574	+ 31.97
Letterheads	3,427,500	3,192,000	— 235,500	— 6.87
Envelopes	153,500	136,675	— 16,825	— 10.96
Circulars, summaries, and notices	541,200	2,900,900	+ 2,359,700	+436.01
Index cards	1,220,700	1,133,500	— 87,200	— 7.14
Guide cards and folders	411,650	305,000	— 106,650	— 25.91
Memorandum sheets	5,678,000	3,355,500	— 2,322,500	— 40.90
Blank books	28,597	19,955	— 8,642	— 30.22
Miscellaneous books (binding)	3,945	5,898	+ 1,953	+ 49.51
	Cost.	*Cost.*	*Cost.*	*Per cent.*
Blank forms	$51,225.93	$38,128.35	—$13,097.58	— 25.57
Reports, pamphlets, etc	301,666.94	309,652.01	+ 7,985.07	+ 2.65
Letterheads	5,208.85	4,441.32	— 767.53	— 14.74
Envelopes	265.96	404.38	+ 138.42	+ 52.05
Circulars, summaries, and notices	2,455.25	8,194.77	+ 5,739.52	+233.77
Index cards	1,104.74	917.97	— 186.77	— 16.90
Guide cards and folders	1,910.98	1,264.69	— 646.29	— 33.82
Memorandum sheets	3,275.18	2,454.04	— 821.14	— 25.07
Blank books	11,296.06	14,686.95	+ 3,390.89	+ 30.02
Miscellaneous books (binding)	8,481.08	9,179.56	+ 698.48	+ 8.24
Miscellaneous	721.74	481.74	— 240.00	— 33.25
Transferred to Federal Trade Commission (Bureau of Corporations) on Mar. 15, 1915	12,386.76	.....	.....	.....
Total	399,999.47	389,805.78	— 10,193.69	— 2.55

During the fiscal year 1916 the Department issued 1,945 publications, compared with 1,038 during the fiscal year 1915. Those issued in 1916 contained a total of 61,702 printed pages, compared with 61,301 in 1915, and there were printed of them for the Department a grand total of 7,124,035 copies, against 3,753,795 in the preceding year, an increase of 3,370,240 copies. While nearly all bureaus show increases, the Bureau of the Census and the Bureau of Foreign and Domestic Commerce contributed the larger ones, due in the case of the former to the printing of several hundred summaries of the results of the census of manufactures in 1914 and in the case of the latter mainly to a large edition of a circular advising the public to save their rags and other paper-making materials.

The publication work of each bureau of the Department for the fiscal years 1915 and 1916 is summarized in the following table:

Bureau or office.[a]	Publications.		Pages.		Copies printed for Department.		Cost.[b]	
	1915	1916	1915	1916	1915	1916	1915	1916
Office of the Secretary....	64	77	2,237	2,428	157,250	261,850	$6,055.39	$6,331.07
Bureau of the Census.....	138	836	19,937	14,165	524,625	1,432,910	97,830.49	54,283.37
Coast and Geodetic Survey.....	29	56	3,197	3,960	55,060	79,750	21,630.72	22,218.71
Bureau of Fisheries.....	57	81	3,159	2,620	68,200	171,350	11,902.88	10,339.36
Bureau of Foreign and Domestic Commerce...	494	575	18,708	21,645	2,108,460	4,359,200	98,937 71	120,459.01
Bureau of Lighthouses...	87	129	3,548	4,361	258,300	351,175	25,188.70	21,646.99
Bureau of Navigation....	17	23	2,523	3,207	55,900	59,950	12,154.79	17,483.47
Bureau of Standards.....	137	150	6,662	8,328	153,400	203,050	19,408.79	28,209.20
Steamboat-Inspection Service.....	15	18	1,330	988	372,600	204,800	8,511.22	8,062.35
Total.....	1,038	1,945	61,301	61,702	3,753,795	7,124,035	301,620.69	289,033.53

[a] In 1915 the Bureau of Corporations (which has since been merged in the Federal Trade Commission) issued 10 publications, containing 2,550 pages, of which 24,100 copies, costing $14,319.65, were printed. These figures, however, are excluded from this table and from computations based on figures therein in order to reach more accurate comparisons in the work of the other bureaus and the Department as a whole.

[b] Figures relate to publications actually delivered to the Department during the year; consequently they do not agree with similar figures in a preceding table giving the cost of work done by the Government Printing Office during the fiscal year. Frequently the cost of a publication is charged against allotments for two or more fiscal years.

During the year 3,648,311 publications and printed circulars of the Department were distributed to the public through the Division of Publications, compared with a total of 2,523,994 during the fiscal year 1915, an increase of 1,124,317, or over 44 per cent. Of the total number distributed in 1916, 3,239,685 were wrapped and mailed by the Superintendent of Documents and 408,626 by the Division of Publications. Those wrapped and mailed by the Superintendent of Documents comprised a mailing list distribution of 2,834,575 and a distribution in response to individual requests of 405,110.

The Department during the year received and acted on 104,833 miscellaneous requests, calling for 605,110 copies of publications, compared with 79,738 requests, calling for 385,208 copies in 1915. This was an average of 348 requests and 2,010 publications for each working day, against an average of 265 requests and 1,280 publications during the preceding year.

Roundly, about four-fifths of the Department's publications are sent to firms and individuals on regular mailing lists. In addition, many other classified mailing lists have been made up for use in

sending typewritten or multigraphed information to persons interested in the various activities of the Department. These lists are maintained in the Division of Publications.

On July 1, 1916, there were in the Division 348 mailing lists, containing 267,939 names, compared with 314 lists, with 169,595 names, a year ago. During the year 108,435 names were added to the lists and 10,091 were dropped from them, making a net increase for the year of 34 lists and 98,344 names. More than 18,000 changes of address of persons on existing mailing lists were also made.

Stencils or plates are in use for 335 lists, with 254,317 names, of which the stencils or plates for 209 lists, with 176,419 names, are preserved in the Division and those for 126 lists, with 77,898 names, are kept in the Office of the Superintendent of Documents. For 13 lists, comprising 13,622 names, stencils have not been embossed, the lists being preserved in card form only.

During the past year there was installed in the Division machinery for an entirely new addressing system. This required the cutting or embossing of new address plates for 209 mailing lists, containing 176,419 names. This work was accomplished under difficulties, but without any delay or confusion; and the Department has now in operation one of the most modern, complete, and efficient addressing and mailing equipments in the country.

This Department has for several years cooperated with the Superintendent of Documents in testing public sentiment as regards the selling of Government publications. That the public is willing to pay a nominal price for them has been evidenced—if indeed it has not been fully demonstrated—by the large increase in sales of publications of the Department of Commerce during the past fiscal year. Figures furnished by the Superintendent of Documents show that during the year ended June 30, 1916, 89,747 copies of the Department's publications were distributed by the Superintendent of Documents through the medium of miscellaneous sales, compared with 43,370 in 1915. For the same period 3,280,888 copies were distributed by annual subscriptions, against 1,348,741 copies in 1915, making a total sales distribution for the year of 3,370,635 copies, compared with only 1,392,111 copies in 1915—an increase of 1,978,524 copies, or more than 142 per cent. Receipts from these sales and subscriptions increased from $22,278.05 in 1915 to $44,227.93 in 1916, a gain of $21,949.88, or nearly 100 per cent.

The most significant feature of these figures has to do with the amount saved to the Department in expenditures for printing. It is safe to say that were the Department's publications distributed on a strictly free basis four publications would be given away where now only one is sold. One seldom buys what he does not want, while, on the other hand, modesty is rarely displayed in asking for something which may be had for nothing, even though the free article has no value and is utterly lacking in interest to the recipient. And as a result, instead of more than $44,000 coming back into the Treasury, probably $175,000 more printing money would have been required in 1916 for the Department to meet the free demand, and there would still be the costs of wrapping, mailing, transportation, and delivery for additional millions of pamphlets, a large proportion for possible immediate consignment to waste baskets.

The following summary of sales by the Superintendent of Documents during each of the past six years of publications issued by the Department is gratifying evidence of the estimate which the general public places on these publications:

Year.	Miscellaneous sales.		Subscriptions.		Total receipts.[a]
	Copies.	Receipts.[a]	Number.	Receipts.	
1911	9,233	$14,893.00	.....	$27.10	$14,920.10
1912	30,071	5,708.44	539	2,749.75	8,458.19
1913	10,423	4,004.90	572	1,958.55	5,963.45
1914	40,648	7,804.85	2,329	5,789.80	13,594.65
1915	43,370	9,603.50	5,705	12,674.55	22,278.05
1916	[b] 89,747	[b] 17,719.84	[c] 11,326	26,508.09	[b] 44,227.93

[a] Includes in 1911, $13,255; in 1912, $2,450; and in 1913, $1,090, received from sales of the 1911 World Trade Directory, which, by direction of Congress, was sold at $5 per copy.

[b] Preliminary figures.

[c] Total number of copies of publications distributed, 3,280,888, each subscription being for one copy of each issue of a publication for a definite period.

One of several very sure indexes to the increasing activities of the Department is afforded by the product of a duplicating plant installed in the Division of Publications about four years ago. This equipment was designed to aid the bureaus in making duplicate copies of typewritten letters and documents quickly, accurately, and in larger numbers than in ordinary manifold operations. The following statement showing the amount of work turned out by the plant for each of the last four years indicates the extent to which it has been utilized by the bureaus and offices of the Department.

Year.	Requisitions filled.	Pages duplicated.	Copies printed.
1913	600	882	677,746
1914	1,591	3,150	1,176,366
1915	3,169	7,142	3,816,937
1916	3,260	8,424	5,813,890

The figures in the table show increases for 1916 over 1915 as follows: Requisitions filled, 91, or nearly 3 per cent; pages duplicated, 1,282, or 18 per cent; copies printed, 1,996,953, or 52 per cent.

Three years ago the Department adopted the practice of giving wide publicity, through newspaper advertisements, to proposed contracts for materials and supplies. Large sums are expended each year for such materials and supplies and the publicity given has resulted in greater competition and more satisfactory contracts than formerly. The following statement shows the cost of this advertising for several years:

Year.	Advertisements inserted.	Authorities to publish issued.	Insertions authorized.	Total cost.
1910	49	238	715	$1,721.36
1911	26	86	260	439.40
1912	27	112	295	531.38
1913	33	153	434	660.46
1914	159	526	1,408	1,968.41
1915	226	797	2,143	3,058.14
1916	223	732	2,037	[a] 2,619.71

[a] Figures subject to slight revision, owing to a few estimates of cost having been made in cases where newspapers have delayed rendering bills.

Work of the Solicitor's Office.

During the fiscal year ended June 30, 1916, 245 contracts, totaling $1,316,163, together with 11 contracts of indeterminate amounts; 45 leases, amounting to $29,452; 33 revocable licenses, amounting to $1,600; 14 insurance policies in the sum of $826,400; and 299 bonds, amounting to $616,050, were examined (approved, disapproved, drafted, redrafted, or modified).

The number of legal opinions rendered, formal and informal (memorandum), numbered 341. In addition to the above, 1,278 miscellaneous matters, embracing everything submitted for the advice or suggestion of the Solicitor, or for the formulation of departmental action, not included in the foregoing items, were handled by this Office.

Motor Vehicles.

The two gasoline trucks, one 1,500-pound capacity and one 2,000-pound capacity, have been operated by the Department for carrying mail and supplies between the Commerce Building, the city post office, and the various bureaus of the Department and making miscellaneous trips to the several executive departments, etc.

The 1,500-pound capacity truck ran 11,076 miles during the year, averaging 39.2 miles each day and making 11.6 miles on each gallon of gasoline used. The total cost of maintaining the truck amounted to $440.66, or less than 4 cents a mile.

The 2,000-pound capacity truck ran 8,444 miles during the year, averaging 28.3 miles each day and making 11.1 miles on each gallon of gasoline used. The total cost of maintaining the truck amounted to $348.72, or slightly in excess of 4 cents a mile.

The Department purchased during the year a 1,000-pound capacity gasoline truck for hauling mail, the collection of test samples from various departments, and making miscellaneous trips between the Commerce Building, the Bureau of Standards, etc. Early in January a schedule was established providing for three round trips daily. The truck was put into operation on January 8, 1916. It covered 6,230 miles up to and including June 30, averaging 41 miles each day and making approximately 14.7 miles on each gallon of gasoline used. The total cost of maintaining the truck from January 8, 1916, to June 30, 1916, amounted to $81.01, or an average of 1⅓ cents a mile. The low cost per mile of this truck is due to the fact that as it is new little extra equipment was required for it.

The Department also added a package-carrying motorcycle to its equipment during the year. This is used to deliver special packages and letters to the outlying bureaus of the Department, to the several executive departments, and to the Capitol. It has proved invaluable for use between the Commerce Building and the Bureau of Standards, which is far away. The motorcycle was put into operation May 11, 1916, and up to the close of the fiscal year ran 830 miles, averaging 20.2 miles a day and making 34.5 miles on each gallon of gasoline used.

First-Aid Outfits Needed for Department's Buildings.

The necessity of having the Department's buildings equipped with first-aid outfits was brought to my attention during the year

by an employee. Upon investigating the matter I found the Comptroller of the Treasury had decided that in the absence of an express provision of law such outfits could not be purchased for the use of employees whose compensation is fixed by law. As first-aid outfits are furnished by private concerns, there seems no reason why the Government should be less solicitous about the welfare of its employees. I am therefore including an item in the estimates of appropriations for the next fiscal year requesting Congress to authorize the purchase of such outfits.

Stock and Shipping Section.

There were received and filled by the stock and shipping section during the year 8,852 requisitions for supplies of all kinds, of which 3,392 were for the offices and bureaus of the Department located in Washington and 5,460 were for the outside services. Of the total number of requisitions received, 4,199 were for blank forms, 599 were for printed stationery, and 4,054 were for miscellaneous stationery supplies.

To fill the 5,460 requisitions for the outside services required the packing and shipping of 7,772 pieces, weighing 204,886 pounds, or over 102 tons, of which 6,751 pieces, weighing 146,220 pounds, were sent by ordinary mail, 374 pieces, weighing 4,478 pounds, were sent by registered mail, and 647 pieces, weighing 54,188 pounds, were sent by freight or express.

The following table shows the number of books and blanks sent to each of the outside services during the year:

Service.	Blank books.	Blank forms.	Service.	Blank books.	Blank forms.
Customs Service:			Steamboat-Inspection Service	250,525	1,090,118
General	5,876	774,148	Lighthouse Service	7,015	1,084,078
New York	321	94,500	Miscellaneous	534	157,474
Shipping Service	5,556	188,520			
Radio Service	725	248,724	Total	270,552	3,637,562

The following table gives the quantity of each class of printed stationery supplied during the year:

Envelopes	4,335,350	Blank books	4,859
Letterheads	574,000	Blank forms	243,942
Memorandum sheets	4,073,600	Index cards	800,100
Embossed letterheads	24,500	Guide cards	104,610
Embossed envelopes	12,100	Vertical folders	87,650
Stenographers' notebooks	3,882		

In addition to the foregoing there were placed with the contractors 523 orders for 4,347,450 envelopes, costing $6,093.73, of which 3,286,950 were used by the offices and bureaus of the Department located in Washington and 1,060,500 were used by the outside services.

Exhibits.

The bureaus of this Department engaged in work along safety-first lines, namely, the Bureaus of Standards, Lighthouses, Coast and Geodetic Survey, Navigation, and the Steamboat-Inspection Service, participated in the Safety-First Exposition held at the New National Museum from February 21 to 26, 1916. The following exhibits in particular attracted a great deal of attention: A direction indicator for wireless messages, invented by an employee of the Bureau of Standards; a revolving lens of the Lighthouse Service; a series of sketches illustrating the development of a mariner's chart, shown by the Coast and Geodetic Survey; a complete radio set of the type now in general use on passenger vessels and also a set used in the early days of wireless, exhibited by the Bureau of Navigation; and models of various types of life-saving equipment, exhibited by the Steamboat-Inspection Service.

The Department refunded $2,500 of the $55,625 allotted to it by the Government Exhibit Board to make exhibits at the Panama-Pacific International Exposition at San Francisco, Cal. The exposition closed on December 4, 1915, and a portion of the exhibit material was loaned to the National Exposition of Panama, held in the City of Panama from January 21 to May 1, 1916, which material has since been returned to the Department. Other exhibit material was diverted for use at the Panama-California International Exposition at San Diego, as provided by Public Resolution No. 1, approved December 17, 1915.

Authority to Make Purchases not Exceeding $25 Without Obtaining Proposals.

Section 3709 of the Revised Statutes provides that—

> All purchases and contracts for supplies or services, in any of the Departments of the Government, except for personal services, shall be made by advertising a sufficient time previously for proposals respecting the same, when the public exigencies do not require the immediate delivery of the articles, or performance of the service.

In the estimates submitted to Congress for the current fiscal year, this Department requested authority to make purchases not exceeding $25 without complying with this provision of law, but the request was not given favorable consideration. During the fiscal year ended June 30, 1916, the Chief Clerk's Office issued

244 sets of proposals involving purchases not exceeding $25 each. The average cost of each purchase amounted only to $7.33. The number of proposals sent out for each purchase averaged 4. It is conservative to state that the clerical labor of writing, comparing, mailing, listing, receiving, tabulating, and writing awards on these proposals involved an expenditure almost as great as the cost of the articles purchased. No modern business concern would tolerate a system where the purchase cost bears such a relative value to the cost of the goods purchased. The general merit of the provision of section 3709 is admitted, but its requirements serve no useful purpose when applied to the large number of small purchases that are necessary. Congress has recognized the wisdom of removing small purchases from the requirements of this section by provisions similar to the one requested by this Department which were enacted into the laws applying to the Department of Agriculture and the District of Columbia. The matter will therefore be resubmitted to Congress in the estimates for the fiscal year 1918.

Transfer of Commerce Building.

On March 3, 1916, the Commerce Building, rented and occupied by this Department, was purchased from the Commerce Building Co. by Mrs. Henrietta M. Halliday for a consideration of $800,000.

Consolidated Department Library.

The past year has been one of definite progress in the consolidated library in the Commerce Building. The number of volumes on hand June 30, 1916, was 103,738, against 100,000 last year, or 3,738 accessions. During the year 952 weekly and monthly periodicals were currently received, 918 of which are received in exchange for the Department's publications; 761 books were received from the Library of Congress as copyright transfers; 5,961 books were reclassified, which involved changing labels, making book cards, and changing class numbers on approximately 23,804 catalogue cards; 5,438 volumes, consisting of duplicates and books no longer required, were disposed of, thus making shelf room for new material; and 535 volumes were sent to the Government Printing Office for binding or rebinding. A very important part of the work accomplished in the library during the year has been the cataloguing of all available material on the subject of commerce. This is of particular importance in connection with the work of the Bureau of Foreign and Domestic Commerce.

Typewriter Purchases.

The Department purchased during the year 198 typewriters, 115 for use in the District of Columbia and 83 for the outside services. The total cost was $14,561.50. The allowance for old machines given in exchange was $3,469.75, making an outlay for new machines of $11,091.75, an average price of $56.02 paid for each machine.

Fire-Alarm Equipment.

A selective ringing fire-alarm system, consisting of 24 boxes and bells, 2 on each floor, was installed in the Commerce Building during the year. The pulling of a lever on any floor rings all the bells in the building and indicates the floor on which the alarm is sounded. Two fire drills were held, one on February 28 and one on May 8, when the building, occupied by 1,200 employees, was emptied in eight and six minutes, respectively.

Foundation for the Promotion of Industrial Peace.

The Nobel Peace Prize was awarded to Hon. Theodore Roosevelt, the twenty-sixth President of the United States, on December 10, 1906. The Foundation for the Promotion of Industrial Peace was created by the act of Congress dated March 2, 1907 (34 Stat., 1241), for the purpose of using the Nobel Peace Prize awarded to Hon. Theodore Roosevelt, as "the nucleus of a fund the income of which shall be expended for bringing together in conference at the city of Washington, especially during the sessions of Congress, representatives of labor and capital for the purpose of discussing industrial problems, with the view of arriving at a better understanding between employers and employees, and thus promoting industrial peace."

The following were appointed trustees of the Foundation: The Chief Justice of the United States; the Secretary of Agriculture; the Secretary of Commerce (and Labor); John Mitchell, then president of the United Mine Workers of America, representing labor; Marvin Hughitt, then president of the Chicago and North-Western Railway Co., representing capital; and Seth Low and Thomas G. Bush, representing the general public.

Both representatives of the public are dead. Mr. Thomas G. Bush died several years ago, and the vacancy has not been filled, while Hon. Seth Low died on September 17, 1916, so that the following gentlemen now constitute the trustees: Hon. Edward D. White, Chief Justice of the United States; Hon. D. F. Houston, Secretary of Agriculture; Hon. William C. Redfield, Secretary of

Commerce; John Mitchell, representing labor; and Marvin Hughitt, representing capital.

The first meeting of the Foundation during my tenure of office as Secretary of Commerce was held on May 28, 1914, those present being Messrs. White, Houston, Redfield, Low, and Mitchell, together with George C. Havenner, Chief Clerk of the Department of Commerce, acting as assistant secretary of the Foundation. At this meeting the difficulties encountered by the Foundation, due to the small income from the fund and the fact that the members of the board of trustees were so widely scattered, were discussed in detail and a committee consisting of Messrs. Low, Mitchell, and Redfield was appointed to consider and report on the whole constitution and future program of the Foundation, with power to direct the treasurer to invest the cash on hand.

This special committee submitted its report at the next meeting of the board of trustees, held in the office of the Secretary of Commerce on January 16, 1915, Messrs. Edward D. White, William C. Redfield, Seth Low, and John Mitchell being present, which report included the following resolution, unanimously adopted:

Resolved, That the Congress be petitioned to permit the return to the Honorable Theodore Roosevelt of the Nobel Peace Prize Fund, as it may stand in securities and cash at the time when the transfer is made, and for authority to dissolve the Foundation for the Promotion of Industrial Peace.

Resolved, That the special committee have authority to attend to all details growing out of the foregoing resolution.

No other meeting of the board of trustees has been held.

The Solicitor of the Department of Commerce prepared bills (S. 7410 and H. R. 21236) to dissolve the Foundation and return the fund to the donor. These were introduced, but no action was taken upon them.

A statement received from the American Security and Trust Co., of this city, treasurer of the Foundation, shows the condition of the fund under date of October 1, 1916, to be as follows:

Securities:		
New York City (registered), 4½ per cent corporate stocks, May 1, 1957		$30,000.00
New York City (coupon), 6 per cent revenue bonds, Sept. 1, 1917		2,000.00
American Security & Trust Co. 3 per cent certificate of deposit, Dec. 21, 1916		9,135.00
American Security & Trust Co. 3 per cent certificate of deposit, Mar. 26, 1917		2,000.00
Total securities		43,135.00
Cash on hand, capital account	$1.95	
Cash on hand, income account	890.49	
Total cash on hand		892.44
Total present worth		44,027.44

Status of Proposed Legislation Affecting the Department.

On page 199 of my report for the fiscal year ended June 30, 1915, is printed the recommendations of the Board of Inquiry into the *Eastland* disaster. Every one of the recommendations of that board have received definite action at the hands of this Department. The following bills were drafted under my direction and introduced in both the Senate and the House of Representatives:

House bill 4787, providing for the appointment of a board of naval architects to be a part of the Steamboat-Inspection Service of the Department of Commerce and prescribing their duties. This bill covers paragraphs 1, 2, and 5 of the *Eastland* board's report. It has not yet been acted upon by the committees to which it was referred.

House bills 4781, 4783, and 4785, amending sections 4464 and 4465 of the Revised Statutes and relating to appeals from boards of local inspectors. The Committee on the Merchant Marine and Fisheries of the House of Representatives held hearings on these bills and combined them into House bill 13831, which was passed by the House of Representatives on June 5, 1916. It went to the Senate and was referred to the Committee on Commerce, which has not as yet reported it. This bill covers the recommendations in paragraphs 3 and 4 of the *Eastland* board's report.

The Solicitor of the Department has given his personal care to the above measures and has done everything within his power to urge their consideration and passage. The Department earnestly desires that the foregoing measures shall become laws.

The following legislative matters have also been given the attention of the Department:

House bill 449, providing for 11 supervising inspectors, instead of 10. This measure is intended to remedy the impossible conditions existing in the first steamboat-inspection district, illustrated and described herein and on pages 193 and 194 of my last report. The measure passed the House of Representatives February 7, 1916, and is pending in the Senate.

House bill 4782 relates to hydrostatic tests of boilers, and was prepared by the Steamboat-Inspection Service. No action has been taken upon it.

House bill 4784 embodies my recommendation to change the name of the Steamboat-Inspection Service to the Marine Inspection Service. It passed the House of Representatives February 21, 1916, and is pending in the Senate.

House bill 13112 amended section 14 of the seamen's act to correct an apparent misunderstanding in regard to life buoys. This bill has become a law.

House bill 11254, commonly known as the "dogfish bill," providing an appropriation of $25,000 for developing the fishery of dogfish and for other economic uses in other directions, is now a law.

House bill 14338, authorizing aids to navigation and other works in the Lighthouse Service and the installation of wireless apparatus on the seagoing vessels of said Service, became a law August 28, 1916.

The bill for the protection, regulation, and conservation of the fisheries of Alaska was reported to the House of Representatives by the Committee on the Merchant Marine and Fisheries in the closing days of the session, and the bill and report were referred to the Committee of the Whole House on the state of the Union.

The bill amending section 3 of the organic act creating the legislative assembly in the Territory of Alaska, and which will prevent the Territory from imposing other and additional taxes on the fish industry, was referred to the House Committee on Territories, where it is now pending.

I renew the recommendation in my last report that the Government initiate negotiations to purchase Dutch Harbor, the abandoned village of the North American Commercial Co. in Alaska. The condition described on pages 179 and 180 of my report of last year still prevails, and the suggested purchase can hardly fail to be one profitable to the Government.

The Department has caused to be prepared a series of comparative maps showing certain of the important countries of the world, imposed upon the United States on the same scale. The object has been to awaken an intelligent interest in these countries and to give comparative information concerning them not now known to be readily available. Copies of these maps have been furnished to business houses, to schools of business administration, to chambers of commerce, and to such other parties as were interested in the development of trade in the respective countries.

I emphasize the moral obligation which exists to increase the salaries of the Supervising Inspector General of the Steamboat-Inspection Service and the Commissioner of Navigation to an equal basis with the other chiefs of the Department. Congress has imposed upon each of these Services duties which add greatly to the burdens and responsibilities of its respective chief. It is not

equitable to demand a very much larger volume of labor while providing no compensation for same. The officers in question are underpaid, and simple justice requires that they be adequately compensated for the valuable service they perform. Under the Bureau of Navigation a statement is given of the additional duties imposed by a series of laws on this Service which have at least doubled the amount of work required of it.

In my last year's report, on page 145, I recommended that lighthouse inspectors be compensated more adequately for their valuable service. These officers are now paid less than are others of similar technical standing and responsibility. The following comparison of salaries speaks for itself:

Lighthouse inspectors (except third district), each	$2,400
Naval officer and Army Engineer officer (part of time) replaced by each lighthouse inspector, average pay and allowance per district	5,000
Assistant engineers, War Department, under Engineer officers and not charged with independent responsibility, average in 16 cities	3,300
Captains in Coast Guard (also retirement pension)	4,000
Superintendents, Coast Guard (formerly Life-Saving Service), including longevity pay (also retirement pension)	3,000
Supervising inspectors, Steamboat-Inspection Service	3,000
Assistants, Coast and Geodetic Survey, 12 officers receive from	$2,500 to 4,000

A provision authorizing the increase of pay for all these inspectors, except the third district (already paid $3,600), to not exceed $3,000 was reported favorably by the Committee on Interstate and Foreign Commerce of the House of Representatives and by the Committee on Commerce of the Senate, and the item was included in the Lighthouse bill as passed by the Senate. It is earnestly hoped this may be enacted into law at the next session. The matter is treated more fully in the report of the Commissioner of Lighthouses.

The request of the Department for an increase in the number of commercial attachés from 10 to 20 was declined by Congress. The request will be renewed at the coming session. The time for increasing this invaluable working force is now. To postpone it until after the war is to lose the golden opportunity. Every day in which we fail to develop our foreign trade by an enlarged working force is a day largely wasted and an opportunity lost not to be recovered.

Increased Cost of Living.

The Department is embarrassed in its present operations and in the preparation of its estimates for the coming fiscal year by the increased cost of materials and supplies of many kinds, by the

advances in wages in many directions, and, as regards the adequacy of salaries paid, by the great increase in the cost of living. Economic publications report an advance in a single year of 34 per cent in the cost of the commodities required for the life of a family. This can only mean that many of those who are depending to-day upon the same salaries they received one or two years ago must be cruelly cramped. Such a condition can only react unfavorably on their effectiveness as workers in the public service.

Such a condition also directly affects the cost of living of the Government itself. It can not secure men at the same wages it has paid in the past, nor can it purchase goods at the prices formerly paid. For lack of means to run them, arising in large part from the above causes, two vessels of the Lighthouse Service and a small ship in Alaska of the Coast and Geodetic Survey have long been idle. Meanwhile the public work suffers. We must take our choice in the coming year of paying wages and purchasing supplies on the current basis or else must still further restrict the public work.

Cooperation with Foreign Chambers of Commerce.

In many foreign countries there are so-called American chambers of commerce purporting to serve specially the interchange of trade between the country in which they are located and our own. There is no doubt that some of these organizations do good service. On the other hand, it is possible some of them may not be wholly disinterested in their work. They have no official or even semi-official relation with our Government of any kind. It would be well if a semiofficial relation between these international chambers of commerce and the Department of Commerce could be brought into being. This would settle the question of disinterestedness, would provide a useful adjunct to the work of our foreign service, and provide such a degree of public supervision as the circumstances seem to require.

Advantages of Free Ports.

Much has been printed about the advantage of free ports, and the advantages of them are real. Their establishment would permit a greater employment of American labor and capital in industries located at the said free ports, whereby the cost of duty on materials used in the manufacture of articles exported from the free ports would be reduced, the cost of cartage and railway transportation would be lessened, and goods could be manufactured

for export on the water front in such a way as to save much of the expense now incurred. There would be no question of rebate of duties on goods entering for manufacture into a free port, for no duties would be charged until they emerged from that free port into the commerce of the country. If reexported, there would be no question of duty at all. The concentration of industries in such a free port and the existence of warehouses therein would form an industrial export unit of high efficiency.

Need for an Archives Building.

The construction of an archives building, of which in recent years there has been much said, would solve two serious problems affecting this Department, namely, the provision for the safeguard of the records of the Bureau of the Census and those of the Coast and Geodetic Survey. The same is true, indeed, of the records of all the services of the Department, but has special weight in the case of the two services concerned. It has been said and is possibly generally assumed that the old Census records have no current value. This is far from true. These records contain information that is constantly sought and which, if lost, could not be replaced. In the case of the Coast and Geodetic Survey, records that have cost millions and on which present and future millions depend are stored under conditions, hereinafter described, which would be thought criminally careless if done by any private concern.

On April 24, 1916, in response to a letter from Senator Miles Poindexter, I wrote the Senator the following, which is printed here to emphasize the importance of the matter as it affects this Department:

It needs but a step from the Capitol into the basement of the building (I had almost said the alleged building) occupied by the Coast and Geodetic Survey to see conditions that are shocking. Land titles all along our seaboard are dependent upon the accurate and continued knowledge of changes in the ocean and river lines. These changes are incessant. Because of them the records are constantly consulted. They go back to colonial days and affect many millions in value. These records, covering our whole Atlantic front, affecting the accuracy of every water-front title from Canada south, are in rolls on wooden racks in the old building occupied by the Coast and Geodetic Survey. It would be impossible to replace these records, and they are, to be very frank, liable to destruction at any hour. The same is true of the costly engraved plates. Many of these, costing great sums, through a century past, are stacked in wooden racks in the basement of the same old structure only to be reached by involved passages which would make saving them impossible should fire occur and under such conditions that a small fire occurring near them and lasting but a short time would destroy property of priceless value which could not be restored. The same is true of the invaluable scientific working library of the Coast Survey. Two fires have already occurred in the building. It is not fireproof. Had these fires

not been accidentally discovered before they had gone far, the building and the records in it would have been destroyed.

There are many scores of thousands invaluable records of the Bureau of the Census stored in the old Light Infantry Armory Building, at Fifteenth and E Streets NW., where they are exposed to destruction by fire. These records are many of them of importance as affecting the validity of pensions and are constantly consulted for genealogical purposes and others.

There are scientific records in the Bureau of Fisheries exposed to loss from fire in the old building occupied by that Bureau. I think a visit to the upper floor of that building would satisfy you that no sane industrial manager would allow it to stay for a day longer than time sufficient to replace it.

There are in the Bureau of Navigation records of our shipping going back to our earliest days. They are stacked in the basement, and were any serious fire to affect the Commerce Building they would be destroyed along with many others.

It is hardly necessary to go through all the services of the Department. The facts are alike in them all with varying degrees of importance. The Bureau of Standards, located at a distance with substantial buildings, is an exception. If an archives building were constructed, this Department could use to great advantage 85,000 cubic feet of space therein. It should be borne in mind also that the question of effective use of the records is involved as well as that of their safety. Much damage has been done by overhauling records in order to find the one desired in the necessary confusion and a good deal of time has been wasted that would have been saved could the records have been properly stored, located, and catalogued. I venture to think there is no argument for the existence of the Library of Congress that does not apply with great force to the establishment of our Government archives in a building which shall serve for those important records the same purpose that the Library of Congress does for our printed literature.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE.

Unusual demands have been made upon the Bureau of Foreign and Domestic Commerce during the fiscal year, and it has responded with exceptional service. The year has witnessed an unprecedented development of American export trade. The minds of our business men have turned with increasing determination to the rich promise of foreign markets. Expanding opportunity abroad has created a more vigorous attitude at home. With these things has come a clearer recognition of the facilities afforded by this Bureau as a promotive agency in the furtherance of trade.

Functions of the Bureau.

The primary function of the Bureau is the gathering and giving out of practical data to enable American manufacturers to cultivate the markets of the world with the greatest possible effect. It is constantly watchful at many points in the current of commercial life. From the bazaars of Madras it transmits textile information to the mills of New England. From Bolivia it sends samples of hardware to be inspected by the exporting houses of New York. On the farms of South Africa and Australia its agents investigate the prevailing types of agricultural machinery that they may bring that knowledge to the manufacturing enterprises in our Middle West. The representatives of the Bureau penetrate to the remote regions of the earth that the exporters of the United States may proceed intelligently, on a basis of definite facts, to the conquest of new fields.

It aims at the achievement of visible results. To present practical information to those who can use it, to dispel misapprehensions, to adjust differences, to bring together buyer and seller in an effective manner—these are the ideals toward which the efforts of the Bureau are directed in every aspect of its work. That it has succeeded may be indicated most readily, I think, by an account of some of the things accomplished in the fiscal year just past.

Typical Results Accomplished.

Late in 1915 the Bureau undertook to assist in establishing the smelting of tin in the United States. In January, 1916, an article was published in Commerce Reports stating that arrangements

had been completed by the American Smelting & Refining Co. to bring Bolivian tin ore in quantities to the United States for smelting and refining. As the result of representations made by the State Department at the request of the Bureau, the Bolivian Government assured the United States against discrimination in the matter of export duties on tin or other metal. Under date of July 25, 1916, the American Smelting & Refining Co. advised the Bureau that it was getting out about 15 tons of refined tin a day. It was claimed that the quality of the tin is superior to that which had formerly been imported.

Through the efforts of Bureau officials the Chinese Government decided to equip two cotton mills with American machinery. It placed orders with American manufacturers and builders for machinery and apparatus valued at more than $700,000.

Through the publication of Foreign Trade Opportunities and the circulation of plans and specifications throughout the United States, American manufacturers have secured orders for supplying railway materials in China aggregating about $1,200,000. A prominent exporting house in New York was awarded a contract for supplying railway bridges valued at more than $475,000. A locomotive works secured an order for supplying locomotives valued at over $289,000. An award was made for the supply of freight cars, valued at $473,000, to another manufacturer. The above are only the more important items in connection with the orders placed by the Canton-Hankow Railway. Most of these orders are now being executed.

These are a few of the things that the Bureau of Foreign and Domestic Commerce has helped to accomplish. It receives many letters testifying to the value of its work and expressing appreciation of the practical service that it renders to American manufacturers and exporters. These communications are nearly all from firms that have themselves received specific assistance from the Bureau. The New York representative of a firm in Lisbon, Portugal, has this to say:

> I take much pleasure in informing you that I have concluded very important business transactions, thanks to the valuable information and precious help I received from your Bureau. Your Bureau furnished me with a few addresses of manufacturers, and, thanks to your assistance, I have been able to place an order for $95,000.

One of the largest American companies manufacturing low-priced automobiles says:

> We wish to take this opportunity to inform you that the results we have obtained through the cooperation of the Bureau of Foreign and Domestic Commerce have been very marked, and we find the Bureau a very efficient help in obtaining foreign trade.

From another great vehicle corporation this statement comes:

We have noticed a great improvement recently in the material contained in the daily Commerce Reports, in the special agents reports, and work of the members of the Consular Service. The present practical value of this we are glad to acknowledge and want to assure you of our hearty cooperation.

A Chicago publication devoted to the milling interests writes as follows:

Your regular Commerce Reports are very valuable to us and can not be duplicated from any source that we know of. The writer wishes to compliment your Bureau on the splendid way in which you get up this information.

The opinion of the Bureau's service entertained by the president of one of the world's most important hardware concerns is shown in the following extract from a letter signed by him:

I wish to take this opportunity to express to you, as I have to others in your Department, my appreciation of the service that it is rendering and the extent to which it is constantly developing and improving in that respect in the interest of the merchants and manufacturers of the United States.

That the Bureau furnishes precise and usable information in the great majority of cases is indicated by a statement made by a manufacturer of Toledo, Ohio:

The service rendered by the Bureau of Foreign and Domestic Commerce to the American manufacturer can not be overestimated. I have used that service in the interests of my company to great advantage in the saving of time and money. I have not yet submitted a question on foreign-trade conditions to the Department that was not fully and satisfactorily answered.

The export manager of a motorcycle company in Michigan expresses the opinion that Commerce Reports are worth $25 a year to a manufacturer interested in export trade. The actual subscription price is $2.50.

A Buenos Aires merchant says:

Through your Bureau of Foreign and Domestic Commerce I have been able to get into direct communication with some of the largest manufacturers of the lines in which I am interested, and am pleased to say that I have made several contracts on very agreeable terms.

A firm of St. Louis shoe manufacturers writes as follows:

We find the data very interesting and particularly valuable in our investigations. We more than appreciate your efforts in our behalf and the comprehensive manner in which you have placed this information before us. Each day we learn more of the benefits that accrue in the expansion of our export business through the efficiency of the local bureau.

Commercial Attachés.

During its second year the problems of the commercial-attaché service were not unlike those of last year, when the attachés established themselves at their posts, got in closer touch with the trade

conditions and methods in the countries to which they were accredited, and increased their points of personal contact. This process continued. There was no scarcity of things to do; the difficulty was rather to eliminate the smaller details of purely local matters in order to devote entire time to the larger trade matters of a national scope.

There were five changes in the fiscal year—one transfer and four new appointments. Mr. Harrington resigned his post at Lima to enter private business; Prof. Hutchinson left Rio de Janeiro to resume his duties at the University of California; Mr. Baker, at Petrograd, returned to the Consular Service; Mr. Baldwin, former Chief of the Bureau, resigned the London post to enter private business; Mr. Downs, at Melbourne, was transferred to Rio de Janeiro, his long experience in trade with Brazil peculiarly fitting him for that post. The new appointments were as follows: Philip B. Kennedy, director of the day division of the School of Commerce and Finance of New York University and a member of the foreign trade committee of the Merchants' Association of New York City, to the Melbourne post; William F. Montavon, of the Insular Service, to the post at Lima; Pierce C. Williams, a department head in one of the leading American export houses, to the London post; and William C. Huntington, agent in charge of the Chicago district office of the Bureau, to the post at Petrograd.

A distinct achievement to the credit of the commercial attaché service has been the part it has played in the fostering of American organizations abroad. It is essential that our commercial interests in foreign fields should be mutually helpful. For this purpose, some form of substantial organizations—outposts of American commerce—which will command the respect of foreign governments and private enterprise is required. It is pleasing to report that our representatives have been able to give substantial assistance in the establishing of such commercial organizations—the American chambers of commerce and commercial clubs abroad. Concrete results have been attained in Rio de Janeiro, in Buenos Aires, in Peking, and in Barcelona. At the suggestion of Commercial Attaché Havens, the American Society in Santiago, Chile, is establishing a commercial section, while in London the movement is under way. Incidentally, the American Chamber of Commerce of China, the American Chamber of Commerce in Rio de Janeiro, and the American Commercial Club in Buenos Aires are sufficiently organized to affiliate with the Chamber of Commerce of the United States of America.

Another important phase of the work of the year was in relation to the investment of American capital abroad. The Department has for some time emphasized the important relation between investments and trade and the commercial attachés have done valuable work on this subject. All the attachés made reports on foreign investments. From South America, the Far East, and Australia, and even from Europe, investment opportunities were reported. Some of these have already been acted upon by American banks and corporations; others are now under consideration. Further to carry on this work, the Bureau has appointed a financial expert as special agent to investigate and report in detail on investment opportunities in South America, and arrangements are being made to appoint another for a similar mission in the Far East.

A new method of investigation was inaugurated this year. Under the direction of the 10 attachés, experts in foreign countries prepared extensive reports, uniform in treatment and practical in character, on the hardware trade in their respective countries. These reports cover all phases of the trade, such as credits, packing, styles, methods of distribution, and sources of supplies, the attachés guiding the work and themselves contributing material of a general nature.

To supplement the reports and to make them more valuable to American manufacturers and exporters, each attaché was given an allotment for the purchase of samples. The samples secured represent the styles and types in common demand and are indicative of either the progress of local manufacturers or of the competition to be met from European markets. They have been assembled in the New York district office and exhibited, together with information as to prices, import duties, country of origin and market, and other data of a very practical nature, to hundreds of interested manufacturers and exporters from all parts of the country. Arrangements are now well under way to make them available in the production centers. When the reports are published, the hardware industry of the United States will be in possession of the most complete information ever furnished by this Government in its trade-promotion work. The Department plans to continue this practical method of investigation by a similar study covering the wearing-apparel trade in South America during the next fiscal year.

In summarizing the activities of the European representatives, the main feature is that their work has been very largely deter-

mined and shaped by the war. Mr. Baldwin and, later, Mr. Williams, at London, have kept the Department and, through the Department, American business men informed as to war legislation affecting our foreign commerce. The same is true of the Paris post. Commercial Attaché Veditz, however, found in Spain a more favorable field for trade promotion and continued to devote as much of his time as possible to that country. It was quite often necessary for the attaché to visit Switzerland, to which country he is also accredited, as Switzerland had its contraband and embargo difficulties for American trade. Mr. Thompson's headquarters are theoretically at Berlin. He has made frequent trips there, and it is quite likely that during the coming year he will be there a large portion of his time. Practically, his entire time at The Hague was devoted to the difficulties arising from contraband and embargo and with the Netherlands Oversea Trust. A somewhat similar task at Petrograd confronted Commercial Attachés Baker and Huntington. Moreover, the services of the attaché at this post have been in especial demand by American business men, as interest has increased notably in the trade with Russia. This interest is evidenced by the formation of a strong American-Russian chamber of commerce and by the organization of big trading companies for trade with Russia. The incumbents of the Melbourne post, Mr. Downs and Prof. Kennedy, have likewise been in a country where business is under the domination of war conditions. As far as there has developed a "war normal" in all of these countries, the attachés have been able to devote a larger portion of their energies to general trade investigations. In the war countries especially the commercial attachés have worked closely and cordially with the State Department representatives.

As in the case of Russia, the awakened interest in China as a potential market for American products was an outstanding feature of our foreign trade in the last year. The commercial attaché, Mr. Arnold, had a strenuous year and furnished a wealth of commercial information about his interesting field. Due to the unsettled political conditions, the time was not ripe for great trade expansion, but was suited rather for a survey of the field and the laying of plans for future development. It is pleasing to note that, while not neglecting the important countries to the south of us, our business men have given more attention to the fertile markets of China and Russia.

In South America there was more opportunity for direct trade promotion. All of the Department's representatives have taken

a prominent part in connection with the "return visits" committees which have gone to South America during the year. The attaché at Buenos Aires was of material assistance to the International High Commission. In addition to the promotion of American commercial organizations and valuable reports on investment opportunities by these representatives, special mention should be made of the very careful and thorough study of Brazilian trade by Commercial Attaché Hutchinson, stationed at Rio de Janeiro. In connection with this work, the attaché traveled extensively through all parts of the country with his secretary, and the handbook which is in the course of preparation will be a notable addition to the Department's publications.

As urged in my report for the preceding fiscal year, there is need of an increased appropriation to permit of the appointment of 10 more commercial attachés to be stationed in important districts which deserve attention. Aside from this, I may mention three deficiencies in the service: (1) The legislative limitation that forbids the employment by any attaché of more than one clerk; (2) the lack of funds available for travel; and (3) the lack of any specific appropriation for the maintenance of a staff in Washington to direct the movements and activities of the attachés and adequately handle the increasing amount of correspondence and reports. Because of the value of this service in national efforts for commercial extension abroad, as demonstrated during the past two years, it is earnestly desired that adequate provision be made for the removal of these handicaps and the logical expansion of the work.

Commercial Agents.

The value of the work accomplished by the Bureau's special field service has, it is felt, been very materially enhanced during the fiscal year 1916. A greater variety of subjects has been investigated, and the several phases of the work have been so harmoniously coordinated that an increased efficiency has been clearly observable at all points. A systematic and successful effort has been made to secure men of special competence for this branch of the Bureau's activities. There have been energetic surveys of foreign markets, careful planning and effective supervision on the part of the Washington office, and a consistent purpose to make the resulting data available to American business men in the most practical form. That the Bureau's aim in this respect has been, in large measure, attained is shown by the keen interest and the

spirit of hearty cooperation manifested by important commercial houses and trade associations.

During the fiscal year the Bureau has had a total of 19 agents employed in foreign countries and in the United States. Of these, 3 carried on their work entirely in this country, 3 were concluding work the principal part of which had been done during the previous year, 3 were starting on extended investigations as the year closed, and the others performed the greater part of their special work during the fiscal year. A wide range of subjects was covered, including such diverse topics as banking, cotton goods, lumber, commercial laws, ports and port facilities, and the establishment of a dyestuffs industry in the United States. The territory in which the agents traveled embraced Latin America, the Far East and India, Australasia, and South Africa. The work of 12 of the agents was connected with Latin American markets; 3 with those of China and Japan; 1 with the Straits Settlements, Dutch East Indies, and India; 1 with Australasia; and 1 with South Africa.

Of the Bureau's inquiries, through its commercial agents, into the markets for specific lines, that concerned with the trade in cotton goods has been most extensive. This work was continued last year by Ralph M. Odell, who has been in the employ of the Bureau since 1911. At the beginning of the fiscal year he was concluding a thorough and comprehensive investigation into the cotton-goods trade of China, in which market American sales have become almost negligible in recent years. After finishing in the great oriental Republic, he went on to Singapore, the Dutch East Indies, Ceylon, and India, rendering reports on each of the first three regions and on Madras, in India. At the close of the year he was in Calcutta, where the imports of cotton goods amount to $100,000,000 annually. He purposed to spend some time there, later visit other parts of India, and then return to the United States.

The other two agents working in the Far East were Mr. Sams, on wearing apparel, and Franklin H. Smith, on lumber. The latter had practically completed his work in China, Japan, and the Philippines when the fiscal year began, and his chief work last year was in Australasia. The report of Mr. Sams on wearing apparel in Japan was received in June and has not yet been published. He will follow much the same route as Mr. Smith, going from the Far East to Australia and New Zealand.

In the investigation into agricultural-implement markets, Juan Homs was assigned to the South African field, with Australia and New Zealand following on his itinerary, while Frank H. von Motz undertook a survey of the South American countries. These regions are among the most promising in all the world with respect to agricultural development in the near future, and the sale of farm implements is sure to grow steadily year after year as new land is opened up or the old more fully cultivated.

In addition to agricultural implements, the special lines that commanded the Bureau's attention in South America last year were fruits and nuts, machinery and machine tools, hardware, and furniture. The data on the trade in fresh fruits were gathered at the instance of western fruit growers, but the reports covered, of course, accounts of the openings for the products of every section of the United States. A small reciprocal trade in fresh fruits has already been established between North and South America, and our apples are fairly well known in the larger cities of the southern continent. In machinery and machine tools the present demand, considering the large area and population of South America, is small, partly because of the very high cost of fuel (particularly in the last year) and partly because of the fact that South Americans have not turned hitherto to mechanical pursuits. J. A. Massel, covering this subject, has visited and reported on Argentina, Chile, Peru, Bolivia, Colombia, and Venezuela, but only the last four were included in the work of the fiscal year.

An investigation that is likely to produce immediate and far-reaching results is that into the lumber markets of South America by Roger E. Simmons. It is confidently believed that very substantial benefits to the lumber-export interests of the United States will accrue from his work. Mr. Simmons, after concluding his reports, traveled for some weeks in this country, interviewing lumber manufacturers and officials of lumber associations.

As regards the work of five other agents in the South American field, it may be said that S. S. Brill, on hardware, and L. L. Bucklew, on furniture, were concluding in the first part of the fiscal year 1916 work that had been chiefly conducted in the preceding fiscal year. W. A. Tucker, on textiles, H. G. Brock, on boots and shoes, and Philip S. Smith, on electrical goods, began work on their respective lines in May, starting first in Cuba as a preliminary to their South American travels.

One of the noteworthy publications issued during the year was "Banking Opportunities in South America," by W. H. Lough,

the result of a six months' tour in the first part of 1915. An inquiry into the commercial laws of South American countries was carried on by E. M. Borchard, who spent six months in South America on a joint mission for this Bureau and the Library of Congress.

The work of one special agent, Garrard Harris, is devoted largely to the collection of material for commercial handbooks. His reports on Central American countries were published in a volume entitled "Central America as an Export Field," and his work since leaving the United States last fall has consisted in part in gathering data for a similar book on the West Indies. It is also planned to have him cover Colombia and Venezuela in the same way, and the whole of the Caribbean district except Mexico will then have been fully described from a commercial point of view.

With respect to the work of agents in the United States, it may be noted first that the Bureau last year sent a special representative, Stanley H. Rose, on what might be called a tour of consultation through the chief sections of the country interested in exporting. His particular mission was to interview business men and advise with them concerning their special problems in export trade, and to acquaint the business public in general with the facilities of the Bureau.

The other two agents in the United States, Dr. Thomas H. Norton and Grosvenor M. Jones, have been engaged on work that has an exceptional value and significance at this time. The activities of the former have been directed to three ends—the establishment of a dyestuffs' industry in this country, the manufacture of nitrogen from the air through hydroelectric power, and the securing of a supply of potash to take the place of that usually purchased from Germany. His efforts along these lines have been uniformly vigorous and judicious, and they have been attended with a very marked success.

An elaborate volume on "Ports of the United States" represents the results of a study of port facilities carried on last year by Grosvenor M. Jones. He subsequently took up the study of ocean transportation, resulting in the publication of two very timely reports—one on "Navigation Laws: A Comparative Study of the Principal Features of the Laws of the Leading Maritime Countries" and the other on "Government Aid to Merchant Shipping."

Because of increased appropriations the Bureau has been able to plan for a notable broadening of the commercial-agent service during the fiscal year 1917. Among the lines to be studied are investment opportunities, paper and printing supplies, railway

supplies, coal, transportation and port facilities, and construction materials, all in South America, and railway supplies, boots and shoes, electrical goods, and possibly motor vehicles and investment opportunities in the Far East and Australasia. With these and the investigations continuing from the past fiscal year the Bureau expects to have between 20 and 25 agents in foreign lands during the fiscal year 1917, and the number may run to 30.

To systematize and facilitate this work, it has been deemed advisable to establish a separate division of commercial agents, which will devote its entire time to the direction of the traveling-agent service. This division was just being formed at the close of the fiscal year. For the present it will consist of four men—a chief, an assistant, an editor, and a clerk and stenographer. It will have its headquarters in New York, where the principal exporting houses can be frequently consulted with regard to the details of export work. Besides working in close cooperation with the agents from the time they are appointed until they leave the service, the new division will undertake to push actively in this country the projects initiated by the men in the field and endeavor to make their work continually productive of tangible results.

District Offices of the Bureau.

As explained in my last annual report, the United States has been divided into eight districts, with district offices in New York, Boston, Chicago, St. Louis, Atlanta, New Orleans, San Francisco, and Seattle. This enables the Bureau to maintain more intimate relations with business men throughout the country.

The district office is first of all a service station, supplied with stocks of the various circulars, trade lists, publications, etc., issued by the Bureau for distribution and equipped with a reference library of publications on foreign trade, commercial directories, and periodicals for the convenience of the business public; second, it is the headquarters of the commercial agent in charge of that district. The latter is expected to keep in touch with the manufacturing and exporting interests in his territory, and to see that they are fully informed as to the services rendered by the Bureau. He endeavors to see that the specific opportunities for the sale of American goods abroad that are received by the Bureau are brought to the attention of the appropriate firms.

There has been a continuous, and in some cases remarkable, increase in the number of visitors at the district offices and the

volume of mail handled. The New York office during the past year received from 5,000 to 7,000 letters a month, while the number of callers at that office rose from approximately 1,000 in June, 1915, to 2,894 in June, 1916.

The district offices serve as headquarters for foreign buyers visiting the United States and render a very important service in putting these men in touch with American manufacturers able to supply their needs. The Bureau's records show millions of dollars' worth of American goods purchased by these visitors with the assistance of its district and cooperative offices. Only a short time ago a South American business man wrote that, through connections he effected as the result of assistance given him by the New York office during his recent visit to the United States, he has sold more than $250,000 worth of American goods in five months.

To strengthen the personal bonds between the members of the field force and to supplement the exchange of ideas by mail, a special conference was called in Washington at the end of June. This brought together the managers of the eight district offices, the men in charge of five of the cooperative offices, and representatives of four large commercial organizations located in cities where the Bureau has district offices. These men spent five days discussing branch-office problems, consulting with the division chiefs in the home office, with the officers of other Government services, and with those of semipublic bodies that have to do with foreign trade.

A feature of trade promotion that has been given care during the past year is the adjustment of disputes between American exporters and foreign buyers. The Bureau gives special attention to every complaint coming from abroad and endeavors to follow it up to a satisfactory conclusion. There has been a large proportion of acceptable adjustments. The district offices have been able also to render valuable assistance to American houses having difficulties with foreign collections or excessive claims.

On March 1, 1916, the Bureau's exhibit of foreign-manufactured goods at the customhouse in New York was opened to the business public, with an extensive exhibit of hardware and allied lines, collected through the commercial attachés. This exhibit was started and will be maintained for the purpose of showing to our manufacturers possibilities for competing with foreign manufacturers in foreign markets. Accompanying each sample are tags showing the countries of sale and of origin, prices, import duties, and

the volume of sales. There are, in addition, a great many catalogues of the foreign manufacturers. American manufacturers and exporters of hardware were quick to perceive the value of our work and many of them had their representatives make a careful study of this survey of the world's markets. Up to the close of the fiscal year these samples had been exhibited only in New York, but plans are now well under way to display them in all the important trade centers of the country.

It has been clearly demonstrated that the best results are obtained only when a full set of samples along some particular line is exhibited. Instructions have been issued to appropriate field agents to obtain a complete line of samples of wearing apparel in South America. Many samples are received from time to time from consuls and commercial agents. These are exhibited at the various branch offices and by cooperating commercial organizations. It is realized, however, that such individual samples are distinctly less useful than are those obtained by concerted effort and illustrative of an entire industry.

During the fiscal year 1915 a plan was formulated for the establishment of "cooperative offices" of the Bureau, to supplement the work of its district offices. Under this arrangement the Bureau extends to any commercial organization that is willing to maintain a special foreign-trade department in accordance with the Bureau's rules, and to the foreign-trade branches of large railway systems that comply with those rules, exactly the same information and service that it furnishes to its own district offices. Seven of these offices are now in existence, being maintained by the Philadelphia Chamber of Commerce, the Cleveland Chamber of Commerce, the Cincinnati Chamber of Commerce, the Los Angeles Chamber of Commerce, the Portland (Oreg.) Chamber of Commerce, the Cincinnati, New Orleans & Texas Pacific Railway Co. at Cincinnati, and the Southern Railway and allied lines at Chattanooga. Arrangements have practically been completed for the opening of a cooperative office by the Chamber of Commerce in Dayton, Ohio.

The expansion of the system of cooperative offices has gone on slowly, as the Bureau prefers to maintain a very high standard of requirements and develop new offices only where the local organizations have sufficient interest in foreign-trade advancement to give the new office proper support. When competently managed, these cooperative offices have proved of decided usefulness to the commercial organizations establishing them, and it is hoped that

more of the large cities may avail themselves of these aids in the winning of foreign markets.

This system is of great actual and potential importance, since the Bureau's service is thus made readily available to sections of the country that would otherwise not be able to utilize it in such a quick, satisfactory way. The cooperative offices represent a signal step in advance—another movement in the fulfillment of the Bureau's purpose to bring its facilities into intimate relationship with all the business men of the United States. They effect a saving of time, introduce the element of personal contact, arouse a lively local interest, and give rise, in the mind of the commercial community, to a deeper understanding of the governmental efforts that are being made in its behalf.

Cost of Production.

In view of the proposal to create a permanent tariff commission and to transfer to that body the cost of production division, the work of the past year has been directed chiefly to the completion of the investigations already undertaken. Five reports were published dealing with various branches of the clothing industry, women's muslin underwear, hosiery, knit underwear, men's factory-made clothing, and shirts and collars, and one report dealing with the cost of production of cotton-spinning machinery. For all these reports the field work was completed during the fiscal year 1915.

The criticism of industrial conditions contained in the reports was constructive throughout. The best methods of operation were described in full and possible improvements were pointed out. Opportunity for the development of export trade in several lines undoubtedly exists. The most promising markets were indicated statistically and the appropriate means of entering the markets were shown by extracts from consular reports and references to publications of the Bureau. The need of more accurate accounting methods was emphasized and an inexpensive plan of determining cost was given.

Field work during the fiscal year 1916 was devoted chiefly to cane sugar and glass. A force of special agents visited nearly all the cane plantations and sugar mills in Hawaii and later made a similar study in Cuba. The investigation of the glass industry was begun in January, 1916, the branches studied covering plate glass, window glass, wire glass, opalescent glass, lamp chimneys, lighting goods, bottles, fruit jars, and tableware.

Several special studies and reports were prepared, and the division has answered many inquiries, complaints, and other communications concerning the effect of the tariff upon certain industries, high prices, and related subjects. The amount of original work that has been accomplished by the division with its comparatively limited force is a matter of congratulation.

Foreign-Tariff Work.

Considerable attention has been devoted during the year to contemplated changes in commercial and tariff policies due directly or indirectly to the war. Reports were published dealing with the proposals of the British Board of Trade, the Association of British Chambers of Commerce, the Interstate Commission of Australia, and the proposed customs union between Germany and Austria-Hungary. While it is quite probable that some of the extreme measures embodied in those proposals will not be adopted, it is safe to assume that the war will bring about some radical changes in the tariff policies of the principal industrial and commercial nations of Europe, and such changes may prove of more than academic interest to the American manufacturer and exporter. The proposed changes must be closely followed and brought promptly to the notice of the business public.

The trade-mark work of the Bureau is meeting with gratifying success and promises to become of most practical value to American exporters. In addition to giving trade-mark information upon request, the Bureau has called the attention of some American firms to the infringement of their marks in certain Latin-American countries.

Export Statistics.

For the first time substantially complete returns of exports are now being received. Heretofore, under laws and regulations framed to meet conditions prevailing a century ago, there was no real check on the declarations made by exporters. It was a matter of common knowledge that many shipments left the country without any declaration of quantity or value and that for many others the declaration was purely perfunctory, often made by a forwarder who had no adequate knowledge of the goods exported. New regulations issued jointly by the Secretary of the Treasury and the Secretary of Commerce were put in force February 1, 1916, outlining a procedure that insures the presentation of a declaration for every shipment from the shipper or his duly authorized agent. Before they became effective the new regulations were severely

criticized by shippers as an undue interference with commerce; but since their enforcement few complaints, and those easily adjusted, have been received. Accurate export statistics, so essential to correct planning in foreign trade, have thus been obtained with no real burden on our exporters.

Editorial Work.

The editorial work was heavier during the last fiscal year than at any time in the history of the Bureau. Fewer general-trade studies were undertaken through the consular service, but there was a very marked increase in the cost of production reports and in the trade reports submitted by the enlarged field staff of the Bureau. The wide scope of the Bureau's activities makes editorial work difficult. There are hundreds of different reports on hundreds of different subjects. The steady improvement in the character and training of the Bureau's field representatives has made it possible to give more attention to form and less to content, because the trained specialist who submits a report can be depended upon to have his facts correct, and the editorial problem becomes one of presenting these facts in a clear and concise style.

New Officers and Adequate Salaries Needed in Washington.

The Bureau is in urgent need of two additional chiefs of division for service in Washington—(1) a chief of the division of commercial attachés and (2) a chief of the division of branch offices. These two important branches of the service are now in charge of (1) a translator and (2) an editorial clerk, both of whom have other duties that at present demand some of their time and attention. The appropriation for the commercial attachés is so worded as not to permit the employment of any persons in Washington. It therefore has been impossible for the Bureau to employ even an extra clerk to do routine work in connection with the service, and clerks who have other duties have been called away from them in order to attend to it. The same is true of the branch-office service. It is essential that the Bureau have these two places and that men of ability and initiative give their entire time to them. It is certain that the work of the two divisions could be considerably increased if adequate supervision were employed in Washington.

I especially urge that the salaries in this Bureau be brought up to the level of salaries which have been established in other Government departments where men of similar training and ability are required. The Bureau of Foreign and Domestic Commerce comes

into active competition, in selecting men and in retaining its present staff, with other bureaus and commissions, such as the Federal Trade Commission, Interstate Commerce Commission, Tariff Commission, Shipping Board, and other Government departments, to say nothing of the many business opportunities for which our men are particularly well qualified on account of the splendid preparation they receive in our service. The highest salaries paid in any administrative position in the Bureau outside of the Chief of the Bureau are those of the assistant chiefs, one of whom receives $3,500 and the other $3,000. Of the chiefs of division one receives $2,500 and the other but $2,000. Important divisions, for which no chiefs are provided for by law, are under the direction of officers, variously styled assistant chief of division, commercial agent, expert, expert clerk, editorial clerk, and translator, who receive salaries ranging from $2,000 to $2,500.

In the other departments and especially in the commissions referred to above administrative officers doing the same type of work are paid salaries ranging up to $5,000. It will be absolutely impossible for us to hold some of the best men in our service unless we are enabled to compete with these commissions and other departments. Only recently the Bureau found it impossible to obtain the services of two men simply because another branch of the Government outbid it. I expect in my estimates for this Department to ask Congress for authority to establish a higher scale of salaries, and it is my hope that I shall not only be able to increase the salaries of those who deserve increases, but also to bring in new men who could not be attracted at salaries which we now pay.

The Bureau of Foreign and Domestic Commerce has used its resources to the full in obtaining the information most needed by American business men and in bringing this information to them so as to accomplish the greatest results. But it has not been content with this. The Chief of the Bureau has deemed it his duty to cooperate with other Government offices and with business organizations in every question that affected commerce. Through the cooperation of the Bureau of Foreign and Domestic Commerce the National Association of Credit Men has established a foreign-credit division or information service. The Ways and Means Committee called upon the Bureau frequently for information. In connection with the revision of the duties on dyestuffs the resources of the Bureau were placed fully at the command of the committee. Many other questions relating to cost of production and other fac-

tors connected with the tariff were answered by the Bureau. At the request of the Committee on the Merchant Marine and Fisheries an investigation was made dealing with ocean freight rates.

During the past year this Department through the Chief of the Bureau of Foreign and Domestic Commerce has been cooperating continuously with the Federal Trade Commission and the Forest Service for the betterment of the lumber industry of this country. For some time past the lumber industry of the United States has been in an unstable and depressed condition. This has been due to overproduction and unregulated competition. The lumbermen have appealed to the Government for assistance and have asked that something be done, either administratively or by legislation, to improve the condition of the industry. The Chief of the Bureau of Foreign and Domestic Commerce was, therefore, authorized to confer and cooperate with representatives of the Federal Trade Commission and Forest Service to this end, and conferences and hearings have been held in connection with a direct application which has been made to the Federal Trade Commission for relief under the antitrust acts. At present the Bureau is working on some far-reaching plans for cooperative activity on the part of this Department and the lumbermen through their organizations.

In closing this portion of my report it ought again to be emphasized that the Bureau of Foreign and Domestic Commerce finds itself at a material disadvantage as respects the compensation of its office staff in comparison with the various commissions which have been created. These commissions have a comparatively free hand with reference to salaries because they operate so largely under lump-sum appropriations. The salaries paid by them average much higher than the statutory salaries which the Bureau pays. As a consequence, it is found that we are unable to get the desired men from registers of eligibles and are not even able to hold those of our force who happen to be particularly valuable to the commissions. The inevitable result follows that our men are tempted to accept places that pay more, and the time and labor put into training them for our work goes for naught. In cases of this kind, where, however unconsciously, Government services do actually bid against one another for men, the result is destructive to the services which are handicapped by statutory salaries.

This adds emphasis to the suggestion that these salaries should be made more commensurate with the value of the work done. There ought, however, to be a certain comity between Government services in this matter whereby one of them does not for its own

advantage work injury to another through taking its men away without notice. The subject is treated in another aspect under the Bureau of Standards.

Special Tariff Study Prepared for the Senate.

In response to a Senate resolution of January 17, 1916, there was prepared in the Bureau's cost of production division a report entitled "Foreign Commerce and the Tariff," which was subsequently published as Senate Document No. 366, Sixty-fourth Congress, first session. This pamphlet presents comprehensive statistics of imports and exports of foodstuffs, raw materials, and manufactured articles for a long period of years, traces the immediate effect on imports of changes in tariff laws, compares for many articles the ad valorem duty and the labor cost, and contrasts the growth in imports and exports of manufactures of the United States, the United Kingdom, Germany, and France. The period selected for analysis covers the 17 years from the fiscal year ended June 30, 1899—the first full year under the Dingley Tariff Act—to and including the fiscal year ended June 30, 1915. A supplementary comparison is made for the nine months October 1, 1912, to June 30, 1913, and from October 4, 1913, to June 30, 1914, this latter period beginning with the operation of the present tariff law and ending one month before the outbreak of the European war. Although this period was much too short to permit a fully satisfactory study of the effect of the tariff on imports or exports, the facts are clearly set forth and the tendencies indicated. Twenty-nine tables of detailed statistics enhance the value of this concise and significant report.

Examinations for Eligibles for Appointment.

Efforts to improve the personnel of the Bureau, both in the main office in Washington and in the field offices in the United States and foreign countries, continued along the lines adopted in the previous year. The examination system, consisting of a written test to which were admitted all applicants making out a prima facie case of fitness and an oral test before a board in Washington where the personal fitness of the successful candidates in the written examinations were passed upon, worked out very well. A noticeable improvement in the quality of appointments was achieved. During the year the United States Civil Service Commission examined 56 candidates for commercial attaché, 194 candidates for special agent, and 115 candidates for commercial agent. Fifty-seven candidates took oral examinations and 18

appointments resulted. In addition to these special examinations conducted by the courtesy of the Civil Service Commission, there were 10 regular civil-service examinations.

The widest kind of publicity was given to the special examinations and there was strong competition for practically every place in the field services. The Bureau received the hearty cooperation of the United States Civil Service Commission, the associations of manufacturers and other commercial organizations interested, the newspapers and trade press, and universities, colleges, and schools of commerce. Technical questions for examinations were in several instances prepared by the secretaries of associations, and assistance in correcting the examination papers was rendered by the officers of the associations, the editors of trade papers, and experts in the Bureau of Standards. The oral examinations which were conducted for the principal appointments were attended by experts from various Government offices. It is a feature worthy of note that many of the appointees were men who resigned from positions carrying higher salaries than those paid in the Bureau. It had become known that appointments were on the "best man" basis, and as a result there were high-grade applicants who would not otherwise have been interested.

BUREAU OF STANDARDS.

Functions of the Bureau.

The work of the Bureau of Standards is so individual, so differentiated alike in its character and its location from other Government services, yet so intimately wrought into the fabric of our progress, that it is fitting to explain its functions somewhat in detail and to point out how they bear on our national growth. It is a testing bureau for the Government. It is a national physical laboratory. It develops and establishes standards of weights and measures. But in doing these it does much more. It reaches out into every walk of life and may be truly said to establish standards which to a greater or less degree affect the life and work of every citizen in his domestic, professional, commercial, industrial, or scientific relations.

There are three important phases of this work. There is the solid foundation of research into the fields of precise measurements, of electricity, heat, light, chemistry, metallurgy, and into the whole subject of structural, engineering, industrial, and miscellaneous materials, including such as rubber, paper, textiles, and many others. There is the application of the results of these scientific researches to the help of all our industries, our public utilities, our railways, and to the operations of cities, States, and the National Government itself.

Also, there is the direct application of scientific research directly and indirectly to human life, to aiding the social advance of our people. This appears in its development of safety codes, such as the National Electric Safety Code, the National Gas Safety Code, and the continuing studies for the prevention of fire, both on land and water. It appears also in the popular scientific circulars, such as Measurements for the Household, soon to be followed by Materials in the Household, and this in its turn by Safety in the Household. This series of three pamphlets constitutes the most effective forward steps yet taken anywhere to bring the results of scientific research directly into the home. It is done in such a way that any household may have at its disposal in simple practical form the latest expression of the scientific study of all lands in all the past.

Again, the contribution of the Bureau of Standards to our social life appears in its studies of the safety of materials, especially those whose misuse or failure would involve danger to life. He would be bold indeed who would limit the present and future bearing of the work of this service on any form of human activities in this Nation. It cooperates with the sculptor in studying the composition of statuary bronze. It enters the brickkiln to advise on materials and processes there carried on. It produces the choicest of porcelains in exquisite colorings and glazes from new materials and aids in the construction of glass pots. It cooperates in the study of paper-making materials and in the application of new dyes. It joins forces with the electrotyper, the automobile engineer, and with those concerned in refrigeration. It provides safeguards against him who would deceive the humblest purchaser by a false weight or measure, and furnishes standard specimens to guide the largest industry. From the home to the greatest university, from the motor car to the railway system, from the mechanic at his bench to the largest operation of big business, its touch is constant, helpful, inspiring.

Its work in optics is not confined to the light visible to the eye. It has to do with mental optics as well as with the discovery and correction of industrial waste. It brings light where there was darkness before. I do not need to sound its praises. That is daily done by those the broad land over whom it has served. I merely express my deep appreciation of the public and social value of this great work and of the men who carry it on.

Technical Conferences at the Bureau.

A unique feature of the Bureau's work in a cooperative way is the system of technical conferences which are held almost daily throughout the year. At such conferences representatives of those interested in the subject of the conference participate in the discussions, thus giving a broad point of view conducive to the closer cooperation of all factors working for industrial progress. The Bureau has found these conferences to be of the highest value not only for their immediate practical results but for the mutual stimulus resulting from the interchange of experiences of the Bureau experts in their experimental researches and the engineering and industrial experts in the pressing problems of their work in the industries.

The value of such cooperation is mentioned here in order to emphasize the constructive work which is possible for the Govern-

ment to render to the industries and to science. By such methods the Bureau is rapidly becoming a coordinating center for scientific and engineering work. The Bureau unites the forces of physics and engineering in a manner which can not fail to be of the highest value to both, facilitating the rapid application of advances in one field to the needs of the other. A most urgent need to-day is for the more rapid assimilation of scientific progress by the industries. The lag between the publication of scientific results and their practical utilization in the industries must be reduced, and the Bureau of Standards, as shown in the pages of its annual report, aims to facilitate this in the various fields covered by its work. The system of conferences referred to is one of the most effective means to this end.

During the fiscal year 1916 the following societies held sessions at the Bureau of Standards: American Electrochemical Society, American Physical Society, Annual Conference of Weights and Measures (State, city, and national inspectors), Washington Chemical Society, and Washington Society of Engineers.

Cooperating committees or representatives of the following societies have met at the Bureau of Standards: American Ceramic Society, American Foundrymen's Association, American Institute of Metals, American Society of Refrigerating Engineers, American Railway Engineering Association, American Society of Civil Engineers, American Society for Testing Materials, National Electric Light Association, National Lime Manufacturers Association, National Scale Men's Association, Secretaries of Commercial Associations, Society of Automobile Engineers, and Society of Cotton Products Analysts.

Weights and Measures Conference.

The Eleventh Annual Conference on Weights and Measures was held at the Bureau of Standards on May 23–26, 1916. Twenty-one States were officially represented, and delegates were present also from the District of Columbia, Porto Rico, Philippine Islands, and 55 cities and counties. In addition there were 56 persons present representing manufacturers of weights and measures, railroads, etc. At this conference papers on important subjects affecting the work of weights and measures inspection were read and discussed, such as publicity, measuring pumps, industrial measuring equipment, national weights and measures week, methods of selling dry commodities, testing track scales, and specifications and tolerances of measuring devices. Important resolutions were passed,

and the specifications and tolerances were adopted. These are now recommended by the Bureau of Standards for adoption by the several States of the Union. Their early publication in final form will be of great value in unifying State legislation and local inspection practice on a basis approved by weights and measures experts. The fact should here be emphasized that ideal conditions as to uniformity of practice can not prevail until the National Government is given power by legislation to issue binding tolerances and specifications. This view is indorsed by the majority of State superintendents of weights and measures.

Cooperation With Weights and Measures Inspectors.

Some States have no State officials charged with the inspection of weights and measures. The local inspectors of such States apply to the Bureau for assistance, and the Bureau cooperates on the technical details of their work in every possible way. By this means the local inspectors are enabled to begin their work with a high standard in mind and with an efficiency which would otherwise be gained only after extended experience. In like manner newly appointed State superintendents of weights and measures apply to or visit the Bureau to obtain information as to the technical organization of their work and the selection of suitable equipment. Through the annual weights and measures conference such State superintendents are brought together at the Bureau to discuss the practical problems of their work. In this as in other fields of its work the Bureau serves as a clearing house of information and the means of coordinating and unifying inspection practice in all parts of the country.

Weights and Measures Testing.

A few examples may be selected to show the typical standardization work in progress at the Bureau. In the weights and measures division during the year, for example, there were tested 3,500 weights, 500 length standards for use in accurate surveys, 1,369 pieces of chemical measuring glassware, 1,138 hydrometers, and 1,200 automatic scales, 50 platform scales, and 325 track scales. Through such means the service of accuracy is furnished to the industries, since many of these measuring appliances regulate the manufacture of other measuring devices and regulate the accuracy of daily trade.

Of particular interest is the now thoroughly organized testing by two cars made for the purpose of railroad track scales in cooperation with the State and municipal weights and measures

officials, with weight masters, manufacturers, railroads, and Government departments. The work has been done during the year in 25 States. Of 325 scales examined, 61.8 per cent failed to meet the standard of accuracy set. A thorough technical report of the condition of each scale is furnished to all concerned. The Bureau cooperates with the inspectors, weight masters, and manufacturers in improving the methods of construction, maintenance, and operation of these scales.

Mechanical Standards.

The subject of industrial preparedness has emphasized the need for mechanical standards and the adequacy of the means for making and checking such standards. This work is an important part of the Bureau's function, but the present staff would be inadequate to handle it if the work is to increase materially. In view of the large appropriation made by Congress for providing systematically the gauges and measuring tools and other equipment necessary for this purpose, it is probable that the Bureau will be called upon to greatly increase this work.

The need for mechanical standards for materials has been brought many times to the attention of the Bureau within the year, particularly in regard to such products as screws, bolts, nuts, wire, and sheet metal. The diversity of the gauges and standards for such materials is confusing in the extreme, and it is very generally agreed, for example, that a single sheet metal gauge is highly desirable. The Bureau cooperates with the general movements for uniform standards, and it is clear that many engineers and manufacturers are prepared to make some sacrifice of individual preference in the interests of the widest possible uniformity of such standards. With the entrance of the United States into wider foreign markets of the world, the need for standards upon an international basis will be more and more keenly felt, and it need hardly be added that such standards would be less troublesome and less costly the sooner they are adopted.

Temperature Scale.

The temperature work of the Bureau of Standards is of special industrial importance. The establishment of the temperature scale from absolute zero to the highest known temperatures involves investigations in the scientific theory of temperature and heat measurements, laboratory researches of the most exacting nature, and refined apparatus which can be maintained only by continued standardization. The results of such work are applied

in almost every branch of science and industry. The temperature scale is maintained by certain fixed reference points, the fundamental being the freezing and boiling points of water. During the year an important fixed point for lower temperatures was determined, namely, the freezing point of mercury. The painstaking manner in which this was done resulted in an exceptional degree of accuracy, the results being expressed to thousandths of a degree Centigrade. The higher ranges of temperature are maintained by fixed points, such as the melting points of the metals and other chemical elements and compounds. During the year work was done on the sulphur boiling point, which is one of the fixed points used. The Bureau is about to issue standard heat samples, consisting of pure copper, pure aluminum, and pure zinc, the melting points of which are points that, in part, define the working temperature scale. With these samples the industries will be enabled to check the accuracy of the readings of their temperature measuring instruments.

Public-Utility Standards.

The Bureau's work in connection with public utilities, such as electric light and power, gas, and street railway and telephone service, includes scientific and engineering research, formulation of specifications or standards of practice, performance, and service, which may be briefly designated as "public-utility standards." The Bureau's publications on standards for electric service and standards for gas service, recently published, were prepared with the nation-wide cooperation of all technical interests concerned. Laboratory research, field investigations, expert questionnaires, conferences, and correspondence all contributed to the success of these documents. In developing standards for gas and electric service, the Bureau has rendered an invaluable service not only to the local utility commissions charged with regulating such service but to the gas and electric industries themselves by making available a national code specifying the conditions of adequacy and safety. The Bureau's work in these subjects will operate to reduce mortality and accidents, promote uniformity of engineering practice, and result in improved service to the general public.

In this connection a most important service rendered to the municipalities and the street railways of the country is the Bureau's researches in the laboratory and in the field on the effects of electric currents which cause corrosion of underground piping

and structures with serious property damage. The economic importance of the Bureau's system of electrolysis survey and remedial measures is realized by the corporations concerned, who express the keenest appreciation of the effective work of the Bureau in this field. Practical results of the Bureau's work are described in publications now available to those concerned. It may be added that the total cost of this work to the Government is justified many times over in the annual saving resulting from the installation of electrolysis mitigative systems suggested by the Bureau.

In the general investigation of public-utility standards, for which provision was made by Congress, the Bureau has investigated the extent to which telephone service may be adequately specified in the series of service specifications or standards. Much preliminary work will be required, both experimental and in actual service, and the heartiest cooperation is expected from both operative interests and the public, as the Bureau's work, as in the case of other public-utility standards, will be fundamental to the technical regulation of telephone service for the general work on public-utility standards. Some single States appropriate five to ten times as much as is available for the Bureau's work on this subject. The results obtained by the Bureau thus far have proved the economic value of expenditures for this purpose. It may be stated that the services required of the Bureau in this connection have far exceeded its capacity with the funds and staff now available.

Fire-Resisting Properties of Materials.

An important feature of the heat work of the Bureau has been the progress in the investigation of fire-resisting properties of materials. An example of such progress of particular interest is the installation during the year of the panel-testing equipment, in which full-size built-up walls and partitions may be tested to destruction and the failures studied scientifically with respect to temperatures and other conditions. The Bureau has cooperated with the Underwriters' Laboratories of Chicago and the Factory Mutual Laboratories of the Associated Factory Mutual Fire Insurance Companies, Boston, Mass., in conducting fire tests of building columns. The syllabus of proposed tests was submitted to hundreds of engineers and architects and the resulting suggestions used in preparing the final test program. The temperature-measuring equipment to be used in connection with the specially designed furnace will permit temperature changes in the structural

columns to be followed throughout the course of the fire test. The keenest interest is felt by all engineers concerned in structural work, and it is believed that the results of these tests will be of great importance in structural engineering and in fire-resisting construction. Incidental to this investigation is the technical study of building codes of the world. These codes govern the construction of houses and other buildings in cities. A basic study of the provisions of such codes will eventually result in the formulation of a standard building code. The Bureau's general researches upon structural materials make it appropriate that the formulation of this code should be undertaken in connection with its work on the fire-resisting properties of materials.

Many of the researches in heat and temperature measurements are of so highly technical a character that their significance is appreciated only by specialists in this subject. Such scientific work, however, is of fundamental importance in technical investigations such as just described, as well as in the control of the temperature conditions which vitally affect the efficiency of industrial processes in many industries.

Investigations of Materials.

The Director's annual report shows a large number of important investigations completed and in progress relating to the properties of structural, engineering, and miscellaneous materials. Some details will be found in the report, but reference is made here to several typical cases illustrating the value of this work. In the clay-products section of the Bureau leadless glazes have been developed which avoid the disastrous effects of lead poisoning in the pottery industries, methods of controlling the quality of clays were developed to such an extent that American clays may now be used in making pottery and porcelain ware which were formerly imported, and, furthermore, the Bureau has introduced scientific methods in the manufacture of clay products. Similar investigations of a fundamental character are in progress in the Bureau laboratory devoted to the subjects of cement, lime, stuccos, paper, textiles, rubber, paints, and similar industrial materials. In such work the Bureau selects the fundamental problems which can best be done in a Government laboratory where auxiliary equipment and technical experts in many lines are available. Special mention should be made of investigations which have proven of economic importance in the duplication of enamels for ironware, special kinds of imported papers, refractory materials, and optical glass.

Typical Investigations for the Industries.

The publication by the Bureau of various tables of densities emphasizes the commercial importance of the measurement of densities, particularly in checking the strength and controlling the purity of technical materials. During the year the Bureau computed and furnished density and volumetric tables for the United States Pharmacopœia, which publishes such standards for the use of the medical profession and the drug and chemical industries.

A scientific study of the theory underlying lubrication has been made, and an important contribution to the subject is that the ordinary laboratory test will not in some cases give the true viscosity of the lubricant. It need hardly be added that a scientifically correct theory of lubrication and a system of testing lubricating oils based thereon will be of great industrial value.

The Bureau's investigation of liquid-measuring pumps brought to light the important subject of the accuracy of such devices. The results of the Bureau's investigations made in the field and in the laboratory have been set forth in a Bureau publication which has just appeared. Short delivery was found to prevail in many sections of the country.

The Bureau has cooperated with the local inspectors in the interest of the users of gasoline and other products measured by such pumps. With the rapid development of new processes in commerce and industry, new problems are encountered which involve measurements and tests for which suitable methods or instruments are not available. In many cases the Bureau assists in developing such methods and equipments.

Standard-Barrel Act.

An act approved by Congress March 4, 1915, establishing standard barrels for fruits, vegetables, and other dry commodities went into effect July 1, 1916. The confusing effect on commerce of the manifold varieties of barrels used for various purposes will be remedied to a great extent, and the uncertainties of prices and quantity statistics will be greatly reduced as a result of this act. As the technical administration of this act will be in the hands of the Bureau of Standards, the Bureau has been active in studying the problem at first hand in the industries affected and rendering the utmost assistance, especially to the manufacturers, packers, and shippers of barrels, in meeting the requirements of the new law.

Optics.

The optical work of the Bureau has very direct technical applications. Fundamental researches have been completed on the wave lengths of light in the various portions of the visible and invisible spectrum of various elements. These values are as important in spectrographic work as the measurements of length in mechanical work. It may be added that such work has been found of value in the analysis of alloy steels, ores, and slags. The use of the spectroscope for quantitative analysis of metals is an unexpected and striking use of pure science in industrial and technical problems. The method is easier and more sensitive than chemical analysis, and the results show that accuracy will be possible when the subject has been more fully studied. Another application of pure science to the industries is the use of polarimetry in sugar analysis and in developing methods of grading samples by analysis. Disputes arose about a year ago between the buyers and sellers of low-grade molasses, and the Bureau served as referee, using optical methods in adjusting the basis of settlement. This branch of optics is known as polarimetry and is the basis for sampling and rating sugars and other products throughout the world. Many refined researches are necessary to place this work upon a precise basis and much of the fundamental work in this field has been done at the Bureau of Standards. Another optical problem of great importance is the standardization of colors and the development of satisfactory methods of color grading for various industrial products. The Bureau has recently developed inclosed standards which are relatively constant where the same materials exposed would change color within a short time. The conditions of reproducibility and definition of color have been studied, tests of color blindness conducted, and apparatus developed for applying the methods of color determinations. In the same laboratory specifications have been prepared for transparency and methods devised for measuring turbidity, and the expansion of materials with temperature has been determined optically with high precision.

Another branch of the optical work of special interest is the optical study of internal strains in glassware, particularly that designed for chemical work which is subjected to heat. A theoretical and experimental study of the errors of lenses has been made, and results will be published at an early date. The tests regularly performed by the Bureau for other departments, includ-

ing the Army and Navy, comprise such instruments as microscopes, photographic lenses, searchlight mirrors, periscopes, telescopes, projection lenses, and gun sights. The Bureau is serving as technical adviser in such matters to various branches of the Government service. An important branch of experimental research undertaken at the Bureau includes the most technical aspects of the subject of radiation. The Bureau has developed methods and completed researches upon the fundamental constants of radiation and constructed instruments from 10 to 20 times more sensitive than any previously constructed. These instruments are of practical service in researches in astronomy and in some cases in psychological laboratory work. The most direct application, however, of these studies of radiation is in standardizing the fundamental data involved in expressing the quality and intensity of radiation in a form suitable for computation. The practical applications extend to the measurements of high temperatures and the development of improved methods of producing artificial light.

Photometry.

The testing of incandescent electric lamps by the Bureau of Standards is a typical system of inspection and test used for all departments of the Federal Government. During the year about a million and a quarter lamps were inspected and tested under specifications prepared by the Bureau in cooperation with the lamp makers and Government representatives. The lamps are inspected at the factory by the Bureau inspectors, and samples are selected and submitted to life test at a specified efficiency in the Bureau laboratories. About 5,000 selected samples are burned on test annually. The methods used in this work have been carefully described in a Bureau publication just issued on the subject. The methods and apparatus devised at the Bureau have been of the greatest usefulness in the general development of the lighting industry. Interesting researches at the Bureau have been completed during the year upon problems involved in the new high-efficiency gas-filled tungsten lamps, in improved methods of measuring light, the study of the color factor in comparing lights from different sources, and the performance of gas-mantle lamps with various elements. In such cases the Bureau works in close cooperation with makers of various types of light sources, illuminating engineers, and gas and electric light companies, as

well as experts engaged in improving the methods of light production. On this phase of the Bureau's work it is felt that the Bureau could render service of a high economic value to the public in the better utilization of artificial light, and in many cases illumination could be greatly improved without increase in cost. The Bureau's publications on the subjects of gas and electric light, especially in the popular circular Measurements for the Household, have been recognized as being an excellent beginning in this direction. This instance is typical of almost every field of the Bureau's work which touches materials and appliances in general use by the public. The knowledge of their efficient use would go far toward promoting the general welfare by increasing safety, economy, and efficiency.

Magnetic Research.

A practical research of unusual interest has been completed after several years of painstaking work. This has yielded a method of determining the properties of irons and steels by magnetization. The magnetic properties exhibited bear a direct relation to the physical and mechanical quality and structure of these metals. Any flaw in the metal promptly shows itself in the graphic curve automatically plotted by the magnetic instruments used. A striking application has been made in determining the quality of steel rails and also of steel to be used for springs and knife blades. The results of the work have just been published by the Bureau and give promise of great practical value. The unique advantage of the method is that the magnetic method tests the whole amount of the material and not the surface only, and that it leaves the test piece unaltered so that the actual specimen tested may be used in a structure after the test has been completed.

Radium Research.

The increasing use of radium and radium products in medical work and for luminous preparations for watch and clock dials and in scientific research have accentuated the importance of the Bureau's work in standardizing the radioactivity of such preparations. Not having facilities for testing the radioactivity of specimens purchased, the buyer has formerly been helpless. Since the Bureau has taken up this work, however, the purchase price is based upon the strength certified by the Bureau of Standards, and the purchaser may demand a certificate from the Bureau.

Metallurgy.

The Bureau's work in metallurgy has resulted in a number of important practical publications. These cover such subjects as platinum, structural brass, pure iron, fusible tin boiler plugs, segregation in steel, pyrometry, rail specifications, etc. Much of this work is being done with the close cooperation of technical societies, such as the American Institute of Metals and the American Foundrymen's Association. The metallurgical work ranges from the quality of materials and the causes of failure to the temperature and other conditions for securing uniformity in the product. The Bureau has investigated the causes of failures of materials in large engineering enterprises, such as manganese bronze used in the great Catskill aqueducts, the tin used in the fusible boiler plugs, deterioration of tinned copper roofing of the Library of Congress, and failures of railway materials. Such failures lead directly to the most fundamental problems of the structure and reactions of metals under different conditions. Only by metallurgical investigations covering every phase of the subject can the quality of metals be theoretically controlled.

The question of outdoor statuary bronzes was submitted to the Bureau by the art commissions of New York, Philadelphia, and Detroit for the purpose of determining the most suitable chemical composition for such bronze and the requisite conditions for its care and maintenance. A systematic study will go far toward improving material and methods of preservation. Likewise the American Foundrymen's Association has submitted fundamental problems; for example, the standardization and testing of molding sands, uniformity of castings from the same ingot at different foundries, and similar problems. The metallurgical work includes the chemistry of the metals, their physical properties, their mechanical strength, and the important subjects of heat treatment and microstructure. The Bureau publications issued during the year on metallurgical subjects contain results of great value to metallurgical and metal industries.

Radio Communication Research.

Of particular interest is the cooperation of the Bureau of Standards with other Government departments in radio research and standards. The small appropriation made for this purpose has been very useful in extending this cooperation, and the new radio laboratory provided by Congress will offer facilities for still more effective work. The Bureau has designed and made instru-

ments suitable for the inspection work of the Bureau of Navigation, including auxiliary apparatus. An interesting and useful application which the Bureau is making of radio communication is in promoting safety at sea. For this purpose the Bureau experts have designed and constructed small radio sets as experimental installations in a lighthouse and in a lighthouse tender. This will enable the Lighthouse Service to render aid to navigation in a more effective manner than ever before. The Bureau fog-signaling apparatus is designed to automatically send out distinctive signals once each minute of short wave length which may be received by all ships within a few miles of the lighthouse. When used in conjunction with the new "direction finder" devised at the Bureau, ships will be enabled to get their bearings by radio communication at all times. This system of radio signaling would supplement the regular lighthouse service in time of fog and greatly assist in navigation. The direction finder referred to is a device of unusual importance. It replaces antenna and is small enough to use in an ordinary room. Trans-Atlantic signals have been received, and the direction of the sending stations are found with high accuracy. This is being adapted for use on battleships and aeroplanes and gives promise of the highest usefulness.

The Bureau has recently provided standard circuits for radio-calibration work for wave lengths up to 20,000 meters. This work involved the design of auxiliary apparatus of suitable types. In connection with the radio work above described the Bureau is undertaking numerous other researches in the various phases of radio work, and the practical results of such researches have already been highly gratifying.

By the bill approved July 1, 1916, an appropriation of $50,000 was made for the construction of a new radio laboratory. The plans for this building are now complete. In preparing them the officers in charge of the radio service of the War Department and the Navy Department were consulted, and the building will be arranged for cooperative use by these services and by the Bureau of Standards.

Chemical Laboratory.

Work has progressed well upon the new chemical laboratory, which at the date of this report is fully inclosed. The work of installing the necessary equipment and furniture will proceed during the winter on the expectation of having the laboratory ready for use in the spring of 1917.

Saving Industrial Wastes.

An interesting example of the saving of industrial wastes has arisen in connection with paraffin paper. It was found that quantities of paraffin-paper scrap or paper stock containing paraffin paper were either destroyed or sold with difficulty and at a low price because the material was not available for further use by reason of the wax in the paper. No commercial process was known for removing this wax. The matter being brought to the attention of the Department by an interested manufacturer, it was referred to the Bureau of Standards. A sample lot of the waste material being supplied, a simple process for removing the wax and utilizing the paper stock was developed and put into practical operation. The Bureau has since issued a special circular letter upon this subject and has sent its expert to supervise the operation of the method recommended where the process has been installed.

Most of the work of the Bureau of Standards in materials has for its ultimate purpose saving waste in materials now used or now wasted because unused. Such materials include clay which by proper treatment can be made available for important uses; materials for making concrete; materials for paper making, including fibers and clays; the saving of unused materials in button making, etc. There are hundreds of cases annually in which manufacturing concerns write or send for specific information to apply in the improvement of processes, the saving of by-products, and the elimination of wastes. The Bureau of Standards could do a great productive work for the country that is badly needed if it had a special force and equipment to be devoted solely to this department of saving industrial wastes.

Recommendations.

Pursuant to suggestions made in my last report, an item has been included in the estimates for the fiscal year ending June 30, 1918, providing for the purchase of the strip of land on the north side of the present property of the Bureau, between that property and Van Ness Street, and also for securing the narrow strip of land between the present property of the Bureau and Tilden Street on the south side.

The increase in the operations of the War Department give emphasis to its repeated requests that the Bureau of Standards vacate the old arsenal buildings in Pittsburgh, which they have long occupied by courtesy for carrying on their structural-ma-

terial work. Although the funds available for these vital studies are barely sufficient to meet the needs of such testing as the Government itself requires, large equipment has been accumulated both in Pittsburgh and Washington, and more is needed. The work is one in which every citizen is interested, and it is essential that the large testing machines required should be provided and that these with the furnaces and other heavy apparatus necessary for the work should be assembled in a building designed for the purpose and of a sufficient size.

Accurate knowledge of the laws governing the behavior of girders used in bridges and other construction stops when we reach a moderate size. It can not be too strongly emphasized that our knowledge is as yet imperfect as regards the laws governing the action of large girders. We do not know certainly what we are about when we use them. There is too much guesswork—too little known fact. If we continue inaction on this important subject, some accident will, at sad cost, so disclose to everyone the limits of our present knowledge that we shall under the pressure of unhappy circumstances take the step which ought to be taken now. Foresight calls for prompt action on this subject. Hindsight will be rather apt to condemn those who fail of foresight to-day. I renew the quotation in my last report from the late Alfred Noble, one of America's most distinguished engineers:

> The use of steel and concrete in girders in the construction of bridges and buildings is increasing rapidly. The calculations of strength of such girders are to a large extent based on theory, not well checked by actual tests; such tests as have been made were on small girders, and the value of the results in determining the dimensions of large girders, such as are now in common use, is doubtful. It is questionable whether, on the one hand, many structures in daily use are not perilously near the breaking point; or, on the other hand, whether the structures are not built unnecessarily massive and costly.
>
> There is therefore great need of a large testing machine for actually testing the strength of girders of large size. Such a machine, operated under the direction of the Bureau of Standards, would soon repay its cost by inducing more economical and safer construction.

An item, therefore, is inserted in the estimates for the coming fiscal year providing for the purchase of a site for a testing laboratory for structural materials, for commencing the construction of a fireproof building, and for beginning work upon the large testing machine required for extending our knowledge of these vital matters beyond the present limits.

The recommendation in my last report that the scientific staff of the Bureau of Standards be increased to meet urgent conditions then existing is renewed and emphasized. For the past

three years there has been practically no increase in the statutory positions of the scientific staff. In the meantime, the calls upon the Bureau in connection with the scientific work of the country, and especially the industries, have grown by leaps and bounds. The demand on the part of the industries for accurate and reliable scientific data has never been as great or as important as at present. This demand is a rapidly increasing one. The growing prosperity of the country, the establishment of new industries, the growing demands of our manufacturers for scientific knowledge and for the aid of the service have added to the serious handicap under which the Bureau labored a year ago. As things now are, it is a hopeless task for the Bureau of Standards to meet the demands upon it. If things remain as they are, much of the work for which it was created must be left undone and much of the help our industries require can not be extended. I therefore have approved the request of the Director of the Bureau of Standards that items be inserted in the estimates for the coming fiscal year which shall add a sufficient scientific staff to cope with the existing demands and which shall provide such further small additions to the clerical and mechanical staff as are required for the same purpose. It is evident that the completion of the new chemical laboratory will itself call for a considerable addition to the staff.

Never has the demand for scientific and technically trained men been as great as at present. This has resulted in the loss of many well-trained men in the Bureau's staff. The time has come when some of the salaries paid such experts must be increased or their services dispensed with. This can not be done without a loss in quality and the deterioration of the high standard of the Bureau's work.

The testing and investigational work of the Bureau is greatly handicapped by the lack of sufficient instrument makers and mechanics. Estimates will be submitted for additional assistance of this kind.

I renew my request of last year for an assistant to the Director, for an editorial clerk, and for a property clerk. No private business of similar size would think of hampering its head with minor details of administration which prevent giving needed time and attention to the large problems that daily arise. If the work of the service is to go on as it should, these three posts should be promptly created and filled. The property of the Government

in the large group of buildings occupied by the Bureau has no proper custodian to-day and can not have one until the property clerk now requested is provided.

Increases in Special Funds.

Increases are urgently needed in several of the special funds under which the Bureau is carrying on important work. The structural-material fund is barely sufficient to care for the testing work of the Government service. It should be increased by at least 50 per cent, in order that the Bureau may undertake more investigational work needed by the Government service and by the public. The importance of this work can hardly be overestimated, not only from the standpoint of economy and efficiency in the structural work of the Government, but from that of the efficient and economical use of these materials on the part of the public.

The Bureau's work in connection with public utilities has proven of the utmost importance. The fund available is insufficient to cover more than two or three problems. The present appropriation might well be increased several fold. It would meet with the hearty approval of all public-service and municipal bodies having to do with the regulation of public utilities. It would contribute greatly to better service on the part of public utilities, as well as to the conservation of life and property.

The enormous annual loss of property by fire emphasizes the great necessity for a better knowledge of the fire-resisting properties of materials and construction. To be of value, such work must be carried on on specimens commensurate with those used in practice. The Bureau's work in this direction has been well organized and much of the apparatus constructed. However, funds are needed for additional equipment as well as materials upon which to work, which in such cases are necessarily expensive; therefore, this fund should be increased by at least 50 per cent.

The fund available during the present year for the investigation of mechanical appliances is not sufficient to meet even the needs of the Government service. Here again, as in the purchase of materials, the Government is purchasing machinery and all sorts of devices in accordance with carefully prepared specifications, and suitable tests are made before their acceptance. The standards of performance in such cases and the methods of measuring the same are equally important to the manufacturer and to the public. This fund should be increased to at least double its present amount.

In general it has been thought best to submit only such estimates as are urgently needed to care for present work rather than to enter new fields. However, two exceedingly important cases have arisen for which estimates will be submitted. The first is that of optical glass. Notwithstanding the importance of this material in the construction of all sorts of optical instruments, it has not yet been successfully manufactured in this country in any considerable quantity. Every effort should be made to assist in the development of this industry. Estimates will be submitted for a special fund intended to enable the Bureau to undertake the important underlying scientific work needed in the production of optical glass.

The second case is that of electrodeposition of metals. Many industries are vitally concerned in the fundamental principles of the electrodeposition of metals, as, for example, the electrotyping and electroplating industries. Little attention has been paid to the underlying scientific principles involved. Such information is urgently needed; therefore, an estimate will be submitted for this purpose.

New Power Plant.

A new power-plant building has become an urgent necessity. The total boiler capacity of the present plant is already seriously overloaded, and the danger of operating with no reserve in case of breakdown is apparent. The electric generating units are in good condition, but should be moved to a new location to relieve the present crowded conditions. Repairs can not now be made with requisite facility, and many lines are inaccessible for repairs. Extension of switchboard space is impracticable in the present location, and for this reason much objectionable and unsafe construction has had to be permitted. The space vacated will be admirably suited to purposes of a general shipping and store room, which is also badly needed.

Policy as to Personnel.

Transfers from the scientific services of the Department to other Government and to private scientific services should be by mutual consent. The Bureau of Standards is constantly embarrassed because its men are tempted away by other Government services and by private concerns. The Bureau is willing to transfer its men either to improved positions in other Government departments or in private life, but thinks it proper that it should be so treated in the matter that its own work shall not be

thereby suddenly and seriously interrupted. In particular, it feels that other Government services should not without notice or consultation take its officers away from the duties for which they have been specially trained without giving it opportunity to prepare for the change. The Bureau of Standards is always ready to take in men and train them for any particular research work within its scope that is desired. Some large industries and railroad companies and some Government services take advantage of this. At present, however, the custom (for it is no less) of tempting its men away by privately offering them higher salaries, without consultation of the Director of the Bureau or without any notice of any kind to him, is one that works serious harm to the public through the stoppage of important scientific work and frequently also works out a serious injustice to the individuals concerned.

I renew the suggestion in my last report respecting the relative treatment by the Government of its scientific, its naval, and its military staffs. The latter, after being educated at great public cost, are assured permanent employment and are given a retirement privilege affording protection in their old age. This is proper and admirable. It is quite improper, however, to restrict it to these particular public servants and to refuse it to others quite as worthy. The scientific staff of the Government is, to say the least, no less productive. The members of that staff give their lives to the country quite as truly unless the Government so ill rewards them for their services that individuals can afford to pay them better.

There is the closest cooperation between the scientific force and the officers of the naval and military establishments, yet the man of science, whose work is embodied in the battleship, in the wireless telegraph, in the explosive, pays for his own education, has no certitude of employment, and can look forward to no protection when he is old. If he wishes the same security that the officer of the Army or Navy has, he must look elsewhere than to the Government for it. Serve he the Government never so faithfully, it extends to him no hand of helpfulness. When our young scientific men leave college after acquiring an education at private cost, they start work in our laboratories at $1,000 or $1,200 per annum, which makes an interesting comparison with the pay given, for example, at the Naval Academy, plus a free education. If a young scientific man enters our service at $1,600, it is usually

because he has spent his own money and time acquiring some special degree in a university and thereby enhancing his value to the public. In a service like the Coast and Geodetic Survey men give their best years to working in remote parts of the United States, Alaska, and the Philippines, must go to sea in small vessels, and at the risk of storms and unknown dangers provide safety for the lives and property of others by surveying waters for the first time. They also must give up home life and endure hardships and dangers at least equal to those which a military service requires. It is not just that with equal education and productiveness, assuming similar risks in their country's service, they should receive unequal treatment. The scientific staff of the Bureau of Fisheries directly aids in discovering new foods and in making them available for mankind. Whole industries also depend upon the fruits of their labors. Yet they receive a similar lack of recognition at the hands of the public. The practical attitude of the Nation toward the men of productive science is the reverse of that which it holds to the trained officers, soldiers, or sailors. All these men are useful, unselfish public servants. There is no thought of preferring one to another. The comparison is between the way in which the Government treats the one and the other and between the way the scientific men are welcomed in our industries, in our universities, and in Government services. The men of science in the Government employ do the work on which our economic structure and our industrial processes in large part depend. They do not receive a sufficient reward.

BUREAU OF THE CENSUS.

During the fiscal year the Bureau of the Census compiled and published a considerable part of the primary or fundamental statistics based on its latest canvass of manufacturing industries and carried on the compilation of more detailed statistics for later publication; conducted its regular annual inquiries relating to mortality, to municipalities, and to cotton and cottonseed; prepared and published the Official Register of the United States; completed the preparation of a report on the blind and brought well toward completion one on the deaf; made semiannual collections of statistics relating to stocks of leaf tobacco; issued a set of tables showing expectation of life for various classes of the population; carried on the compilation of a monograph giving detailed statistics relative to deaths from cancer; prepared estimates of population for States and municipalities; took special censuses of four cities and towns; and complied with many requests for information contained in its records.

CURRENT AND COMPLETED WORK ON STATUTORY INQUIRIES.

Census of Manufactures.

The field work on this investigation, which related to the calendar year 1914, and was made as of December 31, 1914, was completed early in the fiscal year. The compilation and publication of the primary or fundamental statistics based on the inquiry were brought well toward completion during the year and have been finished since its close. The work could have been completed sooner and at less cost if manufacturers throughout the country had responded more promptly and carefully to the request of the Director of the Census for the information required by law. After the reports had been secured, it was found necessary to return many of them to the manufacturers for correction and verification; in some instances this had to be done two or three times. On the other hand, the thanks of the Department are extended to those many manufacturers who by filling out and transmitting over 50,000 schedules in correct form permitted my requesting the Senate Committee on Appropriations to reduce the amount of the sum allotted for the cost of the manufactures census by $40,000.

The statistics relating to all manufacturing industries combined, for the entire United States, were sent to the printer on July 24, 1916—an earlier date, relatively to the period covered by the inquiry, than that at which the comparable figures for any preceding similar census had gone to press and fully two months earlier than the corresponding date in the case of the last preceding census, that of 1909. These statistics show that the total number of persons engaged in manufactures increased from 7,678,578 in 1909 to 8,265,426 in 1914, or by 7.6 per cent, and that the gross value of products increased from $20,672,052,000 in the earlier year to $24,246,323,000 in the later, or by 17.3 per cent.

The remaining work in connection with this census will consist in the preparation of the analytical tables and the text for the final reports, which will comprise an abstract in the form of an octavo volume of about 500 pages and three or four large quarto volumes of approximately 1,000 pages each. (See recommendation relating to "Intermediate census of manufactures," under "Legislation needed.")

Vital Statistics.

The work on the report Mortality Statistics, 1915, is progressing satisfactorily, and the copy will probably be in the hands of the printer by December 1, 1916. A preliminary statement, in the form of a press summary, giving the number of deaths and the death rate for each registration State and each city of more than 100,000 population, has already been issued.

The work on the report Birth Statistics, 1915, is also progressing in a satisfactory manner, and the copy will be sent to the printer at about the same time as that for Mortality Statistics.

The census reports presenting vital statistics are, from year to year, being brought to a higher standard of usefulness. The registration of deaths—which, under the Constitution of the United States, is necessarily a function of the State and municipal authorities—is constantly becoming more nearly complete, the registration area having been extended until it now contains about 70 per cent of our total population. Until recently the birth-registration systems of the States and municipalities were in most cases so inadequate that the Census Bureau did not compile and publish birth statistics. Now the collection of such statistics has also been begun; and it is expected that the registration area for births, which at present contains more than 32 per cent of the population

of the country, will, like the death-registration area, be extended from year to year.

(See also "Life tables" and "Monograph on cancer," under "Special and miscellaneous lines of work.")

Financial Statistics of Cities.

The annual report presenting financial statistics for cities of more than 30,000 population, relating, in the case of each city, to its latest fiscal year terminated prior to July 1, 1915, was completed and sent to the printer in January, 1916, less than seven months after the close of the period covered. This report, which fills 338 pages, presents detailed statistics relating to revenues, expenditures, indebtedness, assessed valuation, and value of municipal properties. The Bureau's classification of municipal financial statistics has received the indorsement of the leading civic organizations of the country, and is now followed to a greater or less extent by many of the cities having more than 30,000 inhabitants.

General Statistics of Cities.

The report on this inquiry, which also referred, in the case of each municipality, to its latest fiscal period ended prior to July 1, 1915, related to the subjects of governmental organization, police departments, water-supply systems, and liquor licenses and taxes. It was completed and sent to the printer in November, 1915, five months after the close of the period covered. The demand for this report has been so great as to require a reprint.

The 1916 report on general statistics of cities will present detailed data in reference to recreation facilities, such as park areas and buildings, organization of park administration, playgrounds and athletics, baths and bathing beaches, zoological parks and collections, music and entertainment provided by the city, art galleries, museums, etc. Practically all the data for these subjects have already been collected, and their compilation is well under way. The report will probably go to the printer in November, 1916.

Cotton and Cottonseed.

During the year the Census Bureau gathered and published statistics relating to cotton ginned, consumed, imported, exported, and on hand, to active spindles, and to cottonseed and linters. A total of 26 reports, in the form of post cards, were issued during the year, and in addition an annual bulletin was published.

Under the authority of the act of Congress approved August 7, 1916, the Census Bureau will hereafter collect and publish monthly statistics relating to cottonseed crushed and cottonseed products manufactured and to imports and exports of cottonseed and its products.

The same act authorizes and directs the Census Bureau to collect and publish, at quarterly intervals, statistics of raw and prepared cotton and linters, cotton waste, and hull fiber consumed in the manufacture of guncotton and explosives of all kinds and of absorbent and medicated cotton. The first publication of these statistics will cover the entire calendar year 1915.

Tobacco Stocks.

The collection and publication semiannually of statistics relating to the quantities of leaf tobacco held by manufacturers and dealers have been carried on in accordance with the provisions of the act of April 30, 1912. Under authority contained in a provision of the act approved May 10, 1916, these statistics will be gathered and issued at quarterly intervals, beginning with the report for October 1, 1916.

The act of May 10, 1916, provides "that hereafter there shall be in the official organization of the Bureau [of the Census] a separate, distinct, and independent division called the Division of Cotton and Tobacco Statistics," and the same act also provides an appropriation "including $15,000 for collecting tobacco statistics authorized by law in addition to any other fund available therefor." Definite arrangements have been made for putting into effect the above provisions of the act.

Negroes in the United States.

The decennial report on Negroes in the United States is nearly completed, and a large part of it is already in type.

The Blind and the Deaf.

The decennial report on the blind population in the United States was completed and that relating to the deaf population was nearly completed during the fiscal year. Both are in the hands of the printer.

Prisoners and Juvenile Delinquents.

The work on the decennial report relating to prisoners and juvenile delinquents was well advanced toward completion during the fiscal year and will soon be in the hands of the printer.

Estimates of Population.

The preparation of a bulletin presenting midyear estimates of the population of States and cities for the years 1910 to 1916, inclusive, was practically completed during the fiscal year and has since been sent to the printer.

SPECIAL AND MISCELLANEOUS LINES OF WORK.

Life Tables.

One of the most important of the special lines of work undertaken by the Bureau was the preparation of a series of tables showing expectation of life for various elements of the population in certain States. These tables, compiled under the supervision of Prof. James W. Glover, of the University of Michigan, are similar in scope and manner of presentation to those issued by life insurance companies, but differ from the insurance tables in that they relate to the entire population of the area covered instead of being confined to risks selected through medical examination and otherwise. A similar set of tables, based on data covering a greater period of time, have been computed and will be published before the end of the current fiscal year. In the report presenting these tables will be given the original data on which they are based, together with an explanation of the methods employed in computing them.

Monograph on Cancer.

A monograph has been prepared and will soon be published in which are presented, in much greater detail than in the annual mortality reports issued by the Bureau, statistics in relation to deaths from cancer.

Financial Statistics of States.

A report on this subject, similar in scope to the Bureau's annual reports giving financial statistics of cities, was prepared and published. This report, which related in the case of each State to its latest fiscal year ended prior to July 1, 1915, was the first ever published in which the statistics pertaining to revenues, expenditures, indebtedness, assessed valuation, and State properties were given in so great detail. It aroused much interest among State officials, who are desirous that the investigation be made an annual one. (See recommendation relating to "Financial statistics of States," under "Legislation needed.")

Occupations and Child Labor.

Work was done in preparation of supplementary statistics of occupations, showing certain details not brought out in the general report on occupations, which formed one of the Thirteenth Census series. These supplementary occupation figures will include data relating to child labor. This work was suspended from October, 1914, to October, 1915, in order to provide as large a force as possible for the work on the current census of manufactures.

Special Censuses of Population.

Special censuses of the population of the following-named municipalities were taken at local request and expense: Highland Park, Mich.; St. Clair Heights, Mich.; Hastings, Nebr.; and El Paso, Tex.

Assistance Rendered Other Departments.

Lists of names and addresses of large manufacturing establishments, about 30,000 in number, were furnished the Secretary of the Navy for use in organizing the industries of the country in furtherance of the plans for military and naval preparedness. Lists of this character were also supplied to the Department of Agriculture and the Federal Trade Commission for use in connection with the activities of those offices.

In this connection it should be noted that the law respecting the confidential character of data collected by the Bureau of the Census is of so rigid a character that the Department is without authority to permit other Government departments to refer to the Census records and files even when the information is sought solely for Government use. The provision of the law on this subject reads, "nor shall the Director of the Census permit anyone other than the sworn employees of the Census Office to examine the individual records." It is in the highest degree proper that the confidence reposed by the business public in the inviolable character of the information given to the Bureau of the Census shall in no smallest respect be shaken. On the other hand, it is going very far to rigidly forbid the use of this information by other Government services who desire to apply it to strictly confidential public uses, as, for example, the determining of the manufacturers who are prepared to do work forming a portion of the national defense. It would seem practicable to place when necessary the employees of other Government departments under oath, as those of the Census are, and then upon proper written assurance of the confidential nature of the purpose for which the information is

required to permit its use by other Government departments when the good of the public required it.

The Federal Trade Commission has by reason of this law been obliged to undertake the collection of information at great labor and expense for confidential public purposes when much if not all of the information was in public records in the same building but was unavailable by reason of the law.

PLANS FOR FUTURE WORK.

Transportation by Water.

The preliminary work on this inquiry, which, under the law, is made at decennial intervals, was begun before the close of the fiscal year. The actual collection of the statistics, which will relate to the calendar year 1916, will commence early in 1917. By reason of the very great increase which has taken place in the number and tonnage of American-owned craft engaged in foreign and domestic commerce, and of the changes that have been made in the methods of conducting the business of water transportation, this investigation is one of especial interest and importance. Its scope will be extended, as compared with that of the 1906 inquiry, so as to cover the shipbuilding industry and the operations of fishing vessels.

Religious Bodies.

The census of religious bodies, like the water-transportation inquiry, is, under the law, made at decennial intervals, and the forthcoming one will relate to the calendar year 1916. The report will present, for each religious denomination, detailed statistics in regard to church membership, church property, number and salaries of ministers, Sunday schools, etc.

Marriage and Divorce.

A joint resolution is now pending in Congress which, if adopted, will authorize the Bureau of the Census to make an inquiry in regard to marriage and divorce covering the period from 1907 to 1915, inclusive, and at annual intervals thereafter. In case this investigation is thus authorized, the field work will begin within a short time after the adoption of the resolution.

Monograph on Tuberculosis.

A statistical monograph on deaths from tuberculosis covering the calendar year 1916 will be prepared and published. This monograph, like that relating to cancer (see "Monograph on

cancer," under "Special and miscellaneous lines of work"), will present much more detailed statistics than are given in the Bureau's annual reports on mortality.

Electrical Industries.

This inquiry, which, under the law, is taken at quinquennial intervals, covers central electric light and power stations, electric railways, and telephones and telegraphs. The forthcoming investigation will relate to the calendar year 1917, and, although the field work can not begin until after the close of that year, the preliminary office work will commence in the latter part of 1917. The quinquennial census reports in regard to electrical industries, begun in 1902, present a complete history of the development of these industries, which has been such an important factor in the industrial progress of the United States.

Executive Civil Service.

A bulletin presenting statistics in regard to the employees in the Federal service on July 1, 1916, will be compiled and published. The Census Bureau has already issued two such bulletins, the first relating to the year 1903 and the second to the year 1907.

Census of City Distribution.

Under my direction the Bureau of the Census is planning an inquiry in one or more cities into that portion of the cost of distribution which arises from cartage and hauling. There are three elements in the full act of transportation—the cartage element, the handling element, and the hauling element, using the latter to mean actual transportation by rail or water. Of these, the last is often the least and by comparison with the others small, though it is the phase which has occupied almost the whole public attention given to the general subject. Again, the first, or the cartage, element is frequently the largest of the three and probably is the largest single element in the entire cost of distribution. It seems probable that it amounts to a great deal more, possibly many times more, than our total annual freight charge. It is a remarkable thing that we allow ourselves to remain in ignorance of this matter. There have been made here and there sporadic attempts to get some information on the subject, but nothing continuous and conclusive has been done. The little that has been learned shows, however, that the problem is larger than is supposed. It has been indirectly attacked by the development of the automobile truck and by the making of improved roads,

but this has all been done without any clear knowledge of the size and weight of the problem to the solution of which it in some measure contributes. The Office of Public Roads and Rural Engineering of the Department of Agriculture has thrown more light upon this subject than is known to have come from any other source. It is hoped that the facts to be developed by the preliminary inquiry of the Bureau of the Census will lead to a thorough knowledge of this almost unknown but vital phase of the cost of living and so to adequate future treatment of it.

LEGISLATION NEEDED.

Intermediate Census of Manufactures.

Under existing law a census of manufactures in the United States is taken every fifth year. Since the close of the year 1914 conditions have so changed that the statistics for that year are no indication of the facts for 1916. There is constant demand for data concerning the annual output of our domestic manufactures at more frequent intervals than every fifth year. A census showing the annual gross value of the products of domestic manufactures and the quantity of some of the principal products could be taken very expeditiously and at small cost and would be of great value. This census need not include statistics of capital, persons employed, quantity of power used, or various other details covered by the regular quinquennial census of manufactures. The inquiry could be confined to the gross value of all products and the quantities and values of the principal ones. The purpose would be to compile and publish these statistics in time to be of current interest and value. This "intermediate census" of manufactures is greatly needed.

It is, therefore, recommended that legislation be enacted authorizing the Director of the Census to take an intermediate census of the quantities and values of domestic manufactures on the above-described basis for 1916 and for every fifth year thereafter.

Forest Products.

In my last report I recommended the enactment of legislation providing for the annual collection of statistics of forest products. Bills having this purpose (S. 4589 and H. R. 12417) are now pending in Congress. Statistics of this character should be collected and published regularly, since they indicate very closely the extent to which the forests of the country are being depleted for commercial purposes.

Financial Statistics of States.

A report presenting, for the fiscal year 1915, financial statistics of States, similar in scope to the financial statistics of cities now issued annually by the Bureau, has been published. This report is the first of its kind which the Bureau has compiled, and State officials are desirous that the investigation be made annually hereafter. Legislative authority will be necessary, however, for the continuance of the work, and bills to provide such authority (S. 4589 and H. R. 12417) are now pending in Congress. The enactment of one of them into law is recommended.

Official Register.

The changes in the scope of the Official Register which are recommended in the annual reports of the Director of the Census for the fiscal years 1913, 1914, 1915, and 1916 should be authorized by law.

Express Business.

I renew the recommendation contained in my last annual report for the repeal of the requirement of the decennial collection of statistics relating to the business of express companies, now contained in the act of June 7, 1906. Annual statistics of this character are collected and published by the Interstate Commerce Commission, and the decennial conduct of a similar investigation by the Census Bureau is wholly unnecessary.

Special Statistical Compilations.

I also renew the recommendation contained in my last report to the effect that express, rather than implied, authority be given the Director of the Census to furnish transcripts of tables and other records and to prepare special statistical compilations for State and local officials and for private concerns and individuals, and that the provision of law conferring this authority be so drawn as to make the amounts received for work of this character actually serviceable to the Bureau instead of only nominally so as at present. The authority under which the Bureau now performs this work is found in section 32 of the Thirteenth Census Act.

OFFICE FORCE.

The appropriation act for the fiscal year 1916 provided for 569 permanent officials and employees of the Census Bureau. The number provided by the act for 1917, under which the Bureau is now operating, is 562, seven employees having been transferred by that act to the roll of the Office of the Secretary.

In my last report I set forth in some detail the manner in which the Census Bureau is handicapped by its low average salary scale, which has driven many of its more capable employees to resign in order to accept more lucrative employment elsewhere, both in and outside the Government service. The appropriation act for the current year afforded some measure of relief by providing 13 additional positions in the salary classes above $1,200 per annum, the number of $1,200 places being correspondingly reduced. The scale of compensation still remains low, however, when comparison is made with many other Federal offices; and in order to bring its average more nearly to the level prevailing elsewhere it is the intention to ask Congress for a further increase in the appropriation—an increase which, though representing but an insignificant fraction of the total amount appropriated, would make possible a number of sorely needed promotions to the salary classes above $1,200. When once the compensation paid in the Bureau of the Census is on a par with that paid elsewhere for comparable work, the Bureau will be able to retain the services of its abler employees—or at least of most of them—instead of losing them to other branches of the Federal service and to the commercial world.

The Bureau also suffers by reason of the inadequate size of its statutory force, which now numbers 562, whereas 10 years ago it was 649, or 87 more than the present number. A portion of this reduction (39 employees) was due to the removal of the Census Bureau to the Commerce Building and the resultant consolidation of a part of its force with that of the Department. Making allowance for this consolidation, the Bureau is now operating with 48 fewer employees than it had 10 years ago. Its work, however, is materially greater at present than it was at that time, by reason of the recent addition of the semiannual (now quarterly) tobacco inquiry to the investigations regularly carried on by the Bureau, and also because of the general increase of the work along all lines, due to the growth of the country during the past decade. It is a fact, therefore, that the Bureau of the Census is doing more work to-day with a smaller force than it did 10 years ago. The Bureau has been able, by improvements in methods and mechanism, to neutralize in part the effects of this condition, but the handicap under which it labors is still a serious one.

In the annual report of the Director of the Census is given a statement showing the nature and distribution of the office and

field forces of the Census Bureau on September 30, 1916. The following is a summary of these forces on that date:

Officials	18
Clerical force	528
Subclerical force	18
Mechanical laboratory force	11
Special agents	19
Total	594

In addition, there are employed throughout the cotton belt 725 local special agents to collect statistics of cotton. These agents perform their work only at intervals and are paid on a piece-price basis.

EQUIPMENT.

Preparation for the Census of 1920.

In respect of tabulating machinery, a great deal of work is necessary in preparation for the Fourteenth Census, to be taken in 1920. Reference is made to the full treatment of this subject on pages 94 to 96 of my last annual report. The sum of $25,000 was granted as the first of four annual installments requisite to bring the work of the mechanical laboratory up to the standard required for the work of the Fourteenth Census. A second installment of $30,000 is inserted in the estimates for the coming fiscal year. If the appropriations for the laboratory continue adequate, it is planned to have the entire machine equipment completed and thoroughly tested by July 1, 1919—the beginning of the Fourteenth Census period. With this end in view, a progressive plan of work has already been begun. This includes the construction of 25 new-model tabulating machines, complete, and of 5 extra tabulator bases and 114 extra counting units of 10 counters each; the rebuilding of 286 automatic card-punching machines and of 2 card-sorting machines; and the overhauling of 17 card-sorting machines and of 5 card-counting machines. This work, together with the maintenance of the machinery in daily use, will tax the capacity of the machine shop between the present time and July 1, 1919.

An estimate, in the sum of $50,000, is submitted for the purpose of developing an "integrating" counter. This counter will be of the utmost value in the statistical work of the Government, because it will make possible very much quicker and more accurate addition of figures representing factors making up the statistical data published by the Government. It will be used in connection with the tabulating machines which have been developed and perfected by the Bureau of the Census.

STORAGE SPACE.

The matter of storage space for the Bureau's old records is steadily becoming more serious. These records consist in large part of population, agricultural, and manufactures schedules—that is, the returns made by the enumerators—of past censuses. Some of them, especially the population schedules, contain information of great value to genealogists, applicants for pensions or increases of pensions, litigants, and others, and their destruction would mean irreparable loss.

At present these schedules are stored in four places—the eighth floor of the Commerce Building, the fireproof vault in the basement, a portion of the basement outside the vault, and the old Armory Building in the rear of Poli's Theater.

One end of the vault is next to the boiler room, and all the steam pipes for one side of the building pass through it. For this reason the temperature—although the windows are left open and the steam shut off from the radiators—can not be kept below 90° Fahrenheit while the heating plant is in operation. It is, therefore, impossible for a clerk to work in the vault, and particularly in the end next to the boiler room, for more than a few minutes at a time, without much discomfort and inconvenience; and the records are rapidly deteriorating because of the heat, in spite of the fact that a large number of buckets of water are kept standing in the vault in order to moisten the atmosphere.

The roof and walls of the old Armory Building are leaky, and some of the records there have already been so badly injured by the rain that portions of them are obliterated.

The Census Bureau is, therefore, in extremely urgent need of additional storage space for its records.

The serious crowding arising from the presence of the Federal Trade Commission in the Commerce Building has continued throughout the fiscal year. Application has been made by the Census Bureau for over 4,000 square feet of the space which it is expected the Federal Trade Commission will soon vacate.

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BUREAU OF FISHERIES.

The important and manifold functions of the Bureau of Fisheries have been extended during the year, new achievements in behalf of the public are recorded, and plans for enlarged usefulness have been perfected. The forty-fifth anniversary of the establishment of the Bureau was celebrated on February 9, 1916, with public exercises, at which a bronze memorial tablet to the founder and first Commissioner, Spencer Fullerton Baird, was dedicated. Later it was suitably placed in the building of the Bureau of Fisheries. The Service sustained a severe loss in the death of Robert S. Johnson, assistant in charge of the division of fish culture since September 16, 1909, and an employee of the Bureau of Fisheries since 1881. Mr. Johnson was succeeded by Henry O'Malley, who has been in the fish-cultural service of the Bureau since 1897 and has held the post of field superintendent in charge of Pacific coast operations since 1913.

Recent Achievements of the Bureau.

He who discovers and introduces a new food at this time deserves well of his country, and were there no other reason for commending the work of the Bureau of Fisheries it would on this single ground deserve the praise of all our people. Among its most important recent activities have been the introduction of new foods and the establishment of fisheries to obtain them and of markets to sell them. In my last report the case of the sea mussel was described. This abundant and accessible product, formerly wasted, has now become a staple food. The past year has been marked by another and a greater success in the introduction of the tilefish. On October 1, 1915, it was unknown to the public. To-day it is a staple food. The romantic history of this fish has been widely told. Discovered in 1879, it seemed exterminated by natural causes within three years thereafter. Gradually it reappeared and ultimately became abundant on our Atlantic coast near the 100-fathom line. The Bureau has long known the fish to be available, but previous efforts to establish a fishery for it failed. The task was to get fishermen to catch the fish, to get dealers to sell it, and consumers to buy it, and to do these three things at the same time. The methods used were so effective that in one month the

Bureau withdrew from the campaign with the fishery established and the demand for the new food created. The progress of the fishery has been extraordinary. It centers as an established industry in New York, in which port as many as 13 different vessels have landed tilefish in one month. Tilefish bears shipment well and is sent all over the eastern half of the country. Some large lots have gone as far as Kansas City. It is a regular commodity in the markets of the eastern cities and a usual item on the menus of hotels, restaurants, and clubs, besides finding general use in private families. An important feature of the fishery is that it is conducted at all seasons of the year, and vessels are now engaging in it at times when they would otherwise be idle.

After years of discussion the present Congress provided means for relieving the fishermen, particularly those on the Atlantic coast, of losses sustained through the ravages of dogfishes. These fishes, which are small sharks, have hitherto had little economic value and have been regarded as a serious nuisance. They come in great droves and do vast injury to the fisheries by destroying nets and lines, consuming bait, and eating or mutilating other food fish that have been caught with hook or net. They have been a menace. It is the purpose of the Fisheries Service to make them useful and to substitute a profit from them for the losses they have hitherto caused.

On June 21, 1916, an act was approved appropriating $25,000 to enable the Commissioner of Fisheries to conduct investigations and experiments to ameliorate the damage done by the dogfish and other predaceous fishes. Work under this law has made notable progress. No feasible method of exterminating dogfishes or of seriously reducing their numbers is known. The task before the Service has been to change a useless article into a useful one; to make an asset out of a loss. Dogfishes have a known food value appreciated and utilized in other countries, but here ignored. While we curse them, others eat them. They are edible fresh, salted, smoked, and preserved in various wholesome palatable ways. From them as by-products are obtained oil, gelatin, and leather. Arrangements have been made with individuals and corporations for the canning, salting, and smoking of large lots of dogfish for food and for utilizing in other ways parts other than the flesh.

To obviate a deep-seated prejudice against the name of "dogfish," which is not a distinctive name for any one fish but is applied

indiscriminately to various other fishes of our fresh and salt waters, the name "grayfish" has been adopted for trade purposes. This is quite in accord with the custom of the business in which the same fish is regularly sold under different names in different sections of the country. Before opening the public campaign to introduce this fish as food, it was served to several hundred persons at Cornell University at the meeting of the Home Economics Department of New York Agricultural College in 1916. In the month of August, 1916, it was served to about 2,000 persons in connection with the Eastport Fish Fair, at Eastport, Me. In both cases it was pronounced excellent. I have eaten it in different forms in my own home with satisfaction. A growing market for the fresh fish is being found in connection with the tile fishery. There is no reason whatever, save only prejudice, why this abundant nutritious fish food should not come into general use.

Continued success has been attained in propagating the diamond-back terrapin. The three oldest broods of terrapin hatched and reared in confinement have produced eggs which have hatched successfully. The adult breeding stock has increased in productivity from year to year, and it is believed the climax is not yet reached. The terrapin that were winter fed the first season laid eggs at the age of 5 years, while those that hibernated the first year did not lay eggs until 6 years old. The mortality among terrapin winter fed with fresh fish was 6½ per cent, while among those that hibernated the death rate was 13 per cent. The cost of feeding terrapin during the first critical winter, when the largest losses occur in nature, is low, varying from 3 to 15 cents per thousand terrapin per day, depending on whether they are fed with fresh fish, salt fish, or oysters. If an average of 10 cents is assumed, the cost of feeding one terrapin for 5 months (the hibernating period) is but 1½ cents. The death rate among impounded terrapin is remarkably low. As regards disease and mortality, the rearing of terrapin is more successful than that of poultry. About 3,000 terrapin in 25 experiment classes are now under observation, and the feasibility of terrapin culture is regarded as established.

The *Albatross* during the past fiscal year gave three months to surveying the halibut grounds off the coasts of Oregon and Washington, continuing the work of the previous year. A report on this work will soon be published. Other work has been done on the blackfish grounds off the North Carolina coast. The known limits of the banks have been extended, and the Bureau continues

to maintain on the principal ground a conspicuous buoy, which is of great aid to the fishermen.

The tuna fishery has become of economic importance in southern California. The migrations of the tuna are, however, so erratic and the fishery therefore so uncertain that the canners suffer from enforced idleness much of the year. At the earnest request of the industry and by virtue of the appropriation in the urgent deficiency act, the *Albatross* has been engaged for several months in an exploration to determine the habitat of the fish after they have disappeared from the coast. This work is progressing.

A somewhat similar work is being done by the schooner *Grampus* in the Atlantic Ocean between Cape Henry and the Bay of Fundy, embracing the most important fishing grounds off the eastern coast of the United States. This investigation is broader in its scope, having for its object the determination of the conditions controlling the movements and abundance of migratory fishes in general, to the end that those due to human agencies and controllable may be differentiated from those having natural causes which can not be regulated, but possibly may be met by modifications of fishing methods.

Alaskan Fur Seals.

The Alaskan fur-seal herd continues to show recuperative capacity under the international arrangement that has been effective since December 15, 1911.

The census of the herd in 1915 indicated a total of 363,872. This number was in part estimated, because the enumeration of certain components of the herd is impossible, and in part was based on actual count. The newborn pups numbered 103,527, and the females of breeding age numbered the same. The total number of animals estimated to be in the herd was not entirely comparable with the number estimated for previous years because of the adoption of a somewhat different method of calculating the natural mortality. Heretofore the assigned natural death rate in the different classes of seals had been based on a purely arbitrary assumption; but in 1915, as the result of extensive branding experiments undertaken in 1912, it was possible to determine the percentage of survival among the branded seals that came back as 3-year-olds, and a more accurate mortality curve was thus obtainable. The indications are that in the former years the actual death rate among certain herd groups was overestimated.

The 1916 census, taken under the same conditions as in 1915, showed a gratifying increase over the previous year. The number of pups born was found by actual count to be 116,977, the number of breeding cows deducible therefrom was 116,977, the number of harems was 3,500, the number of full-grown bulls without harems was 2,632, the average size of the harems was 33 cows, and the estimated total strength of the herd was 417,329.

A conspicuous feature of the herd in 1916 disclosed by this census was the large number of males of breeding age and the still larger number of adolescent males that will be passing over to the breeding class. On the basis of the average harem in 1916, the number of idle bulls then on the rookeries was sufficient for the needs of a herd of 86,500 additional cows. This accumulation of surplus breeding males was a normal consequence of the operation of the existing law, which has prohibited the taking of any seals during the past four years beyond the limited needs of the natives of the Pribilof Islands for food.

The experimental branding of seals, in addition to furnishing more accurate information of natural mortality, has afforded invaluable data, hitherto lacking, showing in a definite and indisputable manner the relation between the age of seals and the size and weight of their skins. The long controversy that has been waged over the alleged killing by former lessees of the seal islands of seals of illegal age could never have been precipitated if the facts disclosed by the recent branding experiments could have been available. These experiments, and the authenticated skins resulting therefrom, unmistakably show a wide range in the size of seals of the same age and prove that the age of any given fur seal can not be infallibly determined from the size or weight of its pelt. This important point is clearly brought out in the following statement showing the London trade categories into which fall the skins of 100 fur seals branded as pups in 1912 and killed when 3-year-olds in 1915:

Small pups	7
Middling pups	42
Large pups	42
Smalls	8
Middlings and smalls	1
Total	100

The skins were handled in the regular course of operations at the dressing and dyeing plant in St. Louis in December, 1915, and were graded according to the London standards by a person who for

33 years had been engaged in the same business as the responsible agent of the principal sealskin dressing and dyeing establishment in London.

The Department has been approached with reference to instituting a suit against the former lessees of the Pribilof Islands for alleged violation of law and contract, according to testimony taken in 1911–1914 by the House Committee on Expenditures in the Department of Commerce. Acting under my instructions, the Solicitor of the Department examined the voluminous testimony and documents in the case for the special purpose of advising the Department whether the evidence therein disclosed warranted the making of a recommendation to the Attorney General that he enter a suit against the former lessees. After an investigation extending over many months the Solicitor reported that the facts did not justify such a course.

In the season of 1915 the quota of surplus male seals that could be taken for the use of the natives of the Pribilof Islands was fixed at 5,500. The number actually taken during the regular summer killing and during the fall and winter after the main body of the seals had withdrawn from the islands was 3,947. In the season of 1916 the number that could be taken was tentatively fixed at 5,000 3-year-olds, with the understanding that such additional seals up to 7,500 as might be required for and by the natives could be taken. The number utilized up to the close of the regular season was 5,392, and that number of skins was included in the shipment on the last vessel leaving the islands in the fall of 1916.

For reasons stated in my last report the fur-seal skins then on hand resulting from the food killings of the natives in 1914 and previously were not offered for sale, and the condition of the trade made it desirable to postpone beyond the limit of the fiscal year 1916 the marketing of those skins and of the additional ones obtained in 1915. Congress was appealed to for the necessary authority, and a joint resolution to this end became a law on June 22, 1916.

Meanwhile the Department has been able to bring about the establishment in the United States of a plant for the dressing and dyeing of sealskins according to the best known methods.

The United States is the largest producer of raw sealskins in the world. It is also the largest consumer of finished seal furs. This would seem to make it natural that it should sell its own sealskins and dress and dye its own furs. It never has, however. We have in the past sent our raw sealskins to London. We have paid

London for dressing and dyeing them, and we have bought them back, paying duty on them on their return and the incidental charges due to double transportation. This added 52 per cent to the price of the raw skins, so that the fur laid down in America, ready to be made up into garments, cost over one-half more than it did when it was purchased as a raw skin.

The Department of Commerce took the first step to end this two years ago, when the sale of the raw sealskins took place for the first time in this country. It was a success. Better prices were had than the foreign ones. The Government got more and it cost the Government less. Last year there was no sale because there was no market, and Congress authorized withholding the skins. On October 21, 1915, a second sale of Government fur skins, this time fox skins, was made in this country with even greater success. There were buyers from many foreign lands, and the prices were higher than ever before obtained. Meanwhile, the Department has been planning to establish the best known method of dyeing and dressing raw sealskins in this country in order that the whole process from beginning to end might be American. This it has now succeeded in doing.

Acting after the advice of the Attorney General, the Department has made a contract for a limited term for the sale of its production of sealskins at auction to all buyers who may come. A consideration of this contract is that the best process of dyeing and dressing seal furs known to the trade shall be promptly established in this country. This was done to prevent the deterioration of something like 8,000 skins which the Government has now in cold storage, but means the permanent establishment of the new industry in the United States. It is expected that it will return a greater profit to the Government on the sale of its skins, while at the same time so reducing the expenses incidental to the dyeing and dressing that the finished fur will be sold at a lower cost to the American consumer than heretofore.

On September 20, 1916, in the city of St. Louis, the first sale took place of the fully dressed, dyed, and finished sealskins ever disposed of by the Government. The lot comprised 1,900 skins. The prices obtained were such as more than covered the cost of dyeing, dressing, and finishing the skins, and the goods were generally approved by a critical class of buyers. The market value of sealskins as furs is suffering from the substantial withdrawal of the article from the market by reason of the closed season. If and when the sale of the furs on a commercial scale shall be resumed,

it is the expectation of the trade that the prices obtained for them will be enhanced.

The sale mentioned, which was the first of its kind in the United States, is the culmination of an effort to establish a new American industry.

An American product, the property of the American people, largely utilized by American women, heretofore shipped across America to a foreign country for sale and for subsequent preparation, is now being sold in an American market and being dressed and dyed in an American city for both domestic and foreign consumption.

The patrol of the north Pacific Ocean and Bering Sea for the purpose of preventing pelagic sealing has been maintained by Coast Guard vessels and has been effective. The thanks of the Department are given the Coast Guard for the manner in which the patrolling vessels have performed an arduous duty and for various acts of courtesy and helpfulness in connection with the movements of persons, mails, and supplies to and from the seal islands.

The North Pacific Sealing Convention of July 7, 1911, and the act of Congress approved August 24, 1912, giving effect to that convention permit certain Indians, Aleuts, and other aborigines dwelling on the Pacific coast of North America, north of the thirtieth degree of latitude, to kill fur seals under restricted conditions. So far as the records of the Department show, no seals were thus taken in 1915, but several hundred, mostly females, were killed by Indians of the State of Washington in 1916, as in 1913 and 1914.

When the commercial killing of fur seals shall be renewed, other products than the skins must have consideration. The carcasses contain materials having economic value hitherto wasted and available not only as possible food but in other directions. The Fisheries Service is giving careful study to these matters.

Seal Island Natives and Their Support.

The native inhabitants of the Pribilof Islands, who are Government wards and depend for their existence on the supplies sent to them by the Department every season, are now generally regarded as forming one of the best fed, best clothed, best educated, and best conditioned native communities in Alaska. Their number remains fairly constant, and in 1915 totaled 314—193 on St. Paul Island and 121 on St. George Island. These people render such

labor as they can and are paid in supplies or cash. In former years, when commercial sealing was in progress, they received comparatively large sums for services performed in connection with the driving and killing of seals and the taking and curing of their skins, and many of them accumulated funds which were deposited to their credit in savings banks. In recent years there has been little opportunity for them to acquire or save money, and their bank accounts have diminished. At the present their savings, amounting to $4,917.91 on June 30, 1916, are on deposit in Washington, D. C., in the names of the individual natives, with the Commissioner of Fisheries as trustee. These accounts were audited by the Disbursing Clerk of the Department in September and found correct.

The health of the natives has been good. Improved housing and sanitary conditions have resulted in the mitigation of tuberculosis, which was at one time prevalent. Additional improvements, for which Congress has in part provided, will further advance the physical condition of the natives and add to their comfort and contentment. The making and using of intoxicating liquors has been suppressed.

The education of the native children is proceeding well, with stress laid on manual training and on the use of the English language. The teaching staff is efficient and has the confidence of the natives.

Supply Vessel.

Because of the delay in finishing the work upon the steamer *Roosevelt*, a naval collier took the supplies to the Pribilof Islands in the fall of 1915, and in the summer of 1916 a private vessel was chartered for this purpose. The method of purchasing supplies outlined in my last report has been followed with advantage to the Government. The work of overhauling the *Roosevelt* has been delayed by a serious strike in the shipyard where the work was proceeding and by the time requisite for making improvements and changes recommended by the Superintendent of Naval Construction of the Lighthouse Service and the Bureau of Construction and Repair of the Navy. Further delay arose from the time requisite to secure a new tail shaft to replace one found to be bent. All the work is now nearly complete, and the vessel is expected to be ready for service by the time this report is printed. The following statement shows in detail the cost of purchase, of alterations, and of repairs to the steamer *Roosevelt* to September 20, 1916:

Purchase price			$35,000.00
ALTERATIONS.			
Converting vessel from coal to oil burner and general overhauling		$13,000.00	
Removing bulkheads and changing location of dynamo	$460.00		
Extension of upper deck; moving pilot house, steering engine, and appurtenances; and altering galley	3,500.00		
Rearranging after quarters	490.00		
Installing bulkheads	485.00		
Changing coal-bunker deck	145.00		
Toilet furniture	62.40		
		5,142.40	
Installing pipe connections, etc	125.00		
Changing feed-water heater	45.00		
Changing boiler-feed piping	225.00		
		395.00	
Furnishing and installing drains to oil tanks	200.00		
Straps and steel cradles, etc., under oil tanks	700.00		
Making and installing heaters, etc	330.00		
		1,230.00	
Increasing height of stack, etc	500.00		
Installing wireless outfit	475.00		
Searchlight, furnished and installed	345.00		
Davits for motor boat	400.00		
		1,720.00	
Total for alterations			21,487.40
REPAIRS.			
Renewing propeller and repairing shaft and rudder	2,700.00		
Tail and thrust shafts, etc	800.00		
Thrust bearings	145.00		
Tail shaft	1,700.00		
Repairing propeller	1,100.00		
		6,445.00	
Adjusting rods of thrust bearing	35.00		
Renewing sash bar in engine room	20.00		
New stuffing box	185.37		
Overhauling main engine	1,410.00		
Overhauling valves, etc	295.00		
Examining and repairing pumps	370.00		
		2,315.37	
Repairing smokestack	70.00		
Repairing boiler	275.00		
Bracket knees on stringers to brace boiler	218.30		
Retubing boiler	2,205.00		
		2,768.30	
Renewing hatch coamings	125.00		
Renewing sheathing, recalking, and painting	1,573.00		
Chain plates and smokestack guys	350.00		
Improvements to fireroom ventilation	405.00		
		2,453.00	
Bracket knees and steel straps, etc., on main deck		805.00	
Repairs, general		1,194.00	
Total for repairs			15,980.67
Total expenditures			72,468.07

The vessel as she stands after the above total outlay represents to the Government an investment of much less than her original cost and much less also than the sum at which it is believed it would be possible to sell her for cash.

Fox Herds.

The herds of blue foxes which inhabit the Pribilof Islands continue to flourish and to yield to the Government a revenue that assists materially in maintaining the natives. The trapping of the foxes is done in winter, under careful supervision, after a computation of the apparent number of foxes available and after making an adequate reserve for breeding purposes. The trapping is done by the natives, who are allowed supplies at the rate of $5 for each fox taken and utilized. The skins obtained during the winter of 1914–15, numbering 253 blue foxes and 40 white foxes, were sold at public auction in St. Louis on October 21, 1915, together with the skins brought from the island in the previous season, whose sale had been deferred on account of the fur market. These numbered 256 blue foxes and 25 white foxes. The prices obtained were higher than had ever before been received in any market for blue-fox skins. Five lots, consisting of four skins each, brought $1,092, $1,020, $1,012, $1,000, and $980, respectively, and the entire proceeds of the sale were over $56,000.

The take of fox skins during the winter of 1915–16, numbering 420 blue foxes and 20 white foxes, were sold in St. Louis on September 20, 1916. The prices obtained were not as high as in the previous year. The gross receipts from the sale of fox skins aggregated $20,527.

The Department is under deep obligations to the Navy Department for the continuous and efficient service rendered through the operation of the two radio stations on the seal islands. In former years the islands were completely isolated from the outside world during the long winter season, but now the Department maintains easy communication at all times.

Minor Fur-Bearing Animals of Alaska.

The Bureau of Fisheries is still charged with the duty of enforcing the law and regulations for the protection of all the fur-bearing animals in Alaska, terrestrial as well as aquatic. The field work is performed primarily by the seven wardens in the Alaska fishery patrol for whom provision is made by law. They are assigned to those districts having the most important output of fur-bearing animals, but their number is insufficient to cover the Territory

properly. Other members of the Alaska fishery service also render such assistance as they can.

The recommendations of the interdepartmental committee from the Departments of Agriculture and Commerce, contained on page 123 of my last report, are again approved and the attention of Congress is specially called to them. It is still uncertain whether a brown bear is a brown bear merely because he is a brown bear. The whole matter should be taken out of the hands of the Fisheries Service, which should have nothing to do with land animals, and should be placed in the care of the Agriculture Department. House bill 10393, now pending but not reported, would provide this result and would carry out fully the recommendations of the interdepartmental committee.

In October, 1915, Warden Reginald F. Irwin was lost while engaged in patrol work in southeast Alaska. He left Ketchikan October 9, 1915, on a hired launch, with two men. The boat was found wrecked several days later in the Chickamin River, but no trace of the men was found and no satisfactory explanation of the cause of their disappearance has ever been given. Careful but fruitless search was made.

The revised regulations for the protection of fur-bearing animals in Alaska, which were published in Department Circular No. 246, third edition, under date of May 24, 1915, have been found quite satisfactory. These regulations place no special restrictions upon the shipping of live fur-bearing animals from Alaska or upon the taking of live animals at any time for use for breeding purposes. It was with hesitation that the Department removed restrictions upon shipping live animals from the Territory. While it is felt that there should be restrictions of this kind, the law does not clearly authorize the Department to make the regulations. Owing apparently to the decreased outside demand for fur-bearing animals for use for breeding purposes, particularly foxes, but few were shipped from Alaska in the calendar year 1915. Records at hand indicate that 58 foxes, 34 minks, and 1 black bear were exported. This cessation of demand for live Alaska fur bearers may be temporary, and it is earnestly recommended that the Government be empowered to make proper regulations in regard to the exportation of these animals from the Territory. Bona fide fur farmers should be permitted to secure breeding animals from wild stock, and under proper regulation they should not be restricted to the open season in which to take them, at least until breeding stock may be obtained under reasonable conditions from other farms.

The lack of proper regulation of this matter results in abuses which meet with general disapproval throughout Alaska. It is hoped that Congress will provide legislation which will enable this matter to receive proper attention.

The rapid decline in the number of martens in Alaska made it apparent in the fall of 1915 that further restrictions should be placed upon the taking of these valuable animals. Early in 1916 the Department issued a regulation that on and after March 15, 1916, the killing of marten is prohibited until November 15, 1921. Few objections were made to the regulation, and approval was general among persons familiar with the conditions.

It is noted with regret that the protection which has been afforded the sea otter for some years has not resulted in any apparent increase of these valuable animals.

Following violations of the laws and regulations, a number of seizures of pelts and of prosecutions took place.

Fur farming continues to receive attention in Alaska. The business is confined almost wholly to breeding foxes, and in this work the several color phases of the red fox as well as the blue fox are used. The law does not authorize the Bureau of Fisheries to exercise jurisdiction over fur farming save so far as the killing of fur bearers is concerned. No fur-bearing animals may be killed in Alaska except under regulations prescribed by the Secretary of Commerce. Acting under this authority the Department has established a regulation that no fur-bearing animal captured in the season when its killing is unauthorized may be killed at any time whatsoever. This regulation is intended to prevent the indiscriminate taking of animals in the close season under the pretext of using them for breeding purposes but actually with the intention of holding them until the open season and then killing them.

Fox farming is carried on in the Kodiak-Afognak region, on islands westward of the Kodiak-Afognak group, in the Copper River district, along the Yukon and Tanana Rivers, and in southeastern Alaska.

It is regretted that many have gone into fox farming with inadequate knowledge, with no facilities for caring for their stock, and apparently with no serious intention to pursue the business to any end. Others have gone into the business seriously with sufficient capital. It is hoped that their efforts will be rewarded with success.

The Department requires all fur shipments from Alaska to be reported to the Bureau of Fisheries, and an arrangement with the

Post Office Department obliges all postmasters in Alaska to certify to the correctness of the reports made of shipments of furs by mail. Postmasters, agents of commercial companies, and individuals have shown a ready cooperation with the Department in the matter of collecting these statistics. In the year ended November 15, 1915, there were shipped from Alaska, exclusive of the Pribilof Islands, furs having an estimated value of $400,532. The chief fur bearers represented by this amount are foxes, lynx, and mink.

No additional islands were leased in the fiscal year 1916 for the purpose of propagating foxes and other fur-bearing animals. The leases for Carlson, Middleton, Simeonof, and Little Koniuji Islands, which were executed in 1914, remain in effect. In the summer of 1916 the Department accepted a proposal for the leasing of Marmot Island, near Afognak Island, for a period of five years, at an annual rental of $200.

Fisheries of Alaska.

As it was thought desirable to further limit fishing in the waters of Alaska, a hearing was held in Seattle on October 1, 1915, in order that persons interested in the fisheries of the waters involved might have an opportunity to present their views. The hearing confirmed the Department's opinion in the matter; and on October 25, 1915, an order was issued to be effective January 1, 1916, limiting fishing in the following-described waters: (1) All waters tributary to Barnes Lake, Prince of Wales Island; (2) Hetta Creek, its tributary waters, and the region within 500 yards of the mouth of said creek; (3) Sockeye Creek, its tributary Boca de Quadra hatchery waters, and the region within 500 yards of the mouth of said creek.

For the enforcement of the fishery laws there has been maintained during the active fishing season as adequate a patrol as the funds and personnel of the Bureau would permit. In addition to the steamer *Osprey*, a number of privately owned boats were used in this work for various periods. There is an appropriation of $10,000 for the fiscal year 1917 for the purchase or construction of two motor launches for the Alaska fishery patrol. These boats will be useful, but other and larger boats are urgently needed for an effective patrol of the various districts.

The census of the salmon entering Wood River (Lake Aleknagik) for spawning was again taken up in 1915 and 1916. The number of salmon entering the lake in 1916 was 551,959, as compared with 259,341 in the previous year.

In January, 1916, the Department authorized the Pacific-American Fisheries to construct and operate on Unalaska Island a plant for the canning or salting of salmon or other food fishes taken in the vicinity of the island. Careful provision was made to ensure when possible the employment in the operations of the company of Aleuts or Indians who were residents of the reservation. In January, 1916, a private individual of Unalaska was authorized to carry on certain limited fishery operations within the reservation, this permit being a continuation of one issued in December, 1914. In June, 1916, a permit was issued to the Union Fish Co., of San Francisco, to engage in cod-fishery operations on Tigalda Island. In both of these latter cases due provision is made for the employment of natives of the reservation.

Five privately owned salmon hatcheries were operated in Alaska in the fiscal year 1916. In the fiscal year ended June 30, 1915, the number of red-salmon fry liberated from these hatcheries was 79,619,500. The corresponding output from these hatcheries for the year ended June 30, 1916, omitting that from the hatchery on the Naha stream in southeast Alaska operated by the Alaska Packers Association, for which returns are not yet available, was 42,658,000. The output from the Naha stream hatchery in the fiscal year ended June 30, 1915, was 20,820,000.

In the fiscal year 1915 the output of the private hatcheries afforded rebates of taxes amounting to approximately $31,800, under a provision of law which allows for every 1,000 red or king salmon fry released a rebate of 40 cents on the license fees or taxes on canned salmon packed. On June 30, 1916, the hatchery operated by the Alaska Packers Association on the Karluk River was permanently closed.

The total investment in the Alaskan fisheries in the calendar year 1915 was $37,316,560, an increase of $277,928 over the preceding year. Approximately 86 per cent of this investment was in the salmon industry. The number of persons employed was 22,462, as against 21,200 in 1914. The total value of the products was $20,999,343, a decrease of $243,632 from the preceding year. The actual quantity of fishery products in 1915 was greater than in 1914, but a lower price was obtained for several grades of salmon packed and there was a decrease in the pack of the more valuable red salmon. There was a large increase in the pack of humpback salmon in southeast Alaska and of pink salmon in west Alaska. In the commercial fishery there were taken 63,537,244 salmon of all species, as against 54,615,915 in 1914, an increase of

8,921,329. There were operated 85 salmon canneries, as compared with 81 canneries in 1914. The pack of canned salmon was the largest in the history of Alaska, amounting to 4,500,293 cases, valued at $18,653,015, compared with a pack of 4,056,653 cases, valued at $18,920,589, in 1914.

The halibut fishery, which is second only to the salmon fishery in importance, is being adversely affected by the action of the Grand Trunk Pacific Railroad in connection with its terminus at Prince Rupert. The matter is now the subject of international negotiations. This Department has brought the facts strongly before the attention of the State Department in the confident expectation that when the injury being wrought to American interests in Alaska is made clear due action will be taken to correct the difficulty.

A comprehensive revision of the fishery laws of Alaska has been under consideration by the Committee on the Merchant Marine and Fisheries of the House of Representatives, and numerous hearings have been held on the bill (H. R. 9528) introduced by Chairman Alexander on January 20, 1916. On August 18, 1916, a revised bill (H. R. 17499) was introduced accompanied by a favorable report. This important measure should be speedily enacted into law.

Propagation and Distribution of Food Fishes.

We record another highly successful year in the propagation and distribution of food fishes. The aggregate output exceeded that of any previous year by more than 558,500,000. The general increase represents more intensive work in old fields and the extension of the work into new fields. What is regarded as a more satisfactory outcome of the year's work than the increased production is the conspicuous gain in the number of fish reared to the large fingerling sizes before planting, the increase being nearly 50 per cent over 1915.

The average cost per million of fish produced and planted in 1916 was $117.86, compared with $131.55 in 1915, $146.36 in 1910, and $239 in 1905.

The hatchery output may be conveniently classified and summarized as follows:

Marine species of the Atlantic coast	3,112,299,525
Migratory fishes of the Atlantic coast	442,472,788
Fishes of the Great Lakes	947,870,217
Migratory fishes of the Pacific coast	248,975,220
Fishes of the interior waters	95,644,816
Total	4,847,262,566

The artificial propagation of cod, pollock, and winter flounder was conducted on a large scale at the three New England hatcheries. Especially noteworthy was the extent of the work addressed to the winter flounder, an excellent food species, which now supports a large fishery. The hatching of the lobster, which is practically confined to the station in Maine, was less successful than in 1915 owing to weather conditions which affected the eggs carried on the lobsters impounded through the winter. The precarious state of the lobster fishery is evidenced by the inability of the two hatcheries in Massachusetts to obtain eggs except at a prohibitive cost, by the increasing difficulties encountered in making collections of brood lobsters, and by the increasing tendency in some places to violate the laws of nature and man.

The most successful shad-hatching operations on the eastern seaboard were on the Potomac River, where, in contrast with the experience of recent years, there was a good run of fish, which permitted a fairly large take of eggs. The outcome was attributable in part to the action of the War Department in maintaining in Chesapeake Bay and tributaries open passageways for navigation, of which the fish could take advantage, and in part to large plants of young shad in 1912, which were due to return as mature fish in 1916. At the shad hatchery at the mouth of the Susquehanna River there was a practical failure, such as has characterized all recent years, owing to conditions over which the Fisheries Service has no control. The closure of the hatchery until such time as these conditions are removed is clearly demanded. A very unfavorable shad season in the North Carolina sounds and streams, owing in part to meteorological conditions and in part to rivalry among fishermen using different kinds of gear, greatly reduced the operations of the Albemarle hatchery, the output being one of the smallest in recent years. At the request of the State authorities and members of the North Carolina delegation in Congress, the steamer *Fish Hawk* was sent to the Cape Fear River to serve as a floating shad hatchery, and a portable hatchery was established also in connection therewith on a tributary of that stream. The results of this experimental work were largely negative, owing to the scarcity of ripe fish. As an adjunct of the Orangeburg (S. C.) station, two field shad hatcheries were located on the Edisto River, largely with a view to determining the possibilities for shad culture in that region. At the height of the very short spawning season the work was suddenly brought to a close by the State fish warden because of his doubt of the legality of the methods

employed by the fishermen on whose catch the hatcheries depended for their eggs. There were the usual successful operations with the Atlantic salmon on the Penobscot River, the white and yellow perches in the Chesapeake Basin, and the striped bass on the Roanoke River.

A third large plant of humpback salmon, hatched in Maine from eggs sent from Puget Sound, was made in the fall of 1915, and a fourth deposit, aggregating 229,584 fingerling fish, was made in 1916. The indications for the permanent establishment of this excellent fish in certain New England waters are promising.

In the Great Lakes, the collections of lake-trout and whitefish eggs, while aggregating upward of 547 millions, were less than last season, owing to boisterous weather during spawning time. An abnormally cold and late spring likewise resulted in a shortage in the pike-perch operations, although the output of fry reached the very considerable total of 436,696,740.

The year's work in the artificial propagation of the Pacific salmons eclipsed all records. About 250 million fish, representing five species, were hatched and planted under favorable conditions, the bulk of the output being chinooks and sockeyes. In pursuance of the fixed policy, increased facilities for rearing salmon are provided each year; and in 1916 nearly 55 million salmon were held at the hatcheries until they reached the fingerling size, an increase of about 100 per cent over the previous year. Successful operations were carried on at the Yes Bay (Alaska) hatchery with the sockeye salmon and on the Columbia River with the chinook salmon, the work in the latter field being of greater magnitude than ever before.

At hatcheries in the interior, where the trouts and basses are handled, good work has been done. The output of the pond fishes was somewhat decreased, but fishes of larger size have been delivered to applicants and the general results have been more satisfactory than before. Increased attention is given by farmers to stocking ponds with desirable food and game fishes. Several very influential monthly home magazines have been urging the importance of private fish ponds, and the Bureau has distributed many thousand copies of Fish Ponds on Farms, a document prepared for the special purpose of giving practical instruction in making and maintaining fish ponds. Applicants in all parts of the country have been supplied with suitable fish for this purpose.

The hatchery output reached public and private waters in every State, as shown by the details of distribution published in the annual report of the Commissioner of Fisheries. The Bureau's railway fish cars were in commission throughout the year and were hauled 149,781 miles while carrying their loads of living freight. Detached messengers, supplying fish to waters off the main lines of travel, covered 645,721 miles. About 10½ per cent of the travel of the cars and 19 per cent of the travel of messengers were furnished gratis by railroads, the remainder being paid for at varying rates. The new steel fish-transportation car, referred to in my last report, was completed and placed in service. Two additional steel cars have been authorized by Congress, but the increase in the cost of materials and labor makes it impossible to secure fully equipped cars within the appropriation. Bids will be obtained and an appeal will be made to Congress for the additional sum necessary.

Stress must be laid on the important rescue work conducted in the Mississippi Valley by special seining crews who operate from Wisconsin and Minnesota to Mississippi and Arkansas. The season's collections were larger than for many years, and food fishes of great value were saved. The total number of fish rescued was upward of 11,682,000 adults, yearlings, and fingerlings, of which about 1,180,000 were delivered by cars and messengers to applicants, while the remainder were returned to the main streams. A conspicuous public service was rendered in March and April, 1916, when about 5 million adult and large fingerling fish were rescued from an area of 11,000 acres along the Illinois River. This region had been inundated when the fishes were in a spawning condition, and as the waters subsided the young and their parents became stranded and were found in great numbers in drainage ditches and depressions when the rescuing parties arrived. This field is very large and can be only partly covered with the present facilities. The work deserves special recognition and support from Congress.

The Bureau aims to maintain close relations with the State fishery authorities and to conduct its work in cooperation with them. The Bureau makes large consignments of fish eggs to States having hatcheries, and also turns over to the States considerable quantities of fry and fingerlings to be planted under local auspices. In 1916 about 377 million eggs and 11 million young fish were thus supplied to 28 States.

The station at Saratoga, Wyo., was opened during the year. The new station in Utah is in course of construction at Springville, the site having been acquired after considerable unavoidable delay about the title. Block Island has been chosen as the site of the new Rhode Island hatchery, but the necessary land has not yet been secured. It is a pleasure to note that the hatcheries at Louisville, Ky., and Orangeburg, S. C., give promise of great usefulness. The output of large-mouth black bass at Orangeburg during the first season of operation was unusually large.

Field stations recently established under the general authority possessed by the Department have been successfully operated on the Quinault Indian Reservation, in Washington, and on the Klamath River, in California, for chinook and silver salmons. These are demonstrated to be such important sources of eggs that the establishment of regular hatcheries thereat is warranted.

The extraordinary interest manifested by the public in the extension of governmental fish-cultural work has been shown by the demand for additional hatcheries in all parts of the country and by the introduction of numerous fish-hatchery bills in both Houses of Congress. In May, 1916, the Committee on the Merchant Marine and Fisheries of the House of Representatives made a favorable report on a bill (H. R. 15617) providing for 17 new fish hatcheries and a fishery experiment station. The amount carried by the bill is $890,000.

Congress has passed a joint resolution authorizing the Secretary of Commerce to accept from Mary A. Scully the gift of a trout hatchery in the Berkshire Hills, Mass. The property comprises about 135 acres, with buildings, ponds, and other accessories of a modern hatchery, and has an unusually abundant supply of water from three different sources. The hatchery was operated for a number of years by the late John S. Scully, and Mrs. Scully's noteworthy gift was prompted by a desire to have the property maintained perpetually for the purpose to which her husband had dedicated it. The property has passed into the control of the Bureau of Fisheries, and an item covering the necessary personnel has been included in the 1918 estimates submitted to Congress.

Fresh-Water Mussel Propagation.

The practical work of mussel propagation on a commercial scale is proceeding satisfactorily in connection with the Fairport (Iowa) Biological Station. Field parties operating in the Mississippi River, in the Wabash River, and in the Black and White

Rivers, in Arkansas, during the fiscal year 1916 planted upward of 331,450,000 young mussels, representing seven species used in making pearl buttons. In the inoculating operations 424,550 fish were handled, over 300,000 of these being rescued from landlocked ponds in the overflowed lands and subsequently returned to the open waters. The average cost of providing, inoculating, and planting the young mussels was $0.0155 per thousand for actual production. When allowance is made for overhead charges, the average cost was $0.0235 per thousand.

The shells of mussels grown from the glochidia stage in the ponds at the Fairport Station have been made into buttons, and the practical application of this work has thus been demonstrated.

Commercial Fisheries.

While the Department outside of Alaska has no direct jurisdiction over these fisheries, it nevertheless is charged with the duty of conducting statistical and other investigations thereof, and through the Bureau's agents and correspondents it keeps informed regarding the general condition of all branches of the industry. It cooperates with the States in collecting data to guide legislation or regulation, it brings to the attention of the State authorities various fishery matters that demand legislative consideration, and it supplies to individuals and firms technical information and disinterested advice about commercial fishery enterprises.

During the past year the Bureau has conducted canvasses of the general fisheries of the upper Mississippi River; the crab industry of Chesapeake Bay; the coastal fisheries of New York and New Jersey, exclusive of shellfish; and the shad fishery of the Hudson River. In addition to the foregoing, the investigations of the fresh-water mussel fishery and pearl-button industry of the Mississippi River and tributaries and of the shad and alewife fisheries of Chesapeake Bay and tributaries, which had been in progress during the preceding year, were completed.

The completion of the extensive canvass of the fresh-water mussel industry has enabled the Bureau, for the first time, to determine its magnitude, the relative productivity of different streams, and the relative importance of the various species of mussels in the different districts. The results of the canvass were promptly made public through three statistical bulletins, from which it appears that more than 10,300 men and women were engaged in gathering mussels for the button factories or in search of pearls, that they had $540,608 invested in boats and apparatus,

and that 51,571 tons of mussel shells, valued at $825,776, and pearls and slugs worth $376,284, were taken in one season.

One of the most important natural resources of Chesapeake Bay is the blue crab. Nowhere else is this species so abundant and so important as a source of income to fishermen and of food to local and distant people. The long continuance and increasing magnitude of the fishery have raised doubts as to the perpetuation of the supply, and the necessity for legislative restrictions has been discussed in the legislatures of both Maryland and Virginia, following a recent sharp reduction in the catch. In order to afford the States full and accurate data on which to base action, the Bureau placed its agents in the field on November 15, 1915, and on December 21, 1915, was able to present a bulletin giving detailed statistics of the industry for the calendar year 1915. This bulletin was distributed to State legislators, fishery officials, crab fishermen, packers, and others, and attracted much favorable comment. The two chief centers of the industry are Crisfield, Md., and Hampton, Va., but every county in both States having a frontage on salt or brackish water has its share in the fishery. The canvass showed that 10,290 persons were engaged, $852,777 were invested, and over 151,000,000 crabs, weighing 50,343,268 pounds, were taken, yielding the fishermen $981,807. The product in 1915 was the largest for which statistics are available, and the value of the catch was 50 per cent more than in 1908, the last previous year for which complete returns had been gathered. It is known, however, that the 1915 returns fell conspicuously short of those a few years before, and it is evident that the climax of this fishery came about 1912.

The Department has repeatedly brought to the attention of the public and the officials and legislatures of the States of Maryland and Virginia the waning shad supply, and has urged the necessity of laws that will give the shad a reasonable amount of protection while the schools are on their way to the spawning grounds. In order to secure further data to substantiate the contention that the shad is being neglected and demands serious consideration if its commerical extinction is to be averted, the Bureau made a complete canvass of the fishery in the Chesapeake Bay region in 1915, and published the results in a statistical bulletin, which was sent to the governors and legislators of Maryland and Virginia, accompanied by a series of three special charts showing the actual location of pound nets and gill nets set for shad on certain sections of the Virginia shore. This presentation apparently influ-

enced the Virginia Legislature in the passage of an act, effective in 1917, which is designed to afford a portion of the shad run a better opportunity to reach the spawning grounds.

As the fishery for alewives or river herring is intimately associated with that for shad, the same apparatus being employed and the fishes being caught at the same season, the canvass included the alewife as well as the shad fisheries, and the published bulletin gives the statistical returns for both. It is shown that this industry in 1915 gave employment to 8,839 persons and $1,528,824 in invested capital and yielded products worth $1,155,670 to the fishermen. Practically all of this is to be credited to Maryland and Virginia, for the interests of Pennsylvania and Delaware in the fisheries of the Chesapeake Basin are insignificant. Compared with 1909, the latest previous year for which complete statistics were collected, the shad catch of Maryland declined more than 50 per cent and the alewife catch nearly 47 per cent. In the Susquehanna River the yield of each of these fishes decreased about 88 per cent. In Virginia in the same period the catch of shad decreased nearly 22 per cent and of alewives over 29 per cent, notwithstanding the use of more apparatus. The pound net is the dominant appliance in both Maryland and Virginia, but fewer of these nets were operated than in 1909, while the use of gill nets has decreased in Maryland and greatly increased in Virginia. Compared with 1896, the pound nets have increased about 50 per cent in number and decreased 50 per cent in the quantity of shad taken; in other words, the amount of netting and labor required to take a given number of shad in 1915 was four times the amount in 1896.

There is not the slightest doubt that the waters of Maryland and Virginia are greatly overfished, and if this condition is allowed to continue the only conclusion to be drawn is that the people of these States and their representatives in the legislatures are willing that these important food supplies and sources of wealth shall be dissipated and lost.

In view of recent discussion of the net fisheries of the coastal waters of New York and New Jersey, the Bureau, at the request of the State authorities, in the spring of 1916 made a canvass of the commercial salt-water fisheries of these two States, exclusive of shellfish, for the calendar year 1915, and of the shad fishery of the Hudson for 1915 and 1916. The results of the canvass have been incorporated in a detailed bulletin, which has been generally distributed in the fishing districts. The data thus obtained will

be used as a guide by the States in determining if additional restrictive measures are required in order to protect the food fishes.

The coastal fishery of New York in 1915 gave employment to 2,504 persons, having invested capital of $1,771,166. The chief items of investment were 166 vessels, valued at $1,326,202. The principal apparatus of capture was 464 pound nets, 160 seines, 653 gill nets, and 5,373 fykes, together with numerous hand lines. Upward of 34,000,000 pounds of fish were taken, and for these the fishermen received $1,121,641. The leading fishes were bluefish, butterfish, cod, flounders, menhaden, scup, sea bass, and squeteague, the first named being most important, with over 6,107,113 pounds, valued at $492,928.

In the corresponding fisheries of New Jersey, 2,303 persons were employed and the investment was $1,192,057. The vessels numbered 53, valued at $232,855, and there were 174 pound nets, 132 seines, 1,761 gill nets, 970 fykes, and 90 bag nets. The catch, amounting to more than 47,856,000 pounds, had a value of $1,348,667. The principal fishes taken were squeteague, ranking first, with over 14,121,000 pounds, valued at $359,977, followed by sea bass, bluefish, butterfish, scup, flounders, croaker, menhaden, whiting, and cod, in the order given.

The Hudson was formerly one of our leading shad streams, and the yearly catch used to run into the hundreds of thousands. The fishery for years has been dwindling and has now reached a condition that can best be described as pitiable. The total number of shad caught on the New York and New Jersey shores was 15,855 in 1915 and 9,287 in 1916.

The fishery service maintained at the two ports of Boston and Gloucester has given detailed information regarding the extensive vessel fisheries centering there. This fleet in 1915 included 410 sail, which brought in 7,244 cargoes of fish, aggregating 171,595,000 pounds, valued at $4,738,000. Compared with the previous year, there was a decrease of 354 trips or fares but an increased production of 9,000,000 pounds and an increased value of $343,000. There was a slightly reduced yield of cod, but an increased catch of practically every other major species. Especially noteworthy was the increase in halibut, swordfish, and mackerel, the last named showing an advance over 1914 of 63 per cent in quantity and 73 per cent in value.

The halibut banks off the coasts of Washington and Oregon, recently surveyed by the *Albatross*, have been resorted to by numerous vessels, and comparatively large catches have been

made during the spring months. These grounds, however, are not generally visited after June, as the fish become scarce. The principal grounds are from Cape Flattery, Wash., to Portlock Bank, off Alaska. In the calendar year 1915, 100 American vessels were engaged in the fishery on all grounds. Their catch was about 50,240,000 pounds, of which about 33,135,000 pounds were landed in Seattle, 5,782,000 pounds in Alaska, and 11,323,000 pounds in Canada.

Marine Fishery Investigations.

At the last session of Congress provision was made for the creation of a number of additional positions in the scientific staff of the Bureau, particularly for the purpose of permitting the prosecution of more systematic investigations of the shellfish and shellfish industries than have heretofore been possible. Meanwhile, during the past fiscal year, important economic investigations of the oyster, the hard-shell clam, and the blue crab have been undertaken, and it is possible to report progress in various lines of inquiry.

The study of the "green gill" in oysters, a condition which renders them unsalable or impairs their sale value and often deprives the oyster crop of a large district of a market, has been of unusual interest and value. The condition in our waters has been found to be due to the same cause as in France, namely, a particular species of diatom, one of a large number of minute one-celled plants on which oysters feed. The desire of oyster growers is that the Bureau shall find a means of preventing "green gill"; but this condition in the Marennes district of France is welcomed by the oystermen, inasmuch as the oysters so affected are highly esteemed because of their color and of the flavor that accompanies the color. It therefore would seem desirable not to devote further time and money to the devising of means to prevent the occurrence of "green gill," but rather to make it known to consumers that their prejudice is foolish and that "green-gill" oysters are in the highest state of perfection.

Specific measures for the protection of the blue crab must rest on a sound biological basis. The Bureau is engaged in an intimate study of the life history and habits of this valuable crustacean, in order to be able to give sound advice to the States. Inasmuch as the crab is migratory, going from the ocean to the bays and back again, and sometimes passing different stages of its life cycle in different States, the Federal Government is the logical

agency for conducting the necessary investigations in an effective manner.

Fresh-Water Fishery Investigations.

There is a growing appreciation on the part of the public of the necessity for the careful conservation of the fresh-water fishery resources. This is reflected in the increased demand for fish for stocking streams and lakes, a more earnest striving for rational regulation of the fisheries, and greater insistence that sewage and industrial wastes shall be disposed of otherwise than by discharge into such waters. The fundamental requisite for a proper policy in respect to each of these is accurate information concerning the fishes, their environments, and the means employed in their capture, all of which have been receiving attention at the hands of the Bureau.

The food of fishes, which in any particular body of water varies greatly in character, both seasonally and with the species, age, and size of the fish, has been under investigation at several places in the Mississippi Valley. Special attention has been given at Fairport and Keokuk, Iowa, to the study of fish food in inclosed or impounded waters, and experiments have been conducted to determine how it may be multiplied in connection with the culture and rearing of food fishes in farm ponds.

At Keokuk, Iowa, the completion of a great dam as a part of a hydroelectric power plant has afforded an unusual opportunity for the study of the effects of such obstructions on fish life. This opportunity has been so used that it is expected within another year to present a report, with not merely local application but of general value in showing the effects of such structures and the means of dealing with them. An activity of still another kind is the study of fishes in relation to the public health. It is a matter of general knowledge that certain species of fishes are destructive of the larvæ of mosquitoes, but it is not so well known that not all of these fish are equally efficacious in waters of any particular type. The fish must be of a kind adapted to the conditions or else the characters of the waters under treatment must be modified to suit the kind of fish which may be available. In still other cases it may be necessary to introduce several species of fishes to meet the several conditions obtaining in different parts of one pond. During the year all phases of the subject were under investigation in cooperation with the Bureau of Entomology of the Department of Agriculture.

The United States has no jurisdiction over the pollution of waters as affecting the fisheries, but in pursuance of the policy of aiding in conserving the fisheries wherever possible a practical service has been rendered by investigating the reported pollution of important streams. A number of such cases have been studied during the year and the reports have been of value in showing the actual conditions. In some cases abuses are found and the necessity of correcting them is shown. In other instances the allegations are determined to be unfounded and a statement to that effect allays dissatisfaction. In either case the general subject is kept before the public and its importance is becoming more generally appreciated, as is evidenced, in part, by the increasing demands on the Bureau for work of this nature.

Operations at Fisheries Laboratories.

The laboratory at Woods Hole, Mass., which has no permanent scientific staff, was opened immediately before the beginning of the fiscal year and continued in operation until about the middle of September, the work being conducted through the agency of temporary employees recruited from universities and other scientific institutions. Studies of nutrition, greening, and propagation of oysters were continued with satisfactory progress. Other researches and experiments related to parasites and the effects of parasitism of fishes; the metabolism and oxygen utilization of fishes; the effects of mineral salts which constitute either normal constituents or pollutions of spring waters; and similar phenomena affecting fish culture and the utilization of fishes.

At the Beaufort (N. C.) laboratory there was the same season of maximum activity in addition to the work carried on by the too small permanent staff throughout the year. The results in terrapin culture and the survey of the fishing grounds carried on under the auspices of this station have been alluded to elsewhere. In addition, investigations and experiments were conducted with the quahog or hard clam and some of the principal crustaceans of the region, and, in cooperation with the Bureau of Forestry, to discover means of preventing or controlling the inroads of shipworms and other marine borers on submerged woodwork. What this station has accomplished and the opportunities for further work which it affords promise important economic service to the entire region served by it.

The laboratory at Fairport, Iowa, and the field parties operating in connection with it planted 331,451,490 larval pearl mussels during the year, the exceptionally high and prolonged flood stages

of the rivers making it impossible to quite attain the record of the previous year. Experience in the work and improvements in the methods made it possible to further reduce the cost of planting from 2.7 cents per thousand mussels in 1915 to 2.35 cents per thousand in 1916. Experiments in rearing have shown that after two seasons' growth the shells were of sufficient size to be usable for the making of buttons, although economy requires that they should be several years older before being taken for commercial purposes.

The laboratory has also been active in experimenting with the hatching and rearing of buffalofish and channel catfish, two important food species of the Mississippi Valley. The results with the former have been very encouraging, while near the close of the year the laboratory reported the first successful propagation of the channel catfish which has been attained anywhere. It is hoped that when the proper methods have been perfected both species will be available for stocking farm ponds in a large part of the almost fishless central part of the country.

This laboratory, which now has a fairly adequate permanent personnel, is rendering valuable service to a large part of the Mississippi Valley.

Vessels.

The steamer *Osprey* is in such bad condition that she has been ordered to Seattle for final examination to determine whether she shall be condemned or sold.

The steamer *Fish Hawk* is in urgent need of extensive repairs, which will be undertaken so soon as funds are provided.

The other vessels of the Service have continued their regular work throughout the year.

New Building.

The old building which houses the Fisheries Service is wholly unfit for its purpose. I earnestly hope that steps may be promptly taken to provide better quarters in the proposed new Commerce Building for its clerical staff, and that its scientific force may have the laboratories in the proposed new aquarium building which they so greatly need. If regard is given to the wonderful work of the Bureau of Fisheries in maintaining and developing an important part of the Nation's food supply, it will be clear that it ought to be provided with the best of facilities for so vital a work. It is now seriously handicapped in this respect, and in so far as its work suffers on that account the food supply of the Nation is injuriously affected. I ask that this receive the prompt and thoughtful attention it merits.

BUREAU OF LIGHTHOUSES.

The present organization of the Service under the act of June 17, 1910, is as follows:

Organization of Service.

The executive center of the Service is in Washington under the Commissioner and the Deputy Commissioner of Lighthouses. There are in this office an engineering construction division, under the chief constructing engineer; a naval construction division, under the superintendent of naval construction; a hydrographic division, under an assistant engineer; and the general office force, under the chief clerk. The Service outside of Washington is divided into 19 lighthouse districts, each under the charge of a lighthouse inspector. In each district there is a central office and one or more lighthouse depots. Each district is provided with lighthouse tenders for distributing supplies to the various stations and light vessels, for transportation of materials for construction or repair, and for care of buoys. In addition, there is in the third lighthouse district, at Tompkinsville, on Staten Island, in New York Harbor, a general lighthouse depot, where supplies are purchased in quantities, special apparatus is designed, manufactured, and repaired, ships are repaired and refitted, and various experimental work is conducted.

On June 30, 1916, there were 5,791 authorized positions in the Lighthouse Service. Of these, 123 were in the technical force, 147 in the clerical and office force, and 5,521 connected with depots, lighthouses, and vessels. Compared with the previous year this is a decrease of 1 in the total force.

Aids to Navigation.

During the fiscal year ended June 30, 1916, there was a net increase of 412 in the total number of aids to navigation maintained by the Lighthouse Service, including 45 lights above the order of minor lights, 5 fog signals, 2 submarine bells, 67 daymarks, 33 lighted buoys, 169 unlighted buoys, and 91 minor lights (including 8 float lights).

Fixed lights were changed to flashing or occulting at 46 stations. The illuminant of 19 lights was changed to incandescent oil vapor, the illuminant of 44 lights (including 2 light vessels) was changed

to acetylene, and the illuminant of 13 lights was changed to electric incandescent. On June 30, 1916, there were maintained by the Lighthouse Service 14,984 aids to navigation, including 5,323 lights of all classes and 584 fog signals (not including whistle and bell buoys), of which 52 are submarine signals. When the Lighthouse Service was established in its present form on June 30, 1910, there were 11,713 aids to navigation. The record therefore shows an increase in the six years of 3,271 aids, an average annual increase of 545 aids.

Following are some of the more important aids established or materially improved in the past fiscal year:

New fourth-order light stations, each with a fog bell, at Rondout North Dike, Hudson River, N. Y., and Point au Fer Reef, Atchafalaya Entrance, La.

Light vessel at Stone Horse Shoal, Nantucket Sound, Mass., in place of the vessel formerly stationed at Shovelful Shoal, in the same locality.

Improved system of lighted aids in the channels leading to Baltimore, Md.

Fog signals at Windmill Point, Mass. (electric bell); Rondout, N. Y. (bell); Point au Fer, La. (bell); Cleveland East Entrance, Ohio (electric sireno); Ashland Breakwater, Wis. (electric sireno); and Point Hudson, Wash. (reed horn). The former steam whistle at Cape Ann, Thachers Island, Mass., was changed to a compressed-air diaphone.

A submarine bell on Hedge Fence Light Vessel No. 9, Nantucket Sound, Mass.

Important lighted buoys in Cape Cod Canal Channel, Mass. (4 buoys, 1 with bell); Negro Ledge, Buzzards Bay, Mass. (bell); No Mans Land, Mass. (whistle); Plum Point, Long Island Sound, N. Y.; Shrewsbury Rocks, N. J. (bell); Cape Fear River Entrance, N. C. (whistle); Mullet Key, Fla. (bell); Santa Elena Shoal, Gallardo Shoal (whistle), and Tourmaline Reef, P. R.; Fighting Island Channel, Detroit River, Mich. (3 buoys); Eagle River Shoals, Lake Superior, Mich. (bell); Clatsop Spit, Oreg.; South Jetty, Oreg. (whistle); Blonde Reef, Hawaii (bell), and Lahaina, Hawaii.

Systems of minor aids and buoyage were extensively rearranged or improved in the following localities: Plymouth Harbor, Mass.; Cape Cod Canal Approaches, Mass.; Pawcatuck River, R. I.; Baltimore Harbor, Md.; Croatan Sound, N. C.; St. Catherine Sound, Ga.; Nassau Sound, Fla.; Lake Okechobee and connecting

waters, Fla.; Manatee River, Fla.; Inside Route, Fla. and Tex.; Middle Neebish Channel, St. Marys River, Mich.; Oakland Harbor, Cal.; and Pearl Harbor, Oahu, Hawaii.

Flashing acetylene lights at Pumpkin Island Reef, Me.; Padanaram Breakwater, Mass.; Canal Channel, Mass. (2 lights); Cuttyhunk North Jetty, Mass.; West Breakwater, R. I.; Mattituck Breakwater, N. Y.; Mud Island Range, Pa. (2 lights); Raccoon Creek Range, N. J. (2 lights); Oyster Creek, N. C.; Fort Sumter Range Front, S. C.; Coon Key, Fla.; Manatee River, Fla. (3 lights); Linda Island, N. Y.; Ballast Island, Ohio; St. Clair Flats Canal Range, Mich. (2 lights); Manistee South Breakwater, Mich.; Sheboygan South Pierhead, Wis.; Lewis Reef, Narrow Point, Middle Point, Point Alexander, Marmion Island, Sheep Creek, Clear Point, Barlow Islands, Naked Island, Little Island, Low Point, Kingsmill Point, Point Augusta, Hawk Inlet Entrance, Hawk Inlet East Shoal, Otstoia Island, McClellan Rock, Grey Cliff, Anchor Point, East Foreland, East Chugach, Flat Island, Race Point, and Point Romanoff, Alaska; Iceberg Point, Wash.; and Waterman Point, Wash.

The fiscal year was marked by three severe tropical hurricanes on the Gulf coast, all occurring within a period of approximately six weeks. The first of these storms was on August 16–17, 1915, in the vicinity of Galveston, Tex.; the second on September 3–4, 1915, near Apalachicola, Fla.; and the third on September 28–29, 1915, near New Orleans, La. No lives of persons in the Lighthouse Service were lost during these storms, but the damage to lighthouse property was great and widespread. A large number of stations and vessels in the eighth lighthouse district were damaged, and many small lights and other structures were destroyed. The total damage amounted to about $212,000. A special appropriation of $200,000 was made by Congress by the act of February 28, 1916, toward repairing and rebuilding the aids to navigation affected by these storms. Immediately after the close of the fiscal year, on July 5–6, 1916, another severe storm visited the Gulf coast in the general vicinity of Mobile, Ala., damaging lighthouse property to the extent of approximately $140,000.

To assist in getting prompt information of defects in aids, a post card has been devised for the use of mariners, printed in such form that it is only necessary to insert the name of the aid reported, with date, time, and by whom observed, and mail it to the proper lighthouse inspector.

Arrangements were made to continue a number of buoys on station throughout the year instead of removing them in winter, as heretofore, because of ice conditions. This plan has been very satisfactory to mariners using the waters affected.

On account of the unprecedented movement of shipping on the Great Lakes, arrangements were made to continue aids to navigation as late as possible, consistent with the safety of employees and property of the Service.

Alaska.

The total number of aids to navigation in Alaska, including lights, fog signals, buoys, and daymarks, in commission at the close of the fiscal year ended June 30, 1916, was 388, including 147 lights, representing an increase of 110 lights since June 30, 1910, or over 297 per cent. The following table, which gives the total number of aids to navigation on June 30 of each year named, illustrates the progress in establishing aids in the Territory:

Aids.	1910	1911	1912	1913	1914	1915	1916
Lights	37	71	85	93	108	112	147
Fog signals	9	10	10	10	10	10	11
Buoys	84	105	132	136	157	167	181
Daymarks	30	29	38	40	44	49	49
Total	160	215	265	279	319	338	388

The act of October 22, 1913, made an appropriation of $115,000 for a light and fog-signal station at or near Cape St. Elias, and the sum of $60,000 for the establishment of aids to navigation and the improvement of existing aids in Alaska was included in the sundry civil act approved August 1, 1914. Work on both was started promptly and good progress has been made. Due to exceptional weather conditions, an entire year has been gained in the building of the Cape St. Elias lighthouse, which went into commission on September 6, 1916. Under the appropriation for Alaskan aids, 36 new lights were established, in addition to other needed improvements.

Pending the completion of the new lighthouse tender *Cedar*, the steamers *Kukui* and *Fern* care for lighthouse work in Alaska.

Administrative Methods and Economies.

The third annual conference of lighthouse inspectors was held during January and February, 1916. The program followed the previous general lines, and the results were beneficial to the Service.

A new edition of the Instructions to Employees, conforming to the revised regulations, was issued during the fiscal year for the guidance of persons in the Lighthouse Service.

Systematic inspections of the various lighthouse districts by the general inspector, examiner, and officers of the Bureau were continued as in former years with satisfactory results.

The standard method of cost keeping was continued as usual.

The Medical Handbook for use of Stations and Vessels was extensively revised and improved by the addition of a chapter on first-aid methods for the injured. Reprints of this edition have been ordered by other Government services engaged in maritime work.

An Executive order was issued on October 6, 1915, upon my recommendation, permitting laborers in charge of lights whose duties require only a portion of their time to hold other appointments under State or municipal offices, subject to proper restrictions.

After careful study, a readjustment of pay of lighthouse keepers was put into effect during the year, which it is believed has created more equitable conditions, considering particularly isolated and undesirable stations.

The usual lists of spare property in lighthouse districts available for transfer to other districts were issued for the information of inspectors. Special instructions were also given regarding the disposition by sale of condemned rope, cordage, and waste paper, to assist in relieving the shortage of paper material.

In view of the unusual trade conditions existing at this time and the extraordinary advance in price of many materials used in the Service, special instructions were issued governing the preparation of requisitions by inspectors, in order that contracts might be reduced so as to come within available funds.

Steps were taken in several lighthouse districts to overhaul and replenish libraries furnished for light stations and vessels in accordance with instructions heretofore issued on the subject.

At the conclusion of the Panama-Pacific International Exposition at San Francisco, to which reference was made in my report for 1915, arrangements were made for the transfer of portions of the Lighthouse Service exhibit to other expositions at San Diego, Cal., and Panama.

During the fiscal year small exhibits illustrating particular features of lighthouse work were shown at the annual meeting of the Chamber of Commerce of the United States, the "safety-first"

exhibit at the National Museum, and an exhibit of graphic methods, all in Washington, D. C.

Officers of the Bureau were designated as delegates to the Second Pan-American Scientific Congress, held in Washington, and two papers on lighthouse subjects were presented by the Commissioner at regular sessions.

During the fiscal year the Department issued a pamphlet entitled "The United States Lighthouse Service, 1915," published for the purpose of furnishing general information regarding the organization and operation of the Service and to enable the Bureau to supply data asked for in inquiries frequently received.

Engineering and Construction.

New works of principal importance under special appropriations completed during the fiscal year are as follows: Point Judith Breakwater lights, R. I.; Fort McHenry Channel lights, Md.; Norfolk Harbor lights, Va.; Lakes Okechobee and Hicpochee lights, Fla.; Atchafalaya Entrance lights, La.; and Ashland Breakwater light and fog signal, Wis.

Other important work in progress at the close of the fiscal year includes: New carpenter shop at the general depot, Tompkinsville, N. Y.; Charleston Lighthouse Depot, S. C.; Galveston Jetty light and fog signal, Tex.; Navassa Island Light Station, West Indies; Ashtabula, Cleveland, and Lorain Light Stations, Ohio; Manistique light and fog signal, Mich.; and Cape St. Elias light and fog signal, Alaska (since completed).

Several improvements and changes at light stations involved handling unusual weights, which was accomplished without accident. At Sheboygan, Wis., on Lake Michigan, an entire cylindrical steel tower, weighing approximately 30 tons, was transferred from one pier to another, and near Georgetown, S. C., an entire keeper's dwelling, with chimneys and piazza complete, weighing about 115 tons, was moved across Winyah Bay.

The most important item of construction work now under way is the new lighthouse on Navassa Island, West Indies. This will be an unusually tall (152 feet) reinforced-concrete tower built on a height of 250 feet, showing a double-flashing white light at a lateral elevation above the sea of 402 feet.

Constant attention has been given in renewals and replacements to the use of more permanent materials, such as concrete beacons for those formerly of timber, asbestos instead of wooden shingles, etc.

Improvement of Apparatus and Equipment.

A standard tool chest for use at light stations, containing all tools required by keepers for ordinary repair work, has been designed and equipped at the general depot. A similar chest, fitted with pipe and machine tools, for use at fog-signal stations, is also under consideration.

A device for automatically replacing burnt-out incandescent electric lamps has been developed and is now in use at several stations. It consists, briefly, of three lamp sockets mounted radially at 120° on a spring-actuated shaft so that the upper lamp is in the focus of the lens. Should the lamp in service burn out, an electromagnet releases a latch and the shaft revolves 120°, bringing the second lamp in service. Should this lamp also burn out, the third and final lamp is similarly thrown in circuit.

Several remote electrically operated light and fog-signal stations have been placed in operation. Duplicate lamps are provided, with automatic cut-in for the spare lamp, and an arrangement of magneto relays in conjunction with a telephone enables the keeper to use the circuit as a telltale for observing the operation of the fog signal.

Experiments were made to investigate the reliability and degree of accuracy to be expected in obtaining distances at sea by observing the elapsed time between radio and aerial or radio and submarine signals dispatched simultaneously. After several trials it was found that the comparatively short ranges of the whistle or submarine bell under service conditions led to such a brief receiving interval between such signals and radio signals as to make highly accurate observations by a stop watch a necessity, thus limiting the use of such a method from a practical standpoint.

Standard power boats have been designed and built for use at various island stations in the Great Lakes, and after a season's service have proven to be good sea boats, well adapted for the use intended.

Two semaphore signals, the first of their kind employed in the United States Lighthouse Service, have been installed in the Livingstone Channel, Detroit River, Mich., for the purpose of assisting vessel masters in obeying a War Department navigation regulation which requires a time interval of not less than five minutes between down-bound vessels using that channel. By a proper arrangement of lights the signals may be used by night as well as by day.

Radio stations have been installed by the Lighthouse Service in connection with the building of Cape St. Elias and Navassa Island light stations, to which reference has already been made. These are of great value in conducting construction operations in such distant localities.

A small-sized mercury float, weighing about 1,000 pounds, has been designed and built at the general depot for use in lenses of the fourth order and smaller sizes.

Electrically operated flashers, intended chiefly for gas lights on light vessels, have proven very satisfactory, especially for relief vessels, whereby the exact characteristic of any station vessel may be quickly reproduced. This is of special benefit in case of accident to a light vessel, when it may be necessary to relieve the station ship immediately.

The new type of post lantern, designated "Type B," has been issued in considerable numbers and has given satisfaction in withstanding the highest winds, yielding at the same time a satisfactory candlepower. Experiments are in progress toward the development of a single-wick burner, instead of a double-wick, for this lantern.

Standardization of apparatus and repair parts has been kept constantly in mind in planning new installations, and it is believed that this practice will result in a saving in the expense of future work.

A new type of gas buoy, designed by the Lighthouse Service, known as "Type S," and intended for shoal water, was completed, tested, and found satisfactory for use in suitable localities where a small light is sufficient.

Photolithographic drawings of various types of incandescent oil-vapor lamps, oil-engine torches, and post lanterns were prepared during the year and issued to the district offices.

In order to plan ahead as far as possible the installation of new boilers on vessels, special instructions were given in relation to rigid examination of all boilers now in service, so that repairs might be conducted at opportune times.

Appropriations.

In addition to the maintenance appropriations for the current fiscal year, appropriations for the following special works were made by Congress:

Repairing and rebuilding aids to navigation, Gulf of Mexico	$200,000
Light and fog signal, Point Vincente, Cal	80,000
Improving aids, St. Johns River, below Jacksonville, Fla	66,000

Improvements at Woods Hole Depot, Mass.	$50,000
Improving aids, Fighting Island Channel, Detroit River, Mich.	25,000
Additional aids, Florida Reefs, Fla.	75,000
Improving aids, Hudson River, N. Y.	100,000
Light and fog signal, Conneaut, Ohio	63,500
Light and fog signal, near Kellett Bluff, Wash.	40,000
Improving aids, entrance to Coquille River, Oreg.	6,000
Improving aids, Toledo Harbor, Ohio	15,000
Light at Dog Island, Me.	3,500
Improving aids, Delaware River, Pa. and Del	80,000
Tender and barge, eighth district, Tex. and La.	20,000
Additional aids, Mississippi River, La.	50,000

It has been necessary in submitting estimates for the fiscal year 1918 to ask for an increase in appropriations. The Lighthouse Service has urgent need for additional funds. The cost of all materials has greatly increased; salaries and wages have been uniformly advanced; and in order that the Service may be maintained at a normal standard of efficiency a corresponding increase in its appropriations is necessary.

The estimate for the Bureau of Lighthouses in Washington is the same as the appropriation for the current year. Estimates for 34 special works have been submitted, aggregating $2,604,300, considering only group 1, of which items amounting to $1,636,300 are authorized by law. This is $1,730,300 more than the appropriation for special works for the current year and includes a number of important works for which estimates were submitted last year but which were not included in the appropriations. The estimates include 3 new lighthouse tenders, 3 new light vessels, 1 new light and fog-signal station, 1 new light station, 3 new lighthouse depots, 11 items for establishing or improving aids in general localities, 1 item for a new system of harbor or channel lights and other aids, 5 items for improvements of light or fog-signal stations or of groups of aids to navigation, 3 items for improvement of lighthouse depots, 1 item for improvement of lighthouse tenders, 1 item for light-keepers' dwellings, and 1 item for communication systems to light stations.

In selecting and submitting estimates for those special works believed to be most important, there were considered estimates submitted by officers in the various districts for new lighthouse and ship construction aggregating about $4,650,000.

Vessels.

The tenders of the Service have been employed to good advantage during the year. The 45 vessels which have been in commission have steamed a total of about 482,000 nautical miles in

their work of supplying light stations, maintaining the buoyage system, transporting construction materials, and carrying the officers and employees of the Service to their stations or on inspection duty.

Under the appropriation of January 25, 1915, of $250,000 for the construction of the new lighthouse tender *Cedar*, contract for building this vessel was awarded May 4, 1915, to the Craig Shipbuilding Co., Long Beach, Cal., for the sum of $234,500. She was under construction throughout the fiscal year, and on October 1, 1916, was 70 per cent completed. Work on the vessel has been delayed by strikes and other causes beyond control of the Lighthouse Service. The *Cedar* will be the largest vessel in the Service and is especially designed for working on the coast of Alaska.

The medium-draft tender *Rose*, for service in the bays and sounds of the seventeenth lighthouse district, was launched on February 19, 1916. The vessel was completed after the close of the fiscal year and was conditionally accepted on August 8, 1916.

The small tender *Fern*, for service in the inside waters of the sixteenth lighthouse district, was completed and placed in commission on June 20, 1915, proceeding to her station of duty on July 1, 1915.

The use of oil fuel is provided for the new tenders for the Pacific coast.

A contract was awarded for a tender, the shallow-draft tender *Palmetto*, on September 27, 1915, for service in the inland waterways of the sixth lighthouse district.

An appropriation of $20,000 was made by the act of July 1, 1916, for a light-draft tender and barge for use in establishing and maintaining aids along the intercoastal waterways of Texas and Louisiana.

With the increase in the number of aids to navigation and the deterioration of older vessels, it will probably be necessary to construct, on an average, one or two new tenders each year.

Estimates have been submitted for three new lighthouse tenders—one to replace the *Gardenia*, or for general service, at a cost of $150,000, and two to replace the *John Rodgers* and *Jessamine*, or for general service, as may be found most desirable, at a cost of $180,000 each. The first of these items was authorized by the act of August 28, 1916, but no appropriation has been made for the purpose.

Radio apparatus was designed and manufactured by the Bureau of Standards for the tenders *Columbine*, *Cypress*, *Orchid*, *Manzanita*, and *Sequoia*. Installation was made on the *Columbine*

and *Cypress*, but deferred on the other vessels owing to lack of funds in the appropriation "Salaries, lighthouse vessels."

The condition of this appropriation also necessitated the laying up of the tender *Lilac* until such time as the shortage may be overcome.

The Lighthouse Service maintains light vessels on 53 stations and has for this purpose 66 light vessels, of which 13 are relief vessels. Some of these vessels are old, 11 having been built over 50 years ago. One is 67 years old. Some of the older vessels are in a condition which does not warrant extensive repairs.

Contracts were awarded for the construction of second-class light vessels *No. 101* and *No. 102* on March 6, 1915. *No. 101* will be placed on station for the present at Cape Charles, Va., relieving *No. 49*, which is to undergo extensive repairs during the present fiscal year, and *No. 102* is intended for station at Southwest Pass Entrance to Mississippi River, La. Good progress had been made by the builder up to the close of the fiscal year.

Plans and specifications have been completed and bids invited for the construction of the new third-class light vessel *No. 99*, and plans and specifications are in preparation for the new first-class light vessel *No. 100*. A contract for the construction of light vessel *No. 99* was awarded on June 29, 1916.

On account of the deterioration of older vessels it will be necessary to construct one or more new light vessels each year.

Estimates have been submitted for new light vessels for general service on the Great Lakes, where they are much needed to replace vessels which must soon be withdrawn from duty; for a new light vessel for station off Cape Charles, Va.; and for a light vessel for the Gulf coast or for general service. The act of August 28, 1916, authorized the vessels for the Great Lakes, at not to exceed $150,000, and the vessel for Cape Charles, at $130,000, but no appropriation was made.

The work of raising Buffalo light vessel *No. 82*, referred to in the report for 1914, was completed and the vessel successfully floated on September 17, 1915. The work of repairing and reconstructing the vessel was nearly completed at the end of the fiscal year.

Careful attention has been paid in designing and remodeling light vessels to making all parts of such vessels accessible for cleaning and painting. The use of internal-combustion engines has also been extended, which it is believed will effect an economy in maintenance.

Cooperation.

In accordance with the established custom of the Service, every effort has been continued to consult the needs of maritime interests and to cooperate effectively with other branches of the Government in matters relating to the work of the Lighthouse Service.

By my authority, deck officers of lighthouse tenders were designated to assist in the examination, under the Steamboat-Inspection Service, of applicants for certificates as lifeboat men required by the seamen's act of March 4, 1915.

The Bureau has further cooperated with the Steamboat-Inspection Service in detailing officers to make stability tests of merchant vessels under examination by that Service.

In connection with marking fishing limits on the Middle Atlantic coast, representatives of the Lighthouse Service attended various hearings held by United States Engineer officers and furnished assistance in the matter of suggestions for lighting fish pounds or the marking of fishing limits, and since then the Service has aided the War Department in placing buoys to mark the limits prescribed by that Department.

The Lighthouse Service also placed a special buoy to mark the fishing grounds off Beaufort, N. C., in connection with work of the Bureau of Fisheries. This Service also assisted the Bureau of Fisheries in collecting samples of sea water for analysis at designated light stations. The plans and specifications of the Fisheries steamer *Halcyon* were prepared in cooperation with the Bureau of Fisheries, and consulting advice was given that Bureau in connection with repairs to the Fisheries steamer *Roosevelt*.

Assistance was rendered the Coast and Geodetic Survey in placing special buoys needed for offshore surveying operations, and various special buoys were also placed for the Navy Department in connection with torpedo and gun practice by naval vessels.

The Public Health Service rendered valuable assistance to the Lighthouse Service in preparing the Medical Handbook and List of Remedies, referred to elsewhere in this report, and also in the matter of sanitary advice, inspections, and fumigations at various stations and vessels of the Lighthouse Service.

The Bureau of Mines continued to assist the Lighthouse Service in making analyses of coal, and detailed information was furnished that Bureau, at its request, in reference to coal purchased by the Lighthouse Service on contracts providing for analysis.

Arrangements were continued with the War Department for the use of lighthouse tenders for mine-planting practice, the Department of Commerce offering the service of such vessels when they can be spared, without reimbursement where the service does not exceed two days.

Joint regulations with reference to the matter of the proper authority to prescribe and supervise lights on certain structures in navigable waters during their construction period and providing for the transfer of such authority upon completion of the structures were issued by the Chief of Engineers, United States Army, and the Lighthouse Service, with the Department's approval.

Arrangements were made with the Hydrographic Office of the Navy Department for the transmission of important reports received affecting an aid to navigation by telephone or telegraph to the proper lighthouse inspector.

The Board of Supervising Inspectors of the Steamboat-Inspection Service adopted a resolution providing that service on vessels of the Lighthouse Service shall be considered, for raise of grade, equal to similar experience obtained on merchant vessels.

Observations made on various lighthouse reservations created as bird reservations under the Department of Agriculture indicate that successful results have been attained in increasing the number of migratory birds frequenting such reserves.

Examinations and reports have been made by the Forest Service in reference to timber on various lighthouse reservations, particularly on the Great Lakes, under the authority of the act of March 3, 1915.

Traveling and Subsistence Expenses of Teachers Employed in Instructing the Children of Keepers of Lighthouses.

The State of Maine, which is in the first lighthouse district, has put in operation an arrangement for a traveling school teacher to visit the outlying light stations in the State where school facilities for children are lacking to give instruction to the children at the stations. The State pays the salary of the teacher, who is transported to and from the light stations by lighthouse tenders where necessary. The State also furnishes books. The keepers, however, are obliged to provide subsistence for the teacher at their own expense. One teacher at present covers 14 light stations, following a regular schedule. An objection is the short period spent by the teacher at each station, which is only about two weeks. It is hoped this condition may be improved by the State

providing more teachers. At Matagorda Island Light Station, Tex., in the eighth district, a similar system is in effect. If the United States Government would authorize the payment of subsistence of teachers, it would be possible to make the same arrangement in other States. I recommend that this be done.

Taking the Lighthouse Service as a whole, it is inevitable from the nature of the Service that many light stations are situated where school facilities are not accessible. Under existing law it is not practicable for the Lighthouse Service to take any direct measures toward the education of the children of the keepers. The matter is given careful attention, however, and the Regulations of the Service provide that in the event of vacancies permitting transfer to light stations convenient to school facilities preference must be given to keepers and assistant keepers having children between the ages of 5 and 16 years who have not now access to schools, provided they desire such transfer and their service and qualifications entitle them to it. Moreover, when other conditions are equal, inspectors are instructed not to recommend for appointment or transfer to stations not accessible to schools keepers having children of school age unless such keepers give assurance that they will make proper provision for the education of their children. Since this regulation went into effect there has been a noticeable improvement as to the number of stations where children of school age are without educational facilities. Inspectors are required at stations not accessible to schools to inquire from time to time into educational conditions for the children and to encourage any course which will lead to their suitable education, consulting, when desirable, with State and local educational authorities. The Lighthouse Service provides circulating libraries for the light stations and has recently taken measures to furnish a number of stations with a useful dictionary, more of which will be supplied as funds permit.

Legislation Affecting the Lighthouse Service.

The following is a summary of special legislation affecting the Lighthouse Service, other than appropriations, enacted during the fiscal year 1916:

The act of June 28, 1916, authorized the Secretary of Commerce to exchange the land now occupied by the Schooner Ledge Range Front Light Station at the mouth of Crum Creek, Pa., for other lands adjacent thereto, and authorized the removal of the present station after certain conditions have been complied with.

The act of June 28, 1916, authorized the sale of the former lighthouse reservation at Scituate, Mass., to the town of Scituate for maintenance as an historic landmark.

The act of August 28, 1916, subsequent to the close of the fiscal year, granted authority for the following purposes:

Exchange of rights of way of the United States in connection with lands pertaining to the Lighthouse Service for such other rights of way as may be advantageous to the Service, providing also for the payment of any expenses, not exceeding $500, incurred by the United States in making such exchange from the appropriation "General expenses, Lighthouse Service."

The establishment and maintenance, in the discretion of the Commissioner of Lighthouses, of post-lantern lights and other aids to navigation on the Mobile, Tombigbee, Warrior, and Black Warrior Rivers, Ala., and Lake Tahoe, Cal. and Nev.

The purchase, necessary equipment, repair, and operation of one motorcycle for the use of the Lighthouse Service in the Hawaiian Islands.

Medical relief for light keepers and assistant light keepers without charge at hospitals and stations of the Public Health Service, and providing also for certain physical examinations of persons who enter the Service hereafter.

The following works were authorized by the same act, at the limits of cost specified, but no appropriation of funds was made: Light-keepers' dwellings, $75,000; light vessels for the Great Lakes, $150,000; lighthouse depot for second district, $85,000; lighthouse tender for third district, $150,000; improvements at Great Salt Pond, R. I., $25,000; improvement of offices and laboratory, Tompkinsville, N. Y., $21,000; improving aids, East River, N. Y., $16,000; light vessel off Cape Charles, Va., $130,000; improving aids leading to Cape Charles City, Va., $12,800; improving aids, eastern shore of Chesapeake Bay, Md. and Va., $29,000; rebuilding light station, Point Borinquen, P. R., $85,000; improving aids, Huron Harbor, Ohio, $4,500; improving aids, Fairport Harbor, Ohio, $42,000; improving aids, Keweenaw Waterway Harbor of Refuge, Portage River, Mich., $110,000; improvements at Detroit Depot, Mich., $53,000; light and fog signal, Sand Hills, Mich., $75,000; improvements, Manitowoc North Breakwater, Wis., $21,000; rebuilding light station, Chicago Harbor, Ill., $142,000; improving aids, Indiana Harbor, Ind., $100,000; aids to navigation, Alaska, $60,000; establishing and improving aids,

Washington and Oregon, $35,000; temporary depot at Honolulu, Hawaii, $5,000; lighthouse depot for nineteenth district, $90,000; and radio equipment for lighthouse tenders, $60,000.

Retirement of Aged or Disabled Employees.

A marine officer of the Lighthouse Service who has served for 40 years recently told me he hoped for the coming of a retirement system which would provide something for his old age after so many years of faithful work. A provision for the retirement of employees of the Lighthouse Service who after long service have lost their ability for further active duty by age or disability arising from their work is essential to full efficiency in administering the Service. In the Army, the Navy, the Marine Corps, and the Coast Guard, including those who serve on the Coast Guard cutters, such a retirement system now exists. The result is an unjust and, I think, an unintentional discrimination against those who serve in one service and in favor of those who serve in others. The men who man the lighthouse ships and who serve in the various light stations give their lives to the Government as truly as does an Army or Navy officer. Many of them would by reason of their special knowledge be required to aid our military forces in time of war.

The Lighthouse Service is in many respects a dangerous service. By every rule of administration and of humanity and by the precedent of the practice both in our own Government in other services and of other governments as respects this particular kind of work, these men are entitled to retirement pay.

In the annual report of the Commissioner of Lighthouses for the fiscal year 1912, page 29, is a statement showing the practice of foreign countries with reference to pensioning employees in other lighthouse services. This shows that a retirement system is in force with favorable results in all of the countries mentioned. The record is one of unenviable isolation and inaction on our part.

On April 24, 1916, the Senate unanimously passed a bill which in its present form provides for the optional retirement of officers and employees of the Lighthouse Service at the age of 65 years after 30 years' service and for compulsory retirement at the age of 70 years. The retirement pay would be at the rate of one-fortieth of the last annual pay for each year of active service, not to exceed thirty-fortieths. The measure has my cordial approval and the warm indorsement of the Senate Committee on Commerce backed by its unanimous passage. It is pending in the House of

Representatives, and I earnestly hope it may soon be enacted into law. It has been recommended in the anual reports of the Lighthouse Service every year since 1910. It ought now to be done and done quickly.

Increase in Limit of Cost of Outbuildings at Light Stations from $200 to $500.

The provision, now contained in the appropriation for general expenses, Lighthouse Service, authorizing the construction of outbuildings at a cost not to exceed $200 at any one light station in any fiscal year was first enacted in the sundry civil appropriation act for the fiscal year 1902. Since that time the increase in cost has been approximately 40 per cent for labor and from 50 per cent to 125 per cent for the materials used in the construction of such buildings. It is figured that a building which in 1902 cost $200 to construct would now cost from $300 to $325.

It is not, however, on account of the increased cost of construction alone that the Department recommends the proposed increase in the limit of cost for outbuildings at light stations. It has been found by experience that the maximum of $200, even under the conditions existing in 1902, was too low to permit erecting buildings of an economical type. The result has been that several small buildings for various purposes have been put up at a station in different years, in order not to exceed the fixed limit of cost. This saves no money, but loses it. The maintenance is greater, the efficiency is less, and an unsightly appearance on the station premises is produced. The total cost of several outbuildings at a station spread over a period of two or three years is as great as or greater than that of a single building, of proper construction and appearance, which would serve all the purposes if constructed at one time in one fiscal year under the higher limit of cost proposed. It is also advisable to erect all buildings, so far as practicable, of fire-resisting materials. This means a higher initial cost than is the case with wooden structures such as have been used heretofore. The increase proposed in the maximum limit of cost will result in economy and efficiency.

Communication Systems to Light Stations.

A general inquiry was made during the year respecting means of communication by telegraph and telephone between light stations and other Government coastal stations and the general communication system of the country. At my suggestion a conference of representatives of the various departments interested

in coastwise communication of all kinds was held in the office of the Commissioner of Lighthouses in December, 1915. As a result of this conference the President, by Executive order, on February 16, 1916, authorized the Interdepartmental Board on Coastal Communications, comprised of representatives of the following departments: Treasury, War, Post Office, Navy, Agriculture, and Commerce. This board is giving continued consideration to this important subject.

An item has been included in the estimates for the fiscal year 1918 of $100,000 for use in cooperation with the Coast Guard, and in harmonious development with broad plans prepared by them, to furnish telephone or telegraph communication between the more important light stations, Coast Guard stations, and principal interior points.

An element of this same subject is the equipment of lighthouse tenders with wireless. Pursuant to existing authority of law, the sum of $60,000 has been included in the estimates for the next fiscal year, and the estimate for "Salaries, lighthouse vessels," has been made to include the cost of the necessary operators.

Increase in Pay and Subsistence Allowance of Crews of Lighthouse Vessels.

There has been much difficulty throughout the year on all the vessels of the Service in maintaining efficient crews at the wages which the existing appropriations have made necessary. The work of the crew of a lighthouse tender is in a true sense technical. It differs essentially from the ordinary work of the crew of a steamer. It includes that ordinary work, and a great deal more. It requires practice over a continued period for crew as well as for officers to handle in a seaway the large buoys in the regular work of placing and replacing them at sea. Many of the stations are in dangerous places, and both life and property are risked if the crew is inefficient or inexperienced. Continuity of service means economy of results. Valuable vessels and costly buoys may at any time be damaged by careless or ignorant handling. Even life itself has been sacrificed for the same cause.

The landing of supplies at light stations is difficult and sometimes dangerous work, not required of crews in the merchant service. The Bureau of Lighthouses ought to be able to pay at least the same monthly wage to seamen that they would receive on a merchant ship. It does not now do so and can not do it, and the officers of the vessels and of the Service at large are embarrassed and hampered in their work through this fact and must

continue to be so until sufficient appropriations are given to correct it.

The officers of the lighthouse vessels deserve commendation for standing loyally by the Service at a time when they are paid less than they could obtain elsewhere for the same work or indeed for work less exacting. In some cases vessel officers have left the Service to find promotion and larger compensation elsewhere, but as a whole the officers have stood loyally by their work. The efficiency of the lighthouse work depends upon these men. They have a peculiar training valuable in time of peace and invaluable in time of war. The Lighthouse Service has my approval in its desire to pay these men what they earn and what they could easily get elsewhere, but this can not be done without an increase in the available appropriations.

A respectful petition for an increase in wages was sent to the Service on September 26, 1916, by the officers of the tenders in the third (New York) district. This says, truly, "It is a well-established fact that private and municipal corporations have been paying men who are engaged in similar occupations a much larger salary than that paid by the Government," and they add, with equal force, "The reason which actuates us to present this petition arises from the present economic conditions, which are, no doubt, known." They are right. They ought to have the increase they ask.

The question of subsistence of crews is also a serious one. The prices of all articles of food have greatly advanced, as everybody knows, but the allowance for subsistence has not changed and can not change until appropriations are increased. Already serious complaints are made, and with justice. The seaman's life is one of hard labor out of doors in all weathers and subject to great exposure. He ought to have abundance of good food and a great Government should not so act as to restrict him in this respect. I put great stress, therefore, upon a sufficient increase in our appropriations to enable us to feed our sailors properly.

The Lighthouse Service, by reason of the peculiar nature of its work, covering all climates from the Arctic Ocean to the Caribbean Sea, and requiring provisions for homes, for vessels, and for its own technical and construction work, has to purchase a great variety of commodities. It is almost needless to say that every one of these has greatly increased in cost. The appropriations remain fixed, but the prices on which goods have to be paid for out of those appropriations are not so fixed. A dollar appro-

priated in the summer of 1916 for possible expenditure in the spring of 1917 will not have the same value at the later period that it had when appropriated. As a matter of fact, it has been greatly reduced in purchasing power in the interval elapsed. While the utmost care, therefore, is given in purchasing to buy in such quantities and by such methods as will make the money go to the farthest cent, it is still impossible to operate at anything near the former costs in this respect. For these reasons also additional appropriations have been asked for the fiscal year 1918.

Inadequate Salaries of Lighthouse Inspectors.

These officers now receive $2,400 per annum except in the third district, where the salary is $3,000 per annum. The lighthouse inspector is charged by the Regulations of the Lighthouse Service with the following duties:

Supervision of all the work of the district in which he is assigned to duty, and he is responsible under the Commissioner for its efficient and economical administration.

He is responsible for the proper management of the light stations, fog-signal stations, light vessels, relief light vessels, lighthouse tenders, and depots; for keeping upon their stations in proper condition all floating aids to navigation; for the maintenance, repair, and operation of all lighthouse craft permanently or temporarily in the district; for the construction of new aids or additions to aids; for the repair, cleanliness, and efficient condition of all aids to navigation and other property in the district; for keeping ready for service at the shortest notice all spare or relief moorings, buoys, buoy appendages, and relief light vessels; for the distribution of supplies; for the efficiency of the personnel; for the approval of vouchers and accounts covering the disbursement of funds as may be authorized on account of the Lighthouse Service; and for such other duties as are involved in the proper conduct of the district or as may be from time to time assigned to him.

In carrying out these duties the inspector is to exercise a constant and watchful supervision over all district affairs, as well as over the officers and men in the service, so as to maintain the district in a high state of efficiency. He shall keep advised of the needs of navigation as respects aids to navigation in his district.

Each inspector has Government property under his care of an average value of $3,000,000. Each has under his supervision an average of 280 employees. Each supervises disbursements that average $304,000 per annum. They are obliged to have technical knowledge of their work, business ability to handle that work economically, vigilance in protecting navigation, engineering knowledge and experience, nautical knowledge and experience, ability to act on independent initiative, since they average a distance of 1,300 miles from headquarters, and there is frequent occasion for immediate action in emergency. They must also have ability to cooperate with representative citizens and local and Government officers in the localities where they are sta-

tioned to further the needs of navigation. The statement printed on page 54 shows that these men are paid much less than other officers of the Government whose responsibilities are no greater and who have no higher technical education or standards. These inspectors are technical men, having in their care property of great value, supervising great areas, making large expenditures, bearing heavy responsibilities. They are underpaid for the work they do. These loyal public servants are entitled to a just compensation for the services they render. They do not now receive it. Our estimates for the coming fiscal year, therefore, have been made upon the basis of the advance suggested in my last report, namely, from $2,400 to $3,000.

Saving of Life and Property.

During the fiscal year 1916 services in saving of life and property were rendered and acts of heroism performed by employees of the Lighthouse Service on vessels or at stations on 161 occasions, a list of which is appended.

In each of these cases a commendatory letter was issued by me, and in the case of the rescue of the bark *British Yeoman* by the lighthouse tender *Columbine*, Frank T. Warriner, commanding, on January 17, 1916, near Port Allen, Kauai, Hawaii, under unusually difficult and dangerous conditions, the President of the United States expressed his appreciation of the services rendered by the officers and crew of the *Columbine*.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
1st.....	C. H. Newman, keeper, Pumpkin Island Light Station, Me.	Motor boat.....	Towed to port disabled motor boat with 2 men on board. Boat leaked badly.
	E. T. Holbrook, keeper, Isle au Haut Light Station, Me.	.....do.....	Towed to harbor disabled motor boat with 4 men on board.
	Do.....	.....do.....	Towed to station disabled motor boat with 5 men on board. Furnished men with food and shelter.
	J. H. Peasley, keeper, Crabtree Ledge Light Station, Me.	.....do.....	Towed disabled motor boat with 1 person on board to shore.
	H. G. Sawyer, keeper, Bear Island Light Station, Me.	.....do.....	Towed disabled motor boat with 1 man on board distance of 3 miles to harbor.
	Tender Hibiscus.....	Schooner Hilda Emma..	Prevented schooner, which had parted anchor chains, with no one on board, from going on rocks in Moosabec Reach and probably becoming total loss.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
1st.....	C. F. Chester, keeper, Owlshead Light Station, Me.	Power launch.....	Assisted 2 fishermen whose launch struck ledge and was in sinking condition. Furnished them food, shelter, and dry clothing.
	J. W. Haley, keeper, Perkins Island Light Station, Me.	Rowboat	Prevented waterlogged rowboat, loaded with lumber and with man on board, from capsizing; lumber saved.
	Do.....	.....	Furnished party which had taken refuge on island during heavy thunderstorm with dry clothing and shelter.
	J. E. Purington, keeper, Nash Island Light Station, Me.	Schooner Maine.....	Towed schooner which had lost her foremast in squall 3 miles with station boat.
	Tender Hibiscus.....	Cunard Liner Armonia..	Recovered anchor and 90 fathoms chain lost off Portland Light Vessel.
	F. O. Hilt, second assistant keeper, Matinicus Rock Light Station, Me.	.....	Endeavored to save man who fell overboard while hauling nets. Recovered body.
2d.....	H. C. Towle, keeper, The Graves Light Station, Mass.	Motor boat.....	Towed motor boat, with 2 men aboard, in heavy sea, to safe anchorage; repaired boat and furnished men food and shelter.
	E. C. Hadley, keeper, Bakers Island Light Station, Mass.	Power boat; William B. Durand, owner.	Rescued sinking power boat, made repairs, and delivered to owner.
	E. C. Mott, assistant keeper, Deer Island Light Station, Mass.	Power boat Alice; John McBride, owner.	Towed disabled boat to station; fed and lodged 11 men.
	M. N. Huse, keeper, Narrows Light Station, Mass.	Launch Nautillus; George H. Walker, owner.	Prevented launch, grounded on Lovells Island, from capsizing.
	A. A. Howard, keeper, Stage Harbor Light Station, Mass.	Catboat Trilby; Ernest W. Chaplin, owner.	Towed catboat in distress to anchorage in harbor.
	J. E. H. Cook, keeper, Cape Ann Light Station, Mass.	Power boat; F. H. Gile, owner.	Towed disabled power boat to Rockport.
	J. B. McCabe, keeper, and E. C. Mott, assistant keeper, Deer Island Light Station, Mass.	Power boat Madeline; Richard Brown, owner.	Towed disabled motor boat, with 4 men on board, to safe anchorage.
	M. N. Huse, keeper, Narrows Light Station, Mass.	Motor boat.....	Rendered assistance to motor boat with 3 persons on board.
	H. M. Bailey, first assistant keeper, and C. R. Albrecht, second assistant keeper, Minots Ledge Light Station, Mass.	.....do.....	Rendered assistance to motor boat disabled in breakers. Kept boat afloat until coast guards arrived.
	L. B. Clark, keeper, Cuttyhunk Light Station, Mass.	Schooner Childe Harold.	Prevented vessel from being driven farther on shoal by informing master of his position.
	Tender Azalea.....	Tug Saddie Ross, with barge Sharon in tow.	Towed disabled tug, with barge in tow, to dock.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
2d.....	A. F. Snow, master, Great Round Shoal Light Vessel No. 86, Mass.	U. S. S. San Francisco...	Rendered assistance to officer and 8 men adrift from stranded ship. Supplied clothing, food, and shelter.
3d.....	Tender Daisy.....	Power boat Grit.....	Towed stranded and abandoned power boat to boat club.
	Tender Gardenia.....	James Hownes.....	Rescued from drowning in Hudson River.
	J. Murdock, keeper, Rondout Light Station, N. Y.	Motor boat Natalie; John H. Flannery, owner.	Rendered assistance to disabled motor boat.
	Tender Daisy.....	Power boat Porto.....	Towed power boat, adrift on Lake Champlain, with 6 people on board, 5 miles to Plattsburg.
	Tender Larkspur.....	Yacht Onward III; J. A. Still, owner.	Towed yacht, in distress, into harbor.
	Tender Gardenia.....	Schooner Highland.....	Towed schooner, in danger of sinking near Fort Wadsworth, New York Bay, and beached in safety.
	W. F. Rhodes, keeper, Romer Shoal Light Station, N. Y.	Thomas F. Leland and James Heavy, of Staten Island.	Rescued men whose boat had capsized, and supplied with clothing, food, and lodging; boat recovered.
	C. R. Riley, keeper, Stamford Harbor Light Station, Conn.	British schooner W. N. Zuricker, Capt. J. L. Priblicover.	Rendered assistance to vessel ashore near Stamford Harbor.
	G. L. Hoxsie, keeper, Castle Hill Light Station, R. I.	Launch Thomas Shea; harbor master, Newport, R. I., owner.	Towed disabled launch to Newport.
	F. A. Jordan, sr., keeper, Penfield Reef Lights, Conn.	Auxiliary sloop Amelia..	Assisted in floating vessel aground on reef.
	J. R. Carlsson, keeper, Bergen Point Light Station, N. J.	Bergen Point Light Station, N. J.	Saved light station from fire caused by burning oil cans and oil barge.
	E. A. Ottenburgh, keeper, Whitehall Narrows Lights Nos. 8, 10, and 12, N. Y.	.....	Rescued 2 men from drowning while attending lights.
	E. M. Grant, keeper, Stepping Stones Light Station, N. Y.	Power boat Helen.....	Towed disabled boat to Low Barrows.
	Do.....	Power boat.....	Towed disabled power boat to station; furnished men with lodging and food; repaired engine.
	J. Carlson, master, and A. H. Nelsson, seaman, Ram Island Reef Light Vessel, N. J.	.....do.....	Towed disabled boat, containing 3 persons, to Noank, Conn.
4th.....	A. Johnson, keeper, Ship John Shoal Light Station, N. J.	.....do.....	Rescued disabled and leaking launch and with difficulty towed it to safe anchorage. Service resulted in probable saving from drowning of occupant.
	C. E. Rickards, first assistant keeper, and C. H. Hickman, second assistant keeper, Harbor of Refuge Light Station, Del.	Power boat of Torpedo Boat No. 61.	Towed disabled launch, with 9 men aboard, to torpedo boat; was drifting out to sea.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
4th.....	M. A. Duffield, keeper, Deepwater Point Range Rear Light Station, N. J.	.....	Gave shelter, quilts, and blankets to employees of Du Pont Powder Works burned in an explosion.
	W. Spear, keeper, Deepwater Point Range Front Light Station, N. J.	.....	Transported boy with fractured arm to hospital at Wilmington, Del., for treatment.
	S. Tessadri, second assistant keeper, Fourteen Foot Bank Light Station, Del.	Gasoline yacht Lillian V.	Cared for crew of launch which broke shaft in vicinity of station.
	G. A. Holston, laborer in charge, Lewes Lighthouse Depot, Del.	Motor boat.....	Towed disabled launch, with party of fishermen, drifting to sea, into Delaware Breakwater.
	W. Spear, keeper, Deepwater Point Range Front Light Station, N. J.	Motor launch Montie, of Camden, N. J.	Towed disabled launch in heavy squall, containing 4 persons, into Salem Canal.
5th.....	J. T. Shipp, keeper, Neuse River Light Station and Point of Marsh Light, N. C.	Motor boat Clara S., Capt. E. B. Pobst.	Assisted occupants after motor boat became disabled.
	A. J. English, keeper, Harbor Island Bar Light Station, N. C.	Schooner M. L. Davis; Isaah Davis, owner.	Floated loaded schooner grounded on Harbor Island Bar, N. C.
	J. T. Shipp, keeper, Neuse River Light Station and Point of Marsh Light, N. C.	Launch Susie Swindell..	Assisted several men and children in disabled launch.
	T. D. Quidley, assistant keeper, Neuse River Light Station and Point of Marsh Light, N. C.	Gas freight boat Nelson; Capt. Murray Nason, owner.	Rendered assistance to disabled boat.
	I. C. Meekins, assistant keeper, Croatan Light Station, etc., N. C.	Peter G. Gallop, keeper, Croatan Light Station, etc., N. C.	Rescued keeper from drowning.
	Tender Jessamine.....	Schooner James H. Hargraves.	Towed derelict from midchannel to Cornfield Harbor, Md.
	W. G. Rollinson, keeper, Hatteras Inlet Light Station, N. C.	Fishing boats.....	Rendered assistance to boats in distress, each having 1 man aboard.
	W. J. Tate, keeper, North Landing River, etc., aids, N. C.	Tug Adelaide, Capt. William Bonsal.	Floated tug grounded near Long Point, N. C. Furnished water and provisions.
	Tender Laurel.....	Sloop Silver Spray, Capt. T. J. Williams.	Towed disabled sloop to harbor.
	W. G. Rollinson, keeper, Hatteras Inlet Light Station, N. C.	Steamship M. G. Walestein; George K. Rollinson, owner.	Pulled disabled steamship off Hatteras Reefs; towed to harbor and landed passengers.
	Tender Maple.....	Schooner Lina James....	Pulled schooner clear of ice into free water.
	Tender Holly.....	Schooner D. J. Whealton	Floated schooner which had gone ashore on Kennons Flats, James River, Va.
	J. T. Shipp, keeper, Neuse River Light Station, etc., N. C.	Motor boat; G. G. Paul, Bayboro, N. C., owner.	Rendered assistance to disabled motor boat and furnished occupant with food.
	W. H. Davis, jr., keeper, Lazaretto Lighthouse Depot, Md.	.....	Attempted to rescue drowning man.
	H. C. Wingate, watchman, Lazaretto Lighthouse Depot, Md.	.....	Do.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
5th	W. J. Tate, keeper, North Landing River, etc., aids, N. C.	Gasoline freighter Gratitude.	Assisted in floating freighter.
	Do.....	.....	Saved raft from stranding.
	S. R. Van Houter, keeper, Thomas Point Shoal Light Station, Md.	Gasoline launch Rex; John D. Johnson, Baltimore, Md., owner.	Rendered assistance to disabled launch.
	O. P. Olsen, assistant keeper, Baltimore Light Station, Md.	Yacht Lola.....	Rendered assistance to yacht which had run ashore.
6th.....	J. Lindquist, keeper, and W. Lindquist, assistant keeper, Mosquito Inlet Light Station, Fla.	Yacht Mana.....	Assisted in pulling yacht off shoal.
	C. P. Honeywell, keeper, Cape Canaveral Light Station, Fla.	Yacht Viola II, of Philadelphia, Pa.; Marshel Jones, jr., owner.	Assisted in repairing yacht in distress.
	H. S. Svendsen, keeper, South Channel Range Lights, S. C.	War Department launch No. 12.	Towed disabled launch in Charleston Harbor to wharf at Fort Moultrie.
	I. Larsen, depot keeper, Castle Pinckney, S. C.	Launch.....	Assisted in mooring launch, grounded near depot, in safe place and transported crew to Charleston.
	C. Seabrook, second assistant keeper, Cape Romain Light Station, S. C.	Schooner Luther F. Garritson.	Transported captain and 7 of crew who had landed on beach to station; furnished food and clothing.
	Tender Mangrove.....	U. S. S. K-5.....	Searched for U. S. S. K-5 when communication with vessel was lost.
	Do.....	.....	Rescued man in drifting boat outside Port Royal Sound, S. C.; put him ashore and boat in safe anchorage.
	Tender Cypress.....	Tug Henry Buck, of Charleston, S. C.	Assisted in extinguishing fire.
	L. H. Bringloe, keeper, Charleston Light Station.	.....	Found body of man washed ashore on Morris Island. Reported to coroner.
	A. A. Burn, first assistant keeper, Tybee Range Front, etc., Lights, Ga.	Small boat.....	Rescued 3 soldiers from Fort Screven, Ga., adrift in a small boat.
	H. S. Svendsen, keeper, South Channel Range Lights, S. C.	U. S. Navy launch.....	Pulled navy yard launch off bank in Sullivans Island Cove.
7th.....	Tender Arbutus.....	Power yacht Bon Temps.	Towed disabled and sinking yacht to safe anchorage, and furnished food and quarters to 10 persons.
8th.....	W. B. Thompson, keeper, and C. C. Sapp, assistant keeper, Sabine Pass Light Station, Tex.	.....	Maintained characteristic of light by hand during hurricane.
	A. B. Modawell, keeper; J. Brew, first assistant keeper; J. W. Gauthier, second assistant keeper; and U. M. Gunn, third assistant keeper, Sabine Bank Light Station, Tex.	.....	Maintained light during hurricane.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
8th.....	H. C. Claiborne, keeper; J. P. Brooks, first assistant keeper; and C. T. Morris, second assistant keeper, Bolivar Point Light Station, Tex.	.....	Maintained characteristic of light by hand during hurricane.
	G. R. Smith, keeper, and L. R. Smith, assistant keeper, Red Fish Bar Cut Light Station, Tex.	.....	Maintained light during hurricane.
	S. Gibbon, keeper, and J. D. Balsillie, assistant keeper, Brazos River Light Station, Tex.	.....	Maintained light during hurricane by hand.
	W. Hill, keeper, Calcasieu Range Light Station, La.	.....	Maintained light and made effort to save Government property during hurricane.
	E. Danley, keeper, Pascagoula River Entrance Lights, Miss.	.....	Displayed energy in making repairs and recovering Government property during hurricane.
	F. A. Schrieber, keeper, Lake Borgne Light Station, Miss.	.....	Maintained light under trying conditions during hurricane.
	F. H. Johnstons, foreman, eighth district.	.....	Maintained light and made temporary repairs, replacing storm panes destroyed in hurricane.
	T. Zettwoch, keeper, West Rigolets Light Station, La.	.....	Maintained light under trying conditions during hurricane.
	C. Riddle, keeper, New Canal Light Station, La.	.....	Do.
	J. P. Groux, keeper, Chefuncte River Light Station, La.	.....	Do.
	H. A. Succow, keeper, and J. W. Sharp, assistant keeper, Pass Manchac Light Station, La.	.....	Do.
	W. W. Bayly, keeper; M. Durabb, first assistant keeper; and J. C. Welch, second assistant keeper, Chandeleur Light Station, La.	.....	Do.
	A. Rodi, keeper, and S. Coludrovitch, assistant keeper, South Pass East Jetty Light Station, etc., La.	.....	Do.
	C. W. Heartt, keeper, Cubits Gap Light Station, La.	.....	Do.
	J. W. St. G. Gibbon, keeper, and C. T. Thomassen, assistant keeper, Head of Passes Light Station, etc., La.	.....	Do.
	E. Grandison, laborer in charge, Ironton Light, La.	.....	Constructed temporary beacon and exhibited the light during hurricane.
	Miss A. Meyer, laborer in charge, Shingle Point Post, La.	.....	Exhibited light from tree in vicinity of destroyed beacon during hurricane.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
8th.....	R. G. Miller, keeper, Barataria Bay Light Station, La.	.....	Maintained light under trying conditions during hurricane.
	J. C. Gray, keeper, and J. P. Anderson, assistant keeper, Timbalier Light Station, La.	.....	Do.
	J. McNamara, keeper; W. H. Oliver, first assistant keeper; F. J. LeBouf, second assistant keeper; and E. F. Burke, third assistant keeper, Ship Shoal Light Station, La.	.....	Do.
	H. A. Burns, cadet officer, and O. Olsen, machinist, tender Sunflower.	Maartensdijk; Texas Transport & Terminal Co., agents, New Orleans, La.	Rendered service in diving to unwind the hawser of steamship Maartensdijk, entangled in propeller of the tender Sunflower while assisting disabled steamship.
	J. W. St. G. Gibbon, keeper, and C. T. Thomassen, assistant keeper, Head of Passes Light Station, La.	Gasoline launch; owner unknown.	Brought man and boy to station and furnished them food and gasoline.
	J. Asplund, keeper, and E. T. Ericksen, first assistant keeper, Galveston Harbor Light Station, Tex.	Launch; owner unknown	Towed disabled launch for distance of about 9 miles to Galveston, Tex.
	Tender Sunflower.....	Steamship Turrialba; United Fruit Co., New Orleans, La., owners.	Assisted in floating vessel ashore in South Pass of the Mississippi River.
	Do.....	Lighter, U. S. Engineer Department, New Orleans, La.	Attempted to pull lighter off west bank of Mississippi River in vicinity of Head of the Passes.
	Tender Camellia.....	Launch Oralie; owner unknown.	Towed disabled launch to Lake Borgne, La.
	Do.....	Launch Simon; owners unknown.	Towed launch containing 8 persons to wharf at Galveston, Tex.
	F. A. Schrieber, assistant keeper, Round Island Light Station, Miss., and N. Nilsen, keeper, Pascagoula River Range Lights, Miss.	Schooner Henry M; owners unknown.	Furnished crew with clothing and food and towed schooner to place of safety.
	M. McCluskey, J. Christiansen, and S. Greve, seamen, Southwest Pass Light Vessel No. 43, La.	Southwest Pass Light Vessel No. 43, La.	Rendered service under hazardous and trying conditions during hurricane.
10th....	J. Safe, assistant keeper, South Buffalo Light Station, N. Y.	Airship.....	Assisted 2 men who, with disabled airship, had dropped into the water.
	C. Fitzmorris, keeper, West Sister Island Light Station, Ohio.	Yacht Dorothy E.....	Assisted owners in getting proper anchorage near light station during gale.
	Do.....	Yacht Argument.....	Assisted crew when yacht was driven ashore on island.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
10th....	A. Shaw, jr., keeper, Presque Isle Light Station, Pa.	Tug Henry E. Gillen...	Endeavored to obtain assistance for tug which stranded on bar, and cared for articles washed ashore.
11th....	Tender Clover.....	Launch Hoodoo; Wm. Bousho, owner.	Rescued disabled launch containing 5 persons.
	P. H. Garraty, keeper; G. J. Hassett, first assistant keeper; and A. Brock, second assistant keeper, Middle Island Light Station, Mich.	Yacht Irvington; E. M. Haywood, owner.	Removed women passengers from vessel aground.
	W. G. Marshall, keeper, and F. McFall, assistant keeper, Windmill Point Light Station, Mich.	Motor boat.....	Towed disabled motor boat to safety.
	E. Van Natta, keeper, Grassy Island South Channel Range Light Station, and H. W. Noel, keeper, Grassy Island North Channel Range Light Station, Mich.	Motor boat; L. Cuneaz, owner.	Towed disabled launch with 8 passengers aboard to shore.
	E. Van Natta, keeper, Grassy Island South Channel Range Light Station, Mich.	Small scow.....	Towed small scow beyond control, with 4 boys aboard, to safety.
	T. E. Dee, keeper; E. Byrne, first assistant keeper; and W. S. Hall, second assistant keeper, Point Iroquois Light Station, Mich.	Motor boat Leora; John Bourne, owner.	Rescued disabled motor boat in sinking condition.
	T. E. Radcliff, second assistant keeper, Tawas Light Station, Mich.	Rowboat.....	Rescued rowboat adrift with 2 boys aboard.
	F. G. Sommer, keeper, and A. Hetu, first assistant keeper, Detour Light Station, Mich.	Tug Gazelle.....	Brought members of crew of disabled vessel ashore for purpose of making repairs.
12th....	C. A. Stram, keeper, and M. Weiss, assistant keeper, Cana Island Light Station, Wis.	Motor boat Martha S., Oconto, Wis.	Pulled boat which had run on rocks out of danger.
	A. C. Erickson, keeper, Little Traverse Light Station, Mich.	Launch.....	Towed disabled launch with 1 occupant into harbor.
	O. C. McCauley, keeper, Squaw Island Light Station, Mich.	Fish tug Two Sisters, St. James, Mich.	Rendered assistance to disabled tug.
	A. C. Mann, second assistant keeper, Calumet Harbor Light Station, Ill.	Son of H. Wentworth, 1600 South Dearborn Street, Chicago, Ill.	Rescued from drowning.
	F. A. Drew, keeper, Green Island Light Station, Wis.	Gasoline steamer Starlight, of Marinette, Wis.	Assisted in getting stranded steamer off reef.
	W. Ottosen, keeper, and R. G. Petersen, second assistant keeper, Pilot Island Light Station, Wis.	Motor boat.....	Towed disabled motor boat with 3 occupants out of danger and repaired engine.
	S. M. Danielsen, keeper, Chicago Harbor Light Station, Ill.	.....	Rescued 5 men marooned on breakwater during storm and took them to safe landing.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
12th....	T. Robinson, keeper; J. Erikson, first assistant keeper; and J. Edlund, second assistant keeper, Muskegon Pierhead Range Light Station, Mich.	Summer cottages.....	Assisted in preventing more serious fire loss to summer-resort cottages near station.
	C. S. Grenell, keeper, Chicago Pierhead Range Light Station, Ill.	.....	Rescued from drowning man who had fallen off pier.
	C. E. Corlett, master, and A. Wanke, engineer, Light Vessel No. 56.	Motor fish boat Whynot.	Towed motor boat to light vessel.
	J. J. Rollefson, keeper, and E. R. Ledwell, assistant keeper, Chambers Island Light Station, Wis.	Motor boat Starlight, Marinette, Wis.	Gave food and clothing to 3 shipwrecked sailors whose motor boat was destroyed by fire, and took men over to Marinette, Wis.
	R. W. Johnson, keeper, and M. Telgard, first assistant keeper, North Manitou Island Light Station, Mich.	Motor boat Alice L.....	Assisted in hauling disabled motor boat, putting on beach, and relaunching after rudder had been repaired.
	R. W. Johnson, keeper, and M. Telgard, first assistant keeper, North Manitou Island Light Station, Mich.	Motor fish boat Whynot.	Assisted in rescuing motor boat.
	O. C. McCauley, keeper, Squaw Island Light Station, Mich.	Fish launch Rosa B.....	Towed disabled launch to Beaver Harbor, Mich.
	J. Kilgore, keeper, Grand Haven Pierhead Range Light Station, Mich.	.....	Rescued 2 men of U. S. Coast Guard in danger of being carried into Lake Michigan by ice.
	T. J. Armstrong, keeper, Michigan City East Pierhead Light Station, Ind.	.....	Rescued 2 men from drowning.
	T. J. Armstrong, keeper, and F. Dykeman, second assistant keeper, Michigan City East Pierhead Light Station, Ind., and J. E. Muckian, assistant keeper, Calumet Pierhead Light Station, Ill.	Fish tug Eagle.....	Assisted in releasing vessel from ice.
	J. M. Robinson, keeper; H. Osby, first assistant keeper; and A. G. Fichtner, second assistant keeper, Calumet Harbor Light Station, Ill.	Motor launch Mary Lee; A. G. Brandesburg, 6117 Greenwood Avenue, Chicago, Ill., owner.	Rescued disabled motor launch in danger of being crushed against pier.
	Tender Sumac.....	Steamer Hennepin; Capt. J. A. Braunell, Lake Shore Steamer Co., First National Bank Building, Milwaukee.	Worked off vessel aground in White Lake, Mich., into deep water.
	Tender Hyacinth.....	Steamer German.....	Worked off vessel ashore on shoal off Rowley Bay, Wis., into deep water.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
12th....	J. McCormick, keeper; William F. Green, first assistant keeper; and Ray H. Buttars, third assistant keeper, South Fox Island Light Station, Mich.	Motor boat.....	Pulled off disabled boat, containing 3 men, ashore on Fox Island and towed her to fish tug.
16th....	Tender Kukui.....	Gasoline schooner Favorite, of Cordova; Bing Halleck, captain and owner.	Rescued captain, engineer, and 1 other person from shipwrecked schooner.
	Tender Fern.....	Small gasoline boat; William Bowers, owner.	Towed disabled boat, and owner suffering from blood poisoning in arm, to Petersburg, Alaska.
	Tender Kukui.....	Three-masted schooner P. J. Abler; J. E. Shields, owner.	Rendered assistance and beached vessel, which was afire.
	Do.....	.....	Searched for party of 3 men and gas boat Francis R., employed by Bureau of Fisheries.
	Geo. A. Lee, keeper, Tree Point Light Station.	Launch Violet; Johnson Russ, owner.	Furnished gasoline.
	N. S. Douglas, keeper, and S. L. Atkinson, assistant keeper, Lincoln Rock Light Station.	Launch from U. S. S. Patterson.	Furnished food to occupants.
	S. A. Ellings, first officer, tender Fern.	Thomas G. Neile.....	Rescued demented man, who had plunged overboard, from attempted suicide.
17th....	Relief Light Vessel No. 92.....	Motor fishing boat.....	Rescued 2 men from disabled boat and kept them on board overnight.
	H. P. Score, keeper, Slip Point Light Station, Wash., with assistance of son Walter.	Motor boat Bunch; Hugh Wickersham in charge.	Rescued disabled boat from dangerous position and towed to safe anchorage.
	L. A. Petterson, keeper, West Point Light Station, Wash.	Small sailboat; Harry Christensen, owner.	Rescued man from drowning whose boat had capsized; furnished dry clothing.
	W. S. Denning, keeper, and S. B. Morris, assistant keeper, Robinson Point Light Station, Wash.	Motor boat.....	Rescued man, wife, and 2 small children from disabled boat near station. Furnished food and clothing.
18th....	J. A. Picone, launchman; G. T. Olsen, keeper; P. Chekles, first assistant keeper; and L. G. McKay, second assistant keeper, Mile Rocks Light Station, Cal.	.....	Rescued from drowning man fallen or jumped overboard from passing steamer.
	L. R. Willard, assistant keeper, Oakland Harbor Light Station, Cal.	.....	Rescued fisherman from drowning by capsizing of boat.
	Tender Madrono.....	Navy tug Vigilant.....	Towed disabled tug from city front to Goat Island wharf.
	Light Vessel No. 83, Cal.....	Steamer Bear.....	Cared for 160 passengers and crew of wrecked steamer Bear; supplied dry clothing and provisions.

SAVING OF LIFE AND PROPERTY BY VESSELS OR EMPLOYEES OF THE LIGHTHOUSE SERVICE DURING THE FISCAL YEAR 1916—Continued.

District.	Vessel or employee rendering service.	Vessel, etc., aided.	Nature of assistance.
18th....	W. M. Greene, second assistant keeper, San Luis Obispo Light Station, Cal.	Small boat from steamship Roanoke.	Sighted and assisted in bringing in boat from steamship Roanoke; 5 dead and 3 nearly unconscious.
	R. H. Williams, keeper, Point Arena Light Station, Cal.	Gasoline schooner Alliance No. 2.	Sighted disabled launch near breakers; notified Coast Guard crew; 1 man rescued.
19th....	Tender Columbine.....	Bark British Yeoman...	Saved vessel and all on board from almost certain destruction, through heroic efforts of officers and crew of Columbine, during progress of a gale off Port Allen, Hawaii.
	Do.....	Steamer Mikahala.....	Pulled grounded vessel off reef on exposed shore of Molokai.

Effective Oct. 15, 1915.
Revised to Oct. 1, 1916.

CHART SHOWING ORGANIZATION OF THE
U.S.COAST AND GEODETIC SURVEY
1916

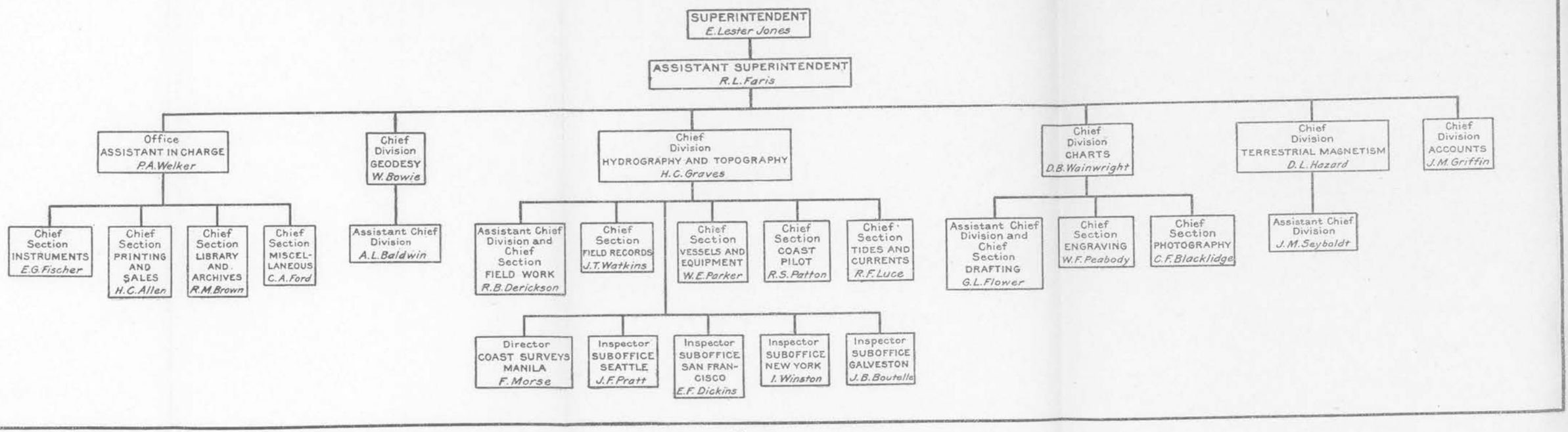

FIG. 1.

COAST AND GEODETIC SURVEY.

Since my last annual report the efficiency of this Bureau has been increased by changes in the organization. The results accomplished since this reorganization confirm the wisdom of the step.

The accompanying diagram outlines the units of the divisions and sections of the Bureau as they are to-day. (See fig. 1.) The work of these units will be understood by the synopsis of the duties of each which follows:

Office of Assistant in Charge.

This officer has charge of the upkeep and management of the buildings occupied by the Bureau, approves the purchase and distribution of all instruments and miscellaneous supplies required, and receives and accounts for all moneys realized from the sale of publications and condemned property and for work done for outside parties. He also has charge of the leave records of the personnel of the Bureau as well as the shipments to and from the office at Washington.

Attached to the office of the assistant in charge are these sections, each under the supervision of a chief:

1. Instrument section.
2. Printing and sales section.
3. Library and archives section.
4. Miscellaneous section.

The functions of these various sections are outlined below.

Instrument section.—This section designs, makes drawings for, and supervises the construction of new instruments and parts thereof which are required in the operations of the Service. The chief of this section is also charged with the responsibility, care, upkeep, issue, and accounting for all instruments and general property of the Service, involving packing, unpacking, shipping, and receiving instruments and general property.

Printing and sales section.—This section attends to the printing of charts on plate and lithographic printing presses from the copper or aluminum plates and the sale and distribution of these charts and other nautical publications. As a part of the office of the assistant in charge, and closely related to the printing and

sales section, there is maintained an electrotype shop, where electrotypes are made of the copper printing plates.

Library and archives section.—This section has the keeping of the original records of field observations and the technical library of books and periodicals maintained by the Bureau.

Miscellaneous section.—This section is charged with the purchase of supplies and equipment for the field and office work and maintains a store of stationery for the office and field forces, as well as the blank books for field observations.

Division of Geodesy.

This division is under a chief and an assistant chief. The province of the division of geodesy is principally the extension of the network of precise leveling throughout the United States and Alaska for the control of levels run by other Government bureaus, by State and city officials, as well as by private individuals and corporations; the determination of geographic positions by triangulation or traverse for the control of Federal, State, and county boundaries and other engineering work in all parts of the United States and Alaska; also the determination of field astronomic positions and the establishment of stations at which the intensity of gravity is determined.

The triangulation and traverse done in the interior of the United States and of Alaska are of a primary nature and are used as bases of control for the detailed triangulation and traverse by organizations which make topographic or other surveys. Along the coast the triangulation done by the Survey comes either directly or indirectly under the division of geodesy. It is of a detailed nature, intended for the control of topographic and hydrographic surveys made by parties of the Bureau in the construction of nautical charts.

These may be considered the field operations of the division.

In the office the observations made in the field are computed and adjusted and the results are prepared for publication.

About 90 per cent of the work of the division is purely practical and of immediate commercial value. Equally important, however, is the work of research into the scientific phases of geodetic work, such as the determination of the shape and size of the earth and of the variation of the densities in the outer portion of the earth.

The Survey has made valuable contributions to science along these lines in recent years.

Division of Hydrography and Topography.

Under this division are carried on the various hydrographic and topographic surveys and resurveys along the coasts of the United States, Alaska, and our insular possessions, which include Porto Rico, Hawaiian Islands, Philippines, and approaches to the Panama Canal. This division also supervises the Bureau's four suboffices, located at New York, Galveston, San Francisco, and Seattle.

Under the supervision of the chief of the division of hydrography and topography are these sections:

1. Section of field work.
2. Section of field records.
3. Section of vessels and equipment.
4. Section of coast pilot.
5. Section of tides and currents.

The duties assigned to these are as follows:

Section of field work.—The chief of this section prepares outlines of survey projects, formulates plans for their execution, advises the division on the conduct of all field operations, and has charge of the division in the absence of its chief.

Section of field records.—In this section the records of the field observations made under the direction of the division of hydrography and topography are reviewed, departures from approved methods are indicated for correction, and practices worthy of adoption are noted for the use of the Service. In cooperation with the other sections of the division, especially the section of field work, the results of the examination of the field records are utilized in planning and directing the field work.

Section of vessels and equipment.—This section has charge of the purchase and maintenance of vessels and all equipment of hydrographic and topographic parties. It prepares plans and specifications and supervises the repairs to the fleet and the construction of new vessels. Its duties include inspection of the vessels, their equipment and personnel.

Section of coast pilot.—This section collects information for and compiles the coast pilots and inside route pilots for the coasts of the United States and its insular possessions. The field work of the section enables its members to advise the chief of the division of the condition of the surveys and discrepancies in the published charts.

Section of tides and currents.—This section, from data obtained from observations made at the different tidal and current stations

inadequate, and unsanitary. Erected at first for a hotel, a residence, and a stable, always unfitted for their present use, their unsuitableness was never more emphasized than now. The greatly increased activities of the Service, creating a greater volume of work, tend to further demonstrate the unfitness of these structures as a working tool. By constant care they are made to look fairly well superficially to a careless eye, but as a matter of fact they are a burden of expense. It is useless to spend more money on them, and it is most unfortunate that we have been obliged to spend nearly $6,000 in providing new boilers and heating equipment for them. Conditions would be bad enough if they were office buildings only, but when they contain a printing plant, a machine shop, a carpenter shop, and a lithographic plant, and are also used as storerooms for valuable records and for goods intended for sale, the condition becomes serious. It is a daily waste of money to use them. The proposed new Commerce Building should be so designed as to take in all the operations of the Coast and Geodetic Survey and provide it with ample room and facilities for its important work. Bad as the structures are as working tools, the danger to invaluable public records involved in their continued use is more serious.

Eight thousand field sheets are stored among the archives which have cost and are to-day worth many millions of dollars. (See figs. 2 and 3.) Every effort is made to protect them, but it is impossible to do so in the present quarters. The only facilities for fire protection are hand fire-extinguishers. There is no fire hose or water main in the building. The nature of the old structures obliges much of the work to be handled in an awkward manner.

Engravers and draftsmen must have good light. This requires us to scatter them in order to have light sufficient, and hence time is lost going back and forth for consultation and information. One room for each section properly lighted should provide adequate space for this work.

The engraving section is far removed from the storage for the copper plates. These plates have to be carried a distance of 300 feet over seven flights of stairs, and during the last year nearly 40 tons of paper had to be carried by hand to the presses because there was no place for it near them. The accompanying illustrations (figs. 4 and 5) give an idea of the present conditions.

Some of the rooms used as offices are two stories below street level and always use artificial light.

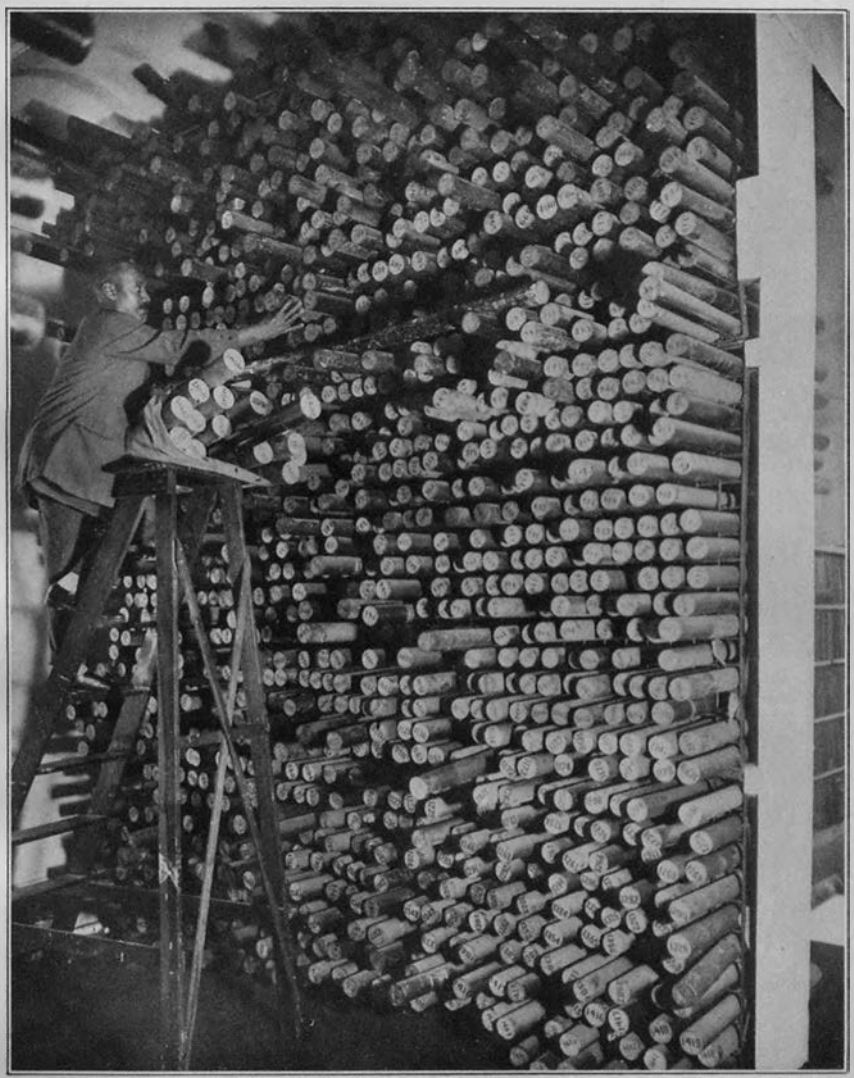

FIG. 2.—*Original field sheets of the Coast and Geodetic Survey filed in the archives in steel racks extending from floor to ceiling. No water system for fire protection.*

FIG. 3.—*Method of moving original sheets, Coast and Geodetic Survey.*

Several of these 70-pound sacks of original sheets are carried each day between the drafting rooms and the archives, a distance of 350 feet and over four flights of stairs.

FIG. 4.—*Carrying copper plates, Coast and Geodetic Survey.*

Transporting engraved plate from storeroom up one of seven flights of stairs and a distance of 300 feet to engraving room for correction. The plates average 42 pounds in weight. About 96 tons' weight is thus transported annually.

FIG. 5.—*Method of carrying paper to presses, Coast and Geodetic Survey.*

Showing how nearly 80,000 pounds of chart paper must be carried annually from the stock room to the presses, an average distance of 170 feet and down one flight of stairs, owing to lack of an elevator.

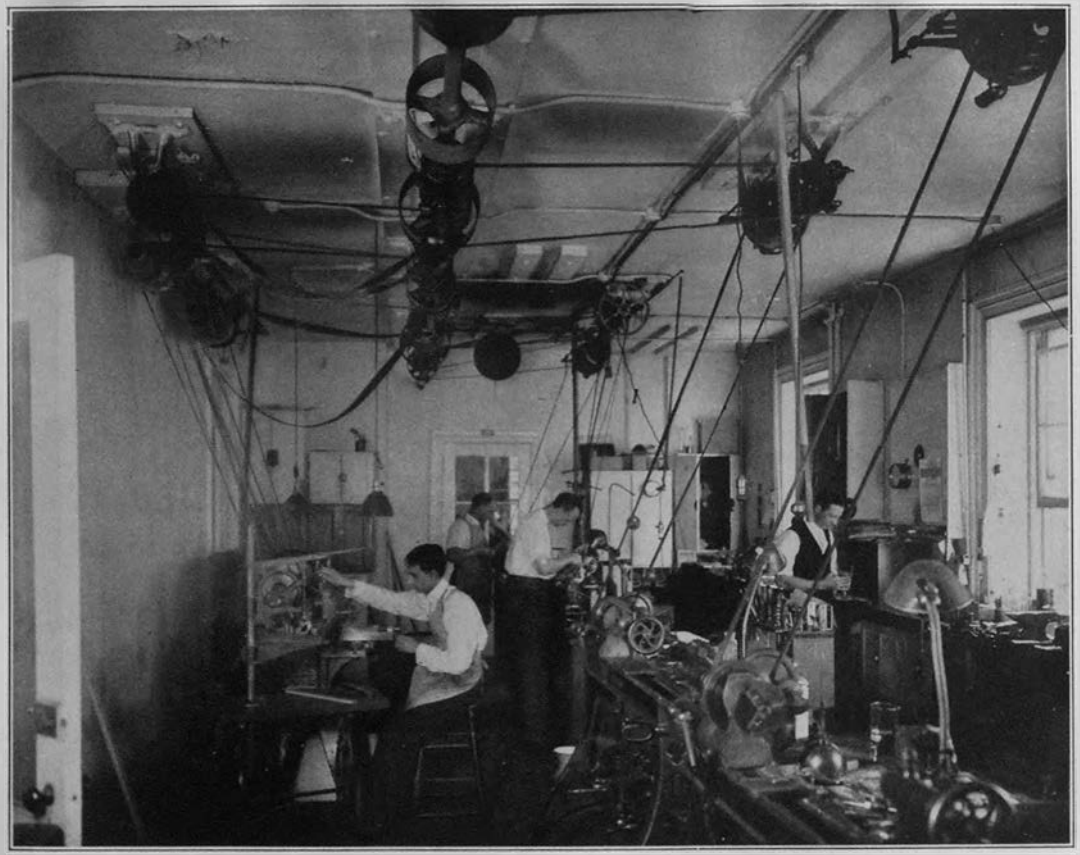

FIG. 6.—*Machine shop, Coast and Geodetic Survey.*

Congestion within buildings necessitates assembly of machines in this small room. Result: Insufficient room for efficient operation, natural light obstructed by belting, shafting, etc., and depreciation of quantity of output.

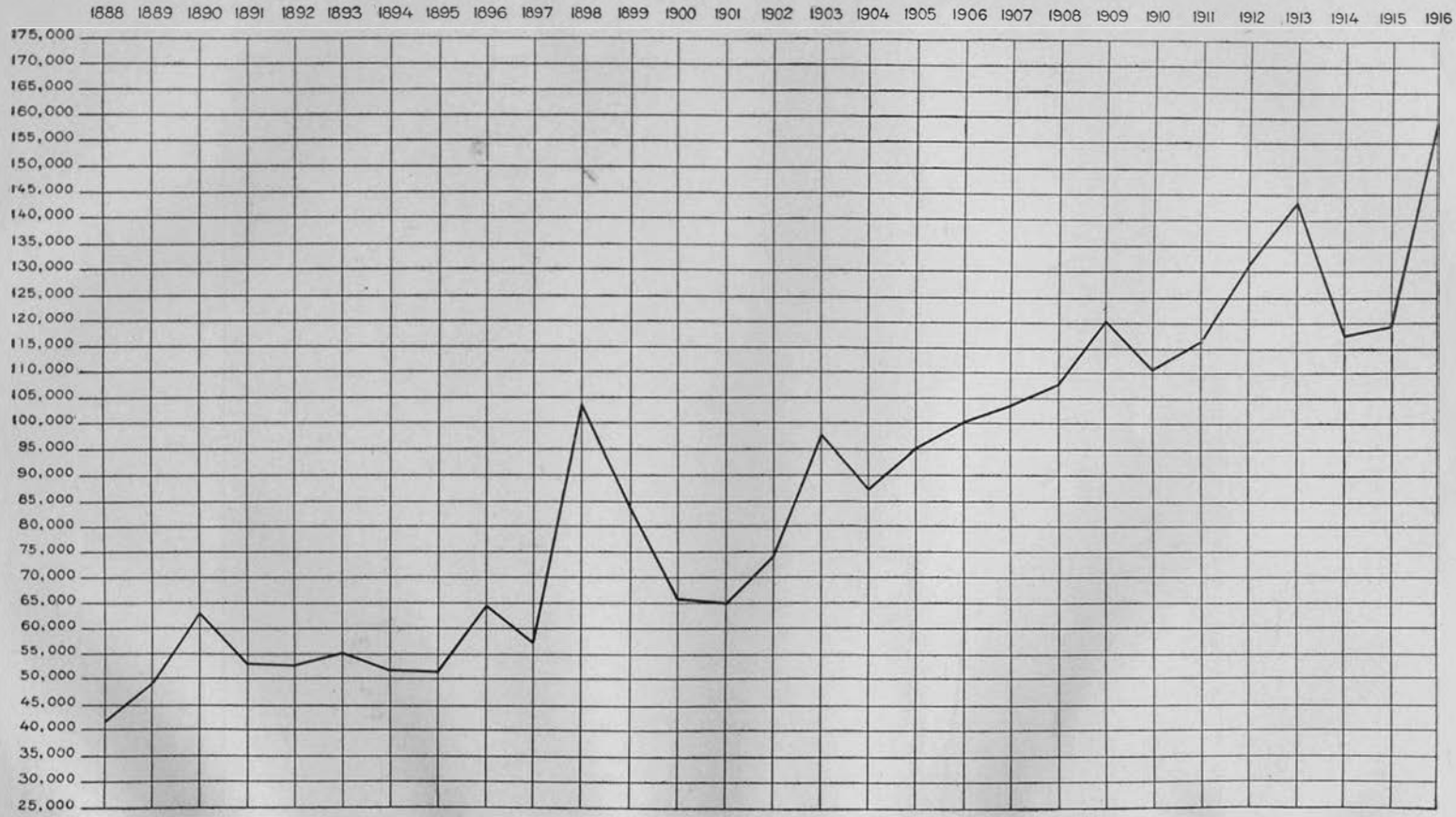

FIG. 7.—*Issue of Coast and Geodetic Survey charts, 1888–1916.*

An electric motor has been furnished in the last year to supply power for the machine shop. (See fig. 6.) The modern method would, however, be to furnish individual motors for the present machines, taking away the belting and shafts. At present to operate the smallest machine the whole overhead shafting must be run, using a 7½ horsepower motor when one of one-half horsepower would suffice.

The hydrographic and topographic draftsmen use drafting tables nearly 50 years old. Modern tables would greatly increase the output.

The storerooms are so crowded that they frequently have to be emptied to obtain a single article desired, thus wasting hours of labor.

Reclassification of Employees.

There are 39 employees in the Coast and Geodetic Survey rated as clerks. Of these, however, but 25 are actually engaged on what is ordinarily known as clerical work. The work of the Service is highly technical, and as it has developed need has arisen here and there for a person to take up and assist in the work. This has from time to time been met by assigning a person rated as a clerk to do the task, so that the number rated as clerks is not an accurate index compared with an ordinary office force with the amount of ordinary clerical service used. The demands of the Bureau are growing so fast that the office personnel is taxed to the utmost. During the last fiscal year nearly one-third more charts were sold than during the previous fiscal year. (See fig. 7.) This means an immense increase in compiling information, drafting and engraving, printing, correspondence, accounts, and indeed all the branches of the Service's work. Under these conditions the office force has been able to do only the most pressing current work, and much that should be kept up has gone into arrears. It is essential that new positions be provided to keep the work up and that these should be designated properly in keeping with the class of work actually performed.

Congress provided three additional computers for the current fiscal year. This was helpful, but not sufficient to meet the demands of the work. In the estimates for 1918 eight computers are asked to make available much geodetic data which otherwise must remain unused. For a similar reason the estimates for the next fiscal year ask for eight additional draftsmen and such other additions to the staff as are requisite to keep the work up.

It must be realized, of course, that the rapid growth in the American merchant marine brings extraordinary demands upon this Service. One can not reason from a period as recent as 1913 to the conditions which exist to-day. The outlook is for even greater pressure upon our facilities, for the number of ships building in the United States was never as great as on October 1, 1916. If the statements made concerning the demands of the work of the Coast and Geodetic Survey are viewed in the light of the report herein on the Bureau of Navigation, the conditions will be easily understood.

Mechanical Engineer for Instrument Section.

It is purposed in the estimates for 1918 to alter the designation of the chief of the section of instruments to that of "mechanical engineer," with an increase of salary from $2,400 to $3,000. E. G. Fischer, the present incumbent, is a mechanical engineer of exceptional ability who has designed many new, delicate, and intricate instruments. Among those of notable value is the tide-predicting machine used by the Service, which is the admiration of the world. His latest achievement is the development of a new electric signal lamp for use in observations for triangulation at night. This lamp, which is illustrated herein (see fig. 8), has a beam candlepower of 250,000, a marked advance in efficiency over the lamp of 1,500 beam candlepower which has heretofore been used. The new lamp has been adopted by private parties and Government bureaus, including the United States Navy, the Forest Service, the Coast Guard, the Aeronautic Service, and by manufacturers also of mine-rescue apparatus. The modest salary now asked for a public servant who can do constructive work of this character is small by comparison with that which would be paid a man of equal productive value in private service.

Systematic Distribution of the Bureau's Charts and Publications.

Requests by persons and corporations for such information as the magnetic variation of the compass at a given point at a period long past and at the present time, in order to locate land boundaries; for the elevation of a point above the sea level; and for the Bureau's nautical charts, etc., are so vaguely and often so inaccurately addressed that it is forced upon us that these people (and doubtless many others) have a real need but lack information as to the branch of the Government service that can supply that need.

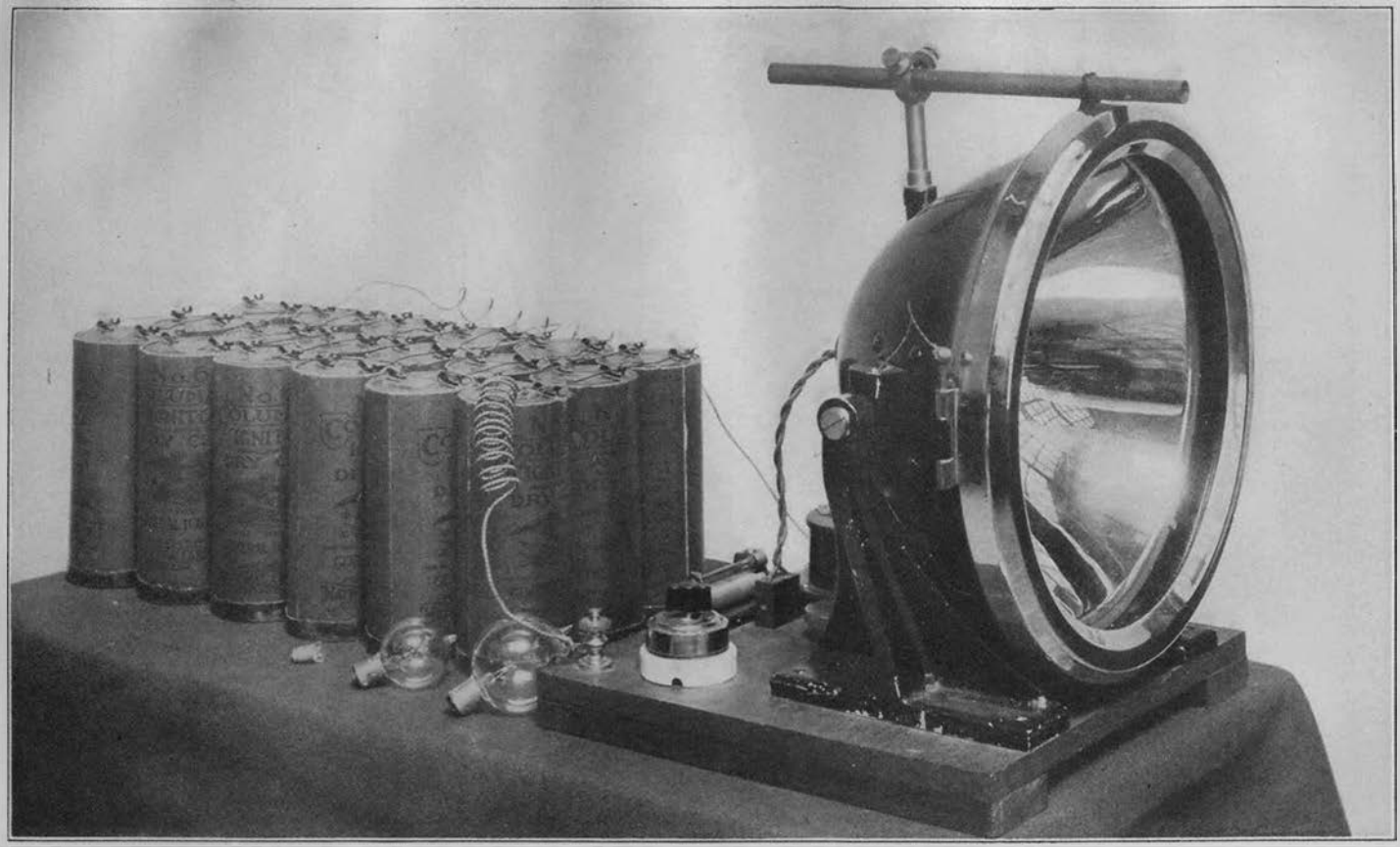

FIG. 8.—*New electric triangulation signal lamp, Coast and Geodetic Survey.*

Yields at 100 feet 250,000 beam candlepower, with 9-volt, 2.5-ampere special bulb developed in the Survey.

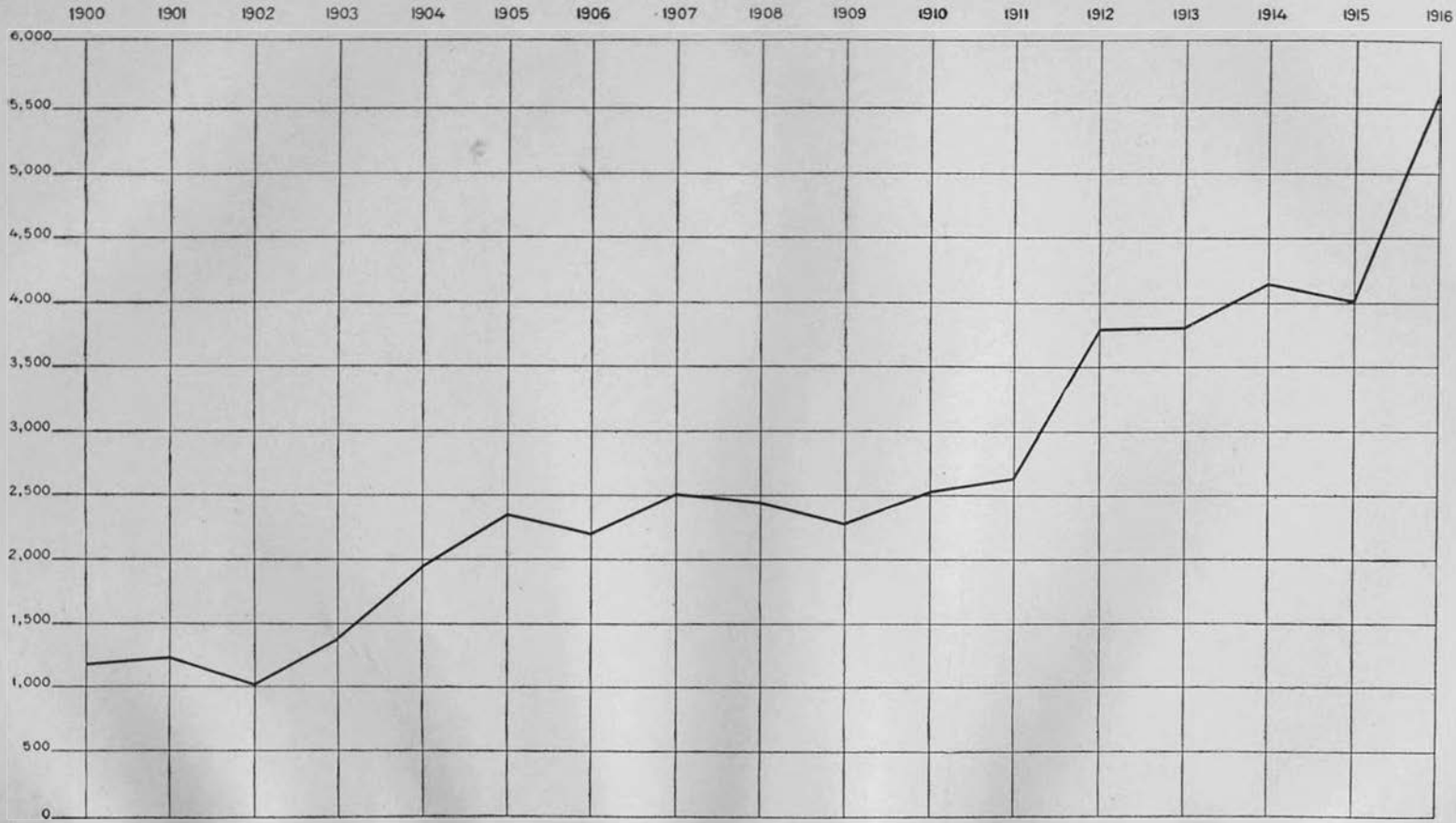

FIG. 9.—*Annual distribution of Coast Pilots, issued by the Coast and Geodetic Survey, 1900–1916.*

To remedy this, and to bring to the public attention the data that have cost so much and are essential to many public enterprises and private projects, there is need of a well-thought-out announcement regarding each publication as it comes from the press which will reach the greatest number concerned with the least expenditure in advertising, and that will prevent the free distribution of expensive publications to those who are merely curious.

With the means at hand the Bureau has undertaken in a small way to carry on such a campaign of education. Requests were forwarded to each chamber of commerce of the important coast cities asking that the Bureau be given lists of the steamship companies and wharves located at those ports, as well as of the yacht clubs there and in the vicinity. Cooperation by everybody was surprisingly responsive. Since securing this information the Bureau has sent a letter to each steamship company when a new chart was published or a new coast pilot was issued. A poster has been prepared, to be placed on the wharves and in the yacht clubs, calling attention to the particular publications and charts of the Bureau and giving a list of agencies where these charts and nautical publications could be purchased.

Heretofore it was the custom of the Bureau to make the surveys, compile information, publish a chart, and supply such demands for it as came in, leaving the public to learn of the existence of the chart as best it could. Recently the Bureau published the usual edition of a chart of Long Island Sound above New York City. Simultaneously with its publication prepared notices were sent to the newspapers in the locality of the waters covered by the chart calling attention to this new chart and giving the particulars regarding it. Almost instantly the demand for this chart was so great that the usual edition was exhausted. This chart was first issued April 29, 1916. Within four months the Bureau had received orders for nearly 1,700 copies of it. There is no question that this demand resulted from the newspaper announcements concerning it.

There are numerous instances of this kind where with proper public announcement the information that is so necessary and has cost so much can be in the hands of those whom it benefits rather than be uselessly stored in Washington. How to do this without an extravagant distribution of publications to persons ordering them through curiosity alone is a matter that is being given earnest consideration.

Printing Office Needs.

The request is renewed for a new printing press, transfer press, and a modern cutting machine. These new facilities in this office will greatly increase its efficiency.

New Suboffices.

Suboffices in Boston, Norfolk, and Juneau and funds to maintain the Galveston office, which now occupies quarters furnished by local public organizations, are needed. At a small cost it would be possible to place in each a local inspector, who, by coming in contact with local conditions and nautical people, would greatly increase the value of the Bureau to the public and materially increase the information it could gather in the course of each year regarding local nautical conditions.

Two New Vessels for the Pacific Coast and Alaska.

In last year's estimates two new vessels were asked for to take the place of the *Gedney*, which was sold a year ago, and the *Patterson*, still in the service, but old, weak, and unfit for the work that is expected from her in the protection of the waters on the Pacific coast.

Congress felt that the replacing of these vessels should be deferred for the time. This request for these two new vessels for the Pacific coast is renewed with the earnest hope that the increasing need of surveys on the Pacific coast will be recognized. It may be well to add here that both the *Patterson* and the *Explorer* will, necessarily, require repairs this year. In view of the age of both these vessels, it is unwise to make extensive repairs to them. It has never been more evident that extraordinary efforts should be made to keep up with the rapid progress of the Pacific coast and Alaska and to safeguard the waters on which they depend for transportation. Alaska up to 1913 had been in a more or less dormant state. Within three years the Territory has developed wonderfully; the new railroad is being built to tap the interior, and her exports and imports have increased from sixty-one millions of dollars to about one hundred millions of dollars. The work of making surveys, which was backward before this increased activity, has not kept pace with the development of this vast Territory.

It is essential that these new vessels, now asked, be furnished in order to survey with the least possible delay the great coastal areas of central and western Alaska.

FIG. 10.—*Coast and Geodetic Survey vessel "McArthur."*

Wooden steam vessel of 299 tons displacement, 220 gross tons, and 130 net tons; registered length 115 feet, breadth 20 feet, draft 12 feet; indicated horsepower 250; speed 8.5 knots; coal capacity 48 tons; complement 7 officers and 30 men. Built at the Mare Island Navy Yard, Cal., in the year 1876. Condemned and sold on February 8, 1916.

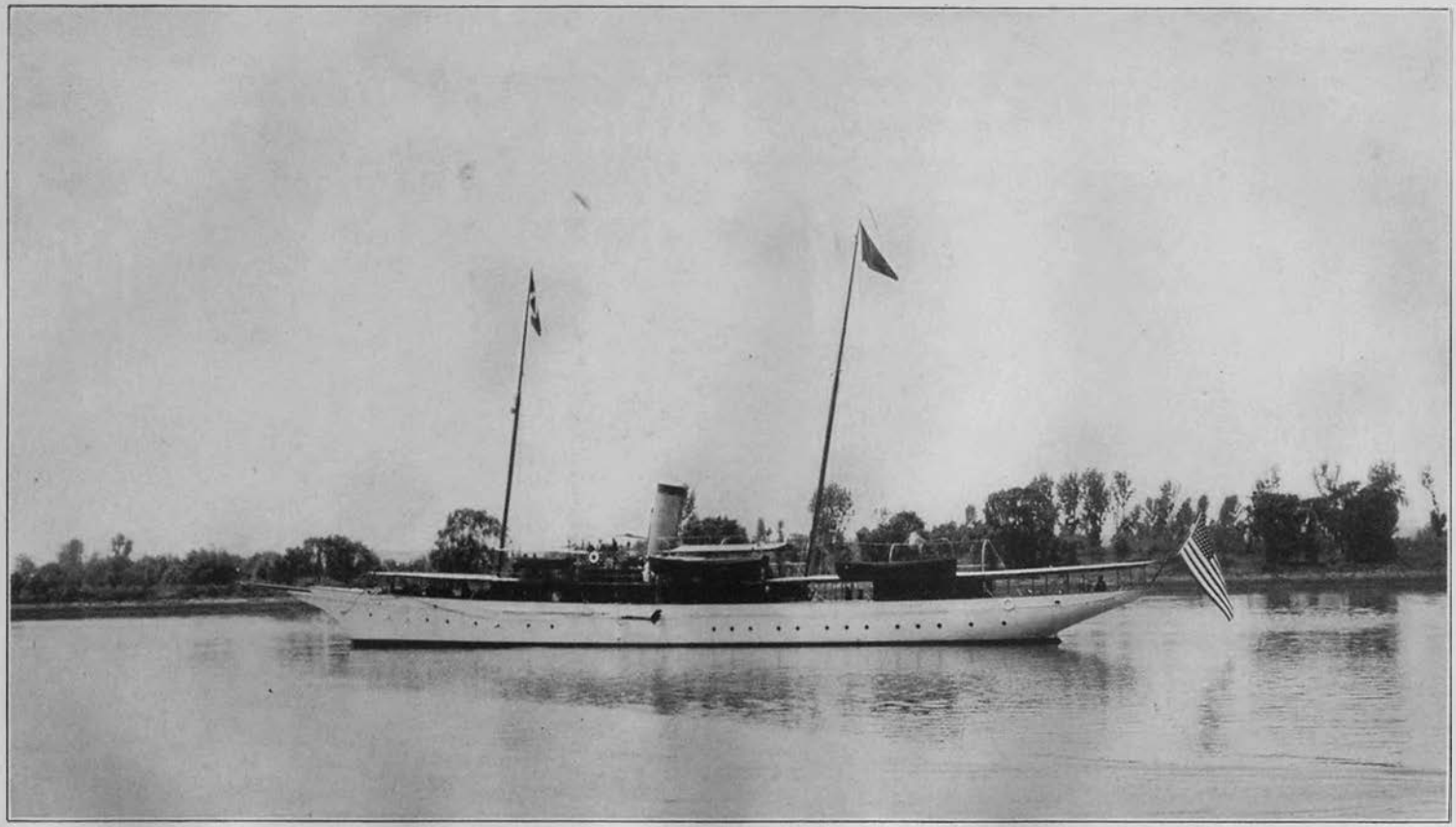

FIG. 11.—*Coast and Geodetic Survey vessel "Isis."*

Steel steam vessel of 377 gross tons and 256 net tons; registered length 180.4 feet, breadth 24.8 feet, draft 11.7 feet; indicated horsepower 2,000; speed 15 knots; coal capacity 120 tons; complement 8 officers and 44 men. Purchased July 1, 1915. Present duty, offshore hydrography on the South Atlantic coast of the United States. This vessel does five times the work of her predecessor ship.

The *Surveyor*, the most suitable vessel of her kind ever built for this Service, will be ready for the Alaska work next spring. Her keel was laid in the winter of 1915, and she was launched in July of this year.

In addition to the present work in Alaskan waters, the coasts of Washington, Oregon, and California are in urgent need of completed surveys and the protection which complete and accurate charts afford. It has been impossible heretofore to give these coasts the attention they require. It can not now be done for lack of ships.

On the Atlantic coast the new vessel *Isis* (see fig. 11) has done admirable work during the past season. She, the *Bache*, and the *Hydrographer* are all in good working condition and suited for the work they are called upon to do. The *Matchless*, an old sailing vessel, nearly 60 years old, is used as a house-boat for surveying parties in some of the inland waters. Extensive repairs on her are useless, as she will last but a short time longer.

It is earnestly hoped that sufficient funds will be appropriated to keep these vessels in service twelve months of the year, as their services are needed on survey work continuously.

Government-Owned Launches Needed.

An appropriation for the purchase of launches for wire-drag surveys and inshore work on the Atlantic and Pacific coasts is again urged. The wire-drag parties cost on an average $3,173 per month, a large part of which is for the hire of launches. Launches suitable for these operations are scarce, and all that are available must be modified to meet the needs of the work. The launches most suitable are the highest priced. For example, the largest boat for each of the Alaska parties cost nearly $1,000 each per month. A great deal of time is lost each year in selecting and remodeling the boats for this particular service. The superstructure has to be removed and at the end of the season put back in the shape it was found, and the Government has to pay for it. If, on account of bad weather, the launches have to be laid up, the cost of their hire still goes on, and, while the officers and men are not idle, the launches are making no returns.

If the appropriation is made for Government-owned launches, they can be built not only in the way best adapted for the work, but they can be used for wire-drag work as well as revision and inshore work. Considered from the standpoint of economy, it is certain that as much as 20 per cent would be saved on the investment.

Increase of Pay of Men on Vessels.

A serious matter with which the Bureau has had to contend is the general demand for increase of pay of the men employed on the vessels of the Survey. On July 1, 1916, increases were approved of $8 per month for seamen and quartermasters and $5 a month for other petty officers and men in Alaska in order to insure the retention of these employees.

In the estimates for 1918 for the Alaska vessels a further increase of $3 per month per man is included for the lower-paid employees. Even then the rates proposed in the estimates for 1918 are about $10 per month below the prevailing wages on the Pacific coast during the summer of 1916. On the Atlantic coast increases in pay are urgently needed, but the present appropriation will not permit it. In the estimates for 1918 increases of $5 to $10 per month are included.

The commanding officers of the vessels in the Service repeatedly urge the necessity for advancing wages if crews and officers are to be retained. They state frankly that it is impossible to get men for the wages heretofore paid. This agrees with the experience of the Department in its maritime services.

The officers of our vessels on the Atlantic coast report similar conditions, stating that it is only with extreme difficulty that they can keep crews when other services and merchant vessels are paying higher wages. One officer writes that every day some of his men ask discharges to accept better paying jobs elsewhere, and that to fill the places these men leave he can only get men that nobody else will use.

There is no service in the Government where trained seamen are more absolutely essential to the welfare of the work. An officer in this Service is a trained specialist, and the same term can be used in reference to a seaman who has had a term of service in this Bureau. The demands on him are much more exacting than under the regular routine on passenger steamers, and his duties are more varied and require thoughtfulness and skill. It can be readily understood that a man who has been trained by an officer of the Government until he reaches a high degree of efficiency should be retained from year to year. Conditions should be such that an employee who proves satisfactory can be given assurance that promotion will follow continued effort on his part. Under the present conditions an inexperienced man is hired in the spring, receives a partial training during the summer, and is dismissed in the fall

because the funds are insufficient to continue his employment from year to year. Were the funds sufficient, it would be perfectly feasible to keep these men busy throughout each year on work that is necessary to be done.

Need of 48 Additional Hydrographic and Geodetic Engineers.

The accompanying table shows the need of additional engineers to properly and efficiently officer the various parties of the Survey. Congress very wisely provided additional funds with which to pay party expenses, and if the Survey is to do the work asked of it in charting the waters of the country and providing geodetic control of the interior further funds must be available for party expenses in the coming year. This means that there must be provided the necessary hydrographic and geodetic engineers to direct this work.

Our engineers are not only the chiefs of party, but they also make the observations with sextant, theodolite, plane table, and level. The men, or nontechnical force, are there to assist the engineer by rowing the boat, running the launch, heaving the lead, etc.; they can not do the instrumental work. Without the engineers the Survey is in the same condition as a merchant vessel which has not sufficient officers for its proper navigation. The result of such a condition upon our work is evident. The officers become overworked, lose their ambition to do things in the most efficient manner, and at the end of the season look for more inviting fields of engineering; or they may accept the conditions imposed and drift along, thinking that if those higher in authority are not sufficiently impressed with the importance of providing means for securing a well-balanced party that can secure results at a minimum unit cost they (the officers) would be exerting futile efforts. We can not blame them.

There will be needed 22 additional officers in the spring of 1917 to carry on the work for which party expenses have been appropriated.

The *Surveyor* will need 11 officers; the *Yukon* will need 3 officers; the *Isis* will need 4 officers; the *Matchless* will need 2 officers; and the Pacific coast triangulation will need 2 officers; total needed, 22.

There are 48 additional officers asked for in my estimates for 1918. This will provide for the 22 now needed and for 26 who will be needed if the increases in the party expenses appropriations are allowed.

FIELD OFFICERS, COAST AND GEODETIC SURVEY—PERSONNEL OF PARTIES.

Assignment.	Summer of 1916.						Summer of 1917.	
	Assistants.	Aids.	Mates.	Deck officers.	Total.		Total.	
					Parties.	Officers.	Parties.	Officers.
Office	15				10	15	10	15
Suboffices	5	1			4	6	4	5
Bache	2		2	4	1	8	1	7
Isis	3				1	3	1	7
Hydrographer	1	1		2	1	4	1	4
Matchless	1		1	2	1	4	1	6
Patterson	3	4	2	1	1	10	1	9
Explorer and Cosmos	3	2	1	1	1	7	1	7
Taku	1	2			1	3	1	3
Surveyor [a]							1	11
Yukon [b]							1	3
Wire drag No. 1	2	2	1	3	1	8	1	7
Wire drag No. 2	1	3	1	2	1	7	1	7
Wire drag No. 3	2	3		3	1	8	1	7
Wire drag No. 4	3	1	1	2	1	7	1	7
Wire drag No. 5							1	7
Wire drag No. 6							1	7
Pacific revision	3				2	3	3	6
Atlantic revision	3		1	1	3	5	4	6
Philippines	10	10	4		6	24	6	24
Inspecting new vessels	1				1	1	1	1
Coast Pilot	4				4	4	4	4
Tides and Currents	1				1	1	2	2
Triangulation	2				2	2	9	13
Levels	4				4	4	7	7
Gravity	2				2	2	2	2
Astronomical	3				3	3	3	3
Total	75	29	14	21	53	139	70	187

[a] Building. [b] Not in commission.

Increase in Salaries for Hydrographic and Geodetic Engineers.

The old theory about the civilian appointments in the Government was that any man was fortunate who retained his job, however small the pay, for more than four years. This was in the days before there were civil-service laws. Now the Government considers itself very fortunate if it can retain experts in its service at salaries much smaller than those ruling in similar work in private life.

The Government is the largest single employer of skilled service. It is also the most inefficient employer. It sees 15 per cent or more of its skilled employees leave each year. These are, as a general rule, the most able and efficient ones. The least able employees remain, and on account of long and faithful, but often not notably efficient, service, they reach the higher positions. Then we have too much deadwood at the top. How often do we

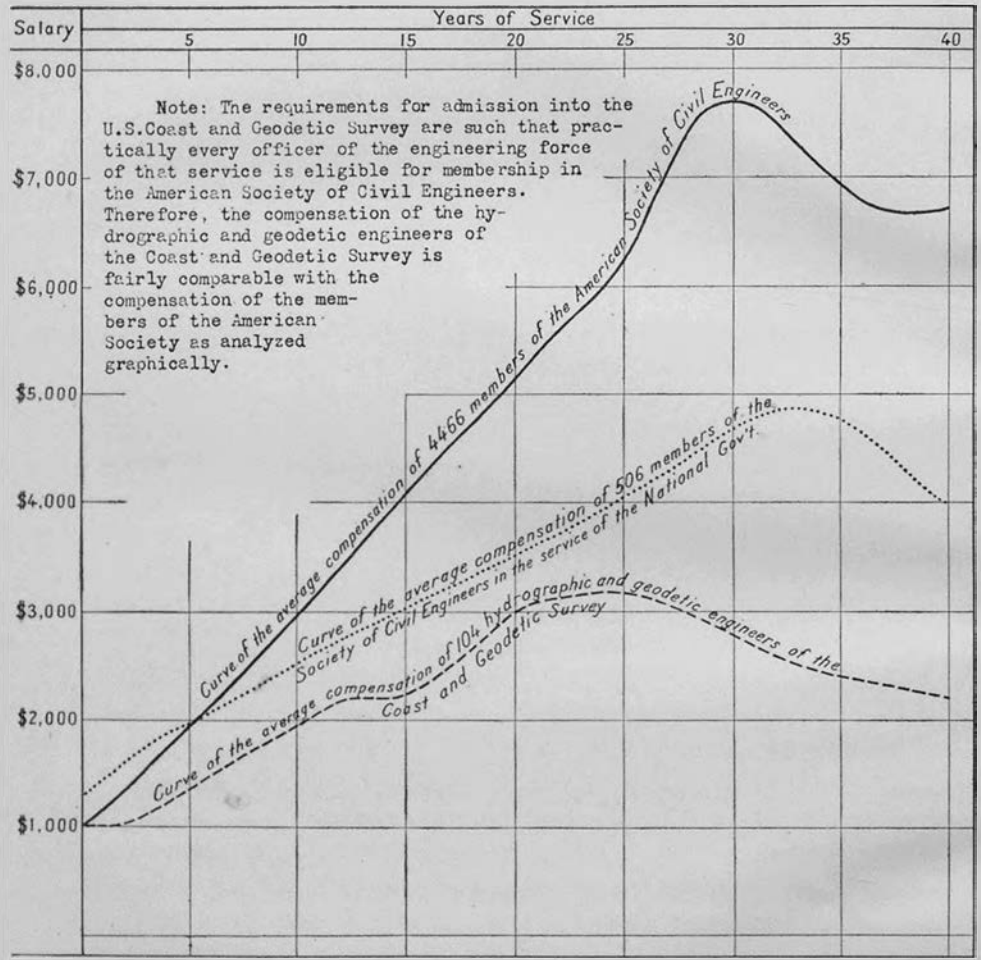

FIG. 12.—*Comparative diagram of engineers' salaries.*

Average compensation of hydrographic and geodetic engineers of the United States Coast and Geodetic Survey, compared with the average compensation of 4,466 members of the American Society of Civil Engineers, as analyzed in a report of a committee of that society, dated December, 1914.

hear that remark about a Government organization, especially an old one. We try to remedy this condition by having a surgical operation where a much milder treatment given at the right time would have prevented the trouble.

What is the condition to-day in the field force (assistants and aids) of the Survey?

There are 104 engineers in statutory and 14 in nonstatutory positions. Of the total of 118, there are 62, about 53 per cent, who have had less than 6½ years of service. There are 43, or about 36 per cent, who have had less than 3¼ years of service. Aside from the inefficiency in costs involved in having inexperienced officers, are we not menacing vessels carrying millions of dollars worth of cargo, besides their own value, and thousands of the crews and passengers who run the gravest risks from having a number of inexperienced engineers and surveyors making the surveys upon which the sailing charts are based? We are; and this condition should be remedied. We can not make some of the work easy, nor can we always make the conditions pleasant under which the men have to live in the field, but we should make our engineers feel that we (that is, the Government) are fair.

What is necessary to make for greater efficiency in the force is to have salaries more nearly equal to those paid for similar or less exacting duties in other Government services and also in private engineering fields. The following tables show the salaries of the officers of the Survey in contrast with those of some other organizations and the relative increase of field officers and appropriations (see also fig. 12):

COMPARISON OF PAY OF HYDROGRAPHIC AND GEODETIC ENGINEERS WITH ANALOGOUS ENGINEERING AND GOVERNMENT ORGANIZATIONS.

Service.	Average pay.	Reference.
American Society of Civil Engineers	$4,224	Report of committee of society, December, 1914.
41 civil engineers, United States Navy	3,429	1916 estimates, p. 1078.
226 engineers, United States Army	3,008	1916 estimates, p. 292.
62 Revenue-Cutter officers (retired list)	2,921	1916 estimates, p. 1120.
249 Revenue-Cutter officers (active list)	2,670	1916 estimates, p. 1120.
Geologists, Geological Survey (73 annual employees)	2,130	1916 estimates, pp. 791–798.
Topographers, Geological Survey (57 annual employees)	2,164	1916 estimates, p. 792.
Bureau of Mines (34 annual employees)	2,662	1916 estimates, p. 806.
Patent Office (396 annual employees)	2,019	1916 estimates, p. 95.
Hydrographic and geodetic engineers, Coast and Geodetic Survey (104 annual employees).	1,720	1917 sundry civil bill.
Hydrographic and geodetic engineers if granted increase requested (152 annual employees).	1,900	1918 estimates.

NOTE.—Wherever information is available in regard to those who resigned from the field force, in general the salary received in the new position is higher than that received in the Coast and Geodetic Survey.

RELATIVE INCREASE OF FIELD OFFICERS AND APPROPRIATIONS.

Fiscal year.	Field officers.	Deck officers.	Total officers.	Percentage of increase over previous year.	Appropriation, party expenses.	Percentage of increase over previous year.
1915	125	5	130	0	$308,000	0
1916	123	13	136	5	343,000	11
1917	118	21	139	2	422,320	23
1918[a]	166	21	187	35	589,838	40

[a] Estimated.

The increases in the number of positions called for in the 1918 estimates are distributed in such a way as to make the salary list more attractive to those now in the service and to the graduates of our engineering schools.

During the past seven years and until July 1, 1916, every man whose name was placed on the "aid" register by the Civil Service Commission was offered a position in the Survey. This is an unhealthy condition of affairs. We should have so many names on the register that the appointing officer may always have at least a choice of three eligibles for each position to be filled. Any other condition is contrary to the best public policy.

The salary list is designed to provide for lowest unit costs and maximum safety; in other words, for the greatest efficiency.

Wire-Drag Work, 1916.

Bowlders, ledges, and other forms of pinnacle rocks have, as usual, been found by the surveys this year. Perhaps the most striking illustration during the year proving the value of the wire-drag work was the development of the main ship channel leading to Salem Harbor. (See fig. 13.) Numerous rocks were found in this channel, which very considerably restricted its width for deep-draft vessels, and this work was fortunately done prior to the visit of one of our battleships there this summer. At the request of the commanding officer of the battleship, one of the wire-drag parties buoyed the channel and an anchorage for the use of the battleship.

The correspondence upon the subject drew the attention of the Navy Department to the matter, and, as a result, a request was received from the Secretary of the Navy that the areas covered by wire-drag surveys be indicated on special editions of the charts for the use of naval vessels. Arrangements have been made to comply with the request of the Secretary of the Navy.

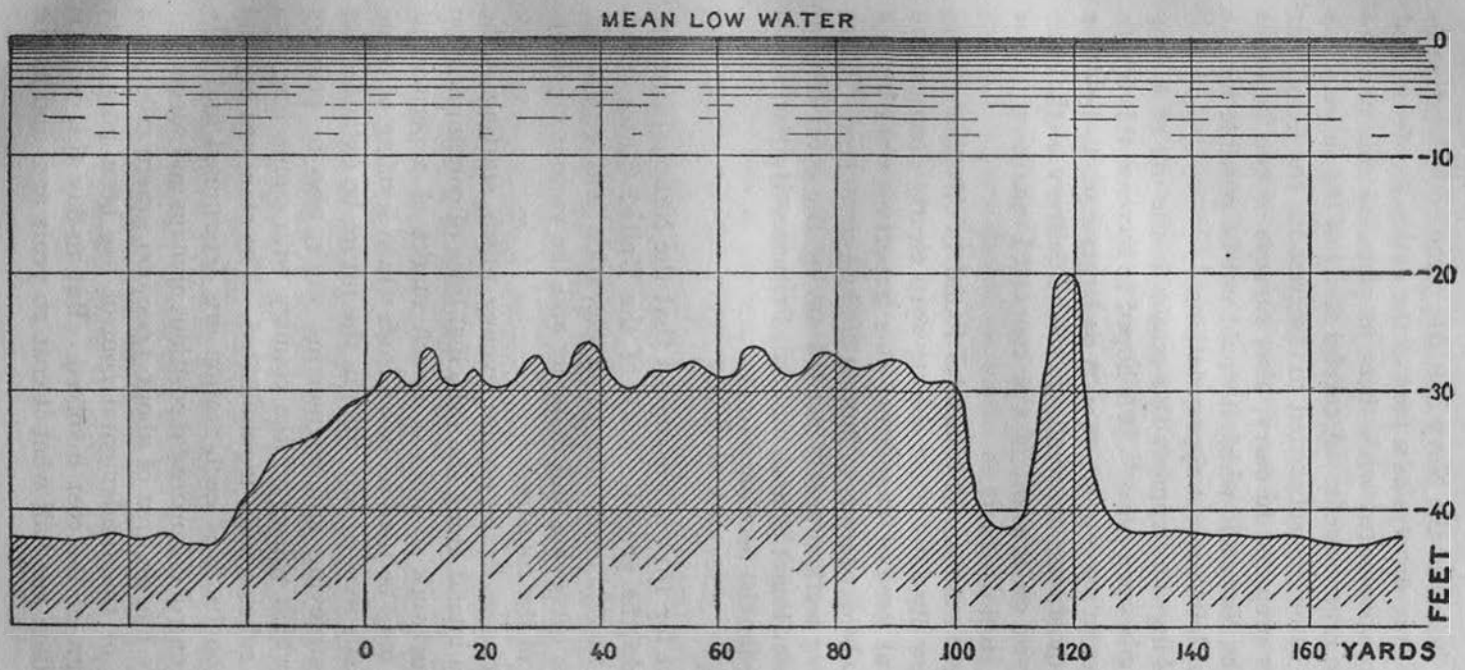

FIG. 13.—*One result of wire-drag work in 1916.*

This pinnacle rock recentlyf ound at the approach to Salem Harbor, Mass., is no less dangerous than submerged pinnacles abounding in Alaskan waters.

The General Board of the Navy has also given consideration to the use of wire-drag surveys as a part of the national defense, and the Bureau has cooperated with them in planning this work to meet their most urgent needs. A careful study of the subject was made, and the estimates submitted to Congress for the fiscal year 1918 have been prepared to carry, also, surveys of two localities requested by the Navy and which it would not be possible for the Survey to do with its present appropriations.

Another striking development this season is the use of a drag 15,000 feet long in open areas. It is hoped to increase this length for ordinary use in open areas as soon as larger reels to hold the necessary length of wire are available. The delivery of the reels has been delayed on account of the congested condition of the market for all steel products.

The numerous submerged pinnacles found in Alaskan waters and on the New England coast during 1916 clearly demonstrate again the urgent need of expediting this important work in vast areas known to be dangerous to human life and commerce. There is also wire-drag work urgently needed among the coral reefs of southern Florida, Puget Sound, and San Francisco Harbor, which is only waiting for the necessary funds.

Geodetic Work.

In my report for 1915 it was shown that the National Government should do the geodetic work of the United States which furnishes the fundamental control in elevation and geographic position for the surveying and mapping and the various engineering operations of the country.

This work consists in the precise leveling which, starting at the coasts, extends inland along the principal lines of communication and forms a network of lines of bench marks of a permanent nature, which may be used as bases from which leveling of equal or lower accuracy may at any time in the future be extended for the detailed surveying and engineering work; also in primary triangulation which will cover the country with connecting arcs of stations all substantially monumented. The standard or final latitude and longitude of each station are determined and published for the control in horizontal positions of maps and surveys.

This country has an area of about 3,000,000 square miles, and the extension of the fundamental control has been necessarily slow on account of the cost involved. But to-day this work is done for less than one-half what it cost 20 years ago, and as the

demands for the results are far greater than hitherto it appears to be good management, on account of the necessity for the results and the economy with which it is done, to push to a rapid completion that part of the work which is essential in the proper development of the country.

The plan that should be carried out during the next few years is to have such an amount of primary control that no place in the United States would be more than about 100 miles from a precise-leveling bench mark or a primary triangulation station.

The appeal to Congress during the past session for funds to extend the geodetic work of the Survey was met by an increase of 70 per cent. This is a good start, but considering the fact that the previous appropriation was only $31,000 it will be seen that further increases should be made, as the estimated cost of completing the work which is badly needed now is more than $1,000,000. If no further increase is made, this work will require from 15 to 20 years. It should be done in one-half that time.

What has been said as to the need for geodetic control in the United States applies equally to the interior of Alaska. There is no control, except along the Alaska and Canada boundary and along a portion of the coast, for an area of over one-half million square miles of territory, which is becoming more and more necessary for the operations of several Federal organizations as well as for private individuals and corporations. The country can not be properly developed without maps and surveys, which in the interior are being made by the United States Geological Survey, the General Land Office, the Forest Service, and the Alaskan Engineering Commission. Requests for geodetic data in the interior of Alaska have been made upon the Coast and Geodetic Survey by officials of those organizations, and I strongly recommend that funds be provided for starting this important work.

The precise leveling and primary triangulation which should be done in the interior of Alaska are indicated on the accompanying diagrams (see figs. 14 and 15) and in the following statement.

In my report for the previous year there was shown the importance of having certain primary triangulation on the Pacific coast of the United States and Alaska and supplementary triangulation on the Atlantic and Gulf coasts. The increased funds provided by Congress made it possible to do something on these lines of work.

PRIMARY TRIANGULATION NEEDED IN ALASKA.

	Miles.
Norton Sound to Eagle, via Yukon River	750
Yukon River to Kuskokwim Bay	350
Upper part of Kuskokwim River	250
Across Alaskan Peninsula, Cook Inlet to Bristol Bay	120
Susitna River, Cook Inlet to Fairbanks	300
Cordova to Tanana, along Copper and Tanana Rivers	700
From Copper River to One hundred and forty-first meridian	100
Total	2,570

PRECISE LEVELING NEEDED IN ALASKA.

Norton Sound to Eagle, via Yukon River	800
Yukon River to Kuskokwim Bay	400
Upper part of Kuskokwim River	300
Susitna River, Cook Inlet to Fairbanks	325
Cordova to Tanana, along the Copper and Tanana Rivers	750
Copper River to One hundred and forty-first meridian	110
Total	2,685

I can not leave this subject of geodetic work without calling attention to the assistance needed at the office to make the results of the field work available for the Government and for the public.

For many years the primary triangulation in the interior and the tertiary triangulation on the coast existed as a number of detached schemes, each based upon a separate astronomic determination (datum) for the latitudes and longitudes of the stations. Eventually, in 1901, the systems were sufficiently connected to justify the adoption of a single datum for the whole country. This was necessary for the proper utilization of the results. The adoption of the single datum for the whole country has been highly commended by geodesists of Europe, where, in general, each country has its own datum, with consequent confusion in the maps along the frontiers.

But the adoption of the single datum involved the Survey in much work, for practically all of the triangulation done previously needed recomputing. But new geodetic work has been turned in, in increasing amounts, by the vessels and land parties, due to larger appropriations for field work, so that, at present, there are thousands of triangulation stations for which the standard or final positions are not available in the proper form for use by the Government and the public. There has not been a proportionate increase in the computing force, which is now just about able to compute and have published each year data for as many stations as are established in a year, but which is not able to handle the older but very valuable work. Without

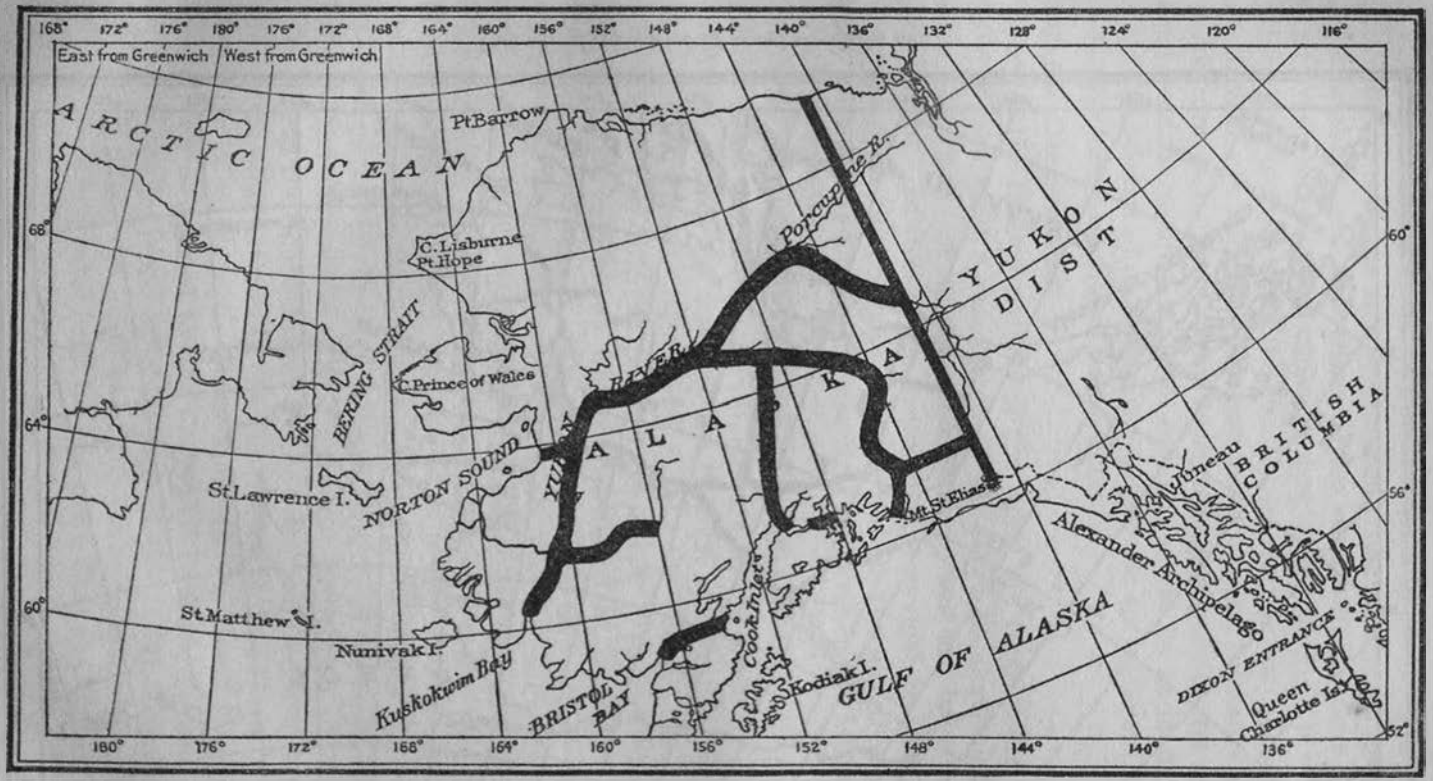

FIG. 14.—*Primary and secondary triangulation needed in Alaska now.*
(Work along 141st meridian has been done by Boundary Commission.)

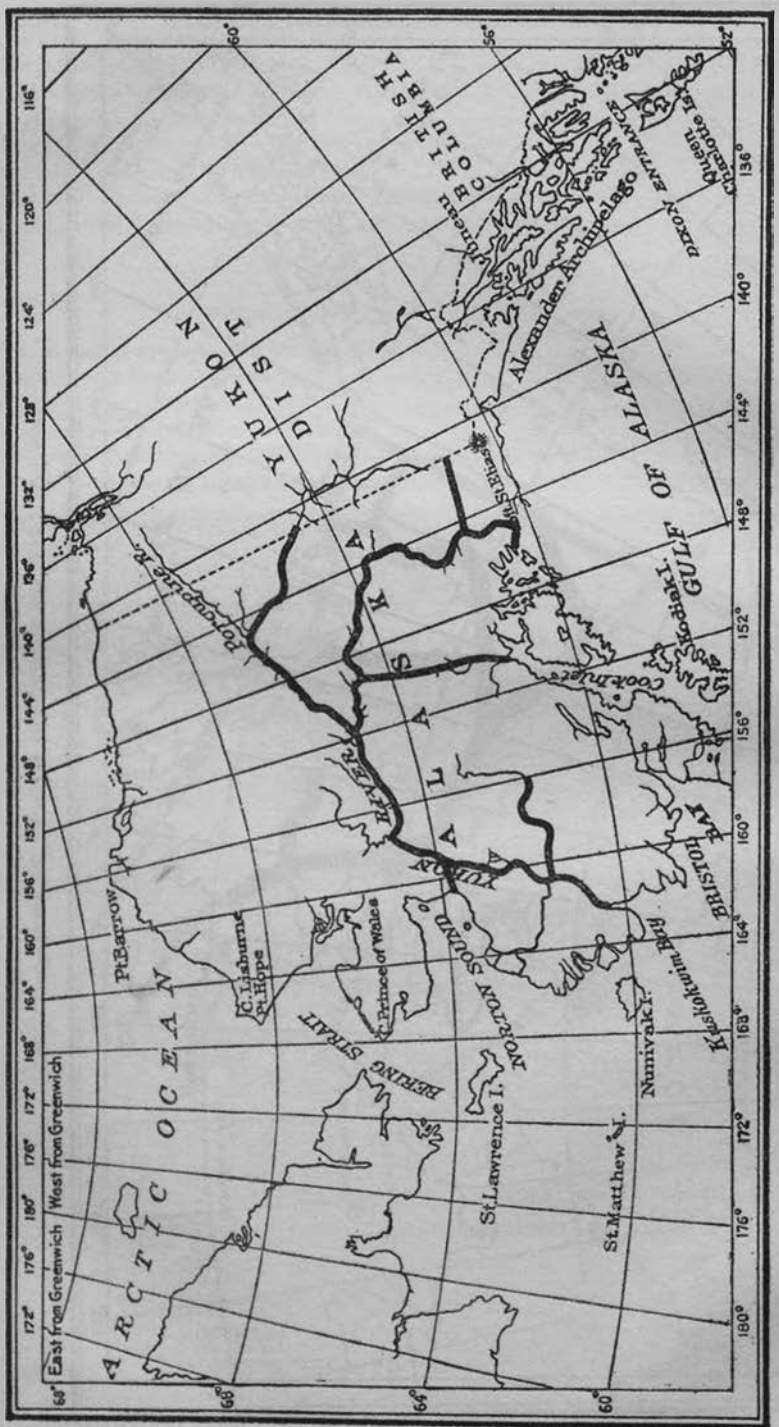

FIG. 15.—*Precise leveling needed in Alaska now.*

an increase in the force of computers much geodetic data must remain in the archives and be practically unavailable for use.

The establishment of a triangulation station in the field costs, on an average, about $60, while the cost of computing the observations and preparing the results for printing is only about $7 per station. It will be good business to make this additional expenditure, in the form of an increased appropriation for additional geodetic computers. Not to do so would be as inefficient as for the officials of a factory not to provide for sufficient force for the packing and sale of its products.

Magnetic Observatories.

Most of the leading nations of the world are cooperating in a study of the earth's magnetism in an effort to determine its origin, the causes of its many fluctuations, and the laws which govern them. In view of the dependence of navigators and land surveyors upon the compass needle, of which the directive force is the earth's magnetism, the practical importance of this study can not be questioned.

In order that accurate data may be available for these investigations, many magnetic observatories are in operation at which continuous records are made of the changes in direction and intensity of the earth's magnetic force. As the changes are found to be different in different parts of the earth, it is important to have the observatories as widely distributed as possible. The United States, by reason of its large extent of territory, is called upon to take a large share of this work, and magnetic observatories are now being operated by the Coast and Geodetic Survey at Cheltenham, Md.; Tucson, Ariz.; Vieques, P. R.; Honolulu, Hawaii; and Sitka, Alaska.

In his address at the celebration of the centennial of the Coast and Geodetic Survey, Dr. L. A. Bauer, Director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, urged the establishment by the Coast and Geodetic Survey of magnetic observatories in the Canal Zone and at Guam. The desirability of a magnetic observatory in the Canal Zone had already been recognized by the Coast and Geodetic Survey, and in view of the proposed rehabilitation of the Jesuit observatory near Manila under the auspices of the Carnegie Institution, it is felt that there is greater need for one there than at Guam. It is proposed, therefore, as soon as conditions are favorable and the

necessary funds can be secured, to establish a magnetic observatory in the Canal Zone.

To insure freedom from the disturbing effect of electric car lines and similar causes it is necessary to place a magnetic observatory at least 10 to 15 miles from such installations. From this it follows that it is usually necessary to provide quarters for the observer and means of transportation for supplies from the nearest supply point.

When the building now in process of construction at the Sitka observatory is completed, there will be observer's quarters at each of the five observatories except Cheltenham. Up to the present time it has been possible for the observer in charge of that observatory to rent suitable quarters. The character of the observatory work is such that it is important to have the observer in charge live so near that he can readily make an inspection of the buildings and instruments at any time of the day or night. At the present time there are only two rented houses at Cheltenham, and they are about a mile from the observatory. Conditions might easily arise which would compel the observer to go still farther away for suitable quarters. The present combination of office and observatory in one building is also unsatisfactory, because of the danger that necessary articles of office equipment may have a disturbing effect on the instruments. Provision therefore has been made in the estimate for 1918 for a building for office and quarters at Cheltenham.

A material reduction in the cost of operation of the Tucson and Honolulu observatories is expected from the substitution of motor-driven for horse-drawn vehicles. A small truck has been purchased for Tucson, and while the first cost is about $250 greater than for a horse and wagon it is estimated that there will be a saving of about $75 a year in the cost of operation (including depreciation), and there will also be a material saving of time on the road and in the care of the horse.

A similar change is being made for Honolulu. The needs of the observatory will thus be better served.

Retirement.

The serious question of retirement for civil-service employees, while probably affecting more or less all the bureaus of the Government, is so specially evident in the Coast and Geodetic Survey that some specific retirement provision should be made for its engineers. The Bureau is somewhat handicapped to-day on account of the

fact that a number of these highly trained men, who have served the country faithfully for nearly 50 years and have had largely the same education as the graduates of Annapolis and West Point, have now reached the age where the duties they once performed are too irksome for their advanced years. It necessarily results in a hardship for them to undertake to perform such arduous tasks.

The small salaries these hydrographic and geodetic engineers, who are also navigators, have received during their tenure of office have not been adequate for them to save any considerable amount of money. The result is that in their advancing years they are forced to attempt to continue at their duties, when at the age of 64 they should be allowed to retire at a substantial pension, the same as an Army, Navy, Public Health Service, or Coast Guard officer. It is not justice, under prevailing conditions, to ask that these men retire from the service. At the same time, frankly speaking, the service is handicapped, inasmuch as their places should naturally be filled by younger men who are better able to meet the hardships.

To-day in the Coast and Geodetic Survey there are 15 or more men who have passed the retirement age, and they should be properly cared for by the Government to which they have devoted their lives. No one except those in touch with the situation can realize what their services have meant to this part of the Government work. While I have particularly dwelt on the question of retirement for hydrographic and geodetic engineers here, other aged employees of the Bureau are deserving of recognition under retirement legislation, but along different lines.

Purchase of Dutch Harbor, Alaska, as a Government Base.

Further attention is called to the desirability of the purchase of Dutch Harbor, Aleutian Islands, Alaska, as a Federal Government base. It is a matter that has been advocated by the heads of other services of the Government, and the value to the Government of this location in far western Alaska can not be overestimated at this time. Further, it can be said that it would be a better investment to the Government than it was a year ago, on account of the increased activities in Alaska and its waters and the need of a permanent coal, oil, and supply base on the Bering Sea.

General Summary of Operations—Vessels and Parties.

Atlantic coast.—The steamer *Bache* was employed on hydrography extending out to the 100-fathom curve on a part of the coast of New Jersey; off the entrance to Chesapeake Bay, Va.;

and on the coast of Georgia between Brunswick and Savannah. Revision work was done in Norfolk Harbor and Hampton Roads.

The steamer *Hydrographer* was employed on hydrography in New York entrance in the vicinity of Sandy Hook; current observations at the eastern end of Long Island Sound; hydrography on the north side of Block Island, including Great Salt Pond; examination for a reported shoal in Gardiners Bay, N. Y.; surveys of Assateague Anchorage, Va., and Port Royal Sound, S. C.

The steamer *Isis* was purchased on July 1, 1915, and was employed chiefly on hydrography extending out to the 100-fathom curve on the coast of New Jersey, off the entrance to Chesapeake Bay, and on the coast of South Carolina.

The schooner *Matchless* completed the resurvey of Roanoke and Croatan Sounds, N. C.; of Pasquotank River from Albemarle Sound to a point 2 miles above Elizabeth City; and of the easterly side of Pamlico Sound from the north end of Core Sound to Ocracoke Inlet.

Wire-drag work in the approaches to Boston Harbor, Mass., was completed by wire-drag party No. 1 from Minots Ledge to Nahant; in Quicks Hole and the nearby part of Buzzards Bay, Mass.; in the eastern passage of Narragansett Bay in the vicinity of Newport, R. I.; and in the approaches to Salem, Mass. Chart-revision work was done in Narragansett Bay.

Wire-drag party No. 2 continued the survey of the coast of Massachusetts between Boston and the Cape Cod Canal; completed the stretch from Minots Ledge to Plymouth; and began a survey of East River, N. Y., completing the examination of the main channel from Lawrence Point to College Point. Chart-revision work was done in East River and Newark Bay, and hydrographic examinations were made in the vicinity of Bergen Point, N. J., and Pollock Rip Slue, Mass. A topographic and hydrographic survey of Plymouth Harbor, Mass., was begun.

Revision work for the location of prominent natural objects on the charts and building and location of hydrographic signals were done on the coast of New Jersey, at the entrance to Chesapeake Bay, and on the coasts of South Carolina and Georgia between Charleston and Brunswick.

Field verification was made of coast-pilot information along the coast from Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays, and between New York and Key West.

Suboffices of the Survey were maintained at Boston, New York, and Galveston, Tex.

The offices at New York and Galveston are under the charge of officers of the Survey, and that at Boston is under the charge of a representative of the Bureau of Foreign and Domestic Commerce. At these offices a stock of charts and publications of the Survey is kept on hand.

At the request of the Navy Department a verification was made and the beacons renewed on the torpedo-boat trial course at Provincetown, Mass.

Field work, Pacific coast.—The steamer *Explorer* was employed on combined surveys at the entrance to Cook Inlet, Alaska. A resurvey was made at Port Gamble, Wash.

The steamer *Gedney* made a complete survey of Bucareli Bay, Port Real Marina, and Portillo Channel, from the limits of previous surveys to the seaward entrance between Capes Bartolome and Felix, southeast Alaska. This vessel was afterwards condemned and sold.

The steamer *McArthur* was engaged on combined surveys of Sealed Passage, Felice Strait, and the northerly part of Revillagigedo Channel. This vessel was afterwards condemned and sold.

The steamer *Patterson* was employed on general surveys in the Shumagin Islands, Alaska Peninsula. Parts of Nagai and Big Koniuji Islands and all of Spectacle, Bendel, and Turner Islands were surveyed. Examinations were made of the area about Tuscarora Rock, Unalaska Bay, and in the vicinity of Harvester Island, Uyak Bay.

During the season of 1916 this vessel was employed in surveys of the passages in southeast Alaska leading southward from Sumner Strait, between Kashevarof Passage and Eastern Passage, including Ernest Sound and Bradfield Canal.

The steamer *Taku* completed the survey of Port Gravina, the coast from Knowles Head to Red Head, and Fidalgo Bay, Prince William Sound, Alaska. In the spring of 1916 this party took up the survey of Orca Inlet and the delta from Point Whitshed to Point Martin. A subparty began a survey of the military reservation at Orca Inlet.

The steamer *Yukon* continued the survey of the Kuskokwim River, and an officer of this vessel made a running survey of the river above Bethel on a river steamer. The *Yukon* was not put in commission in 1916 owing to a shortage in funds.

Wire-drag party No. 3 completed the dragging of channel areas, with depths less than 50 fathoms, in Revillagigedo Channel from Twin Islands southward to the Canadian boundary, and the

topography from the entrance of Boca de Quadra to Foggy Point, including Very Inlet. In Clarence Strait the main channel was dragged from Caamano Point to Lemesurier Point and some triangulation was done. Work was continued during the season of 1916 in the passages between Clarence Strait and Eastern Passage extending southward from Sumner Strait to and including Ernest Sound.

Wire-drag party No. 4 completed the dragging of the main channel of Sumner Strait, from Shakan Bay around Point Baker to Zarembo Island, during the season of 1915, and in the following season undertook the completion of the entire channel of Sumner Strait from Wrangell to the sea, including the entrance northward of Coronation Island and the passages extending southward from Sumner Strait to a junction with the work of wire-drag party No. 3.

A hydrographic examination was made of the bar between Middle and Stake Points, Suisun Bay, Cal.

An examination was made in the vicinity of Cape Flattery to locate a reported rock and to develop Neah Bay and the broken ground near Duncan Rock.

A field revision of the Coast Pilot of California, Oregon, and Washington was begun and also of the Coast Pilot of Southeastern Alaska.

Suboffices of the Survey were maintained at Seattle, Wash., and San Francisco, Cal.

Philippine Islands.—The field work in the Philippine Islands is under the immediate direction of the director of coast surveys, an officer of the Coast and Geodetic Survey, who, acting under authority of the Superintendent, makes plans for the work, issues detailed instructions to the field parties, and has charge of the suboffice at Manila.

The steamer *Pathfinder* was employed on hydrographic surveys in the easterly approach to San Bernardino Strait and combined surveys at the entrance of Manila Bay. Lines of soundings were run across the Sulu Sea to develop a safe route for vessels through Balabac Strait northward of Borneo. Combined surveys were begun at the south end of Palawan Island.

The steamer *Fathomer* was employed on hydrographic surveys in the north end of the Sulu Sea in the vicinity of the Cuyo Group. Combined surveys were made in Green Island Bay, east coast of Palawan. Afterwards the triangulation of the east coast of Mindanao was begun.

The steamer *Romblon* was employed on combined surveys at the north end of Palawan Island and in the Cabuluan Islands.

The steamer *Marinduque* was employed on combined surveys on the east coast of Coron and Busuanga and the western approaches to Coron Bay and afterwards on the east coast of Palawan. A triangulation station was established on Mayon Volcano, southern Luzon, and connected with the scheme of triangulation connecting Sorsogon and Lagonoy Bay.

Assistance Rendered in Saving Life or Property.

On June 19, 1916, the steamer *Pathfinder*, in response to a call by wireless, went to the assistance of the steamer *Fernando Poo*, which had stranded on a reef near Black Rock Light in the Sulu Sea, Philippine Islands.

The passengers and crew, with the baggage and mails and a quantity of provisions from the stranded vessel, were taken to Iloilo by the *Pathfinder* after several unsuccessful attempts to tow the *Fernando Poo* off the reef had been made. The vessel afterwards sank.

Minor assistance was rendered to several vessels by the steamer *Isis* while employed in offshore work on the south Atlantic coast. Among these were the four-masted schooner *Augustus Welt*, bound to Stamford, Conn., from Buenos Aires, the United States Engineers' dredge *Barnard*, and the launch *North Star*.

The steamer *Bache* rendered minor assistance to the barkentine *Argo*, of Nostral, Denmark, bound for Satilla River, Ga.; the steamship *Rio Grande*, bound for Savannah; the Finnish bark *Vega*, bound for Sapelo River; and the topsail schooner *Jarstein*, bound for the same place.

New Vessels for the Survey.

An appropriation of $289,000 became available July 1, 1915, for two new vessels for the Survey, to replace the *Endeavor* and the *McArthur*, which had become unfit for further use.

The *Endeavor* had been condemned and sold in May, 1915. The *McArthur* and *Gedney* were sold at Seattle in 1916.

The steamer *Isis* was purchased for the use of the Survey July 1, 1915.

Plans were made and a contract awarded to the Manitowoc Ship Building and Dry Dock Co., of Manitowoc, Wis., for the construction of a new steel steamer for the Survey to be called the *Surveyor*, and the construction was begun. On June 30, 1916, the construction of this vessel was reported as 55 per cent completed.

The *Surveyor* is a steel steam vessel of 1,000 tons displacement, 186 feet in length, 34 feet beam, and 12 feet draft. She will have one triple-expansion engine of 1,000 horsepower and is expected to have a speed of 12 knots. Her engines and boilers will be of the latest and most approved type, and the boilers will be fitted to burn fuel oil.

The *Surveyor* will carry the usual equipment of a surveying vessel, including machines for sounding at all depths. She will be fitted with a radio apparatus of a new type.

Coast Pilot Work.

The collection of information in the field for the compilation of new editions of the Coast Pilot volumes has been continued, and the office compilation and publication of these volumes have made good progress.

A new Coast Pilot volume for Alaska was published, two new editions of Coast Pilot volumes for the Atlantic coast were prepared, and eight Coast Pilot Supplements were prepared and published.

Tidal and Current Work.

Tidal observations were made in connection with hydrographic surveys in the United States, Alaska, and the Philippine Islands and at seven regular stations on the Atlantic coast, three in the Gulf of Mexico, and three on the Pacific coast.

Tidal indicators, exhibiting automatically the stage and height of the tide, were maintained at Fort Hamilton and New York, N. Y., and at Reedy Island, Delaware River.

With the cooperation of the Bureau of Lighthouses, observations of currents were made at five light vessels on the Atlantic coast, two on the Gulf of Mexico, and five on the Pacific coast. Current observations were also made by field parties engaged on hydrographic work.

Two special publications relating to tidal currents on the Atlantic and Pacific coasts were prepared and published. Special tide tables for the Kuskokwim River, Alaska, were prepared and published.

The general tide tables for 1917 were prepared and sent to the printer. These tables have been greatly enlarged and simplified and much information in regard to the currents has been added.

Tidal information was prepared for use in the Coast Pilots and for publication in the newspapers.

An effort has been made to greatly improve the tidal bench marks established by this Service, and a circular on the subject has been issued.

Geodetic Work.

A reconnoissance for primary triangulation from southern Utah westward along the Oregon Short Line Railroad through Oregon was completed and a connection made with stations of the California-Washington arc in the vicinity of Portland, Oreg.

Observations at the primary triangulation stations in northern Utah were continued. The work follows the Oregon Short Line Railroad to its crossing of the Columbia River in northeastern Oregon. The arc then extends westward down the river to a junction with the Washington-Oregon arc of triangulation in the vicinity of Portland, Oreg. A base line was measured at Stanfield, Oreg., in the spring of 1916, and at the close of the fiscal year observations were in progress at triangulation stations in the vicinity of, and to the eastward of, Portland, Oreg.

The use of motor trucks on these pieces of work proved to be very efficient in reducing the time of travel between stations, which were in some cases 100 miles apart. Such a distance could usually be made in one day by the truck, while the older method of traveling by freight teams would have required at least four days.

The use of the motor trucks on the triangulation and the reconnoissance (selection of the stations) is an innovation in this country which was inaugurated the last part of the previous fiscal year.

The primary traverse line between Memphis, Tenn., and Little Rock, Ark., was measured with invar base tapes. Angles were measured with the same accuracy as in primary triangulation at the turning points of this traverse. A primary base line was measured in the vicinity of Argenta, Ark., near the end of the traverse line, from which a primary triangulation will extend westward.

A reconnoissance for primary triangulation was extended from the vicinity of Pecos, Tex., northward through New Mexico and into Colorado, connecting stations of the Texas-California arc with stations of the transcontinental arc.

A portion of the old traverse line extending from Port Isabel to Brownsville, Tex., was rerun.

A secondary triangulation was executed on the Patapsco River and in Baltimore Harbor in compliance with a request of the United States district engineer officer at Baltimore.

In cooperation with the Chief of the Geodetic Section in Mexico a connection was made across the Rio Grande of the triangulation systems of the United States and Mexico.

Determinations were made of the geographic positions of prominent natural objects on the coast of California for use by the Lighthouse Service in locating aids to navigation.

The line of precise levels between Reno and Las Vegas, Nev., begun during the previous year, primarily at the request of the United States Geological Survey, was completed. This was needed to coordinate lines of levels which had been run by that survey in the southern part of Nevada. A spur line was run into southern California to the town of Laws.

A line of precise levels was run across the State of Florida connecting the permanent tide gauges at Cedar Keys, St. Augustine, and Fernandina, with the object of determining whether there is any relative difference in elevation between the mean sea level of the Atlantic and that of the Gulf of Mexico. The final computations have not been made, but the preliminary results of this work indicate that the difference is very slight, with the Gulf the higher.

Another line of levels was extended from the vicinity of Huntley, Mont., northeastward through Glendive to Snowden, on the Great Northern Railway, where connection was made with previous work.

Lines of precise leveling were begun in the States of Indiana and Michigan which had been requested by the United States Geological Survey. At the end of the fiscal year levels had been completed between Terre Haute and Lawrenceburg and progress made on the line running to the northward of Indianapolis.

Work was begun on a line of precise levels in Maine to extend across the State from Boundary to Vanceboro. This line will furnish much needed fundamental elevations in the interior of the State and will form a connecting link in the precise leveling net of Canada. The Geodetic Survey of Canada and the United States Coast and Geodetic Survey are cooperating in their geodetic work to the extent that the leveling and triangulation nets of the two countries will supplement and strengthen each other.

The efficiency of a precise-leveling party was increased by having the observations recorded on a listing adding machine, which was taken to the field and mounted on one of the small motor cars used in transporting the party during the observing as well as to and from their headquarters, also by having the tripod and level mounted on the second car. The machine and instrument remained on the cars throughout the day, even when the track was cleared for trains.

These improvements were made during the year, and so far as known were never employed in any country before.

Gravity stations were established in Michigan, Minnesota, North and South Dakota, Montana, Wyoming, Nebraska, Virginia, Delaware, Maryland, and Pennsylvania for the purpose of extending the investigations of the variations in the densities of the materials in the outer portion of the earth.

A determination was made of the difference of longitude between the observatory of the Coast and Geodetic Survey Office in Washington and the observatory of the Bausch & Lomb Optical Co., in Rochester, N. Y. An astronomic latitude was also observed at Rochester.

The astronomic latitudes of two monuments on the Tennessee-Kentucky boundary between the town of Hickman, Ky., and Union City, Tenn., were determined, at the request of the local authorities, in order to settle the question of the location of a portion of the boundary between the two States.

The computation, adjustment, discussion, and preparation for publication of the results of the work of triangulation, leveling, gravity, and latitude and longitude determinations were carried on throughout the year.

The demands for the results of the geodetic work are increasing from year to year. The calls for such data come from Government, State, municipal, and private engineers and surveyors. The geodetic data are used for the fundamental control of the elevations and geographic positions of their work.

Magnetic Work.

In the continuation of the magnetic survey of the United States, observations for the determination of the three magnetic elements were made at 427 stations, of which 250 were new primary stations, 87 were auxiliary stations for the investigation of regions of local disturbance, and 59 were repeat stations.

At the request of local authorities meridian lines were established at 20 places in connection with the magnetic work.

The magnetic survey of the 49th parallel boundary between the United States and Canada, of which the part west of the Rocky Mountains was done in 1905, was nearly completed by the close of the fiscal year.

Magnetic observations have now been made at all but 240 of the county seats in the United States.

Magnetic observations in Alaska and the Philippine Islands were confined to those which could be made in connection with other surveying operations.

The magnetic observatories at Cheltenham, Md.; Vieques, P. R.; Tucson, Ariz.; Sitka, Alaska; and near Honolulu, Hawaii, were in operation throughout the year.

Menaces to Navigation Discovered During the Year.

The following dangers to navigation were discovered, investigated, or reported by vessels or parties of the Survey during the year:

Massachusetts.—Shoals and rocks located with wire drag in approaches to Boston; shoals and depths less than charted found with wire drag off Plymouth; shoals and rocks off Scituate discovered with wire drag; shoal of small extent and several pinnacle rocks at entrance to harbor of Salem discovered with wire drag; shoals off Minots Ledge and in Broad Sound discovered with wire drag; rocks between Bartlett Rock and Howland Ledge discovered with wire drag; shoals off Brant Rock discovered with wire drag; shoals discovered with wire drag in vicinity of Marblehead Neck; dangerous rock with 19 feet of water near sailing course into Quicks Hole, with depths of 19 and 20 feet and depth of 13 feet south of Gull Island.

Rhode Island.—Shoal awash off Newport, discovered by wire drag.

New York.—Rocks at City Island, New York Harbor, located with wire drag; shoals and pinnacle rocks in East River located with wire drag; obstruction in Newtown Creek struck by tug *Alfred J. Murray*, reported by New York suboffice.

New Jersey.—Shoal with 5 fathoms of water 25 miles south by east of Barnegat reported.

Virginia.—Shoal with 22½ feet of water in approaches to Chesapeake Bay discovered and located.

North Carolina.—Obstruction on Middle Ground southeastward from Roanoke Marshes Light, with depth of 6 feet, and two other shoals located.

South Carolina.—Shoal with 27 feet of water between Martins Industry Light Vessel and Charleston Light Vessel discovered and developed.

Texas.—Shoals in Gulf of Mexico reported by suboffice at Galveston.

California.—Shoal with 5½ fathoms of water near Sears Rock and Centissima Rock in Bonita Channel, entrance to San Francisco Bay, reported by San Francisco suboffice.

Alaska.—Three uncharted rocks in Revillagigedo Channel discovered with wire drag; rock with 12 feet off Point Stanhope discovered with wire drag; submerged rock in entrance to Shakan Bay with depth of 23 feet discovered with wire drag; rock in Clarence Strait struck by steamship *Mariposa*, position determined with wire drag; uncharted rock with 6 feet of water discovered with wire drag off Point Stanhope; five shoals located with wire drag in southern and eastern parts of Sumner Strait; 18-foot rock located with wire drag in entrance to Union Bay, Ernest Sound; four uncharted rocks in Sealed Passage and Felice Strait discovered and developed; reef 2 miles southeast of Aiaktalik Island marked by kelp, struck by steamer *Pavlof*, reported; rock near midchannel in Grindall Passage located; a number of uncharted dangers discovered and located in Kashevarof Passage, Clarence Strait; uncharted rock with 1 foot of water east of Fire Island, Kashevarof Passage, Clarence Strait, discovered and reported; three rocks near Wedge Islands, Clarence Strait, and one rock off Point Halliday, Movia Sound, located; four rocks located in channel southward of Tongass Island, Dixon Entrance; rock in Wrangell Strait, struck by steamer *Alki*, reported.

Philippine Islands.—Shoal in Iloilo Strait, Panay, reported by director of coast surveys, Philippine Islands.

STEAMBOAT-INSPECTION SERVICE.

Personnel.

The force of the Steamboat-Inspection Service at the close of the fiscal year was as follows:

At Washington, D. C.		
Supervising Inspector General	1	
Chief clerk (who is Acting Supervising Inspector General in the absence of that officer)	1	
Clerks	7	
Messenger	1	
		10
In the Service at large:		
Supervising inspectors	10	
Traveling inspector	1	
Local inspectors of hulls	47	
Local inspectors of boilers	47	
Assistant inspectors of hulls	43	
Assistant inspectors of boilers	43	
Clerks to boards of local inspectors	69	
		260
Total		270

Three permanent positions (two assistant inspectors of hulls and one assistant inspector of boilers at New York) were added to the Service during the fiscal year. Congress provided for the current fiscal year 30 additional assistant inspectors, 1 additional traveling inspector, and 1 clerk, making the present total field force 291 persons and an aggregate force of 302 in the entire Service. This addition was essential to doing the work of the Service properly, but the demands upon the force have so largely increased that even the increased staff is now insufficient and a further increase is imperatively required. The weakest spot in the Service is in the clerical staff. It is obvious that an increase of 31 inspectors will mean additional pressure upon a clerical force already insufficient and overworked. The urgent need, therefore, for an increase in the clerical force of not less than 12 will be brought before Congress at its next session. It has repeatedly been necessary to detail to the Office of the Supervising Inspector General clerks from other bureaus and offices in order to keep up with the current work. This means merely the taking from forces already pressed to add to one that is overworked. It is robbing Peter to pay Paul.

Summary of Activities.

The force inspected and certificated 7,349 vessels in the fiscal year 1916, issued licenses to 18,102 officers of all grades, inspected at the mills 4,553 steel plates for the construction of marine boilers and a large amount of other boiler material, and examined for visual defects 4,522 applicants. Passengers to the number of 317,066,553 were carried on vessels which are required by law to report the number of passengers carried. The number of accidents resulting in the loss of life during the fiscal year was 247, and the number of lives lost was 1,276, including both passengers and crew. Of the lives lost, 192 were from suicide, accidental drowning, and other causes beyond the power of the Service to prevent, leaving a loss of 1,084 lives as fairly chargeable to accidents, collisions, explosions, foundering, etc. The lives of 917 passengers were lost, which, compared with the number carried, shows a ratio of 1 life lost for every 345,765. This compares with a loss of 107 passengers in the previous year, the excess being due to the sad loss of lives in the *Eastland* disaster. There was a decrease of 204 in the number of vessels inspected, and a decrease of 348,234 tons in the tonnage of vessels inspected, compared with the previous fiscal year. There were certificated 5,818 domestic steamers and 240 foreign passenger steamers. There were inspected 23 passenger barges, 574 seagoing barges, and 694 motor vessels. During the year there were examined and tested 203,017 life preservers. There were 2,741 reinspections of passenger and ferry steamers made by boards of local inspectors during the year, although for lack of money all reinspection work had to be stopped on June 3, during one of the heaviest months of navigation. This was particularly unfortunate, because reinspections are made without prior notice to the vessel and afford an invaluable means of supervision. During the year 28,019 applications were received for certificates of service as able seamen, 2,317 were rejected, and 24,425 certificates were issued. There were 29,323 certificates of efficiency issued to lifeboat men.

During the year the traveling inspector traveled over 15,080 miles, inspected 368 vessels in use, and found and reported 282 deficiencies of various kinds, which are detailed in the annual report of the Supervising Inspector General.

Expansion of the Service.

The great prosperity of the country is bringing serious additional demands upon the Service. More people travel, more go

on excursions, and more freight is shipped. The merchant marine is rapidly enlarging. The vessels are bigger; the demands for exhaustive inspections are greater. The expansion of our merchant marine is affecting the Service by the increase of the personnel, the demand for more numerous examinations for licenses, and the conducting of a larger number of investigations. All this means more men and more money. The work grows not only in volume but in quality. The public standard for it is higher; the law makes increased demands upon it, as, for example, by the provisions of the seamen's act.

Vessel Inspection.

In the old days the inspection of a vessel was a matter of hours, whereas now it is one sometimes of days. Under the old conditions the inspection was superficial, whereas under present conditions it goes into minute details to ascertain whether the vessel is in fact in proper condition to be certificated. To-day the local inspectors make careful inquiry to satisfy themselves that every vessel submitted for inspection is of a structure suitable for the service in which she is to be employed, has suitable accommodations for passengers and crew, is in a condition to warrant the belief that she may be used in navigation as a steamer with safety to life, and that all the requirements of law in regard to fire, boats, pumps, hose, life preservers, floats, anchors, cables, and other things are faithfully complied with. In the same way, also, the local inspectors give particular attention to the inspection of the boilers of steamers and their appurtenances before the same shall be used, and once in every year at the annual inspection are required to subject all boilers to the hydrostatic pressure. When a vessel is most carefully inspected with reference to hull, boilers, equipment, and appurtenances, the inspectors approve the same and make and subscribe a certificate of approval under oath.

For vessels of over 100 tons, subject to the inspection of the Service, blue prints are required to be submitted, descriptive of the hull, for the information of the inspectors, but these blue prints are not required to be approved by the local inspectors having jurisdiction. Therefore, in my last annual report recommendation was made for the creation of a corps of experts to be employed in the Office of the Supervising Inspector General whose business it would be to approve hull construction. For many years the law has required that blue prints of boilers be submitted to the local inspectors for approval, but it was recommended in

my last annual report that the blue prints shall be approved in the Office of the Supervising Inspector General, under the direction of a corps of experts to be created for that purpose. The effect of this would be to have absolute uniformity in both hull construction and boiler construction. The Office of the Supervising Inspector General has carefully considered the desirability of so arranging its work as to require the local inspectors to furnish the central office with copies of blue prints of hulls and copies of blue prints of boilers in order that this information may be available at one central place, but this can not be done unless the personnel of the central office is increased, and, also, unless the personnel of the field service is increased. It is believed, however, that an increase in force would be justified for this purpose.

There was a time when it was thought impossible to build a fireproof excursion steamer, but with a constant demand for increased safety precautions men have commenced to give their attention to this most important matter. The subject of fireproof construction of excursion steamers may still be debated by some, but the fact remains that such a steamer can be built and prove a commercial success. If, upon the one hand, it be claimed that it is impossible to build such steamers absolutely fireproof and still carry large numbers of persons, the answer to that objection is that it may be necessary eventually to put a limit upon the number of persons that shall be carried on an excursion steamer, because, in the last analysis, safety is the first consideration and financial profit is the last. I have already referred to the advisory conference of May 3, 1916, on the subject of making passenger vessels more secure from destruction by fire. There was also held in the Department on May 22, 1916, a conference on automatic sprinklers on vessels. The idea of the Department is not to force fireproof construction on excursion steamers regardless of all other considerations, but rather to proceed in the consideration of the subject with an open mind and to obtain information, suggestions, and criticisms by those who are competent to furnish information upon this subject. The time is one for progress in the construction of vessels as in other matters. Men are not content to proceed along old beaten paths, but are seeking to meet new conditions as they actually are and to make vessel construction as completely up to date as are buildings or railroad cars.

The work of the Steamboat-Inspection Service has also expanded in connection with the inspection of motor boats. Hence the Department suggested that the name of the Service should be changed from Steamboat-Inspection Service to that of "Marine Inspection Service," because the Service touches, in its activities, not only the inspection of steamers, but also the inspection of motor boats and sailing vessels, and has to do not only with the licensing of officers of steamers, but also the licensing of officers of motor vessels and the certification of seamen and lifeboat men.

Years ago when a steamer was inspected and certificated, that was the end of it, but to-day not only do the local inspectors follow up the annual inspection by numerous reinspections, but the work of the local inspectors is followed by two traveling inspectors. It would be hard to overestimate the effect of the work of the traveling inspectors, for these men are discovering and correcting mistakes, oversights, and errors made by the local inspectors. By this is not meant that the local inspectors are not careful, but they are human, and it is necessary that there be a rigorous follow-up system on their work by the traveling inspectors, the supervising inspectors, and the central office.

Licensing of Men.

The Service licenses not only officers on steamers and motor boats subject to inspection and on certain classes of sailing vessels, but, as a result of the seamen's act, it has become necessary to certificate thousands of able seamen and lifeboat men. In the work of certificating lifeboat men, the Service has been assisted by other officers of the Government specially designated for that purpose. It is the hope and plan of the Department, however, to be able in the near future to have the work of licensing lifeboat men done entirely by the inspectors of the Steamboat-Inspection Service. It will thus be seen that whereas once only the officers of vessels were licensed now the work of licensing has been expanded so that it covers the crew as well as the officers. This has resulted in an immense amount of work and will result ultimately in improved safety conditions on board ship.

Investigations.

In past years, while there were many investigations conducted, there was nothing like as many as to-day, for now everything is investigated. This in the aggregate will obtain good results and safer conditions, but it is not to be forgotten that the effective-

ness of investigations is impaired if there is not a sufficiently large personnel to conduct them promptly. It is therefore necessary that there be a larger number of assistant inspectors to do the actual work of inspection, while the local inspectors may give more of their time to conducting the investigations and trials of licensed officers.

In connection with the work of conducting investigations the Department believes that it would be well that copies of testimony of all investigations and trials be forwarded to the central office. It may seem surprising to some that this has not been done, but it is due to the fact that the personnel of the Service has not been sufficiently large to permit of the work being properly done in the field service by the clerks in transcribing their notes or for the work of reviewing the testimony being done in the central office. It is the desire of the Department that the testimony in every case shall be carefully reviewed, for in this way errors can be corrected and the local inspectors can be instructed accordingly.

Rehabilitation of the American Merchant Marine.

The work of the Service would in any event have increased from this time forward, because of the fact that the American merchant marine is again being surely built up. In that work the Service can have no small part, because, just as intelligent regulations are made and intelligently and equitably enforced, just to that same extent does the Service assist or retard the development of the American merchant marine.

It is not out of place when discussing the subject of the upbuilding of American shipping to make reference to a most excellent pamphlet that was prepared for the Department of Commerce by E. Platt Stratton, formerly Supervisor of the American Bureau of Shipping, which is entitled "Standardization in the Construction of Freight Ships." The author has ably brought to bear upon a most interesting and vital subject an immense amount of information and the results of a peculiarly valuable training and experience. The suggestions that are made in that pamphlet may well receive the careful consideration of American shipbuilders. It should be the pride of this country that its shipyards should be the best in the world. As an economic proposition it may be that both shipowners and shipbuilders can learn fruitful lessons by a careful study of the pamphlet above referred to.

The work of the Service has increased immensely as a result of admittance to American registry of many foreign-built ships, and as the time approaches when these vessels will be subject to the same inspection as American-built ships it can be appreciated that the inspectors of the Service on the coasts will be most busily occupied in examining these vessels preparatory to the issuance of certificates of inspection.

Increase of Force.

The increase of the inspecting force by 31 was opportune. The time had come when it was useless for Congress to pass more laws looking to safety on board ship or for the Board of Supervising Inspectors to make further regulations in regard to the subject until a sufficient number of men was furnished to enforce the provisions of the laws and the rules and regulations that already existed. Large as the increase was in the number of inspectors, a sufficient number has not yet been furnished, and it is necessary that a material increase be made in the number of inspectors in the near future in order to carry on the work of the Service satisfactorily.

As I have already said, when the number of inspectors was increased Congress made no corresponding increase in the number of clerks. Such an increase is a crying need at the present time, especially in the field service. There should be an increase in the number of clerks, so that the work that is at present required may be properly done, and so that the Bureau may undertake new work that will result in better inspection. The amount of overtime put in by both inspectors and clerks is large, far too large. Provision must be made for a larger number of men to do the clerical work unless the Service is to suffer.

Larger Appropriations.

It necessarily follows that inasmuch as the Service is expanding, as has been referred to in the preceding paragraphs, there must be more money provided in order that it may properly carry on its work, and this money should be available not only for the payment of adequate salaries, but also for contingent expenses. If more money is furnished in the contingent fund, more supervision could be undertaken of vessels and the work of the local inspectors could be better followed up by the supervising inspectors, who, true to their title, should be constantly engaged in supervising their districts. These men are now kept busy, but their activities could be directed more effectively if more money was provided.

Division of Districts.

The absurdity of one supervising inspector on the Pacific coast charged with the supervision of the vessels of California, Oregon, Washington, Alaska, and Hawaii, including the Sacramento, Columbia, and Snake Rivers, still continues. The chart herewith, reprinted from my previous report, speaks for itself. No man can cover such a task. The work is not done and can not be done even by a superman, as under the existing conditions it is supposed to be.

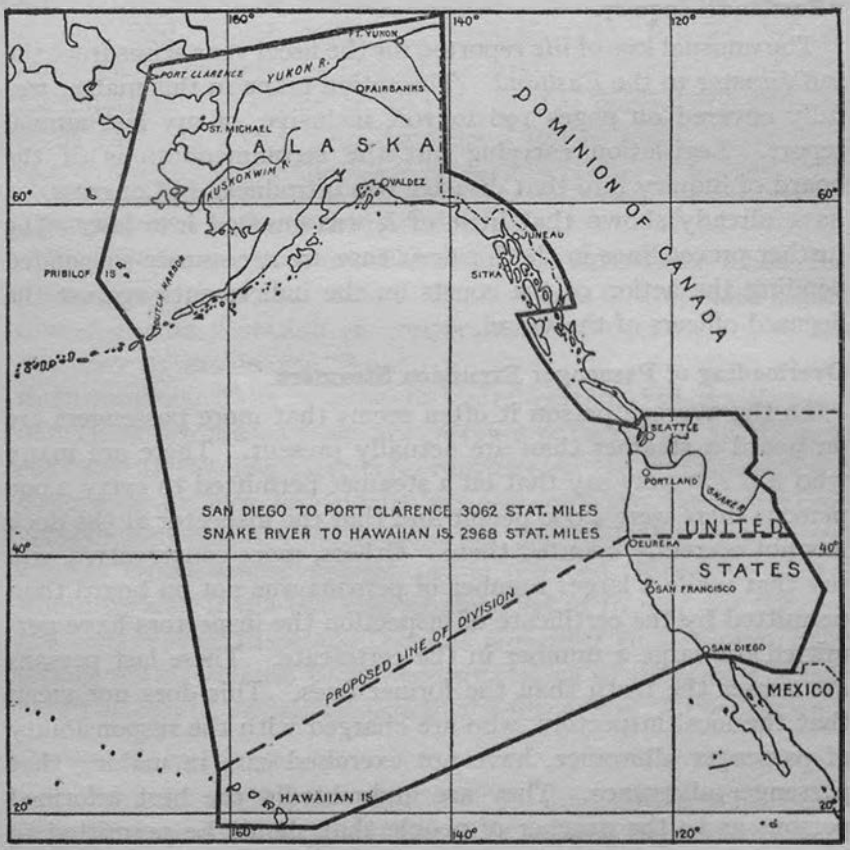

FIG. 16.—*First steamboat-inspection district, now supervised by one inspector.*

Let one read the law which says that "each supervising inspector shall watch over *all parts* of the territory assigned to him, shall *visit*, confer with, and examine into the doings of the local boards of inspectors within his district, and shall instruct them in the proper performance of their duties," etc., and also provides (sec. 4408, Rev. Stat.) that "the supervising inspectors shall see that the several boards of local inspectors within their respective districts

execute their duties faithfully, promptly, and, as far as possible, uniformly in all places," etc.

With this in mind, ask how one supervising inspector can comply with this law in a district which reaches from the Arctic Ocean to the Tropics and from Idaho to Hawaii. Were there such a superman, funds are not sufficient. It is earnestly to be hoped that this absurd arrangement will be ended by legislation to provide for two districts on the Pacific.

"Eastland" Inquiry.

The unusual loss of life reported for the fiscal year arises from the sad disaster to the *Eastland*. The action taken in this matter was fully covered on pages 196 to 200, inclusive, of my last annual report. Legislation carrying out the recommendations of the board of inquiry into that disaster was introduced in Congress. I have already shown that little of it was enacted into law. The further proceedings in the *Eastland* case are necessarily suspended pending the action of the courts on the indictments against the licensed officers of the vessel.

Overloading of Passenger Excursion Steamers.

To the average person it often seems that more passengers are on board a steamer than are actually present. There are many who will sincerely say that on a steamer permitted to carry 2,000 persons there were 4,000 people and that the inspector at the dock has not correctly counted them. Others, more conservative, will say that while a larger number of persons was not on board than permitted by the certificate of inspection the inspectors have permitted too large a number in the certificate. These last persons are nearer the truth than the former ones. This does not mean that the local inspectors, who are charged with the responsibility of passenger allowance, have not exercised care in making that passenger allowance. They are undoubtedly the best informed persons as to the number of people that should be permitted to be carried on excursion steamers subject to their jurisdiction. At the same time, it is not denied that the local inspectors are human and that the judgment of men is not the same. Therefore, while in one instance an inspector may refuse to permit a sufficiently large number of persons to be carried, in another instance an inspector may permit too large a number to be carried. The question therefore arises, What is the solution for this condition

of affairs? It would be found if due consideration were given to this matter that the question would be very difficult to answer without taking into consideration many varying conditions. Upon the one hand, it may be suggested that legislation should be enacted to control this feature of inspection. Upon the other hand, it must be said that no matter what legislation is enacted there is hardly any measure that could be provided that would not work hardship. Furthermore, it is probable that no matter how carefully a law might be worded it might overlook some unsafe conditions that would result in disaster. The Bureau intends, however, by suggestions now under study, and which it hopes to formulate by the spring of 1917, to further control the situation so as to bring about safer conditions and in many instances to reduce the passenger allowance on certain classes of vessels.

Transportation of Dangerous Articles.

From time to time recommendations have been made that some change should be made in the law so as to give some control over the transportation of dangerous articles on freight vessels, and also to enable the Bureau to formulate intelligent regulations controlling the transportation of certain inflammable and dangerous articles on steamers carrying passengers. In the present state of the law there is no control over the transportation of dangerous articles on freight vessels, and the law sometimes brings about absurd conditions in the transportation of dangerous articles on passenger vessels. It is believed, therefore, that it would be well if the law was so amended as to give the Office of the Supervising Inspector General authority to formulate regulations with reference to the transportation of dangerous articles on all classes of vessels subject to the inspection of the Service.

Passengers on Ferryboats.

There is at present no legal limit to the number of persons a ferry steamer may carry, and therefore nothing to prevent a ferryboat from carrying passengers in excess of a safe limit. The Department has urged that this be corrected and favors bill H. R. 4781, introduced for that purpose. The efforts of the Department have been opposed by the officials of the city of New York, and so far no action has been taken. While there is no doubt that the opponents of the measure are sincere in their attitude, the Department feels that it is both possible and desirable that a

limitation should be authorized. The following correspondence will show the Department's attitude:

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, March 1, 1916.

Hon. DUNCAN U. FLETCHER,
United States Senate.

MY DEAR SENATOR FLETCHER:

I think a further statement is desirable concerning Senate bill 1222 (H. R. 4781), in order to make the issue concerning that measure clear. The question raised is this, to speak plainly: Shall ferryboats continue unlimited and without restriction as to the number of passengers they can carry and without being obliged to have life preservers sufficient to accommodate all on board? This is the condition under the present law. I disapprove this condition. I am unwilling to assume myself or to have my associates assume the responsibility for a continuance of this condition. I do not care to have upon my conscience the possible loss of life in some serious accident because of neglect on my part in a matter of this kind. My duty obliges me to urge in the strongest way that the utmost practicable safeguards of law be placed upon these vessels, and I earnestly hope you will concur with me.

Ferryboats frequently, and in New York Harbor especially, navigate waters in which the danger of collision is peculiarly great and in which, as a matter of fact, collisions do constantly occur. I hand you copy of report dated February 28 of a collision between two ferryboats in New York Harbor arising from dense fog and heavy traffic. Fortunately, nothing serious happened. No lives were lost. But you will observe that this collision took place despite the fact that "both these vessels were proceeding carefully, sending the usual fog signals." The report further says, "The necessary lookouts were maintained. The vessels were so close to each other when sighted that there was little room to answer, and the board is of the opinion that the collision came about as a result of misunderstanding of signals due to fog with the accompanying whistle signaling in an area of heavy traffic."

I am myself familiar with the traffic conditions in New York Harbor. I have made many trips on the crowded ferryboats, and I think the condition of permitting them to carry an unlimited number is wrong, and I protest against its continuance.

On the other hand, many of the objections raised are wholly imaginary. It is quite practicable to handle the matter in such a way as to occasion no material inconvenience, and I assure you that every effort would be bent to this end in the event that the bill became law.

Whether this shall be the case or not I want this Department to be on record as favoring every practicable safeguard to life and asking that all be done within reason for its protection.

A letter similar to this has been sent to Judge Alexander, chairman of the House Committee on the Merchant Marine and Fisheries.

Yours, very truly,

WILLIAM C. REDFIELD, *Secretary.*

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, May 26, 1916.

Mr. R. A. C. SMITH,
Commissioner of Docks and Ferries, New York, N. Y.

MY DEAR SIR:

Permit me to quote a letter from the postmaster at San Francisco dated the 19th instant, as follows:

"I had occasion on Sunday afternoon, May 14, 1916, to cross the bay on the ferry steamer plying between Sausalito and San Francisco, a distance of approximately

six (6) miles. This crossing is made at that point of the bay directly opposite the Golden Gate, and, due to high winds, fogs, and strong tides, it is the roughest on the bay.

"On this occasion my attention was called to the crowded condition of the boat. Not alone was every seat occupied, but the aisles and decks were crowded with people standing. I inquired of one of the officers as to the law on the limitation to the number of passengers that might be carried, and was informed in rather an indifferent manner that the only restriction was that there should be a life preserver for each passenger on board. The officer seemed to resent my inquiry and rather taunted me, saying the present Congress had refused to pass a law safeguarding the lives of passengers on ferries."

I hand you copy of my reply to him. I am informed by a passenger who recently crossed the Tottenville ferry that the boat was so crowded there was great difficulty in getting the front chain fastened across the bow to safeguard the passengers. This Department regards a limitation upon the number of passengers permitted on a ferryboat both feasible and necessary. It believes that the present conditions are certain to result in serious loss of life in some accident. It has, as you know, done all in its power to secure authority to limit the number of passengers, but largely through your opposition it has failed to receive that authority. Your attention is called, therefore, to the complaint herein and to the answer we have to make and to the statement which I now desire to place on record that the Steamboat-Inspection Service of this Department, with my full concurrence, regards existing conditions as a menace to safety and that it must be absolved from all responsibility should any disaster occur in which there is loss of life arising from an excessive number of passengers on any ferryboat anywhere in the country, and that those must accept the responsibility through whose opposition lawful power to prevent such a disaster was withheld.

Yours, very truly,

WILLIAM C. REDFIELD, *Secretary.*

The Department does not desire to impose any hardships upon the owners or operators of any ferryboat and believes it quite possible to regulate the matter sufficiently without so doing. It is conceded that ferry operators are commonly properly solicitous of the safety of their passengers and that they would not willingly oppose methods to protect the lives of such passengers. At the same time the fact remains that there is now no such lawful protection provided, and this condition ought not to continue. The Steamboat-Inspection Service has at present no power in the matter, but it is ready to cooperate when it has authority with any parties interested to bring about the desired result.

Limited Authority to Investigate Marine Disasters.

There is at present no general authority of law for investigating marine disasters. Authority exists only to inquire into the conduct of licensed officers on such occasions. If, for example, there were an accident in which all the licensed officers were killed, as in the case of the towing steamer *Sam Brown* on February 2, 1916, the Department has no lawful authority to investigate the cause of disaster. This would be true of an accident to an ocean vessel in which the licensed officers were lost. Authority

should be given to the Steamboat-Inspection Service to investigate marine disasters occurring on any vessels under its supervision. The experience of the Service confirms the recommendation made on page 205 of my last report, which said:

A tribunal should be lawfully established for investigations into marine casualties involving serious loss of life, similar generally to the courts of inquiry provided for in the British merchant shipping act and the Canadian merchant shipping act.

Fusible Plugs.

Special attention has been given during the year to the safety conditions created by the use of fusible plugs. In this matter the Bureau of Standards has ably assisted. The practice of the Steamboat-Inspection Service as regards the use of fusible plugs is in advance of that of both the Navy and the Coast Guard and is setting to them an example of a high standard of safety practice which is to be commended.

Salaries of Assistant Inspectors.

On July 18, 1916, the assistant inspectors of steam vessels at San Francisco forwarded to me a respectful petition for an increase in salary, in which they said, with truth:

The work of the Steamboat-Inspection Service at this port has increased greatly owing to increase in tonnage of vessels inspected and the higher standard at which the Service is maintained at this time, whereas the salaries paid assistant inspectors have remained stationary for many, many years. * * * The cost of living is so much greater at this time than it was at the time our present salaries were fixed that we find it a very hard struggle to properly rear our families.

They add, with equal truth:

The salaries received by men in kindred occupations in the maritime world, such as masters, mates, and engineers, with whom we come in contact daily in the performance of our duties, is so much in excess of the salaries received by us it seems to have a tendency to lessen the respect due inspectors in this Service.

Finally, they add a suggestion that is pertinent for the present and future good of the Service in saying:

The meagerness of the salaries paid assistant inspectors for the quality of work required is one of the reasons why the best men are not now taking the civil-service examinations for these positions.

The request of these worthy officers is as forceful as courteous. It is for the good of the country that their compensation should be made more commensurate with the value of the duties rendered by them.

Protection of Dredge Workers.

On May 20, 1916, the president of the International Dredge Workers Protective Association, at Chicago, wrote me asking

help to get better protection for their men who go out on scows 8 miles into the lake. He said:

> These steel scows have no life guards or shelter of any kind for a man to get away from the storms. * * * The scows are loaded down to a foot above the water, and the sea sweeps right over them. The tugs let out about 800 feet of cable, and no one can see if anything has gone wrong on the scows.

To this he adds that about 12 men have been lost from these scows at different times. In reply, I told Mr. Flannery, the president of the above association, that I should emphasize the need of better laws for the protection of these men in my annual report. I now do so. I regret exceedingly that the law gives this Department no jurisdiction over such scows or over their equipment or navigation. At present the Service is powerless. I earnestly hope that Congress will realize the humane necessity of providing for the protection of these men and will give us power to regulate matters in their behalf.

Work for Other Departments.

The work done by the Steamboat-Inspection Service for other departments of the Government is constantly increasing until now it has become a factor to be carefully considered in administering the work of the Bureau. If the demands continue, it will be necessary to have a larger force of inspectors to do this Government work, or perhaps a special force assigned to it, or arrangements will have to be made for somebody else to undertake the work.

Archaic State of Inspection Laws.

The laws under which the Steamboat-Inspection Service operates are archaic and should be revised. They are vague, out of date, and in some respects contradictory. They do not provide for an organization of the Service suited to modern conditions. Authority is scattered. Differences of practice on vital matters are permitted, and until there is a change it is difficult to standardize the Service. An inquiry has been made by a committee of the Chamber of Commerce of the United States, whose report will, I trust, deal frankly with this phase of the subject. As things now are, authority has more or less at times to be assumed to do particular things under general powers. The spirit of the Service is admirable. Its standards are high. Its practices were never so efficient as to-day. It can not, however, reach the perfection at which it aims until it has a modernized law behind it and a sufficient office and field staff to do its work.

BUREAU OF NAVIGATION.

Increased Duties of the Bureau.

In my last annual report I stated that Congress had imposed serious additional duties upon this Service without giving any added compensation to the Commissioner of Navigation for these great additions to his responsibility and without allowing him any additional force with which to do the larger work. I then said that it was an act of simple justice that under the onerous conditions imposed by law on him his salary should be made equal to that which others similarly situated receive. I therefore included in the estimates for the present fiscal year an increase in the salary of the Commissioner of Navigation from $4,000 to $5,000. It was not granted. I now specifically state the added burdens placed upon this Service, as follows:

On August 18, 1914, Congress passed the act permitting the registry of American-owned foreign-built vessels for our foreign trade. Under this act there have been admitted 187 vessels of 623,717 gross tons. The increase in our foreign fleet has been of vital value during the war and has involved determination of many new questions and the readjustment of a great deal of work to the new conditions.

The Hardy Act, of March 3, 1913, increased the number of licensed officers to be carried on vessels. This brought a serious additional load to the Service because there was an insufficient number of licensed officers to meet the condition of the law along the Atlantic and Gulf coasts. There were hundreds of violations of this law which the Service has had to handle, and it has been difficult and laborious to adjust the act to existing conditions.

The wireless communication law of July 23, 1912, and the radio communication act of August 13, 1912, involved the creation of a new service covering the inspection of every wireless station in the United States and those on vessels leaving our ports under certain conditions. It also required licensing shore stations and stations on American ships, the examining of operators, and the general supervision of a highly technical service.

On February 24, 1915, Congress passed the act admitting as vessels of the United States foreign vessels wrecked on our coasts

or on adjacent waters and owned by Americans and repaired in American shipyards. Under this act 7 vessels of 11,630 tons have come in. Each of these cases requires a careful consideration and in some instances the appraisal of the value of the vessel in her salved condition.

The deficiency appropriation act of July 29, 1914, transferred to the Bureau of Navigation the employment of 62 navigation inspectors, requiring the creation of a civil-service register, the organization of the force, its assignment to various districts, the supervision of the work, and the handling of the large number of fine cases reported by these men.

The act of August 22, 1914, provided for the use of gasoline engines as emergency power for lights and wireless apparatus on passenger vessels. This required investigation by the Service into the efficiency and performance of these auxiliary engines.

The act of March 4, 1915, enables the consular officers to issue provisional certificates of registry to vessels abroad purchased by citizens of the United States. The application in detail of this wholly new principle in American legislation has required careful attention from the Service.

On March 4, 1915, the passage of the seamen's act placed upon the Bureau of Navigation a great additional burden of new work. The adjustment of the law to the conditions then existing was a matter of long, hard, patient labor.

In addition to the above express requirements of law, the Bureau of Navigation was called upon to do much of the work of American preparation for the International Conference on Safety of Life at Sea, held in London in November and December, 1913, and January, 1914.

If the above additional duties, none of which formed any part of the work of the Service when the existing salaries were fixed, are not sufficient to justify added compensation, it should be noted that there has been an unprecedented increase in our foreign-going fleet. In three years the tonnage of this fleet has more than doubled, and there are to-day building in our shipyards the unprecedented number of 417 steel vessels, being a total of 1,454,270 gross tons of steel ships. Each of these ships must be documented and admeasured and inspected as regards her radio apparatus when same is used. Meanwhile the annual number of seamen shipped and discharged under the supervision of the Service has grown in two years from 378,772 to 487,524.

The situation, then, is that, under conditions in which both by the development of the country and by express acts of Congress serious additional burdens have been placed upon this Service, no account has been taken of these things in the compensation of the men who must do the work. The salary of the Commissioner and the Deputy Commissioner remain as they were fixed in 1884. I therefore renew my recommendation that the salary of the Commissioner of Navigation be made $5,000 and recommend that the salary of the Deputy Commissioner be increased from $2,400 to $3,000 and that of the chief clerk from $2,000 to $2,400. Our estimates also include a necessary addition for the clerical force of this Service.

Total American Merchant Marine.

American merchant shipping registered for the foreign trade and enrolled or licensed for the coasting trade and fisheries on June 30, 1916, comprised 26,444 vessels of 8,470,946 gross tons. The following statement shows the condition of our merchant marine at the close of each of the last four fiscal years, and at a glance discloses the extent and direction of its development during this interesting period in the world's history.

Year ended June 30—	Foreign trade, registered.	Coasting trade, enrolled, licensed.		Total.
		Great Lakes.	Sea and rivers.	
	Gross tons.	*Gross tons.*	*Gross tons.*	*Gross tons.*
1913	1,027,776	2,939,786	3,918,956	7,886,518
1914	1,076,152	2,882,922	3,969,614	7,928,688
1915	1,871,543	2,818,000	3,699,886	8,389,429
1916	2,193,286	2,760,815	3,516,845	8,470,946

The increase has been due chiefly, of course, to the facts that a great portion of the tonnage of the world has been employed for military purposes and another portion has been destroyed by acts of war, that merchant shipping of belligerents sought at the outset of war the shelter of neutral ports and has remained there, and that the shipyards of the warring powers have turned their energies to naval and military production and have reduced their output of merchant shipping. Fortunately, Congress the day before the war began had taken up a measure necessary to meet the situation foreshadowed and before the war was a fortnight old had passed the ship-registry act for the admission of

foreign-built ships to American registry for foreign trade. The measure was passed in an emergency, but it was not an emergency measure, as it rested on a principle adopted years ago by other maritime nations and repeatedly advocated in recent years in Congress. The total increase in our merchant shipping during the past four years has been 584,428 gross tons. Abroad both belligerent and neutral nations recognized that during the war the American flag offered apparent advantages, particularly against submarine attack, and that the ship-registry act of 1914 would increase American shipping at the obvious expense of foreign shipping. Naturally, therefore, other nations promptly took measures to prevent the transfer of their merchant ships during the war period to foreign flags. Between February 12, 1915, and June 30, 1916, the following nations passed laws or issued decrees prohibiting, under penalties, during the war the transfer of merchant ships under their respective flags to the flags of other countries: United Kingdom, Germany, Norway, France, Italy, Netherlands, Russia, Sweden, Austria-Hungary, Denmark, Spain, Greece, Brazil, and Belgium.

The merchant shipping of these nations in June, 1916, comprised 39,429,471 gross tons out of a world's total of 42,534,275, excluding American shipping. Possibly other nations have passed similar laws of which the Department of Commerce has not yet been advised. An effect of these measures is seen in the small amount of foreign tonnage transferred to the American flag during the fiscal year 1916 compared with the fiscal year 1915. A considerable tonnage, probably over 200,000 gross tons, representing American investment of capital before the war, but owned in the name of foreign corporations, could not be transferred in view of these measures of foreign nations. During the past fiscal year, in fact, while the foreign tonnage transferred to the American flag has comprised only 34 vessels of 92,439 gross tons, the American tonnage transferred to foreign flags has comprised 160 vessels of 102,479 gross tons, of which the largest were the steamships *Siberia*, 11,306 gross tons, *Robert Dollar*, 5,356 gross tons, and *Constitucion*, 3,358 gross tons, transferred to the Japanese; *Oceana*, 7,796 gross tons, transferred to the Spanish; and *M. S. Dollar*, 4,216 gross tons, transferred to the British flag. In each of these cases the vessel was actually sold to foreign owners. Up to October 30, 1916, during the current fiscal year, 48 American vessels of 76,880 gross tons have been sold to foreigners.

The ship-registry act during its brief operation up to June 30, 1916, added, as stated, 615,800 gross tons to our merchant shipping. Domestic shipbuilding has also added its quota, while the principal subtractions, of course, are due to the loss or abandonment of vessels and sales to aliens. The operation of these causes during the past four fiscal years is indicated briefly in the following statement:

Year ended June 30—	Built in United States.	Lost or abandoned.	Sold to aliens.
	Gross tons.	*Gross tons.*	*Gross tons.*
1913	346,155	101,256	51,373
1914	316,250	227,257	36,676
1915	225,122	211,429	18,595
1916	325,414	193,104	102,479
Total	1,212,941	733,046	209,123

Besides the positive forces adding to or subtracting from our merchant shipping, other forces under the laws operate to affect statistical returns, though not affecting the actual volume of shipping. In certain trades our laws take cognizance of some types of vessels and in other trades exempt them from navigation papers. Thus a barge in a harbor is not required to be enrolled and included in the returns, while the same barge in trade to another State must carry papers and will be included in the returns. Such changes, considerable every year, materially affect the legal total of our tonnage, but do not, of course, affect the physical facts of shipping.

While American tonnage in foreign trade has more than doubled in four years, our tonnage in the coasting or domestic trade has diminished nearly 10 per cent. The heavy ocean freight rates which foreign nations are willing to pay to secure the products of our factories, farms, and mines have attracted 10 per cent of our shipping from transportation service between our own ports to the transportation service abroad. The ocean trade routes followed by increased American shipping is indicated by the following statement of the tonnage clearances of American ships for foreign ports in 1914 and 1916, clearances being expressed in net tons of 100 cubic feet available for cargo or passengers, and the same ship, of course, usually clearing several times during a year and thus appearing several times in the total.

Clearances for—	1914 tonnage.	1916 tonnage.	Increase.
Europe	447,667	1,134,952	687,285
South America	192,479	945,353	752,874
Asia	72,218	131,198	58,980
Australia, etc	28,615	157,390	128,775
Africa	4,263	79,412	75,149
Total	745,242	2,448,305	1,703,063

Trade to the foreign ports of our own continent and to near-by islands, where the same ship makes many voyages annually, calls for the following separate statement of American clearances:

Clearances for—	1914 tonnage.	1916 tonnage.	Increase.
Nova Scotia and British Columbia	1,854,058	1,998,805	144,747
British West Indies and Bermuda	138,073	266,163	128,090
Cuba	871,506	1,810,358	938,852
Panama	500,009	1,139,889	639,880
Mexico, Haiti, and Dominican Republic	964,553	1,691,412	726,859
Central America and West Indies, except British	66,883	390,150	323,267
Total	4,395,082	7,296,777	2,901,695

Of 38,895,261 net tons of shipping cleared on ocean voyages to foreign ports during the fiscal year ended June 30, 1916, 9,745,082 net tons, or 25 per cent, were American. In the fiscal year 1914, of 39,622,486 net tons, only 5,141,324, or 13 per cent, were American.

World's Merchant Shipping.

The growth of American shipping in foreign trade is satisfactory not only from our own comparative records but also by comparison with the changes in the merchant shipping under foreign flags. To an extent these have been coincident with the operation of the ship-registry act, for transfers which have added to our tonnage, of course, have decreased tonnage under foreign flags, particularly the British and the German. The best available return on the world's merchant shipping at the present time is in Lloyd's Register of Shipping for the year ended June 30, 1916. The figures include only vessels of 100 gross tons or over and do not usually include river vessels or unrigged barges, which comprise a considerable part of American tonnage and of the tonnage of nations along the banks of the Rhine, the Danube, and other

large rivers. The changes effected during the war period are shown by the following table:

Flag.	1914		1916		Increase (+) or decrease (−).
	Number.	*Gross tons.*	*Number.*	*Gross tons.*	*Gross tons.*
British	11,328	21,045,049	11,141	20,901,999	− 143,050
American:					
Sea	2,490	2,970,284	2,587	3,790,578	+ 820,294
Great Lakes	610	2,352,764	592	2,318,223	− 34,541
Philippine Islands	74	45,146	66	40,060	− 5,086
Total American	3,174	5,368,194	3,245	6,148,861	+ 780,667
German	2,338	5,459,296	1,953	4,151,552	−1,307,744
Norwegian	2,191	2,504,722	2,255	2,771,022	+ 266,300
French	1,576	2,319,438	1,510	2,216,643	− 102,795
Italian	1,160	1,668,296	1,210	1,896,534	+ 228,238
Japanese	1,103	1,708,386	1,151	1,847,453	+ 139,067
Dutch	806	1,496,455	792	1,508,916	+ 12,461
Russian	1,245	1,053,818	1,251	1,068,502	+ 14,684
Swedish	1,466	1,118,086	1,380	1,025,020	− 93,066
Austro-Hungarian	445	1,055,719	396	892,618	− 163,101
Danish	822	820,181	854	857,602	+ 37,421
Spanish	647	898,823	606	829,836	− 68,987
Greek	485	836,868	439	733,276	− 103,592
Other flags	2,091	1,736,221	1,838	1,833,272	+ 97,071
Grand total	30,836	49,089,552	30,167	48,683,136	− 406,426

Judged by international standards our recent maritime growth is as gratifying as when measured only by our own returns. After two years of conflict the world's merchant tonnage is not quite 1 per cent less than before hostilities were declared, although during the interval merchant shipbuilding has been wholly or partly abandoned by some of the nations at war. During the two years before the war merchant shipping increased from 44,600,677 tons in 1912 to 49,089,552 tons in 1914, or about 10 per cent.

American Shipbuilding.

During the fiscal year ended June 30, 1916, all American shipyards built 937 merchant vessels of 325,414 gross tons, compared with 1,157 vessels of 225,122 gross tons for the previous year. These figures cover vessels completed and documented for trade at the customhouses. It does not include vessels launched but not documented up to the end of the fiscal year. In my report last year it was estimated that this year's output doubtless would be 400,000 gross tons. The conditions which obtained in our larger ship-

yards and, indeed, through our steel industries in the spring and early summer of 1916 are generally known. The demands upon such plants taxed them to their maximum capacity, and the demand for skilled labor, especially in shipyards, often exceeded the available supply. Wages generally were increased and strikes occurred in some shipyards. Delays in construction involving about 80,000 tons of ship construction were thus inevitable, and the finished product of our yards, accordingly, is less than was estimated a year ago. The total volume of construction under way or undertaken during the year greatly exceeds, however, the most sanguine expectations of our shipbuilders a year ago.

Since my last annual report the shipbuilding industry of the United States has ceased to hold the position merely of a domestic industry, and through the skill and enterprise of our builders, naval architects, and capitalists has become a matter of prime international interest and concern, as, for the time at least, it must be a main source of supply of new ships for the prosecution of the world's foreign trade. During the first six months of 1916 American shipyards completed and the Bureau of Navigation officially numbered 524 vessels of 240,055 gross tons, while during the same period British shipyards, according to Lloyd's returns, launched 160 vessels of 238,255 gross tons. In June, however, British yards more actively resumed merchant shipbuilding, and during the nine months up to October 1 they had launched 246 vessels of 430,522 gross tons. In the same period American yards had completed 846 vessels of 361,113 gross tons for American owners and 5 vessels of 17,203 gross tons for foreign owners, a total of 851 vessels of 378,316 gross tons. Some of the British ships launched await engines and machinery, the output of which is still delayed by the demands of the munitions department.

The current fiscal year opened, accordingly, with the promise of the largest output of American shipyards in our history. On July 1, 1916, work had actually begun, according to the returns of shipbuilders, on 186 steel vessels of 699,658 gross tons, and under normal industrial conditions all this tonnage should be completed during the current fiscal year. During the calendar year 1915 British yards launched 650,919 gross tons. In addition American shipbuilders were under contract to build 199 other steel merchant vessels aggregating 526,126 gross tons, a portion of which will be completed during the current fiscal year, but the greater part

of which will not be completed before the fiscal year ending June 30, 1918.

On October 1, 1916, American shipyards were building or under contract to build 417 steel merchant ships of 1,454,270 gross tons. Of this tonnage the builders at that date expected to launch 326 ships of 998,035 gross tons before the end of the current fiscal year. Some yards are working the full 24 hours with three shifts of men, and in some instances bonuses have been offered to builders and by builders to their employees for delivery in advance of the contract date. This does not include the wooden shipbuilding in many smaller yards. This product is usually about 100,000 gross tons annually and will be greater during the current year.

I have already stated that the present tonnage building in American yards includes 195 ocean steel steamers of over 1,000 gross tons each, aggregating 1,037,103 gross tons.

On December 31, 1913, German shipyards were building or under contract to build 104 ocean steel steamers, each of over 1,000 gross tons, aggregating 810,520 gross tons, the largest volume of work in the Empire's history. Much of this tonnage, on account of the war, is not yet completed.

The naval appropriation act of August 29, 1916, provides the largest building program for the Navy in history. At an estimated cost of $588,000,000, battleships, battle cruisers, scout cruisers, and other types of warships and auxiliaries, numbering 157 and of approximately 855,000 tons displacement, are to be built during the next five years in private and Government shipyards. Of these, 66 of about 382,000 tons displacement are to be begun as soon as practicable and the remainder before July 1, 1919. The current fiscal year practically opened, accordingly, with about two and a quarter millions of tons of merchant and naval shipping, valued roughly at $800,000,000, under construction, ordered, or to be ordered as rapidly as our shipyards, Government and private, can undertake the work.

So many uncertain factors enter into the prosecution of this work that it is inadvisable to make any more precise conjecture than has already been made as to the merchant shipping which will be completed during the current fiscal year. Our steel industries must furnish an extraordinary amount of materials for shipbuilding, at home and abroad; our shipbuilding plants, already increasing in number and facilities, must be further extended; and the number of skilled mechanics must be increased. Transpor-

tation must be uninterrupted, and capital and labor must work together on mutually satisfactory terms. Events have combined to afford the opportunity this year to establish the shipbuilding industry in the United States in a firm position for years to come. It is not probable that in the immediate future we shall again come so nearly to rivaling Great Britain's primacy as a shipbuilding nation as we do at the present time, for shipbuilding is one of the foundations of the British Empire, while shipbuilding and the merchant marine can hardly—at least for years to come—equal the railroads in importance to the development of America. We are, however, now so far in advance of all other powers than Great Britain that only the failure to make full use of present opportunities can deprive us of the second place among shipbuilding nations. It is gratifying that our shipyards are building for foreign as well as for American owners. This trade, I trust, may be retained through the excellence of our work and the reasonableness of our prices. It will then become a real and abiding source of national strength as well as an advantage to our labor and capital.

Our shipowners and shipbuilders, wisely, are chiefly devoting themselves to building cargo boats needed to meet the requirements of the present time and of the years just ahead. The use of oil as fuel on ships, on railroads, on motor cars and trucks, and in manufacturing plants was growing before the conflict broke out and has received a tremenduous impetus from the conditions of modern warfare. Last year's report noted the fact that oil tankers comprised a third of the tonnage brought under the American flag by the ship-registry act of 1914. Of the tonnage now building in our shipyards, oil tankers number 80, of 500,000 gross tons, or nearly half of the total. The export of coal has been one of the sure sources of strength of British trade and maritime rank, and in the same fashion to an extent the export of oil from North America is contributing and will continue after the war to contribute to our export trade and rank as a sea power.

World's Shipbuilding.

The world's merchant shipbuilding reached its maximum in the calendar year 1913, when, according to Lloyd's Register, 1,750 ships, of 3,332,882 gross tons, were launched. Lloyd's returns, as stated, do not include vessels under 100 tons, river vessels, barges, etc. The changes wrought in merchant shipbuilding by the war are shown by the following return for the calendar years 1913, 1914 (for five months of which work in most yards was modified

by conditions created by the war), and 1915, when the full effects of the war are shown:

Where built.	1913		1914		1915	
	Number.	*Tons.*	*Number.*	*Tons.*	*Number.*	*Tons.*
United Kingdom	668	1,932,153	656	1,683,553	327	650,919
British colonies	91	48,339	80	47,534	31	22,014
Austria-Hungary	17	61,757	11	[a] 34,335	(b)	(b)
Denmark	31	40,932	25	32,815	23	45,198
France	89	176,095	33	114,052	6	25,402
Germany	162	465,226	89	[a] 387,192	(b)	(b)
Italy	38	50,356	47	42,981	30	22,132
Japan	152	64,664	32	85,861	26	49,408
Netherlands	95	104,296	130	118,153	120	113,075
Norway	74	50,637	61	54,204	59	62,070
Other countries	108	61,979	61	51,311	37	33,960
Foreign total	1,545	3,056,434	1,225	2,651,991	659	1,024,178
United States:						
Coast	182	228,232	84	162,937	76	157,167
Great Lakes	23	48,216	10	37,825	8	20,293
Total for United States	205	276,448	94	200,762	84	177,460
Grand total	1,750	3,332,882	1,319	2,852,753	743	1,201,638

[a] Returns not complete. [b] Returns not available.

The output of the world's shipyards during the calendar year 1916 will exceed that of 1915. During the first ten months of the year 1916, American yards have completed 963 vessels of 431,345 gross tons. During the first nine months of 1916 British yards have launched 246 vessels of 430,522 gross tons, and France has recently launched the passenger ship *Paris*, greater in tonnage than all the merchant shipping she launched in 1915. The steel merchant ships under construction or contract in the United States on October 1, 1916, numbered 417 of 1,454,270 gross tons. On June 30, 1916, the shipyards of the United Kingdom had 440 ships of 1,540,218 tons, nearly all steel steamers, under construction. In the late summer of 1916 Japanese yards had contracts running into 1918 for 104 ships of 464,370 tons. At the close of 1915 Dutch yards had under contract to build within three years 71 ships of 251,750 tons, and on the same date Italian yards were building 12 steamships of 82,500 gross tons.

Conditions Affecting American Maritime Interests.

I have presented the more important facts of the recent growth of American merchant shipping and the recent changes in the merchant shipping of the rest of the world and comparative facts about the recent growth of American shipbuilding and the changes in shipbuilding in other maritime countries not merely for the

satisfaction which our progress must afford to Americans. I am more concerned with our maintenance of the position now gained and our improvement of the opportunity afforded by conditions of to-day and of the future just ahead. While the building of merchant ships and the operation of such ships are, of course, wholly distinct, governed by different conditions, natural and artificial, the two have been linked together in the case of successful maritime nations.

One of the first conditions essential to the prosecution of both of these branches of activity, abundant capital, works now more strongly in our favor than before, and as the European war continues our capital increases and foreign capital is consumed. Even after the close of the war the drain on production to raise the taxes to meet the obligations arising from the war will be very heavy. Foreign shipbuilding and the operation of foreign merchant ships must contribute to this taxation and will be handicapped accordingly.

We are equally fortunate in the possession of abundant steel of domestic production, essential as the prime raw material for shipbuilding. We have abundant copper, abundant coal, oil, and lumber. The other leading maritime nations lack one or more of these resources.

Under the spur of demands arising during the war the number of our skilled workers in steel has increased rapidly in the past two years, and one of the ultimate benefits to the country of the large amount of steel shipbuilding for commercial and naval purposes now engaging American shipyards will be the training of a proportionately large number of mechanics and laborers in the diverse branches of labor involved in modern shipbuilding.

The intimate association of a merchant marine under the national flag with all forms of our national life have been brought home to the American people during the past two years. Shipbuilding and shipowning, it has been demonstrated, are on a different and a higher plane than other industries, for in a measure all others are more or less dependent on them, and there is need, accordingly, for a large and intelligent consideration of their welfare. Shipbuilding necessarily is conducted here and abroad under the conditions of the freest international competition. The prospective shipowner of any nation may purchase a ship in any market which offers the most favorable terms and sail it under the colors to which he owes allegiance. This latter opportunity was extended to Americans by the ship-registry act of 1914. Up to

that time American capital could be invested in foreign-built ships only through the organization of a foreign corporation, and the ship was required to carry the foreign flag of the nation which created the corporation. In the important matter of the first cost of a ship, on which depends throughout its lifetime the important annual factors of interest, insurance, and depreciation, American shipowners are now on equal terms with foreign shipowners in the competitive foreign trade. The ship-registry act removed the last of the substantial handicaps in the so-called "antiquated navigation laws" upon the operation of American ships. Others had been removed from time to time during the previous two decades.

In the maintenance of an American merchant marine in the competitive foreign trade the United States must meet the disadvantages of a limited maritime population. In the earlier years we were a fringe of sparsely settled States along the Atlantic seaboard, and a large part of the population earned its living on the sea. At that time we resembled, as to the opportunities open for employment and a career, nations which are necessarily maritime for geographical reasons, such as the island empires of Great Britain and Japan and peninsulas like Norway and Italy.

Many in the growing population of these countries for long years have had to choose between emigration to foreign shores or colonies and a life at sea. Half a continent to be developed since the close of the Civil War still calls Americans from the sea. Then, again, though the world's tonnage increases the number of ships decreases. In 1880 Lloyd's Register recorded 32,298 ships of 22,151,651 gross tons, while in 1916 the number is only 30,167 and the tonnage 48,683,136. The chances for an independent command at sea are diminishing, and, after a fashion, a change is taking place continuously in shipping not unlike the change effected ashore by the establishment of department stores. The naval legislation of the recent session of Congress provides in effect for 77,000 enlisted men to man all the ships of the Navy. For obvious reasons all or nearly all of them should be American citizens. To man the seagoing American merchant ships and yachts of the United States on June 30, 1915, crews numbering 57,000 were required and to man the American merchant ships and yachts on the Great Lakes required 24,000 men, in all 81,000, and, as indicated later, only about half of these are native or naturalized American citizens. The seafaring life must be made sufficiently attractive both in its compensation and surroundings to attract our citizens to our marine.

One fact is already clear about the conditions under which competition in the foreign carrying trade will be conducted after the end of the war. The steamship companies of the principal maritime nations are already effecting consolidations under their respective flags by which large fleets of merchant ships are being placed under the management of men of the largest and most successful experience in the prosecution of shipping enterprises and the development of foreign trade. Hardly a week passes without chronicling the purchase of some British steamship company by another and larger company, and all of these purchases are with the plain view of increasing efficiency in management and the fullest use of ships available after the war. The same tendency is to be noted in the Scandinavian countries. Before the war, in 1913, the Hamburg-American company and the North German Lloyd owned together 2,215,000 gross tons of ocean steamships, or half the tonnage of the German Empire, and a consolidation of the two companies is reported to be under consideration. If the United States is to compete on the sea with large maritime companies, effectively organized, it must be prepared with equally efficient organizations, for which ample resources are unquestionably available.

Shipping Commissioners.

Since the outbreak of the European war the work of shipping commissioners has steadily grown with the increase of American shipping in foreign trade. During the year ended June 30, 1914, the seamen shipped, reshipped, and discharged on American vessels numbered 378,772, during the year 1915 the number was 414,744, and during the year ended June 30, 1916, shipping commissioners at 12 seaports shipped, reshipped, and discharged 487,524 seamen on vessels of the United States, an increase of 72,780 over the previous year and a record total of routine work for this service. The total appropriations for this service for 1914 were $71,350; for 1915, $70,500; for 1916, $69,725; and for the current year, $73,300, of which $1,300 is for the reestablished office at Bath, Me. The service can not be maintained effectively with the present appropriations, and the estimates, accordingly, provide for increases in the clerical force of the present offices and for the creation of shipping commissioners at additional ports.

The steady increase in the number of men shipped, reshipped, and discharged represents only part of the additional work required by present conditions. As the war has progressed the belligerent European powers have naturally issued rigorous regula-

tions concerning the right to land in their seaports, and passports are now generally required from seamen as a condition to landing. The shipping commissioners have been employed as far as practicable in assisting American seamen to secure passports and certificates of citizenship. The dangers from submarines and mines adrift have increased the perils of the sea, and the anxiety of friends and relatives ashore as to the whereabouts of men afloat has increased the correspondence on such subjects, which falls within the line of the shipping commissioner's duty. The statute (sec. 4508, Rev. Stat.) requires the shipping commissioner "to afford facilities for engaging seamen by keeping a register of their names and characters," and the need of such a register has never in recent time been greater than under present abnormal conditions. At most of the offices, however, it has not been practicable to keep up with this work, as the actual work of shipping, paying off, and discharging seamen has taken all the time of the small force authorized by the appropriations. The enactment of the seamen's law of March 4, 1915, especially sections 2, 3, 4, and 7, in so far as they deal with wages and deductions therefrom, has for a time at least increased the occasions for disputes which it is the special function of the shipping commissioner to arbitrate if practicable. The prosecution of commerce by sea depends to a great extent upon the prompt despatch of ships and to secure this despatch the shipping commissioners' offices must be adequately and intelligently manned. The work has grown so rapidly and so unexpectedly that the service at some points is in danger of breaking down unless reasonable provision be made by Congress to strengthen it.

The Department has practically exhausted temporary expedients in appeals to other branches of the Government to perform for it duties imposed by law upon the Department of Commerce.

Although the returns of shipping commissioners cover the repeated shipments and discharges of the same men on various voyages during the year, they give an approximate idea of the nationality of the men who compose the crews of our merchant ships. Out of 252,681 thus shipped last year, 76,956 were reported as American born and 31,877 as naturalized Americans; in all, 108,833, or 43 per cent of the total. This percentage is corroborated by a special inquiry conducted by shipping commissioners into the exact composition of the crews of American steamers shipped by them from May 1 to July 30, 1916. The steamers numbered 433, of 1,520,176 gross tons, and were manned by 21,010 men, of whom 5,807 were in the deck department, 8,413 in the

engine department, and 6,790 in the steward's department and miscellaneous. Of the total, 6,692 were American born and 2,486 naturalized Americans, a total of 9,178, or about 45 per cent. From November, 1915, to June 1, 1916, the Steamboat-Inspection Service issued 20,678 certificates to able seamen, of whom 6,302 were American born and 2,165 were naturalized Americans, a total of 8,467, or about 43 per cent, these figures covering men on vessels of the Great Lakes as well as on ocean vessels. As the ships now building in American yards are completed from time to time, there will be an increasing demand for seamen, and there is no reason to believe that it can be met to any greater extent than at present from our native-born population. On the contrary, the great increase in the Navy authorized at the last session of Congress will call for a large increase in the Navy personnel, and all are agreed that our warships should be manned throughout by our own citizens.

Navigation Receipts.

The receipts from tonnage duties during the fiscal year ended June 30, 1916, amounted to $1,454,565.83 (including $3,455.40 collected for the Philippine Islands' fund and $4,623.50 alien and penal tonnage duties). The year's revenue is the largest from this source for any year since the Civil War period and may be compared with $1,315,425.30 collected during the fiscal year 1915 and $1,310,759.03 collected during the fiscal year 1914. The receipts last year, accordingly, were 10 per cent greater than during the year before the outbreak of the war. The increase is wholly from ships in the overseas trade with Europe, Asia, Africa, Australia, and South America. Ships from ports in those continents paid $1,325,699.29, compared with $1,165,568.75 in 1914, while ships from near-by foreign ports of the Western Hemisphere paid only $124,243.04, compared with $143,136.78 in 1914. Changes made by two years of world warfare in the flags of the ships carrying the foreign trade of the United States are shown by the following comparative table of tonnage duties paid by the flag during 1914 and 1916:

Flag.	1914	1916	Increase (+) or decrease (−).
American	$77,445.06	$169,785.02	+$92,339.96
Other neutrals	147,106.18	315,907.65	+168,801.47
Allies	875,737.20	960,793.56	+ 85,056.36
German and Austro-Hungarian	210,470.59	.70	−210,469.89
Total	1,310,759.03	1,446,486.93	+135,729.90

American and other neutral ships have thus more than made good the loss of revenue through the withdrawal of German and Austro-Hungarian ships.

The receipts from navigation fees during the past year were $158,518.08, compared with $142,446.37 for the year 1915 and $152,694.19 for the year ended June 30, 1914. The amount collected for navigation fees, $158,518.08, and the tonnage dues, $1,454,565.83, together $1,613,083.91, are all the Federal taxes imposed on shipping, American and foreign, in ports of the United States. The value of our exports and imports of merchandise during the past fiscal year was $6,531,542,375, and the Federal charges on shipping, accordingly, were only one-fortieth of 1 per cent of the value of the cargoes carried.

The receipts from navigation fines during the year amounted to $52,381.75, compared with $41,518.24 for the previous year, and the current year will probably show a further increase. From the three sources named the revenues for the fiscal year 1916 were $1,665,465.66, compared with $1,499,389.91 for the year 1915 and $1,504,194.60 for the year 1914.

In addition to the annual revenues, the sum of $15,540 principal and $4,309.71 interest, in all $19,849.91, was collected on three foreign-built yachts under the decision of the Supreme Court of the United States in the case of Billings *v.* The United States (232 U. S., 261) and $220 was collected for deceased passengers under the passenger act of 1882, making the total navigation receipts for the fiscal year $1,685,535.37. The entire cost of maintaining the Bureau of Navigation was $187,130.

Radio Communication.

The work of the Bureau of Navigation in enforcing the two acts relating to radio communication and the London International Radio Telegraphic Convention of 1912 has been carried on throughout the year. This work comprises the inspection of stations on ships and on land and the licensing of American stations and the examination and licensing of operators. The inspection of radio apparatus on shipboard before vessels clear is always an important feature of this service, and under present conditions, when submarines and mines adrift have added to the usual perils of the sea, such inspection is the more necessary. To meet these conditions merchant ships in increasing numbers have been equipped with wireless apparatus beyond the requirements of the laws of

the United States or other nations. During the past year the radio apparatus on shipboard has been inspected just before 7,236 clearances, compared with 6,155 such inspections during the previous fiscal year. During the past fiscal year in 76 marine casualties the wireless apparatus and operators on board contributed to the saving of life and property. In the case of 45 American ships and 20 foreign ships, either involved in the disaster or coming to the rescue, the apparatus had been inspected by the Department's officers. The ship-inspection work has been carried on during the year by 12 inspectors and assistant inspectors at the principal seaports of the United States. This force has sufficed to inspect the apparatus on about half the clearances of ships subject to the radio-inspection laws, but this result has been possible only by concentrating efforts at the principal seaports with occasional journeys to less important shipping centers. An increase in the inspection force will be asked for, as it is certain that the use of wireless on shipboard will increase.

The total number of licenses for stations issued during the year was 5,601, compared with 4,039 during the previous year. Licenses hitherto issued have been valid for only one year, owing to the changes in apparatus due to the rapid development of the art. Beginning with the current fiscal year, however, licenses issued for ship stations and amateur stations will be valid for two years. The total number of operators' licenses issued during the year was 5,680, compared with 4,859 for the previous year. There are now, approximately, 3,000 first and second grade licensed commercial operators and 285 cargo-grade operators. The number of licensed amateur operators is, approximately, 7,000, and many of these have recently been organized as a reserve force under naval direction. The number of licenses to operators for experiment and instruction is 57, and extra first commercial-grade licenses have been issued to 36 men of special attainments.

The London International Radio Telegraphic Conference of 1912 resolved to hold the next international conference in 1917, and with the approval of the State Department the chairman of the American delegation invited the conference to meet in Washington. In view of the European war, however, it is plain that the conference can not be held in 1917.

Enforcement of the Navigation Laws.

The following table sets forth in detail, by ports and laws violated, the work of the Department in the enforcement of the navigation laws during the fiscal year 1916 and a comparison with previous years.

VIOLATIONS OF NAVIGATION LAWS REPORTED BY THE VARIOUS COLLECTORS OF CUSTOMS, SHOWING THE LAWS VIOLATED, FISCAL YEAR ENDED JUNE 30, 1916, COMPARED WITH PREVIOUS YEARS.

Customs district.[a]	Total.	Steamboat laws (4399–4500, R. S.).	Motor-boat law, "Rules of road."	Surrendered license (4325–4326, R. S.).	Bills of health (Feb. 15, 1893).[b]	Seamen's act (Mar. 4, 1915).	Anchorage and St. Marys River rules.	Passenger act (Aug. 2, 1882).	Enrollment and license (4336, R. S.).	Entry and clearance (2774, 4197, R. S.).	Name on vessel (4178, R. S.).	Change of master (4335, R. S.).	Unlading.	Radio communication laws.	Miscellaneous.
Baltimore	312	22	210	34	....	16	....	....	1	....	27	1	....	....	1
Boston	412	122	213	46	....	6	....	4	1	1	3	....	2	11	3
Bridgeport	54	3	30	19	....	....	....	....	1	....	1	....	....	....	....
Buffalo	144	15	63	1	....	59	....	....	....	1	5	....	....	....	....
Charleston	39	6	12	11	....	....	....	....	....	....	7	2	1	....	....
Chicago	389	21	344	5	....	6	....	....	1	....	8	1	....	2	1
Cleveland	218	88	82	27	....	16	....	....	....	3	2	....	....	....	....
Des Moines	4	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Detroit	441	32	346	33	....	1	1	....	....	4	2	2	15	1	4
Duluth	79	35	36	5	....	1	....	....	....	1	....	1	....	....	....
Galveston	50	22	2	12	....	11	....	....	1	....	....	....	....	1	1
Honolulu	18	7	.....	..2	....	....	....	1	....	2	....	....	3	1	2
Indianapolis	109	2	107	....	....	....	....	....	....	....	....	....	....	....	....
Juneau	33	3	2	24	....	....	....	....	2	1	....	....	1	....	....
Laredo	7	1	1	3	....	....	....	....	....	2	....	....	....	....	....
Los Angeles	172	5	138	9	....	1	....	....	2	1	1	3	....	10	2
Louisville	63	4	41	9	....	....	....	....	....	....	....	....	8	....	1
Memphis	94	6	64	18	....	....	....	....	....	....	3	....	2	....	1
Milwaukee	133	8	118	....	....	....	....	....	1	....	5	1	....	....	....
Mobile	106	15	5	33	....	26	....	1	....	....	23	....	1	....	2
New Orleans	177	43	26	84	....	....	....	....	3	....	9	....	....	5	7
New York	1,256	128	983	50	....	4	....	3	13	6	62	2	2	2	1
Norfolk	531	40	399	42	....	1	....	4	....	....	34	1	3	1	6
Ogdensburg	92	2	27	46	....	....	....	....	14	....	....	....	....	....	3
Philadelphia	483	23	342	77	....	10	....	....	4	....	21	5	1	....	....
Pittsburgh	27	10	13	4	....	....	....	....	....	....	....	....	....	....	....
Port Arthur	68	35	11	8	....	3	....	....	3	....	....	1	2	....	5
Portland, Me	241	14	183	38	....	1	....	....	....	....	4	....	....	1	....
Portland, Oreg	229	....	208	3	....	....	....	....	2	....	7	1	....	1	7
Providence	125	4	88	24	....	....	....	....	2	1	2	1	3	....	....
Rochester	42	2	40	....	....	....	....	....	....	....	....	....	....	....	....
St. Albans	33	....	33	....	....	....	....	....	....	....	....	....	....	....	....
St. Louis	154	3	125	21	....	....	....	....	....	....	....	....	....	....	....
St. Paul	5	....	5	....	....	....	....	....	....	....	....	....	5	....	....
San Francisco	276	45	128	26	....	20	....	4	2	1	19	4	9	5	13
San Juan	11	3	4	4	....	....	....	....	....	....	....	....	....	....	....
Savannah	82	1	60	15	....	3	....	....	....	....	....	1	1	....	1

[a] No violations reported at ports not named.

[b] Bills-of-health cases transferred to Treasury Department July 24, 1911.

VIOLATIONS OF NAVIGATION LAWS REPORTED BY THE VARIOUS COLLECTORS OF CUSTOMS, SHOWING THE LAWS VIOLATED, FISCAL YEAR ENDED JUNE 30, 1916, COMPARED WITH PREVIOUS YEARS—Continued.

Customs district.	Total.	Steamboat laws (4399-4500, R. S.).	Motor-boat laws, "Rules of road."	Surrendered license (4325-4326, R. S.).	Bills of health (Feb. 15, 1893).	Seamen's act (Mar. 4, 1915).	Anchorage and St. Marys River rules.	Passenger act (Aug. 2, 1882).	Enrollment and license (4336, R. S.).	Entry and clearance (2774, 4197, R.S.).	Name on vessel (4178, R. S.).	Change of master (4335, R. S.).	Unlading.	Radio communication laws.	Miscellaneous.
Seattle	409	10	196	125	....	37	....	2	4	2	24	3	3	....	3
Tampa	570	25	342	80	....	49	....	....	....	2	34	5	5	2	26
Wilmington, N. C.	137	7	95	5	....	....	....	....	2	....	28	....	....	....	....
Total—															
1916 (48 ports) [a]	7,825	812	5,126	943	....	271	1	19	59	28	331	35	67	43	90
1915 (48 ports) [a]	6,868	671	4,462	982	....	....	11	10	104	41	348	67	93	37	42
1914 (49 ports) [a]	6,720	768	4,838	631	....	....	8	25	41	26	153	59	90	36	45
1913 (107 ports)	3,506	333	2,783	23	....	....	23	8	24	10	83	26	1	40	152
1912 (105 ports)	3,634	165	3,119	96	3	....	12	17	38	39	81	12	....	....	52
1911 (92 ports)	2,268	182	1,811	23	41	....	17	45	10	16	43	30	....	....	50
1910 (74 ports)	1,070	252	488	17	52	....	13	61	13	16	68	12	2	....	76
1909 (64 ports)	1,134	151	710	33	69	....	3	21	14	7	59	....	4	....	63
1908 (73 ports)	852	245	385	12	42	....	6	21	23	18	30	7	2	....	61
1907 (66 ports)	684	209	92	88	36	....	18	62	9	23	52	27	5	....	63
1906 (77 ports)	670	194	130	114	41	....	13	27	10	6	49	5	9	....	72
1905 (63 ports)	524	142	53	99	42	....	13	21	26	7	20	11	28	....	62
1904 (66 ports)	706	184	93	101	48	....	49	16	29	12	24	19	(b)	....	131

[a] Reports are now made by subports through the principal port of the district.
[b] Included under "Miscellaneous" in 1904 report.

Since the Department in 1912 and 1913 began the enforcement of the navigation laws through the operation of its own vessels careful study has been made of the various methods employed to enforce the navigation laws. It has now been clearly demonstrated that in the case of all laws affecting vessels while under way it is necessary that our inspecting officers should have a vessel from which such inspections can be made. When the vessels are in their docks or at anchor it is not safe to leave the equipment on board and available for inspection, as it is liable to be stolen, and it is impossible to tell whether the ship was manned with the crew required by law. The *Tarragon* and the *Dixie* during the year reported 1,971 violations of law. The Coast Guard aided by reporting 1,333 such violations. A great many of the cases reported by the customs officers were discovered through the use of motor boats, allotments for the hire of which were made by this Department. Practically all of the 1,089 cases reported by navigation inspectors were discovered with the use of such vessels. The inspecting officers should be

men thoroughly familiar with the laws they are enforcing, tactful, and with good judgment, and willing to continue their work at all hours of the day or night. Many of the most flagrant violations are discovered after sunset and on Sundays and holidays. The service is a difficult one. It is meeting with the approval of ship publications, associations, and clubs. The assistance of the United States power squadrons and similar organizations is, together with the Department's inspection work, resulting in a material improvement in the equipment and navigation of all classes of vessels.

Last year the Department asked for an appropriation for the purchase of a vessel to be operated on the Mississippi River, where at present there is no Federal patrol in the enforcing of the navigation laws. The reasons for the use of the vessel on these waters were set forth in detail in my report for 1915. Request for this appropriation will be renewed this year.

The following table shows the work of the various agencies of the Government employed in the enforcement of the navigation laws.

VIOLATIONS OF NAVIGATION LAWS, SHOWING THE WORK DONE BY THE COAST GUARD, THE MOTOR VESSEL "TARRAGON," THE MOTOR VESSEL "DIXIE," LOCAL INSPECTORS OF STEAM VESSELS, RADIO INSPECTORS, CUSTOMS OFFICERS, AND NAVIGATION INSPECTORS, FISCAL YEAR ENDED JUNE 30, 1916.

[The work of the customs officers under allotments made by the Department is shown in the last column.]

Customs district.[a]	Total.	Coast Guard.	Tarragon.	Dixie.	Local inspectors.	Radio inspectors.	Customs officers.	Navigation inspectors.	Cases reported under allotments.
Baltimore	325	5	15	96	5	.....	62	142	.....
Boston	407	46	17	116	119	10	99	.....	.....
Bridgeport	58	.....	19	13	4	.....	22	.....	.....
Buffalo	141	5	.....	5	72	.....	6	53	.....
Charleston	41	11	11	.....	.....	.....	19	.....	.....
Chicago	383	285	.....	.....	5	1	10	82	285
Cleveland	208	8	.....	.....	81	.....	83	36	.....
Des Moines	4	2	.....	.....	.....	.....	2	.....	.....
Detroit	454	256	.....	.....	43	1	61	93	.....
Duluth	79	2	.....	.....	12	.....	53	12	.....
Galveston	54	5	.....	.....	.....	.....	49	.....	.....
Honolulu	14	.....	.....	.....	.....	.....	14	.....	.....
Indianapolis	109	.....	.....	.....	2	.....	18	89	.....
Juneau	31	.....	.....	.....	1	.....	30	.....	.....
Laredo	6	.....	.....	.....	.....	.....	6	.....	.....
Los Angeles	173	2	.....	.....	.....	10	161	.....	127
Louisville	69	.....	.....	.....	6	.....	27	36	41
Memphis	89	.....	.....	.....	9	.....	28	52	50

[a] No violations reported at ports not named.

VIOLATIONS OF NAVIGATION LAWS, SHOWING THE WORK DONE BY THE COAST GUARD, THE MOTOR VESSEL "TARRAGON," THE MOTOR VESSEL "DIXIE," LOCAL INSPECTORS OF STEAM VESSELS, RADIO INSPECTORS, CUSTOMS OFFICERS, AND NAVIGATION INSPECTORS, FISCAL YEAR ENDED JUNE 30, 1916.

Customs district.	Total.	Coast Guard.	Tarragon.	Dixie.	Local inspectors.	Radio inspectors.	Customs officers.	Navigation inspectors.	Cases reported under allotments.
Milwaukee	122	116	.....	.....	.....	.....	6	.....	.....
Mobile	104	6	.....	.....	12	.....	86	.....	.....
New Orleans	170	20	.....	.....	13	2	135	.....	.....
New York	1,252	25	435	305	79	2	308	98	.....
Norfolk	578	7	125	250	50	.....	67	79	.....
Ogdensburg	95	.....	.....	.....	2	.....	93	.....	28
Philadelphia	489	.....	29	9	17	.....	131	303	.....
Pittsburgh	24	.....	.....	4	8	.....	5	7	.....
Port Arthur	65	9	.....	.....	6	.....	50	.....	.....
Portland, Me	238	8	.....	170	10	1	42	7	.....
Portland, Oreg	231	.....	.....	.....	.....	.....	231	.....	217
Providence	123	60	.....	11	5	.....	47	.....	.....
Rochester	42	.....	.....	.....	2	.....	40	.....	38
St. Albans	32	.....	.....	.....	.....	.....	32	.....	32
St. Louis	155	15	.....	.....	4	.....	136	.....	107
St. Paul	5	.....	.....	.....	.....	.....	5	.....	.....
San Francisco	293	175	.....	.....	1	5	112	.....	175
San Juan	15	.....	.....	.....	.....	.....	15	.....	.....
Savannah	84	15	4	.....	1	.....	64	.....	.....
Seattle	420	151	.....	.....	2	.....	267	.....	78
Tampa	574	68	232	5	15	4	250	.....	.....
Wilmington, N. C.	139	31	100	.....	4	.....	4	.....	.....
Total (48 ports)	7,895	1,333	987	984	590	36	2,876	1,089	1,178

The foregoing statement of the work done by the various inspection services is based on reports made by collectors of customs on Cat. 1078 and is approximately correct. At Chicago and San Francisco, however, allotments made by the Department were used by Coast Guard officers, and that Service, as well as the allotment, has been credited with the results. The statement of cases reported under the Department allotments necessarily is approximate only.

There are two facts respecting the Navigation Service which should cause satisfaction to the public. The first is that the Service, though expanding rapidly by reason of the numerous demands upon it as already explained, is still operated at a cost of one-ninth of the revenues which are derived under its supervision. The second is that the strictly educational work of enforcing the navigation laws is itself also fully self-sustaining. It not only pays

its own way, but it pays for the boats and apparatus with which the work is done. The following table shows over a period of five years the outlay for this work, including the cost of vessels and their maintenance and the receipts derived from the mitigated fines:

	Original cost.	Maintenance.					Total.
		1912	1913	1914	1915	1916	
Tarragon	[a]$4,500.00	$1,316.62	$9,022.77	$11,335.76	$7,597.13	$5,113.26	$38,885.54
Dixie	[b]9,000.00	.....	.....	.....	1,780.84	16,915.94	27,696.78
Total	13,500.00	1,316.62	9,022.77	11,335.76	9,377.97	22,029.20	66,582.32
Collections from navigation fines	.....	31,578.13	31,987.85	47,162.02	41,518.24	52,381.75	204,627.99

[a] April, 1912. [b] April, 1915.

More important than these satisfactory financial results, however, is the fact of the widespread cooperation of vessel owners and officers in complying with the requirements of the law. The existing conditions in this respect have radically changed for the better within the last three years. It is unfortunate that the operations of the Service have been limited to the Atlantic coast and the waters directly connected therewith. Nothing has been practicable for lack of funds on the Gulf, in the Mississippi Valley, on the Great Lakes, or on the Pacific coast. The power-boat associations in these waters desire the service extended to them. It is as urgently needed there as experience has shown it was required on the Atlantic shores. It can be conducted there without cost to the Government, as it has been conducted elsewhere. It is earnestly hoped that Congress will at the next session provide another small motor vessel for the development of this important service on the waters of the Gulf, the Mississippi Valley, and the Great Lakes.

Navigation Inspectors.

The work of preventing the overcrowding of passenger vessels has proceeded during the fiscal year 1916 with increasing efficiency.

The following table shows the work done by customs districts.

NUMBER OF COUNTS, AND THE NUMBER OF PASSENGERS INVOLVED, IN PREVENTING OVERCROWDING OF PASSENGER VESSELS DURING THE FISCAL YEAR ENDED JUNE 30, 1916.

Customs district.	Navigation Service.		Customs Service.		Total.	
	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.
Baltimore, Md	1,432	710,947	6	4,656	1,438	715,603
Boston, Mass	82	18,779	950	627,986	1,032	646,765
Bridgeport, Conn	.....	.....	26	15,791	26	15,791
Buffalo, N. Y	1,311	490,216	2,966	580,295	4,277	1,070,511
Charleston, S. C	.....	.....	17	5,597	17	5,597
Chicago, Ill	814	211,939	88	27,756	902	239,695
Cleveland, Ohio	367	145,655	288	184,765	655	330,420
Des Moines, Iowa	.....	.....	3	1,584	3	1,584
Detroit, Mich	906	784,647	104	138,430	1,010	923,077
Duluth, Minn	149	29,522	52	12,035	201	41,557
Galveston, Tex	.....	.....	83	4,729	83	4,729
Indianapolis, Ind	108	38,546	14	10,059	122	48,605
Los Angeles, Cal	.....	.....	21	9,003	21	9,003
Louisville, Ky	52	6,541	231	85,911	283	92,452
Memphis, Tenn	178	57,874	58	17,680	236	75,554
Mobile, Ala	.....	.....	102	22,096	102	22,096
New York, N. Y	184	64,785	28	6,313	212	71,098
Norfolk, Va	121	28,107	120	29,324	241	57,431
Ogdensburg, N. Y	.....	.....	18	6,329	18	6,329
Philadelphia, Pa	331	151,731	16	6,819	347	158,550
Port Arthur, Tex	.....	.....	16	64	16	64
Portland, Me	1,580	212,272	35	6,355	1,615	218,627
Portland, Oreg	.....	.....	44	11,317	44	11,317
Providence, R. I	744	293,392	1	500	745	293,892
Rochester, N. Y	.....	.....	4	3,030	4	3,030
St. Albans, Vt	.....	.....	55	14,214	55	14,214
Seattle, Wash	.....	.....	83	32,633	83	32,633
Tampa, Fla	.....	.....	22	4,127	22	4,127
Total	8,359	3,244,953	5,451	1,867,814	13,810	5,114,351
Total for fiscal year 1915	5,061	1,439,273	5,586	1,619,445	10,647	3,058,718

The Department aims to prevent accidents and violations rather than to permit violations of law at the risk of accident and then to inflict penalties.

The table following shows the cases (called shut-offs) in which inspectors have been obliged to stop vessels from loading to excess above the legal limit, arranged by months and customs districts.

SHUT-OFFS BY MONTHS DURING THE FISCAL YEAR ENDED JUNE 30, 1916.

Customs district.	July.		August.		September.		November.		December.	
	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.
Baltimore	8	7,075	2	2,500	1	500	....	.....	....	.....
Boston	12	11,765	4	5,300	2	525	....	.....	....	.....
Buffalo	3	1,092	3	1,582	....	.....	....	.....	....	.....
Chicago	10	4,755	....	.....	....	.....	....	.....	....	.....
Cleveland	7	11,800	10	13,800	2	1,400	....	.....	....	.....
Detroit	13	28,268	1	3,166	....	.....	....	.....	....	.....
Duluth	....	.....	1	484	1	484	....	.....	....	.....
Indianapolis	1	900	....	.....	....	.....	....	.....	....	.....
Los Angeles	1	60	....	.....	....	.....	....	.....	....	.....
Louisville	1	1,000	....	.....	....	.....	....	.....	....	.....
Mobile	1	550	....	.....	....	.....	....	.....	....	.....
New York	2	2,200	....	.....	....	.....	....	.....	....	.....
Norfolk	1	600	5	2,225	....	.....	....	.....	....	.....
Portland, Me	1	475	....	.....	1	550	1	254	....	.....
Portland, Oreg	3	1,249	1	370	....	.....	....	.....	....	.....
Providence	2	1,000	7	5,940	4	2,906	....	.....	....	.....
Seattle	5	2,070	9	2,415	....	.....	....	.....	....	.....
Tampa	....	.....	1	300	....	.....	....	.....	1	238
Total	71	74,859	44	38,082	11	6,365	1	254	1	238

Customs district.	January.		April.		May.		June.		Total.	
	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.	Counts.	Passengers.
Baltimore	....	.....	....	.....	3	3,582	....	.....	14	13,657
Boston	....	.....	....	.....	....	.....	2	294	20	17,884
Buffalo	....	.....	....	.....	....	.....	....	.....	6	2,674
Charleston	....	.....	1	300	2	1,000	1	500	4	1,800
Chicago	....	.....	....	.....	....	.....	4	812	14	5,567
Cleveland	....	.....	....	.....	....	.....	5	3,405	24	30,405
Detroit	....	.....	....	.....	3	9,693	9	25,464	26	66,591
Duluth	....	.....	....	.....	....	.....	....	.....	2	968
Indianapolis	....	.....	....	.....	....	.....	....	.....	1	900
Los Angeles	....	.....	....	.....	....	.....	....	.....	1	60
Louisville	....	.....	....	.....	....	.....	....	.....	1	1,000
Memphis	....	.....	....	.....	1	492	1	600	2	1,092
Mobile	....	.....	....	.....	1	42	1	42	3	634
New York	....	.....	....	.....	....	.....	....	.....	2	2,200
Norfolk	....	.....	1	234	....	.....	2	592	9	3,651
Portland, Me	....	.....	....	.....	....	.....	....	.....	3	1,279
Portland, Oreg	....	.....	....	.....	....	.....	....	.....	4	1,619
Providence	....	.....	....	.....	....	.....	....	.....	13	9,846
Rochester	....	.....	....	.....	1	600	....	.....	1	600
Seattle	....	.....	....	.....	....	.....	....	.....	14	4,485
Tampa	1	228	....	.....	....	.....	....	.....	3	766
Total	1	228	2	534	11	15,409	25	31,709	167	167,678

NOTE.—Total for fiscal year ended June 30, 1915, 92 counts, 95,293 passengers.

In addition to counting these passengers the navigation inspectors during their spare time enforce so far as practicable the laws in regard to the equipment and manning of all classes of vessels. During the fiscal year 1916 they discovered 1,089 violations of law, an increase of 90 cases over the work of 1915.

The Department is training these men as rapidly as possible in order that it may have at the principal ports a force familiar with the laws they are enforcing and the manner in which the work should be done. In order to secure the best results, vessel owners must be satisfied that the purposes of the Department are educational rather than punitive.

Repaired Wrecks.

Under the act of February 24, 1915, the following foreign-built vessels wrecked and repaired in American shipyards have been admitted to American enrollment for the coasting trade: Norwegian steamer *Anita*, 1,186 gross tons, wrecked off Turks Island, repaired at a cost of $64,000, and documented as the steamship *Elizabeth Weems;* Italian bark *Rosalia d'Ali*, 1,432 gross tons, wrecked in Hampton Roads, repaired at a cost of $15,000, and documented as the barge *Coastwise;* Russian bark *Hilja*, 707 gross tons, wrecked at Pascagoula, Miss., repaired at a cost of $11,000, and documented as the barge *Choctaw;* British steamship *Dunholme*, 3,675 gross tons, wrecked at Bayonne, N. J., repaired at a cost of $220,000, and documented as the steamship *Campana;* and the British ship *Ben Cruachan*, wrecked on the Mexican coast, repaired at a cost of $10,000, and authorized to be documented as the gasoline schooner *Carmela*.

Passenger Act of 1882.

During the year ended June 30, 1916, passenger steamers subject to the act of 1882 on 720 voyages brought 154,057 steerage passengers to ports of the United States, compared with 211,509 such passengers carried on 956 voyages during the fiscal year ended June 30, 1915. That fiscal year, however, included the month of July, 1914, before the European war broke out and the month of August, when many Americans hastened to return home in the steerage, those two months contributing 322 voyages and 110,021 steerage passengers to the returns for that year. Excluding these two months from each fiscal year, 133,503 steerage passengers were brought to the United States on 583 voyages during the past year, compared with 101,488 passengers on 634 voyages during the fiscal year 1915. In the year ended June 30, 1914, on 1,797 voyages

1,016,453 steerage passengers were brought to our ports. The act of 1882 has been enforced carefully during the year as to incoming and outgoing steamers.

Seamen's Act of 1915.

The seamen's act of March 4, 1915, took effect as to vessels of the United States on November 4, 1915, and as to foreign vessels on March 4, 1916, except as to such parts of the act as are in conflict with articles of any treaty or convention. Such parts of the act as regards the vessels of such foreign nations took effect on July 1, 1916. Parts of the act, accordingly, were in effect during eight months of the past fiscal year, and no part of it applicable to both American and foreign ships was in force for more than four months of the year, while some parts of the act relating to foreign ships did not begin to take effect until after the close of the fiscal year on June 30, 1916. It is clearly impracticable to give a final judgment on the general results of so sweeping a measure which has been in force for so short a time and has been applied under its terms so irregularly to the ships of different nations. As was to be expected in the case of a measure quite new in principle and in the application of its requirements to the shipping laws of the United States or other nations, there were many violations of the act by American ships in the few months of its operation, and these, in view of the considerations named, the Department has generally treated leniently, so that commerce should not be impeded through the lack of familiarity with the many provisions of this new law. It has been necessary to obtain from the Department's Solicitor a construction of many of the phrases of the act and in several matters to obtain the opinion of the Attorney General.

The shipping business has, however, adjusted itself with remarkable facility to the operation of the law. In minor points, as in the number of life buoys to be carried on small steamers, the law has required or will require amendment. The Department, however, believes that it marks a great step forward in dealing with transportation by shipping on a more humane and effective basis than heretofore. It is my own conviction that those who have in the past opposed this measure will in the future come to consider it as one of the greatest safeguards for our merchant marine. That marine can never permanently prosper unless the men upon whose services it depends share in its prosperity—not merely in accommodations and in food, but in earning power as well.

CONCLUSION.

The foregoing is respectfully commended to your attention and to that of Congress.

Respectfully,

WILLIAM C. REDFIELD,
Secretary.

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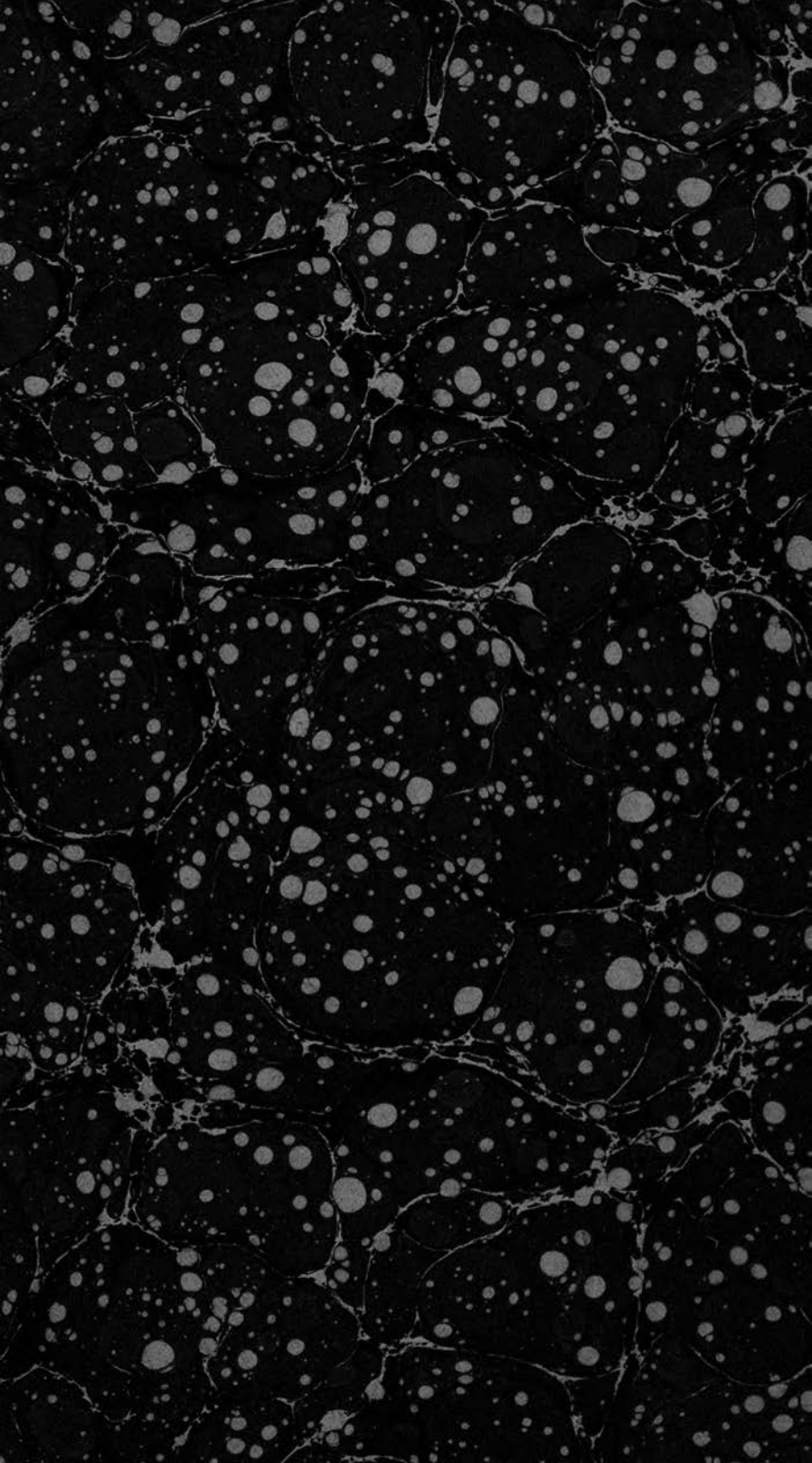


DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA