ANNUAL REPORT
OF THE
SECRETARY OF COMMERCE
—
1922

TENTH ANNUAL REPORT

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ORGANIZATION OF THE DEPARTMENT.

(September 15, 1922.)

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TENTH ANNUAL REPORT

OF THE

SECRETARY OF COMMERCE.

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, September 20, 1922.

To the PRESIDENT:

I have the honor to submit herewith for transmission to Congress the Tenth Annual Report of the Secretary of Commerce, in accordance with the provisions of section 8 of the organic act, as follows:

SEC. 8. That the Secretary of Commerce shall annually, at the close of each fiscal year, make a report in writing to Congress, giving an account of all moneys received and disbursed by him and his department, and describing the work done by the department in fostering, promoting, and developing the foreign and domestic commerce, the mining, manufacturing, shipping, and fishery industries, and the transportation facilities of the United States, and making such recommendations as he shall deem necessary for the effective performance of the duties and purposes of the department. He shall also from time to time make such special investigations and reports as he may be required to do by the President, or by either House of Congress, or which he himself may deem necessary and urgent.

In order to comply with these requirements this report must be more than the formal document hitherto issued, and for convenience I have divided it into the following sections:

I. The general administrative work of the department.

II. Investigations into various economic problems in pursuance of the organic act.

III. Recommendations for legislation in remedy of obsolete legislation and to meet new problems that have arisen in the department, that our commerce and industry may be advanced.

IV. Special and more detailed reports of the different bureaus and divisions of the department and special recommendations of their directors.

This department is by its nature a service department to business, and only incidentally participates in minor regulatory functions.

In the last annual report I stated that the purposes of the administration for the forthcoming year included:

First. A reorganization of the departmental expenditures with a view not only to direct economy but to more effective application.

Second. A reorganization of departmental activities on a basis of cooperation with the commercial and industrial community. These cooperative activities mark an entirely new departure in an attempt to change the attitude of Government relations with business from that of interference to that of cooperation.

Part I.—ADMINISTRATIVE WORK OF THE DEPARTMENT.

The result of the departmental reorganization was that whereas the total appropriations made available for the department under the previous administration for the period in question were $24,320,192, yet the actual expenditure for the fiscal year was $21,024,870.17, showing a total saving of $3,295,321.83, or 13.5 per cent of the available appropriations.

In the course of reorganization the expenditure upon promotion of foreign commerce and upon problems of importance to domestic commerce was increased by about $500,000 over initial appropriations, but these amounts were saved from other work in addition to the amounts shown above.

During the year the Bureaus of Foreign and Domestic Commerce, Census, Fisheries, and Navigation have been completely reorganized as to personnel, administration, policy, and method, so as to bring them not only greater efficiency and economy but into line with full cooperative spirit with commerce and industry in actual tangible service. The personnel of the other bureaus have been found efficient and their methods progressive and helpful. I especially commend the reports of the bureau heads as showing the great progress in fact and in zeal during the year.

Moreover, the work of the department comprises not only the routine administration of the Government services in Foreign and Domestic Commerce, the Lighthouses, navigation laws, Steamboat Inspection, Coast and Geodetic Survey, radio regulation, Census, Bureaus of Standards and Fisheries, employing a total of 12,683 persons, but it comprises a large amount of special services to commerce lying outside the province of these routine duties.

During the past year, the work of the department in special directions has been much dominated by the economic situation. The conditions that prevailed threw a great burden upon the department in economic investigation at home and abroad upon which the policies of the administration during reconstruction could be founded, and in undertaking under your instructions participation for the administration in a large number of conferences with different groups of our commercial and industrial community, in assistance to their efforts to stem the tide of the crisis in different directions and to expedite recovery in others. Some of these conferences were called at the

initiative of the department—most of them upon request of the industries—and a very large amount of constructive cooperation has resulted. A few of the more notable of these cooperative efforts are indicated below.

Reorganization of Foreign-Trade Service.

Early in the fiscal year conferences were held with some 150 representatives of commerce and industry upon the need for reorganization of the department's foreign trade service to make effective cooperation with the commercial community. It was determined that the Bureau of Foreign and Domestic Commerce should include divisions representing the more important commodity and specialty lines, and upon the approval of Congress divisions were established covering foodstuffs, cotton, agricultural implements, automotive products, coal, electrical equipment, hides and leather, industrial machinery, iron and steel, paper, petroleum, lumber, rubber, shoes and leather manufactures, specialties, textiles, transportation and communication, foreign tariffs, and foreign commercial law. Permanent committees from the trades were created for cooperation with the department, and through these committees the expert heads of the different divisions were selected. These committees have kept in constant touch with the department; and the devotion which the business community has shown to this committee work, and the thorough reorganization which the foreign service of the department has undergone has been a distinct factor in preventing the demoralization of our foreign trade to the extent that has been reached by all other trading nations. An index of the appreciation of the service which this reorganization rendered is found in the increase of inquiries to the department for assistance to a total of 589,533 during the fiscal year, or about double those during the previous fiscal year.

These conferences with the principal trade groups and firms interested in foreign trade led to an entire revision of the character of information sought from foreign countries, in broadening its economic character, and in rendering more specific its values to the different industries. More particularly it has been sought to develop systematic and regular information on foreign situations which have direct reflex upon our domestic commerce—for instance, surveys of world stocks and consumption of cotton, wool, wheat, rice, and some other commodities, together with the currents in manufactured goods between other countries than our own in their relation to American markets. The small daily bulletin previously published was consolidated into a weekly publication, the paid circulation of which has

more than doubled. By the issuance of advance proofs, full-page publication of these reports is carried once a week by over 200 daily newspapers and periodicals, reaching a circulation in excess of 10 millions of people weekly.

Assistance to Agriculture.

At your delegation, this department from April to July, 1921, undertook the initial investigations into the credit and commodity situation in agricultural produce at home and abroad, and joined with the other departments in conferences that were called affecting the cotton, cattle, and grain industries. Proposals to again make Government loans to foreign countries for the purpose of marketing the agricultural surplus had received wide support. As a result of these investigations and conferences, however, it was concluded that Europe would ultimately purchase her supplies in a normal way, but that these purchases would be much delayed, owing to her tendency, for financial reasons, to consume her domestic produce before entering the American market, and that the situation could best be met by the extension of domestic credits to the agricultural industry to enable it to tide over.

The reconstitution of the War Finance Corporation was recommended, and the impending widespread bankruptcy in the agricultural industry was thus prevented. Under the authority given by Congress, some 300 million dollars of loans have been provided through that agency, chiefly for agricultural produce, and these loans are now being rapidly repaid. That credit was not required by the buyer has been proved by the fact that the year under review marked the largest volume of exports of agricultural produce in our history. The beneficent results of this credit operation in contribution to the economic recovery of the country can not be overestimated.

In November, 1921, appeals to you from many sections of the sugar trade were referred to this department for consideration. The trade was in the midst of an acute crisis in which prices were far below the cost of production. A survey at home and abroad showed that the difficulty arose mainly from the large carry over of Cuban sugar from the previous year, which was held under short-term loans upon which the margin had mostly run off and the maturity was expiring. The financial crisis then raging in Cuba had also diminished local credits. As a result there was a general loss of confidence, and the distributing trades, both at home and in Europe, were refusing to carry their usual stocks. The worst feature of the situation was that the price endangered the ability of the American beet-sugar

manufacturer to enter into the usual advance contracts with the American farmer for beets. Government action was urged in many quarters, but through extended conferences held by the department, cooperation was secured by the manufacturers, bankers, merchants, and producers, and in result credits were reestablished, liquidation was stopped, and through returning confidence accumulation of normal stocks was resumed by the distributing trades, and the situation tided over.

In September, 1921, the problems of the crisis which had arisen in the rice industry were brought to the department by the various producers' associations in a request for assistance. At that time the price of rice had fallen below the cost of production, the crop had not yet been marketed, bankruptcy threatened not only the producers but also a number of local banks in the rice regions. A survey of the world situation in rice revealed the fact that a shortage in production was going to develop in certain countries where the American surplus rice could later be marketed at fair prices. With credits arranged from the War Finance Corporation to the various producers' cooperative associations, enabling them to carry the commodity, and with the active cooperation of the agents of the department abroad, the entire surplus was marketed at prices which have maintained the industry without loss.

Unemployment.

The extension of unemployment to between 4,000,000 and 5,000,000 of our workers as the result of the industrial slump presented the most difficult unemployment crisis that the country had ever faced. Great agitation was aroused for governmental doles and other fallacious remedies based upon the practices of European Governments.

On September 26, 1921, a conference on unemployment was summoned at this department in cooperation with the Department of Labor. Some 85 representatives of the important industries and the commercial and civic organizations of the country responded to the invitation and remained in session for some weeks. Plans of organization were formulated which would ameliorate the unemployment situation over the forthcoming winter. An organization for the consummation of these plans was created by the Department of Commerce and emergency committees were created in cooperation with over 200 different municipalities. The employers of the country cooperated in a vast extension of divided-time employment. Through these measures and the combined effort of the Federal administration in expediting and of Congress in extending public works, the

most severe winter of unemployment in our history was passed without any notable suffering and without a single public disturbance. The rising demand for unemployment doles disappeared because the fine voluntary cooperation of the whole community solved one of the most difficult situations growing out of the aftermath of the war.

One of the continuing services of this conference is the prosecution of inquiries still in progress into certain special phases of unemployment, under voluntary committees representing the most important leaders in our industries, and our commercial and labor organizations, the results of whose work, when completed, will form an effective contribution to the better handling of the whole problem of unemployment.

Conferences on Housing.

The shortage of some 1,000,000 dwellings as a result of suspended construction during the war led to widespread demand for Federal legislation and assistance. Under an appropriation from Congress an investigation of the situation and possible remedies was made by this department. During the process of the inquiry numerous conferences were held with the various branches of the building industry and with representatives of municipal and civic bodies. It appeared that the retardation was due to (*a*) the acute credit situation; (*b*) high prices of material and labor; (*c*) unsavory business ethics in certain localities; (*d*) wasteful practices in their contribution to costs.

It was concluded that the first two causes would in the main cure themselves by the general fall in prices then in progress. The third could only be cured by vigorous action of the Federal and State authorities, a large measure of which has been accomplished. It was concluded that emergency legislation or Government finance was not desirable and that except for a vigorous support of the purely cooperative service indicated below, the Government should keep out of the housing business.

It was considered on all sides that real service could be accomplished in a general aid by the department to the creation of, and assistance to, the already existing voluntary bodies permanently engaged in developing home ownership. A small division was created in the department the purpose of which was to stimulate such local activity by acting as a clearing house of ideas and information. One result has been the creation of voluntary bureaus in many municipalities for advancement of home ownership and where advice on finance and aid by furnishing designs and specifications of small houses could be obtained at a nominal charge.

Systematic measures of cooperation were set in motion in trade and civic bodies for the eliminating of waste in various directions, and thus a reduction of construction costs. Typical among the latter activities was the appointment of a committee from representatives of the important professional and civic associations to formulate a standard building code, as it was the general consensus of opinion that the varying regulations in force in hundreds of different municipalities, founded as they were without scientific study, had imposed an unnecessary cost upon building of from 10 to 20 per cent. Before the drafting of the recommended code for small houses, a large amount of experimental work was carried on in the Bureau of Standards, and suggestions obtained from over 100 different municipalities. A tentative draft was then submitted to some 975 engineers, architects, municipal officials, and representatives of the building industry, whose useful criticisms were incorporated in the final draft. The code is already being adopted in some municipalities. Work in elimination of waste, in advancing voluntary standardization and inspection of qualities and grades, in elimination of unnecessary variation in dimensions of building material, and in the simplification of specifications have been undertaken by experts from the department at the request of and acting in cooperation with building material, contractors', and consumers' associations, with gratifying results.

The Coal Industry.

The Departments of Commerce and Labor, anticipating the expiration of the biennial coal agreement at the following March, and in view of the dangerously unstable situation in the bituminous industry, joined in an effort during the month of October, 1921, to determine if some arrangement could not be arrived at by which, in case of failure of agreement between operators and miners, arbitration or some other device of settlement could be secured which would insure the country against strike, with its great losses to commerce and labor. The representatives of the operators accepted such proposals; but the workers considered they would be sacrificing their opportunities if they acceded thereto.

As it was evident from the situation that a strike was inevitable, this department warned the public of the necessity to make provision in coal supplies against such an event, and undertook, in cooperation with the public-utility associations, a general campaign to increase the stocks of coal as security of continued industry. In order that the public should appreciate the situation, the department also undertook a survey of

the coal stocks at the end of each month for some months preceding the strike.

As a result of these activities the country entered the strike with by far the largest stock of coal ever known, and the fact that we were able to maintain all commerce and industry throughout the longest strike in history was in no small degree due to this effort.

The strike began on the 1st of April, and at the middle of May a buying panic within a few days raised the price of spot coal to about $3.60 a ton at the mine. As the price of spot bituminous had risen to $12 per ton at the mine in 1920, when production was at the rate of 12,000,000 tons a week, it was evident that some action must be taken if a worse situation were not to arise, with production limited to 4,200,000 tons a week from the nonunion mines.

In the absence of any legislation or any constitutional basis for controlling profiteering, a conference of the producing operators was called at this department, and as a result of these conferences it was agreed that coal prices should not be advanced beyond the Garfield prices plus a reasonable allowance in each district for the differences in wage scale and costs which had ensued since the war. These agreed maximum prices varied from $2.25 to $3.50 for spot run-of-mine coal at the mine. Approximately 85 per cent of the producing districts voluntarily undertook this arrangement, and the price of spot coal in these areas was restrained to an average of under $3.25, whereas in the districts which had refused to enter the agreement prices rose to as high as $10 per ton at the mines. An agreement with the majority of wholesalers and retailers secured that there should be no increases in stocks of coal.

At the end of July some districts withdrew from the agreement, although some 65 per cent of the nonunion operators held to it until August 15, when the strike was settled and the agreement automatically expired.

Despite the districts which refused to cooperate and the occasional bootleggers in coal, the average price of spot coal for the entire period of the strike, as shown by the Coal Age, was $3.70, while the average price of contract coal was about $2.60. During the same period of 1920, even with three times the volume of production but without any attempt at restraint, the price of spot coal averaged $6.20.

During the latter part of the strike stocks began to be exhausted, and it became necessary to establish a voluntary coal distribution through an appeal to the governors to appoint coal

commissions in the different States. A Federal service in this department to coordinate this effort through priorities to public utilities designated to the Interstate Commerce Commission assured that the whole of the essential services of the country were kept going. The resumption of the union mines was accompanied by some overcharging for coal, and after the fiscal year under review legislation by Congress established fuel distribution upon an official footing, and through this organization the situation has been rapidly restored to normal in prices and distribution.

Russian Relief.

Failure of the 1921 harvest in large sections of Russia promptly brought a moving appeal from Russia to the world for assistance. With your approval the matter was taken up by this department in cooperation with the American Relief Administration, of which I am also the chairman. Ultimately Congress was moved to make an appropriation of $24,000,000 in cash and medical supplies for assistance in food and seed to the Russian people. In addition to this, the American Relief Administration provided from charitable and other sources supplies to the value of approximately $36,000,000, making a total of about $60,000,000. The appointment of a buying commission and the necessary organization for the purchase, shipment, and distribution of nearly 800,000 tons, or about 130 shiploads, of supplies was carried out in cooperation between the department and the American Relief Administration. American supplies and ships were exclusively employed. The Relief Administration through the sale of packages to individuals in America to be delivered to their relatives in Russia earned sufficient margin to cover all overhead expenses. All internal transportation in Russia and all other internal expenses, including Russian staff, were paid by the Soviet authorities. In the most acute period of the famine the relief work extended to 17,500 distributing kitchens, employing 84,000 Russians, and furnishing the bare margin of food necessary for maintenance of life to 10,500,000 people.

The large amount of seed which was furnished enabled the planting of large areas and greatly improved the situation for the forthcoming year.

Colorado River Commission.

On December 17, 1921, at your request I undertook, as chairman, to represent the Federal Government upon a commission set up by the seven States in the Colorado River Basin, the purpose of which is to formulate a treaty between these States,

subject to ratification by Congress, to settle the conflict of water rights and a program of systematic development for that great national asset. Meetings of this commission were held in Washington in January, 1922; in Phoenix, March 15; in Los Angeles, March 20; in Salt Lake City, March 27; in Denver, March 31; and in Cheyenne, April 2, at which public hearings were held and necessary information recruited for the forthcoming final sessions of the commission.

Washington Arms Conference.

On November 3, 1921, I was appointed by you to serve upon the advisory committee of the Washington Arms Conference, and the department had previously been called upon to recruit a large amount of economic information from abroad and to furnish the service of its various experts in the formulation of the policies of our Government.

Mineral-Oil Supplies.

Early in the administration consideration was given by the Department of Commerce jointly with the Department of the Interior to the serious situation confronting our country in its supply of oil. As a result of a survey of our own and the world situation, it was concluded that our domestic sources of oil would at the present rate of exhaustion last only a generation, and that foreign nations were rapidly preempting the available foreign oil-bearing territory. Therefore, unless our nationals could reinforce our holdings abroad, we should be dependent upon other nationals for the supply of this vital commodity in a measurable number of years. As a result of these conclusions, conferences were called with the representatives of the oil industry, and voluntary measures were taken by them to extend their holdings of oil-bearing lands abroad. The reports to this department show a rapid expansion of the foreign holdings of our different companies, and they have now reached an extent which should measurably assure to us future supplies under American control. It has developed from these investigations that while our oil-bearing lands are free to the exploitation of foreign corporations, some of the principal countries whose nationals are engaged in such exploitation here at the same time prohibit our nationals from similar free access to their territories.

Revision of Commercial Statistics.

Another direction in which the voluntary cooperation of the commercial community was sought was in the revision of commercial statistics bearing on manufactures, distribution, etc.

Through the manufacturers' associations, committees were created in the principal industries, and upon their advice the work of the Bureau of the Census in this important direction has been reorganized and simplified. Cooperation was also established with various trade associations for the proper publication of current statistics bearing on production and distribution, and the monthly publication entitled "Survey of Current Business" was inaugurated by the department with your approval and has been greatly welcomed by the business community.

Collections of Merchant Debts Abroad.

The general collapse in prices brought great hardship to American exporters, in that hundreds of millions of dollars worth of orders and goods in the course of shipment were repudiated by foreign buyers when the opportunity came for purchase at lower rates. In many instances goods blocked the warehouses of foreign ports, bringing about great difficulties on all sides. The department brought about the appointment of committees among the exporters and various trade associations interested in certain countries and organized a special service to cooperate with these committees in this matter. The foreign representatives of the department in this cooperative work have participated effectively in securing delivery and settlement in cases amounting to upward of $120,000,000.

There have also been a few cases of repudiation by American merchants of goods purchased abroad. The department has interested itself in these matters informally because of the vital necessity to maintain the high repute of American commerce. These cases were in an almost infinitesimal percentage, and in practically every case representatives of the department have secured the acceptance of the goods.

Scientific Assistance in Industrial Processes and Methods.

Congress authorized the use and support of the great physical laboratories erected under the Bureau of Standards for war purposes in national service. In order that the services of this bureau would be best applied, committees of manufacturers' representatives in different trades have been established and are earnestly cooperating with the bureau on various problems of scientific investigation into methods of manufacture and the elimination of waste. The accomplishments in this direction are set out fully in the director's report. An extension of the bureau's work was undertaken in cooperation with many industries in the establishment of a Division of Simplified Practice. Committees acting in cooperation with the experts of the department during the fiscal year have completed the simplification of

dimensions in paving brick and certain articles of furniture with preliminary work in lumber, farming implements, automobile parts, paints, hardware, etc. It would be difficult to estimate the annual value to industry and to the public at large of such simplifications, but it would not be an overstatement that their values run into many millions per annum. Scientific and cooperative work of this character, which in no way infringes upon invention or novelty, has become absolutely vital to our Nation, if we are to maintain our high-wage levels and high standards of living in the face of world competition.

Voluntary Establishment of Grades and Qualities.

Agitation has been current for many years for the extension of the Federal laws to the establishment of grades and qualities of different commodities. The lack of such established grades and standards of quality adds very largely to the cost of distribution because of the necessity of buying and selling upon sample or otherwise, and because of the risk of fraud and misrepresentation, and consequently the larger margins in trading. It was considered by the department, however, that it would be infinitely better if such grades and qualities could be established voluntarily in the trades themselves instead of by legislation, and policed by trade associations as is the case in several old established trades. To this end a number of conferences have been held in different branches of the lumber, textile, paper, and other trades. The service of the department has been to bring the different branches of the trade, the manufacturers, wholesalers. retailers, and representatives of larger consumers' associations together and to develop committees of different branches of trades. The plan has been generally welcomed and applications have been received from many trades for such assistance. The expert services of the Bureau of Standards, Bureau of Foreign and Domestic Commerce, and the other bureaus of the department have been brought into service for technical advice in these matters, and results of important bearing upon the improvement of business ethics and cheapening of distribution have been attained.

Radio.

The sudden increase within a space of 7 months in the use of the radio telephone for broadcasting of from 5 to 320 sending stations and from probably less than 200,000 up to 1,500,000 receiving installations resulted in such "interference" between different sending stations as to threaten destruction to the usefulness of this very important invention. A conference of representatives of the industry, of public bodies, and Government

officials, together with independent experts, was called on February 27, 1922. This conference, after two months of public hearings, study, and investigation, unanimously recommended the immediate extension of the regulatory powers of the Government, and drafted its technical provisions for submission to Congress.

Fisheries.

On May 9 and June 16, 1921, conferences of representatives of the fishing industry and interested public bodies were called to consider the problem of ocean pollution by oil, in its destruction of the fisheries, its danger to harbor cities (disastrous fires having already resulted), and its contamination of the beaches. The conference unanimously insisted upon the necessity of public regulation and the general lines of recommended legislation were drafted.

In May and June, 1922, conferences were called at the request of the fishing industry to consider the stifling of inland fish consumption by the increased transportation rates. Committees were appointed, negotiations instituted with the railway and express companies, and hearings arranged before the Interstate Commerce Commission in November. In result, the rates were modified so as to work less hardship upon the industry and the public.

At the request of State authorities and of the fishing industry, a conference was called on October 25, 1921, to consider the destruction of salmon fisheries in the Federal waters of Alaska. Grounds of agreement were found for the extension of conservation measures, and the necessary legislation was recommended to Congress.

Aviation.

At the request of the industry, a conference upon commercial aviation was called comprising representatives of the manufacturers, of engineering societies, and public officials to consider the great loss of life due to faulty machines, faulty construction, and inadequate experience in aviators. The conference urgently recommended regulation and inspection similar in character to that applied to shipping, and the technical form of such legislation was drafted for recommendation to Congress.

Conferences of less importance have been held to the number of over 50 with different economic groups, mainly for the purpose of assisting to smooth out relations with Government departments and to promote activities of public interest in many directions.

Part II.—INVESTIGATIONS INTO VARIOUS ECONOMIC PROBLEMS IN PURSUANCE OF THE ORGANIC ACT.

Under the provisions of the organic act and at your suggestion from time to time, the department has made investigation and study of various important economic problems confronting the country. The reorganization of the departmental staff and the cooperation of the business community in advancing information have contributed to make the undertaking of such investigations possible. The war, the postwar boom, and the unparalleled depression arising therefrom have displayed both strength and weaknesses in many of our economic institutions and in governmental relationships to commerce and industry. These experiences warrant deep consideration of remedies which may be applied in gain to our economic progress.

THE BUSINESS SITUATION.

The outstanding feature of the fiscal year (July, 1921, to July, 1922) was that it marked the low point in the most violent commodity slump in our history. The liquidation and deflation precipitated the commercial community into all the losses and unemployment that flow from such occasions. It was inevitable that we, in common with the rest of the world, should readjust ourselves not only from the inflated levels of the war but also from the still higher levels of the wasteful postwar boom. The unparalleled character of the slump is indicated by the comparative index tables given on page 38, Appendix A. During the 12 months prior to the year under review both prices and manufacturing production outside of foodstuffs fell by, roughly, 40 per cent, and in consequence some 4,000,000 to 5,000,000 people were unemployed and business stagnated. The only marked exception to this ratio of decreased activities was the quantitative volume of foreign trade.

Our recovery has been marvelously rapid, for within 16 months following the bottom of the slump unemployment was practically extinguished and production was proceeding up to between 85 and 95 per cent of our normal. We have entered into a period of lower and more stable prices with its consequent much sounder and more stable business. The tremendous shock of the

slump together with the aftermath of the war will require some time yet for complete recovery, and speculation is in no way justified.

The readjustments are still unequal in price levels between various commodities and between wage earners and farmers. Nevertheless the outlook is so improved over a year ago as to be scarcely comparable.

CREDIT SYSTEM.

The most distinguishing feature of this slump was that for the first time a major commodity crisis—the greatest we have ever faced—was passed without financial panic. That our recovery from depression has been more rapid than ever before is to be attributed to the fact that we were not compelled in relief from financial panic to repair the vast destruction from bankruptcy that has inevitably followed on such occasions. This fact was in the main due to the Federal reserve system, which here successfully stood the severest test that can ever be applied to it. The measures taken by the administration in the reduction of Government expenditures and taxes, in the handling of Government finance, in voluntary cooperation with many industries to meet their special crises, and in the provision of direct finance to the agricultural community—all contributed to a successful outcome.

The reduced financial strength of Europe, in the diminution of her ability to purchase our agricultural produce in advance of her need, demanded slower marketing and more credit in some parts of the agricultural community. Furthermore, the increased mechanization of the agricultural industry and its enlarged productivity per man have increased its credit necessities. Under the strain there also developed the fact that the demand deposits of the country, limited in their use as they must be to short credits, can not supply the need for the 9 to 36 months' credits required in some parts of this industry or assure the credits needed in finance of the farm cooperatives. Some sort of mobilization of investment capital for agriculture is required to supply this need, which lies midway between those supplied by the Farm Loan Board and by the Federal reserve system.

CURRENTS IN FOREIGN TRADE.

During the 12 months ended June 30, 1922, our foreign trade suffered in common with the general world depression. The monetary value of our exports and imports during the period in

question, in comparison with the previous fiscal year, is shown in the following table:

	1920-21	1921-22
Imports	$3,654,459,346	$2,608,079,008
Exports	6,516,510,033	3,771,286,428
Total foreign trade	10,170,969,379	6,379,365,436
Balance of exports over imports	2,862,050,687	1,163,207,420

The fall in the monetary value of imports was therefore 28.6 per cent, of exports 42.1 per cent, and of our total trade 37.3 per cent. The great decline in value from the previous year was due in a larger degree to a fall in prices rather than in quantities, as indicated by the tables of quantity movements of larger commodities noted on p. 41, Appendix B. From these tables it will be seen that our agricultural exports were slightly larger in quantity during the year of depression, although they decreased in value by about $600,000,000. A study of the whole export and import list so far as quantitative statistics are available indicates that, roughly, our trade in 1922, if it were valued at 1921 prices, would have shown a decrease in exports of 12 per cent, an increase in imports of 29 per cent, or an increase in total trade of, roughly, 2.7 per cent. The balance of goods in our favor drew a net amount of $449,000,000 in gold and silver during the fiscal year 1922, as compared with $511,000,000 during the previous year.

Invisible Exchange.—The influence of the balance of invisible exchange in our whole trade and financial relationships is of growing importance. It is possible to estimate roughly some elements in invisible exchange, such as public issues of foreign loans, tourist traffic, remittances of immigrants, and freights; but other items, such as private loans, reciprocal payments, investments, and loss by speculation in foreign currencies, are unknowable factors. Foreign loans were issued publicly during the fiscal year to the amount of $1,015,000,000 as compared with $618,000,000 during the previous year. It would appear that the net balance of the other items against us amounted to a minimum of from $400,000,000 to $500,000,000 per annum. In any event, the invisible exchange against us could be roughly approximated at not less than $1,000,000,000 or $1,100,000,000 in 1920–21 and about $1,400,000,000 or $1,500,000,000 in 1921–22.

For the year 1920–21 the excess of export goods over imports—i. e., the total trade balance of $2,862,000,000—was liquidated in part by $511,000,000 in precious metals shipped to us,

in part by invisible exchange of, say, $1,100,000,000, leaving an apparently unliquidated balance of about $1,200,000,000 to $1,300,000,000 for that fiscal year. A study of the banking and merchant returns of unfunded foreign advances at this time does not bear out the conclusion that such an amount of private financing of exports as indicated above was ever undertaken, and thus the probabilities are that the speculative losses in European currencies and other investments and other forms of invisible exchange were even larger than has been estimated above.

For the year 1921–22 the excess of exports over imports of $1,163,000,000 was liquidated in part by $449,000,000 net imports of precious metals, and this, together with the additional estimated balance against us of $1,500,000,000 of invisible exchange, exceeds the amount necessary to square accounts by some $750,000,000. No doubt this was at least partly absorbed in repayment of private loans, because even a smaller amount of private export financing existed in July, 1922, than in July, 1921. Generally this change indicates a much sounder and firmer basis of trade.

Gold Movement.—The gold situation in the world is a matter of a great deal of economic thought and no doubt the heavy drain to America has contributed to the instability of foreign currencies, not only by the diminution of their essential guaranties but also by the fluctuation of exchange involved in liquidating trade balances in this fashion. Our gold stocks amount to about $3,077,000,000. Of this, the minimum legal necessities at the moment for assurances to our currency and credits amount roughly to about $1,600,000,000, but for a 60 per cent reserve of security we would require about $2,400,000,000. Therefore, our surplus amounts to somewhere over $700,000,000. While this is an asset, it, nevertheless, would be more advantageous to us if it were in active use abroad.

The automatic tendencies in our international trade and financial relations are, however, setting strongly toward rectification of this whole situation without artificial action. There is a steady increase in the ratio of imports over exports of goods, as indicated by the decrease in the average monthly balances in our favor over the last two and one-fourth years.

	Average monthly balance in our favor.
Six months, July 1 to Dec. 30, 1920	$274,674,811
Six months, Jan. 1 to July 1, 1921	202,333,636
Six months, July 1 to Dec. 30, 1921	126,980,328
Six months, Dec. 30 to July 1, 1922	66,887,576
Three months, July 1 to Oct. 1, 1922	51,623,542

At this rate we would, theoretically, reach a balance in the movement of goods in another few months. However, economic movements do not proceed on time schedules, although their trends are no less positive. Many uncertain factors naturally affect commodity movements and but little beyond tendencies can be noted. It would, at least, appear that the invisible exchange is able to take care of commodity balances and that we are reaching the end of the gold import stage of war readjustments. Continued trend in the general direction now evident would soon produce gold exports even in the face of payments on account of Allied debts.

Shifts in the Character of Exports.—There are several important shifts in our foreign trade due to the war. The export of foodstuffs has immensely increased, due partially to the demoralization of Russia. There is at best no probability of Russian exports of large volume for another two or three years, not only because of the condition of her agriculture, but also because of the demoralization of her railways. There has been a decrease in raw cotton exports due to various causes, partly due to short production, partly due to steady increase in our cotton manufactures, and partly due to reduced buying power in Europe.

The following table shows the quantitative movement of major agricultural exports, prewar and for the last two fiscal years:

	1913	1921	1922
Grain and grain products (bushels)	258,343,629	543,375,523	544,220,964
Meats, dairy products, animal and vegetable fats (pounds)	1,610,053,715	2,384,517,262	2,192,174,236
Tobacco, leaf (pounds)	418,796,906	496,878,830	451,555,221
Cotton, raw (bales)	8,724,572	5,408,986	6,541,841
Fruits (pounds)	620,423,027	675,892,388	491,227,140
Oil cake and meal (pounds)	2,049,361,136	857,606,407	1,099,246,797
Total values	$1,029,967,344	$2,192,335,101	$1,557,372,997
Total values at 1913 prices	1,029,967,344	1,126,682,282	1,168,521,140

About 55 per cent of our total exports are agricultural produce and raw materials and 45 per cent are manufactured and partly manufactured goods (excluding manufactured foodstuffs).

About 75 per cent of our exports of agricultural produce and raw materials go to Europe and about 25 per cent to the rest of the world.

About 26 per cent of our manufactured exports go to Europe and 74 per cent elsewhere.

Our exports of agricultural produce comprise, roughly, 15 per cent of the entire crop value on the farm, while our exports of manufactured goods comprise less than 4 per cent of our production. Our exports of agricultural produce to Europe comprise 11 per cent of the value of our agricultural production and our exports of manufactures less than 1 per cent of our manufactured production.

This last fact has much to do with our ability to shake loose from European economic currents in the manufacturing industries, and with the strengthening of employment in our home industries we will no doubt increase home consumption in agricultural products.

A pronounced shift in our foreign trade during the past few years is the increasing ratio of imports from tropical countries. A study of this situation reveals that over one-half of our imports are of tropical origin (rubber, sugar, coffee, woods, etc.), as against about one-third of such imports before the war. The balance of trade is heavily against us in the Tropics as a whole. A study of the trade of these particular countries indicates that the excess of our imports from those areas over our exports to them is about $500,000,000 per annum, which is largely used by them for the purchase of manufactured goods from Europe, thus to a considerable extent liquidating the excessive balance in our favor in our European trade, created by shipping Europe our agricultural products. This triangular operation seems likely to increase, as tropical goods do not materially conflict with our own production and our consumption of these commodities is likely to increase steadily.

THE EFFECT OF TARIFF ON EXPORTS.—The theoretical assumption that the new tariff will so diminish our imports as to strangle the buying power of foreign countries for our exports does not seem borne out by a critical examination of the actual factors involved. Somewhere between one-third and one-half of foreign buying power for our exports is furnished by invisible exchange. Beyond this somewhere from 49 to 55 per cent of commodities shipped to us from abroad are upon the free list (based upon application of the Fordney tariff to the 1921–22 imports, where about 60 per cent were free), thus the buying power is untrammeled up to, say, 70 to 80 per cent. The remainder of our imports which are dutiable is in large part such goods as will be imported in any event, as sugar, wool, luxuries, etc. Therefore it would not seem that the gross volume of exports would be very greatly influenced one way or another by the tariff. Generally the volume of our imports is likely to be increased by the increasing prosperity at home.

THE RAILWAYS.

Our transportation facilities have lagged far behind the necessities of the country. Progress has been made in their restoration from the demoralization of war, but our rolling stock, our trackage, and many of our terminals are unequal to our needs. Some increases in equipment have been made during the past year; yet they are entirely insufficient as the result of long-continued financial starvation. The deficiency in transportation finds its visible expression in car shortage; and while the recent strike has temporarily aggravated the situation, the trouble is far more deep-seated. Except during periods of business depression or strikes there has to some degree been continuous car shortage for the last six years. Furthermore, car shortage reaches its most acute stage during the four or five months of peak load in the fall and early winter.

Railway cars are the red blood corpuscles of commerce, and we suffer from commercial anæmia every year, because they are starved. The losses through short transportation are a tax upon the community greater than the cost of our Government, because such a shortage not only stifles the progress of production and introduces speculation into distribution, but it also seriously affects price levels. No better instance exists than the lift in the price of coal by over 300 per cent in 1920, when there was no strike, and over 60 per cent in 1922, after production following the strike had been resumed. In both cases the mines could have produced 30 per cent more coal, and if the railways could have transported even 20 per cent more, then prices would have been normal. Furthermore, this very shortage is one of the most deep-seated causes of the instability in the bituminous industry and its recurrent strikes. The car shortage also directly affects our farmers, because in every car-shortage period a price differential on grain below the Liverpool price (and yet in excess of the railway rates and handling costs) sets in of from 5 to 15 cents per bushel. The losses to live-stock growers are very great because of the necessity to feed stock beyond the fattened stage. And there are regularly great losses in fruit and vegetables because of the lack of refrigerator cars.

The management of our principal railways to-day, by all the tests of administration, of load factors, of mechanical efficiency, etc., is the most efficient transportation machine in the world in so far as it is not limited by causes beyond the managers' control.

The situation has been contributed to by the war, but also fundamentally by the cumulation of experiments in public rela-

tions to the railways, both National and State. We have tried uncontrolled operation; we have tried negative regulation in the prevention of discrimination; we have tried nationalization; we are now trying positive regulation. Nationalization would be a social and economic disaster; free operation would reconstruct the vicious practices of 30 years ago. Regulation in some form is necessary, but constructive development of this regulation—to preserve the initiative and responsibility of our railway executives, to secure the fine values of private operation, and at the same time to secure public protection and assure adequate service—is absolutely vital and not necessarily incompatible. The present Transportation Act possesses many constructive features and some weakness. It was the result of compromises in many particulars, and these very compromises are some of its weakest points.

If the causes of financial starvation were solely a question of war and of hard times, we could afford to wait for a natural solution, but they are not. The Transportation Act of 1920 affirmatively declared that the rates should yield a fair return on the aggregate real value of the railway properties (as determined by the Interstate Commerce Commission) used in public service and operated under honest, efficient, and economical management. It provided that the fair return during the first two years should be at the rate of 5½ per cent on the railways as a whole, or in each of the major groups in which the country might be divided in the administration of the law, and that during this period there might be added 1½ per cent for rehabilitation. At the expiration of this two-year period the Interstate Commerce Commission placed the fair return at the rate of 5¾ per cent per annum, or 6 per cent less one-fourth per cent to cover income taxation. The law, however, further provided that any particular carrier which earns in excess of 6 per cent per annum shall hand over one-half of that excess into a contingent fund to be administered by the Interstate Commerce Commission "in furtherance of the public interest in railway transportation" either by loans to carriers or by the purchase of transportation equipment and facilities and the leasing of the same to the carriers. The carriers have never earned these amounts and the failure of earnings without charge on the Government is complete disproof of the current fiction that earnings are "guaranteed."

Furthermore, the immediate effect of this recapture provision would be that whereas the strong and fortunately situated railways are able to earn in excess of 6 per cent, and are there-

fore able to secure finance for betterments, the very fact that they did earn in excess of the average would mean that the weaker roads were unable to earn up to the average. It may be accepted as a general proposition that carriers earning materially below the 5¾ per cent return are not in a position to command the confidence of investors which is necessary for expansion to meet the public demand. The contingent fund makes available money which such carriers may borrow, provided, however, that they are able to give the necessary security for repayment. It is easy to comprehend that such a contingent fund may serve the purpose of bridging carriers over temporary difficulties, but it is more difficult to understand how a carrier which, though it may be very essential to its part of the country, is financially a chronic weakling is to be made strong and capable by becoming more deeply involved. If there is any merit in this device, it seems not to extend to those anæmic carriers that are unable to give the Government the color of assurance of repayment. This device also carries a certain liability to the Government in that carriers that borrow from the fund and fail to pay are likely to become Government railways through their financial difficulties. It would seem that the first of the two uses to which moneys of the contingent fund may be put holds out better promise of furtherance of the public welfare. However, the creation of such a national reserve of transportation equipment has not been seriously undertaken. It would seem that our dire distress in time of car shortage and, at times, motive-power shortage would strongly argue for the creation of such reserves. Rolling stock for limited use during 60 to 90 days is probably unprofitable to any railroad, and certainly the stronger railroads can not, and should not, be expected to provide it for the weaker ones.

The present act contemplated the solution of the problem of the weak roads through voluntary consolidation of the weaker and stronger roads into larger systems to be definitely indicated by the Interstate Commerce Commission. There is no doubt that such consolidation would be a large advance in solution to the whole problem. As the Nation has resolved to control rates, and thus to depend no longer on competition as a means of rate regulation, it should secure the manifest advantages of larger systems. The economies in operation through standardization and better employment of rolling stock would be constructive themselves, but of vastly more importance would be the strengthening of the foundations for the financing of betterments and for more intelligent handling of rate regulation. The part of the act providing for consolidations has not been

advanced very much so far, although a tentative plan of grouping has been issued to serve as a basis for investigation, and hearings have been begun. When the permissible consolidations are once enunciated it is possible that some railways can arrange terms amongst themselves for such consolidations.

How far such voluntary action would solve the problem is uncertain, but compulsory consolidation leads into many untenable premises. It might be that there could be invented some inducements to consolidate into the proposed systems, or to lease for consolidated operation, or some form of cooperative operation. If the recaptured profits principle is to be maintained and if it can be enforced by the Interstate Commerce Commission, the assured application of such recaptured profits within such enunciated groups in some form might at least be worth discussion as an inducement to consolidate.

The alternative of repealing the miscalled guaranty clauses of the act does not fundamentally assist the expansion of the weaker roads, for so long as rates are controlled by 49 different commissions, it is unlikely that the rates would or could be made discriminatory in favor of the weaker roads, and thus the basis for the financing of betterments by these roads would not be materially improved. The suggestion that all rate control should be repealed except control against discrimination or preference would not meet the situation of the weaker roads, because the restoration of competitive rates would enable the stronger roads to again drive the weaker roads nearer to the wall.

Another vivid question in this connection is that of the rates themselves. In an era of wide disparity between farmers' income and that in and of industry, the transportation rates have proven to be a heavy burden on agriculture. On the other hand, under present conditions railway earnings are obviously not large enough to assure railway expansion. Some relief both to the railways and the farmer may be obtained by thorough reorganization of the rate structure. Some classes and areas of traffic are carried at actual loss; others are carried at lower rates than the relative value of the commodities warrant; and a series of scientific upward readjustments should be made in some cases in order to give the railways and the shippers of primary commodities and agricultural produce some relief. The recent reduction of 10 per cent in rates on luxuries as well as on primary goods contributed nothing to commerce and impoverished the railways just that much. The tangled skein of rates seems a mesh in which there is so persistent a resistance against every constructive proposal, that we are incapable of rescue except by some complete departure in courage.

Another phase of present regulation is the machinery of wage control and strike prevention, which is unsatisfactory. The legislation embraces the important principle of the public's right to secure continuity of service and it carries the obligation of the public to secure just wages to the employees. The Railway Labor Board has performed large services to the employees, to the railways, and to the public. The difficulties arise from the tripartite structure of the board under the act, from its detachment from the rate-making body, and especially from the fact that the act did not originally contemplate that the Government would be a universal wage fixer. It was the assumption that the Labor Board would only function in case of a major threat of stoppage in service. The failure of the local adjustment boards for direct contact between employees and employers has thrust all disputes on the Labor Board; and in result we have practically governmental fixing of all wages and conditions of labor with a large destruction of personal contacts.

There can be no question that action in some direction is imperative, if industry and commerce are not to be further strangled by a shortage in transportation. Whatever may have been the sins of railway finance in the last generation, we are not only suffering from them, but we have maintained an attitude of bitterness in our public relationship to our railways for which we pay thrice over in prevention of their proper development.

We must have increased transportation, if we are to maintain our growing productivity. We must therefore find a way out of the cycle of systematic starvation of a large part of our mileage and the denudation of our railway managers of their responsibilities and initiative.

BITUMINOUS COAL.

The highly unstable functioning of the bituminous industry finally resulted in the worst strike in its history, and the strike closed with even a more unstable situation than before. There can be no remedy until primary causes have been fully analyzed and treated.

Our bituminous coal fields are of enormous extent and the capital required to open new mines is comparatively small. There are apparently over 8,000 bituminous mines with an annual capacity of about 850,000,000 tons, or about 300,000,000 tons beyond our present normal national needs. The normal demand, if spread evenly over the year, would be about 10,000,000 tons per week. It varies actually from 7,500,000 tons to 12,000,-

000 tons per week at different seasons of the year. The total capacity of about 16,000,000 tons per week is 4,000,000 over the maximum demand. We need a reserve capacity for the ebb and flow of business tides, but 12,000,000 per week would give 620,000,000 tons per annum, an ample supply.

The overexpansion of the industry is to a considerable degree due to—

(*a*) Annual shortage of cars and consequent scarcity, with temporary high price levels and large profits; periodic strikes and threats of strikes creating congested demand with consonant periodic high prices and profits. These high-profit periods induce speculative expansion of the industry.

(*b*) War demand and profits.

(*c*) Two-thirds of the industry is unionized and one-third is nonunion. The frozen wage over long periods in the union field enables the nonunion field to undercut wages in competitive periods and thus secure more continuous operation. There is, therefore, a constant expansion in nonunion fields with increasing intermittency in union fields.

The worst effect of overexpansion is its by-product of labor waste and partial underpayment of labor and its necessary unrest, because the overcapacity of the industry results not in the permanent closing of some mines but in the operation of all of them more or less intermittently. Thus the working personnel is held attached to each mine in daily hopes of employment. Entirely outside of strike suspensions, our preliminary investigation shows that in the best of recent years the bituminous mines operated only about 249 days out of a possible 308; whereas in most years the average is about 210, as against about 295 days in England and over 300 days in Germany. If we subtract the mines which are operating regularly for certain metallurgical and railway supplies, we will find that the situation is even worse, for the remainder of the bituminous mines are probably operating an average of less than 180 days (more than 120 days' lost time out of the year), and this entirely outside of the loss of time due to national strikes. Nor is this all of the situation, for some mines operate less than 100 days. The perpetual labor difficulties are in large degree the result of a constant struggle for such remuneration, based upon day's pay and piece rates, as will give a standard of living to that portion of the men who are employed from 40 to 60 per cent of their time. A large minority of workers are thus honeycombed with the discontent that arises from the worst stimulant to unrest—insecurity of employment and part-time employment.

Another factor is the somewhat seasonal character of the industry, which can only be cured by storage. Heating requirements are responsible for a considerable part of this seasonal demand, but storage by heating consumers is impracticable. The most constructive storage would come from public utilities and railways, which would result in giving a larger proportion of production to the heating consumption during cold weather.

Minor vicious cycles originate from the periodic shortage in transportation. The more favorable prices to railways than to the public follow from the railways' ability to assure cars. The necessary regulations for equal car distribution and the consequent division of business, between high cost and unsystematic mines, result at once in prices that keep the high-cost mines alive. The industrial community bears the major part of the cost of maintaining an industry 30 per cent overexpanded and overmanned. And it bears even a larger cost from the dangers of interruption, due to national strikes and to the uncertainty of coal prices that vary as much as 300 per cent annually. Fully one-third of the national coal bill would be eliminated by a stable industry.

Owing to the stoppage of immigration, the ranks of miners will soon be difficult to recruit, unless there can be an economy in labor through less lost time. Beyond all this, the very real human suffering due to part-time employment and strikes is a national price that in itself warrants the most earnest effort to secure stability.

The primary cure for overexpansion and intermittent operation is to secure full continuous competition and thus the freezing out of high cost and uneconomic producers. This cure could be secured at once: (*a*) If there were ample transportation at all times; (*b*) if there were greater freedom from strikes by better development of employment relations; (*c*) if there were storage to overcome some part of the seasonal character of the industry.

AGRICULTURE.

The fall in the prices of agricultural produce during the recent depression was the most violent of all commodity liquidations. The fall was to lower levels in relation to pre-war than that of other commodities, and it was also relatively greater than the fall in wages in the other industries. The consequence was that the buying power of the agricultural community was at times even lower than pre-war. There has been, however, a definite recovery from the worst. Incidentally it may be observed that those special varieties of produce which have been under the

most efficient cooperative organization have been better able to resist undue liquidation in the same manner that our trades-union organizations have been able to effect resistance for their groups to the generally falling wage. In a general way agricultural prices are upon a basis of about 124 (as against 103 at the worst), compared to pre-war 100, while industrial wages and public services and manufactured commodities are upon a basis somewhere between 160 and 180, compared to pre-war 100. This is by far the most serious element of instability that remains of our domestic dislocations due to the war. As the agricultural industry is thus still out of line, there must be further readjustments favorable to the farmer, either by increases in prices of farm produce or decreases in the income of the other groups.

No doubt this readjustment will inevitably take place in time by one of two processes: Either through such an amount of migration from the farm into other industry as will overcrowd the industries and reduce wage levels, and at the same time increase agricultural prices, through the restriction of production; or through so great an increase in the efficiency in management and in effort of industrial labor that the cost of manufactured commodities and the public services to the farmer will decrease.

Such processes are slow of accomplishment at best. Wise statesmanship on the part of organized labor would give serious consideration to the whole problem of increased industrial efficiency and the prevention of such tremendous additions to national expenditure as have been involved in recent strikes, if labor is not to suffer greatly some time because of an undue swing of the pendulum the other way.

It must not be overlooked that the agricultural industry has gained greatly in efficiency during the past eight years. The growth of agricultural population has been relatively less than the increase in its total production. There has been a measurable expansion of mechanical equipment and a consequent increase in production per capita.

Some relief could be given to the farmer by readjustment of railway rates in such a fashion as to impose larger burdens upon high-priced commodities and lower rates on primary produce. A greater relief would be given if he were provided with adequate transportation. Further relief could be given by the provision of an adequate credit system to meet his needs of loans for periods in excess of Federal reserve facilities and at nearer the commercial rates of interest.

THE RESTRAINT OF TRADE ACTS.

The country has now had many years' experience with these acts; they have received constant interpretation by the courts, and the working results in our economic fabric in some directions are out of tune with our economic development. No one would contend that there be relaxation in the restraints against undue capital combinations, monopoly, price fixing, domination, unfair practices, and the whole category of collective action damaging to public interest. There has been, however, a profound growth of understanding of the need and possibilities of cooperative action in business that is in the interest of public welfare. Some parts of these cooperative efforts are inhibited by law to-day, but, of much wider result, many are stifled out of fear or shackled from uncertainty of the law. The two latter factors are far more widespread than can be appreciated except through wide contact with economic activities, and they definitely impede our national progress upon right lines. Relaxation of the acts has already been given by legislation in favor of the farmer and trades-unions, but the farmer and laborer are being even more greatly injured by these destructive shackles upon business in many directions, which produce instability of employment and increase distribution costs, than they were by the direct influence of these acts upon their own affairs.

At the time the Sherman Act was passed, the country was in the throes of growing consolidations of capital. These were consolidations of actual ownership, and the country was alive with deserved complaint of domination in business, in attempts to crush competitors with unfair practices and destructive competition. Collective action in its sense of benefit to public interest was much less known and, at any rate, was probably not contemplated as coming within the meaning of the act. In any event there is a wide difference between the whole social conception of capital combinations against public interest and cooperative action between individuals which may be profoundly in the public interest. The former extinguishes individualism through domination; the latter greatly advances it and protects it. Cooperative action has, however, struggled for development through the growth of chambers of commerce, trade associations, and conferences of one kind and another in an effort to meet various sorts of crises, to improve business standards, and to eliminate waste in production and distribution.

It is true that some minority of such activities has been used as a cloak for action against public interest, but it is also true that a vast amount of action in public interest has

been lost and even great national calamities brought upon us by lack of cooperative action. A case in point is that the instability of the bituminous coal industry and the disintegration of its employers' associations by pressure under the restraint of trade acts contributed directly to the prolongation of the coal strike, as no adequate organization of operators existed which could meet and bargain with the workers who were free from all restraint. The whole movement toward cooperative action arises from a fundamental need to which we must give heed. Where the objectives of cooperation are to eliminate waste in production and distribution, to increase education as to better methods of business, to expand research in processes of production, to take collective action in policing business ethics, to maintain standards of quality, to secure adequate representation of problems before the Government and other economic groups and to improve conditions of labor, to negotiate collectively with highly organized groups of labor, to prevent unemployment, to supply information equally to members and to the public, upon which better judgment may be formulated in the conduct of business; then these activities are working in public interest. There are some twenty-odd different functions of cooperative action which are at the same time in the interest of the different trades and the community at large. Any collective activity can be used as a cloak for conspiracy against public interest, as can any meeting of men engaged in business, but it does not follow because bricks have been used for murder that we should prohibit bricks. There is, moreover, a very wide differentiation between cooperative action open to an entire trade or region of a trade and capital combinations, because the former may be dissolved instantly without any disturbance of capital or production and does not represent increasing domination of a group of individuals in a trade, but the democratic development of a whole industry.

It has often been argued that the original intent of the restraint of trade acts was not to inhibit any sort of economic collective action which was in interest of public welfare, and that the time has come when the act should be limited so as to leave free all such action. Without entering upon debate as to the difficulties of such a course it is possible to consider a narrower field of liberalization of law; that is, for the law to be liberalized to the extent that cooperative organizations generally, as distinguished from capital consolidations, should be permitted to file with some appropriate governmental agency the plan of their operations, the functions they proposed to carry on, and the objectives they proposed to reach; that upon approval such of these functions as did not apparently contravene public interest might be proceeded

with; that upon complaint, however, either of individuals or the law officers of the Government that these functions had reacted against public interest, then after a hearing before some suitable tribunal the right to continue these particular functions should, if the complaints are justified, be suspended. If thereafter these functions were continued, or if it should be proved that the activities had been extended beyond the functions in the original proposals, the organization should be likewise subject to prosecution under the present acts. Parties who did not wish to avail themselves of this privilege could continue in the present status.

All who know the situation in such matters will realize that the problems of cooperative action are mainly the concern of the smaller businesses. Such a measure as that suggested above would serve actually to protect small business and thus to maintain competition. Big business takes care of itself. Legitimate trade associations and other forms of business cooperation would be greatly stimulated along lines of public welfare if such a plan were adopted.

It appears to me that the time has come when we should take cognizance of these necessities if we are to have a progressive economic system. Its growing complexity, its shift of objective and service, require a determination based upon a proper sense of maintenance of long-view competition, initiative, business stability, and public interest.

UNEMPLOYMENT DUE TO THE BUSINESS CYCLE.

The slump we have just passed through was in part the rotation of the business cycle of alternate prosperity and depression in our productive industries. Thirteen times since the Civil War have we passed through these experiences. Their human interpretation is always vast unemployment, suffering, and stagnation of enterprise. If the future is like the past, such periods will reoccur.

The peak periods of boom are times of speculation, overexpansion, wasteful expenditure in industry and commerce, with consequent destruction of capital. The valleys are periods of economy and gains in national efficiency. It is the wastes, the miscalculations, and maladjustments, grown rampant during the booms, that make unavoidable the painful processes of liquidation.

The obvious way to check the losses and misery of depression is to check the destructive extremes of booms. Mitigation of booms and depressions is a task for consideration by our business men and bankers, by labor, by the producer and the con-

sumer, and so far as it involves Government employment, by our legislatures. The intelligence of a people who have solved prevention of the financial panic and its interpretation into the widespread waste of bankruptcy can surely apply itself also to some measure in the solution of the prevention of commodity slumps and their fatal interpretation in vast unemployment.

Nor are the lines of solution wholly visionary. The special committee of eminent business men, manufacturers, and economists appointed through this department are convinced that in certain directions it is possible at least to devise some mitigation of both peak and valley. For instance, sound public policy plainly indicates that a smaller percentage of public work should be undertaken when private industry is active and a larger percentage in periods of depression, when capital and labor are not fully employed. It is surely short-sighted policy for public-work activities to compete with private industry for men, money, and materials when private industry is fully engaged. It is estimated that fully one-third of our construction industries lies in the control of local and General Government. Moreover, these possibilities do not lie alone in governmental works but can be translated into the larger public utilities.

Another direction in which mitigation can be secured is by a much more effective statistical service, through which better judgment may be formed by business at large as to the true picture of current business trends. It is possible to point out in retrospect the disaster from overstocking and speculation which came upon many industries during the last depression, due solely to lack of information as to the volume of stocks in raw materials and manufactured goods; to lack of knowledge at an early date of the incipient signs of retreating consumption. Such statistical information, its understanding and use, would in itself contribute greatly to stabilization by erecting signs of danger and clear road ahead.

Part III.—LEGISLATION NEEDED.

The requirements of the organic act include recommendations for the effective performance of the department in fostering and developing commerce and industry. In this purpose many steps are needed in matters directly connected with the departmental activities, in revision of legislation that has not kept pace with our national growth, to make for better administration and public welfare.

Further Reorganization of the Department of Commerce.

A great deal of study has been given during the year to reorganization in the department in order that it may more effectively serve American commerce and industry and effect economies in Federal administration. The Department of Commerce was created "to foster, promote, and develop the domestic and foreign commerce, mining, manufacture, shipping, and fishing industries, and the transportation facilities." Excluding all of the semijudicial functions in the Government respecting these matters and excluding the Shipping Board, there are still a large number of functions of the import designated in the organic act which are administered outside the department. They lie in seven different departments and independent agencies of such widely divergent major purposes as the War and Navy. There is inevitable overlap, duplication, and lack of concentration of purpose. In the interest of economy, efficiency of administration, and better service to the public, all the functions of the Government of the character enumerated in the organic act should be at once concentrated in three different groups (*a*) industry, (*b*) trade, and (*c*) navigation, and each should be under an assistant secretary. Whether each of these groups is brought into this department is secondary to the necessity for the grouping itself in order to obtain concentration of purpose and elimination of overlap. Direct savings of upwards of $1,000,000 per annum in administration could be made and many times this amount given to the public in increased values and service.

Foreign-Trade Zones.

Foreign-trade zones in the ports of the United States have long been urged by trade and official bodies as a measure of benefit to American commerce, as they eliminate waste of time,

labor, and money in the importation of raw materials which are to be reexported after manufacture in conjunction with domestic materials, and of goods to be repacked or reshipped for distribution in foreign countries. Such zone areas would prove an excellent substitute for the inadequate system of bonded warehouses and drawbacks and afford much more economical handling. Their most important purpose would be in contribution to our merchant marine in increasing the volume of carriage in American bottoms.

Fees Charged for Passports.

The regulations at the present time in effect with regard to the fees charged for passports and visés are irksome and provocative of resentment abroad, which is reflected in retaliatory measures that handicap American merchants and traveling salesmen in foreign countries. The fees should be radically reduced and the formalities thoroughly revised.

Liability of Ocean Cargo Carriers.

The liability of ocean cargo carriers for loss of, or damage to, goods carried by them is at present inadequately defined. Bills of lading, the basic contract of transportation, lack uniformity. Much needless and time-wasting litigation has resulted. Rules have been proposed which are to remedy the situation. When finally approved as equitable to the legitimate interests of carriers, underwriters, shippers of goods, and of bankers—the four factors concerned in foreign shipments—they should be adopted as amendments to the Harter Act.

Codification and Revision of the Navigation Laws.

Codification and revision of the navigation laws has for some time been given the attention of the Shipping Board in collaboration with the Department of Commerce. The results will be brought to Congress during the coming session. They include a marked simplification of the administration and supervisory work of Government agencies in charge of shipping.

Load-Line Law.

A load-line law should be enacted substantially similar to the laws of the maritime powers of Europe. At present our cargo steamers are allowed to clear from the ports of these foreign powers as an act of courtesy through a "gentleman's agreement" and not because they comply with laws, the propriety of which can not be questioned and which are enforced in the case of all ships except our own. We can not rely on such consideration abroad and at the same time enact laws frankly discriminatory against foreign ships in our own ports.

Modification of Inspection System.

The present double system of inspection of the hulls of ocean-cargo steamers should be modified because of the expense and loss of time involved in this supervision by the Government and by the private insurance agencies. The staff of officers engaged in measuring tonnage of vessels should be transferred from the Treasury Department to the Department of Commerce as stipulated in a bill approved by both departments and now pending.

Federal Taxes on Americans Resident Abroad Engaged in American Commerce.

The United States is the only important nation which imposes her domestic taxation upon the earned income of her citizens who are resident abroad engaged in the expansion of American commerce. The result is that our nationals are paying double taxes on their earnings; that is, not only to the countries where they reside but also to their home country. They are, therefore, placed at a great disadvantage in competition with other nationals.

We will have neither a stable export business in manufactured goods nor a successful merchant marine so long as the distribution of American goods rests in the hands of other nationals. The marketing of American goods abroad is a matter of ability and zeal in representation as well as of comparative prices. The effect of increased taxation from the war, in its tremendous burden where it is duplicated from two nations, tends to drive our citizens out of the front line of commerce. This suggestion is not intended to apply to returns on foreign investments of residents or of nonresidents beyond their necessary working capital.

Commercial Aviation.

Legislation now before Congress for the regulation of safety requirements in commercial aviation must be enacted before aviation will become a practical question.

Radio Regulation.

It is imperative, if the development of the radio art and its more general use are not to be greatly retarded, that the regulatory powers of the department in connection with "interferences" should be greatly extended. Legislation now before Congress has been supported by the conference comprising representatives of all groups of producers and users of radio apparatus, referred to in Part I of this report.

Lighthouse Service.

In addition to legislation for the reasonable readjustment of the small proportion of salaries in the Lighthouse Service now fixed by law, which is considered the most urgent need of the service at the present time, the following items of legislation are recommended for that service as important for its efficient operation and the proper care of its employees. (*a*) The extension of the retirement law to cover cases of disability, not due to personal misconduct, in the field personnel of the Lighthouse Service who are now the only persons in the civil service without the benefit of disability retirement. (*b*) The provision of medical relief for light keepers at remote stations, inaccessible to Public Health Service hospitals, so as to give all the keepers equal consideration. (*c*) Authorization of the adjustment of claims of lighthouse employees for losses of personal property caused by storms, etc., and incident to their work. (*d*) Extension to lighthouse employees of privileges now accorded by law to similar services respecting the purchase of commissary supplies, transportation of families and household effects when ordered to change station permanently, and transportation on Army transports. (*e*) Provisions for the better protection of aids to navigation damaged by passing vessels, and making sums received in payment for such damages available for repair of aids. (*f*) Authorization of the construction of a number of special works in the Lighthouse Service, for which estimates are submitted, particularly a lighthouse and fog signal at Cape Spencer, Alaska, the installation of radio fog signals, and the construction or improvement of lighthouse depots at Newport, R. I., and Boston, Mass., and of aids to navigation at Ludington, Mich., Galveston, Tex., Sandusky, Ohio, and Fairport, Ohio. (*g*) Legislation to better define the relations of the Lighthouse Service to the Navy under the act of August 29, 1916, providing for its transfer in time of national emergency.

Fisheries Conservation.

The present laws governing the fisheries of Alaska were passed nearly 20 years ago when the Alaskan fisheries were in a far different position from to-day. Since that time there has been a great exhaustion of the fisheries and at present these laws are wholly inadequate for the proper protection and conservation of the great salmon fisheries of Alaska. A new code should be enacted which would give to the department complete jurisdiction over the fisheries in the territorial waters of Alaska. The fishing industry itself is now in agreement upon this necessity

and legislation is before Congress for the purpose of adequate conservation. Unless prompt attention is given we can expect the same complete destruction that has extinguished other species of our best food fish.

Pollution of Coastal Waters.

Pollution of the coastal waters by industrial wastes is yearly becoming a graver menace to the fisheries, shipping, and use of our pleasure beaches. Owing to the recent great increase in the use of fuel oil on shipping and in the utilization of the many petroleum derivatives in industries, the pollution of waters by oil, especially in the vicinity of the more important harbors, has become particularly flagrant and damaging. Legislation is before Congress in this matter, and unless it is enacted great and serious damage will ensue.

Compensations for Expert Employees in the Department.

The salaries of experts and specialists engaged in the Department of Commerce have not been adjusted to the increased cost of living or the increased commercial payment for this type of service since the war began. The average salary of a university-trained expert in this department to-day is approximately $2,820 per annum, including the highest grades and bureau chiefs. Such an income ranks below that of skilled mechanics in some trades, and compares with an average of over $4,000 for professors in seven of our large universities. The result is an almost total inability of the department to hold its employees. Our turnover now amounts to 35 per cent per annum and the general tendency is to leave us with simply a residue of deadwood. Moreover, the constant outlook of men is to leave Government for private employment. Many promises have been held out to them, and unless their situation is speedily remedied—not only in this department, but in other Government departments as well—the quality of Government service must rapidly deteriorate and wasteful expenditure of millions of dollars result. The great majority of the men of this class in the service of the Government are carrying on under conditions of great self-sacrifice. The cost of fair rectification would not exceed $200,000 per annum for the whole department.

Yours faithfully,

HERBERT HOOVER,
Secretary of Commerce.

APPENDIXES.

APPENDIX A.—COMPARATIVE INDEX TABLES.

PRICE COMPARISONS (1913=100).[1]

	July, 1920.	July, 1921.	Percentage increase (+) or decrease (−) in July, 1921, from July, 1920.	July, 1922.	Percentage increase (+) or decrease (−) in July, 1922, from July, 1921.
Farm products:					
Price to producer—					
Crop (15th of month)	284	107	−62.3	118	+10.3
Live stock (15th of month)	176	109	−38.1	119	+9.2
Wholesale prices—					
Wheat, No. 1, northern, spring (Chicago)	314	150	−52.2	142	−5.3
Wheat, No. 2, red, winter (Chicago)	284	125	−56.0	117	−6.4
Corn, contract grades, No. 2, cash (Chicago)	248	98	−60.5	103	+5.1
Oats, contract grades, cash (Chicago)	249	99	−60.2	99	0.0
Barley, fair to good, malting (Chicago)	194	103	−46.9	103	0.0
Rye, No. 2, cash (Chicago)	351	192	−45.3	135	−29.7
Cotton, middling upland (New York)	321	97	−69.8	175	+80.4
Wool, unwashed, fine (Ohio)	282	132	−53.2	218	+65.2
Cattle, steers, good to choice, corn fed (Chicago)	181	99	−45.3	114	+15.2
Hogs, heavy (Chicago)	178	116	−34.8	121	+4.3
Sheep, ewes (Chicago)	141	62	−56.0	117	+88.7
Sheep, lambs (Chicago)	189	133	−29.6	163	+22.6
Food:					
Retail price—Price index	219	148	−32.4	142	−4.1
Wholesale prices—					
Price index	238	141	−40.8	142	+0.7
Flour, winter straights (Kansas City)	323	179	−44.6	162	−9.5
Sugar, granulated, in barrels (New York)	447	128	−71.4	154	+20.3
Beef, fresh carcass good native steers (Chicago)	197	115	−41.6	114	−0.9
Beef, fresh steer rounds No. 2 (Chicago)	211	122	−42.2	130	+6.6
Pork, loins, fresh (Chicago)	221	150	−32.1	160	+6.7
Cloths and clothing: Wholesale prices—					
Price index	300	172	−42.7	180	+4.7
Cotton, print cloth, 27 inches, 64 by 60—7.60 yards to pound (Boston)	412	124	−69.9	191	+54.0
Cotton, sheeting, brown, 4/4 Ware Shoals L. L. (New York)	381	116	−69.6	172	+48.3
Worsted yarns, 2/32's crossbred stock, white, in skein (Philadelphia)	225	148	−34.2	180	+21.6
Women's dress goods, storm serge, all wool, double warp, 50 inches (New York)	253	157	−37.9	145	−7.6
Suitings, wool, dyed blue, 55 to 56 inches, 16-ounce Middlesex (Boston)	269	189	−29.7	198	+4.8

[1] Prices from U. S. Department of Labor, Bureau of Labor Statistics, except market price of wool compiled by U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce.

APPENDIX A.—COMPARATIVE INDEX TABLES—Continued.

PRICE COMPARISONS (1913=100)—Continued.

	July, 1920.	July, 1921.	Percentage increase (+) or decrease (−) in July, 1921, from July, 1920.	July, 1922.	Percentage increase (+) or decrease (−) in July, 1922, from July, 1921.
Cloths and clothing: Wholesale prices—Continued.					
Silk, raw Japanese, Kansai No. 1 (New York)	127	158	+24.4	194	+22.8
Hides, green salted, packer's, heavy native steers (Chicago)	160	76	−52.5	99	+30.3
Leather, sole, hemlock, middle, No. 1 (Boston)	202	124	−38.6	124	0.0
Boots and shoes, men's black calf, blucher (Massachusetts)	292	225	−62.9	209	− 7.1
Fuel and lighting: Wholesale prices—					
Price index	259	186	−28.2	254	+36.6
Coal, bituminous, Pittsburgh, mine run, Kanawha (Cincinnati)	273	209	−23.4	245	+17.2
Coal, anthracite, chestnut (New York tidewater)	180	198	+10.0	.....	.....
Petroleum, crude, Kansas-Oklahoma, at wells	375	107	−71.5	206	+92.5
Metals and metal products: Wholesale prices—					
Price index	202	124	−38.6	121	− 2.4
Pig iron, foundry No. 2, northern (Pittsburgh)	290	138	−52.4	163	+18.1
Pig iron, basic, valley furnace	311	132	−57.6	165	+25.0
Steel billets, Bessemer (Pittsburgh)	242	125	−48.3	136	+ 8.8
Copper ingots, electrolytic, early delivery (New York)	121	80	−33.9	87	+8.8
Lead, pig, desilverized, for early delivery (New York)	196	100	−49.0	131	+31.0
Tin, pig, for early delivery (New York)	109	62	−43.1	70	+12.9
Zinc, slab, western, early delivery (New York)	141	82	−41.8	103	+25.6
Building materials: Wholesale prices—					
Price index	269	160	−40.5	170	+ 6.3
Lumber, pine, southern, yellow flooring, 1 by 4, "B" and better (Hattiesburg district)	284	140	−50.7	196	+40.0
Lumber, Douglas fir, No. 1, common, sls, 1 by 8 by 10 (State of Washington)	320	125	−60.9	158	+26.4
Brick, common red, domestic building (New York)	381	225	−40.9	307	+36.4
Brick, common building, salmon, run of kiln (Chicago)	241	172	−28.6	186	+8.1
Cement, Portland, net without bags to trade, f. o. b. plant (Chicago district)	180	170	−5.6	158	−7.1
Steel beams, mill (Pittsburgh)	205	139	−32.2	109	−21.6
Chemicals and drugs: Wholesale prices—					
Price index	212	129	−39.2	121	−6.2
Sulphuric acid, 66° (New York)	114	90	−21.1	71	−21.1
House-furnishing goods: Wholesale prices—Price index	275	180	−34.5	173	−3.9

APPENDIX A.—COMPARATIVE INDEX TABLES—Continued.

PRODUCTION COMPARISONS (1913=100).

	July, 1920.	July, 1921.	Percentage increase (+) or decrease (−) in July, 1921, from July, 1920.	July, 1922.	Percentage increase (+) or decrease (−) in July, 1922, from July, 1921.
Beef products	111	101	−9.1	119	+17.8
Pork products	97	110	+13.4	117	+6.4
Lamb and mutton	70	67	−4.3	65	−3.0
Wool (consumption)	92	132	+43.5	[2] 130	−1.5
Cotton (consumption)	109	85	−22.0	95	+11.8
Anthracite coal	108	92	−14.8	[3] 115	+25.0
Bituminous coal	114	76	−33.3	[3] 126	+65.8
By-product coke	.....	122	.....	235	+92.6
Crude petroleum	185	194	+4.9	225	+16.0
Pig iron	120	34	−71.7	94	+176.5
Steel ingots	132	36	−72.7	113	+213.9
Copper	.....	17	.....	89	+423.5
Zinc	139	54	−61.2	110	+103.7
Manufactured tobacco	93	87	−6.5	96	+10.3
Hemlock	90	60	−33.3	[4] 90	+50.0
Oak flooring	146	193	+32.2	361	+87.0
Locomotives	58	19	−67.2	42	+121.1

[2] April. [3] March. [4] June.

COMMERCIAL COMPARISONS (1913=100).

Business:					
New York Stock Exchange—					
Total sales of stocks	179	134	−25.1	219	+63.4
Price of 25 industrials	191	127	−33.5	171	+34.6
Price of 25 railroads	65	64	−1.5	77	+20.3
Bond sales (excluding Liberty and Victory)	149	264	+77.2	455	+72.3
Bond prices, 40 issues (Annalist)	76	80	+5.3	92	+15.0
Interest rates, call loans	264	179	−32.2	122	−31.8
Interest rates, time loans	135	111	−17.8	65	−41.4
Transportation:					
Freight ton-miles	148	104	−29.7	[4] 106	+1.9
Vessels entered in foreign trade—					
Total	150	128	−14.7	149	+16.4
American	264	221	−16.3	271	+22.6
Foreign	108	97	−10.2	105	+8.2
Vessels cleared in foreign trade—					
Total	154	131	−14.9	141	+7.6
American	264	201	−23.9	244	+21.4
Foreign	112	104	−7.1	102	−1.9
Banking: Bank clearings—					
In New York City	251	195	−22.3	233	+19.5
Outside New York City	261	188	−28.0	201	+6.9
Employment:					
In New York State factories	[5] 608	[5] 444	−27.0	[5] 490	+10.4
In Wisconsin factories	[6] 144	[6] 89	−38.2	[6] 107	+20.2

[4] June. [5] 1914=100. [6] First quarter of 1915=100.

APPENDIX B.—EXPORTS AND IMPORTS OF DESIGNATED COMMODITIES DURING THE FISCAL YEARS ENDING JUNE 30, 1921 AND 1922, SHOWING DECREASES IN 1922 VALUES DUE TO PRICE FALL.

EXPORTS.

	1921	1922	Value in 1922 at 1921 prices.	Decrease in 1922 value due to price fall.	Per cent decrease due to price fall.
Grain and grain products:					
Quantity in bushels	543,375,523	544,220,964	.....	.....	.....
Value in dollars	1,071,311,692	582,595,371	1,072,986,053	490,390,682	45.7
Meats, dairy products, and animal and vegetable fats:					
Quantity in pounds	2,384,517,262	2,192,174,236	.....	.....	.....
Value in dollars	421,815,460	290,760,006	399,925,325	109,165,319	27.3
Iron and steel:					
Quantity in tons	4,240,356	1,736,816	.....	.....	.....
Value in dollars	421,489,059	119,838,308	172,637,774	52,799,466	30.6
Sugar:					
Quantity in pounds	582,698,488	2,002,038,450	.....	.....	.....
Value in dollars	43,739,437	77,447,331	150,273,006	72,825,675	48.5
Tobacco leaf:					
Quantity in pounds	496,878,830	451,555,221	.....	.....	.....
Value in dollars	237,051,083	156,728,904	215,427,965	58,699,061	27.4
Cotton, raw:					
Quantity in bales	5,408,986	6,541,811	.....	.....	.....
Value in dollars	600,185,629	596,378,864	725,887,911	129,509,047	17.9
Cotton cloth:					
Quantity in square yards	556,374,368	613,129,088	.....	.....	.....
Value in dollars	141,402,145	76,935,012	155,820,626	78,885,614	50.6
Boards, planks, and scantlings:					
Quantity in M feet	1,268,501	1,551,564	.....	.....	.....
Value in dollars	70,498,215	52,677,305	86,229,721	33,552,416	38.9
Coal, bituminous:					
Quantity in tons	34,423,964	13,035,800	.....	.....	.....
Value in dollars	301,979,315	67,915,106	114,353,948	46,438,842	40.6
Mineral oil, refined:					
Quantity in M gallons	2,670,801	2,421,248	.....	.....	.....
Value in dollars	506,011,802	304,228,443	458,729,646	154,501,203	33.7
Copper, refined:					
Quantity in pounds	458,027,070	677,487,373	.....	.....	.....
Value in dollars	73,064,698	88,782,115	108,059,236	19,277,121	17.8
Total above classes: Value in dollars	3,888,548,535	2,414,286,765	3,660,331,211	1,246,044,446	34.0

APPENDIX B.—EXPORTS AND IMPORTS OF DESIGNATED COMMODITIES DURING THE FISCAL YEARS ENDING JUNE 30, 1921 AND 1922, SHOWING DECREASES IN 1922 VALUES DUE TO PRICE FALL—Continued.

IMPORTS.

	1921	1922	Value in 1922 at 1921 prices.	Decrease in 1922 value due to price fall.	Per cent decrease due to price fall.
Sugar:					
Pounds	7,006,687,732	8,464,334,833			
Dollars	664,077,990	200,744,161	802,418,942	601,674,781	75.0
Rubber:					
Pounds	356,975,223	568,381,428			
Dollars	114,639,659	86,751,219	182,564,115	95,812,896	52.5
Coffee:					
Pounds	1,348,926,338	1,238,012,078			
Dollars	176,988,079	148,502,658	162,427,185	13,924,527	8.6
Hides and skins:					
Pounds	352,192,773	392,903,607			
Dollars	105,998,798	78,899,320	118,263,986	39,364,666	33.3
Silk, raw:					
Pounds	29,462,745	48,178,964			
Dollars	181,882,615	300,445,363	+297,456,924	+2,988,439	1.0
Paper, newsprint:					
Pounds	1,475,111,157	1,856,200,102			
Dollars	81,842,012	71,382,737	102,981,982	31,599,245	30.7
Tobacco, leaf:					
Pounds	58,923,217	65,225,437			
Dollars	68,219,595	57,049,845	75,498,443	18,448,598	24.5
Wool;					
Pounds	318,235,873	255,087,236			
Dollars	77,902,393	45,648,860	62,445,355	16,796,495	26.9
Wood pulp:					
Tons	624,167	902,178			
Dollars	76,191,213	49,607,999	110,110,825	60,502,826	51.9
Burlap:					
Pounds	537,034,044	499,532,078			
Dollars	64,086,584	40,874,128	59,594,177	18,720,049	31.4
Cotton, raw:					
Pounds	125,938,754	179,165,055			
Dollars	44,666,171	43,957,891	63,531,929	19,574,038	30.8
Total above classes:					
Pounds	13,007,621,936	15,587,899,538			
Dollars	1,656,495,109	1,123,864,181	2,037,293,863	913,429,682	44.8

Part IV.—SPECIAL AND MORE DETAILED REPORTS OF THE DIFFERENT BUREAUS AND DIVISIONS OF THE DEPARTMENT AND SPECIAL RECOMMENDATIONS OF THEIR DIRECTORS.

ADMINISTRATIVE DIVISIONS OF THE OFFICE OF THE SECRETARY.

DEPARTMENT OF COMMERCE,
OFFICE OF THE CHIEF CLERK,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request, I furnish the following condensed report upon the work of the various divisions of the Secretary's office during the past year:

DISBURSING OFFICE.

ESTIMATES FOR FISCAL YEAR ENDING JUNE 30, 1924.

COMPARISON BETWEEN THE ITEMS OF ESTIMATES FOR THE DEPARTMENT OF COMMERCE SUBMITTED FOR THE FISCAL YEAR 1924 AND APPROPRIATIONS FOR THE FISCAL YEAR 1923.

Bureau.	Estimates, 1924.	Appropriations, 1923.	Increase.	Decrease.
OFFICE OF THE SECRETARY.				
Salaries	$249,450	$196,050	$53,400	.....
Contingent	100,200	80,200	20,000	.....
Rent	68,000	68,000	.....	.....
Printing and binding	550,000	425,000	125,000	.....
Increase of compensation	2,000,000	1,835,159	164,841	.....
Total	2,967,650	2,604,409	363,241	.....
BUREAU OF FOREIGN AND DOMESTIC COMMERCE.				
Salaries	261,930	232,510	29,420	.....
Commercial attachés	250,000	200,000	50,000	.....
Promoting commerce	475,000	379,100	95,900	.....
District and cooperative office service	150,000	.....	150,000	.....
Promoting commerce, South and Central America	250,000	170,650	79,350	.....
Promoting commerce, Far East	250,000	166,150	83,850	.....
Export industries	650,000	450,000	200,000	.....
Transporting remains, etc	1,500	.....	1,500	.....

COMPARISON BETWEEN THE ITEMS OF ESTIMATES FOR THE DEPARTMENT OF COMMERCE SUBMITTED FOR THE FISCAL YEAR 1924 AND APPROPRIATIONS FOR THE FISCAL YEAR 1923—Continued.

Bureau.	Estimates, 1924.	Appropriations, 1923.	Increase.	Decrease.
BUREAU OF FOREIGN AND DOMESTIC COMMERCE—con.				
Transportation of families, etc., of officers and employees	$50,000	.....	$50,000	.....
Statistics of domestic commerce	50,000	.....	50,000	.....
Studies of economies in distribution of raw materials and manufactures	125,000	.....	125,000	.....
Weekly export figures	75,000	.....	75,000	.....
Economic abstract of foreign countries	25,000	.....	25,000	.....
Investigation of the restrictions and regulations of trade by foreign countries	65,000	.....	65,000	.....
Directory of foreign buyers	30,000	.....	30,000	.....
Editing commerce reports and supplements	55,000	.....	55,000	.....
Distributing industrial motion pictures to foreign countries	15,000	.....	15,000	.....
Exhibits at conventions and commercial meetings	5,000	.....	5,000	.....
Total	2,783,430	$1,598,410	1,185,020	.....
BUREAU OF THE CENSUS.				
Salaries	948,090	802,340	145,750	.....
Collecting statistics	1,055,950	895,000	160,950	.....
Tabulating machines	46,000	40,340	5,660	.....
Total	2,050,040	1,737,680	312,360	.....
STEAMBOAT INSPECTION SERVICE.				
Salaries, office	23,840	22,940	900	.....
Salaries, inspectors	602,100	610,500	.....	$8,400
Clerk hire	115,700	112,700	3,000	.....
Contingent	160,000	160,000	.....	.....
Total	901,640	906,140	3,900	8,400
Net decrease	.....	.....	.....	4,500
BUREAU OF NAVIGATION.				
Salaries	49,230	42,780	6,450	.....
Admeasurement of vessels	5,100	3,760	1,340	.....
Instruments for counting passengers	250	250	.....	.....
Enforcement of navigation laws	75,000	60,000	15,000	.....
Preventing overcrowding of passenger vessels	18,000	10,000	8,000	.....
Wireless communication laws	150,000	130,000	20,000	.....
Salaries shipping commissioners	29,800	30,600	.....	800
Clerk hire, shipping service	95,460	70,000	25,460	.....
Contingent expenses	10,240	10,000	240	.....
Refunding penalties, etc	3,000	3,000	.....	.....
Total	436,480	360,390	76,890	800
Net increase	.....	.....	76,090	.....
BUREAU OF STANDARDS.				
Salaries	522,560	432,360	90,200	.....
Equipment	75,000	75,000	.....	.....
Repairs and alterations	20,000	20,000	.....	.....
General	75,000	75,000	.....	.....
Improvement and care of grounds	10,000	10,000	.....	.....

COMPARISON BETWEEN THE ITEMS OF ESTIMATES FOR THE DEPARTMENT OF COMMERCE SUBMITTED FOR THE FISCAL YEAR 1924 AND APPROPRIATIONS FOR THE FISCAL YEAR 1923—Continued.

Bureau.	Estimates, 1924.	Appropriations, 1923.	Increase.	Decrease.
BUREAU OF STANDARDS—continued.				
Testing structural materials	$200,000	$175,000	$25,000	
Testing machines	35,000	30,000	5,000	
Fire-resisting properties	25,000	25,000		
Public-utility standards	100,000	85,000	15,000	
Testing miscellaneous materials	45,000	30,000	15,000	
Radio communication	40,000	30,000	10,000	
Color standardization	10,000	10,000		
Clay products	30,000	25,000	5,000	
Mechanical appliances	40,000	15,000	25,000	
Optical glass	25,000	25,000		
Textiles	25,000	25,000		
Sugar	40,000	40,000		
Gauge	40,000	40,000		
Mine scales	15,000	15,000		
Metallurgical research	50,000	40,000	10,000	
High temperature	10,000	10,000		
Sound	10,000	5,000	5,000	
Industrial research	200,000	150,000	50,000	
Railroad scales	40,000	40,000		
Standardization of instruments, machinery, etc	100,000	100,000		
Standard materials	10,000	10,000		
Radioactive substances	10,000	10,000		
Internal-combustion engines	45,000		45,000	
Building for power plant	50,000		50,000	
Additional land	80,000		80,000	
Rope inspection	20,000		20,000	
Total	1,997,560	1,547,360	450,200	
LIGHTHOUSE SERVICE.				
Salaries, bureau	92,820	68,290	24,530	
General expenses	4,170,000	4,200,000		$30,000
Salaries, keepers	1,300,000	1,300,000		
Salaries, vessels	1,635,000	1,700,000		65,000
Salaries, Lighthouse Service	460,000	400,000	60,000	
Retired pay	85,000	80,000	5,000	
Public works:				
Vessels, general service	1,010,000		1,010,000	
Depot, Portsmouth, Va	275,000		275,000	
Cape Spencer, Alaska, lighthouse station	165,000		165,000	
Depot, Newport, R. I	82,300		82,300	
Radio fog signals	25,000		25,000	
Stannard Rock, Mich., repairs	30,000		30,000	
Galveston Bay aids	125,000		125,000	
Depot, Boston, completing	71,000		71,000	
Potomac River aids	90,000		90,000	
Ludington, Mich., aids	70,000		70,000	
Florida west coast, repair and rebuild	34,200		34,200	
Sandusky Bay aids	105,200		105,200	
Newport, Ohio	39,400		39,400	
Erie, Pa., aids	38,500		38,500	
Marquette, Mich., station	15,000		15,000	

COMPARISON BETWEEN THE ITEMS OF ESTIMATES FOR THE DEPARTMENT OF COMMERCE SUBMITTED FOR THE FISCAL YEAR 1924 AND APPROPRIATIONS FOR THE FISCAL YEAR 1923—Continued.

Bureau.	Estimates, 1924.	Appropriations, 1923.	Increase.	Decrease.
LIGHTHOUSE SERVICE—continued.				
Public works—Continued.				
Grays Harbor, Wash., station	$20,000		$20,000	
Eliz. Hook, Wash., station	12,000		12,000	
Delaware Bay aids		$138,000		$138,000
Alaska aids		125,000		125,000
Calumet Harbor aids		66,000		66,000
Spectacle Reef Station		14,500		14,500
Detroit depot		50,000		50,000
San Juan depot		60,000		60,000
Florida coast aids		50,000		50,000
Raritan Bay aids		100,000		100,000
Total	9,950,420	8,351,790	2,297,130	698,500
Net increase			1,598,630	
COAST AND GEODETIC SURVEY.				
Party expenses:				
Atlantic coast	186,000	138,000	48,000	
Pacific coast	372,500	314,309	58,191	
Tides, etc	29,800	29,841		41
Compilation Coast Pilot	5,600	5,600		
Magnetic work	50,000		50,000	
Seismological work	25,000		25,000	
Federal boundary and State surveys	256,830	134,560	122,270	
Earthquake regions	15,000	15,000		
Mississippi River Commission	5,000		5,000	
Hawaiian Islands	7,500		7,500	
Special surveys	5,000	4,550	450	
Objects not named	5,000	5,000		
Repairs of vessels	98,600	75,000	23,600	
Pay, etc., officers and men	547,000	528,000	19,000	
Pay, commissioned officers	525,154	524,005	1,149	
Salaries, office	455,670	303,110	152,560	
Office expenses	88,000	100,000		12,000
Repairs, etc., mine sweepers		36,160		36,160
Total	2,677,654	2,213,135	512,720	48,201
Net increase			464,519	
BUREAU OF FISHERIES.				
Salaries	487,060	456,960	30,100	
Officers and crew, Alaska vessels	31,630	31,630		
Miscellaneous expenses, Bureau of Fisheries	632,000	549,000	83,000	
Alaska general service	200,000	165,000	35,000	
Expenses of advisory committee	5,000		5,000	
Office building repairs	10,000		10,000	
Fish hatchery, Mill Creek, Calif	15,700		15,700	
Fish hatchery, Saratoga, Wyo	17,500		17,500	
Fish hatchery, Nashua, N. H	15,300		15,300	
Pollution of waters	10,000		10,000	
Yes Bay, Alaska		7,000		7,000

COMPARISON BETWEEN THE ITEMS OF ESTIMATES FOR THE DEPARTMENT OF COMMERCE SUBMITTED FOR THE FISCAL YEAR 1924 AND APPROPRIATIONS FOR THE FISCAL YEAR 1923—Continued.

Bureau.	Estimates, 1924.	Appropriations, 1923.	Increase.	Decrease.
BUREAU OF FISHERIES—continued.				
Duluth, Minn.		$6,000		$6,000
Gloucester, Mass.		6,500		6,500
Fish rescue station, Mississippi River		40,000		40,000
Total	$1,424,190	1,262,090	$221,600	59,500
Net increase			162,100	
RECAPITULATION.				
Office of the Secretary	2,967,650	2,604,409	363,241	
Bureau of Foreign and Domestic Commerce	2,783,430	1,598,410	1,185,020	
Bureau of the Census	2,050,040	1,737,680	312,360	
Steamboat Inspection Service	901,640	906,140	3,900	8,400
Bureau of Navigation	[1] 436,480	[1] 360,390	76,890	800
Bureau of Standards	1,997,560	1,547,360	450,200	
Lighthouse Service	9,950,420	8,351,790	2,297,130	698,500
Coast and Geodetic Survey	2,677,654	2,213,135	512,720	48,201
Bureau of Fisheries	1,424,190	1,262,090	221,600	59,500
Total	25,189,064	20,581,404	5,423,061	815,401
Net increase			4,607,660	

[1] Includes $3,000 miscellaneous indefinite.

APPROPRIATIONS AND EXPENDITURES.

The itemized statement of the disbursements from the contingent fund of the department and the appropriation for "General expenses, Bureau of Standards," for the fiscal year ended June 30, 1922, 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, 1922, required by the act of Congress approved March 3, 1887 (24 Stat. 523); the statement showing travel on official business by officers and employees (other than 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, 1922, as required by the act of Congress approved May 22, 1908 (35 Stat. 244); the statement showing typewriters, adding machines, etc., exchanged by this department during the fiscal year ended June 30, 1922, as required by section 5 of the act of March 4, 1915 (38 Stat. 1161); and the statement in connection with the payment of increased compensation to employees of this department during the first four months of the fiscal year ending June 30,

1923, as required by section 7 of the act of March 1, 1919 (40 Stat. 1268), will be transmitted to Congress in the usual form.

The table following shows the total amount of all appropriations for the various bureaus and services of the Department of Commerce for the fiscal year ended June 30, 1922:

Bureau.	Legislative act.	Sundry civil act.	Deficiency act.	Allotments, legislative act May 29, 1921.
Office of the Secretary	$314,550.00		$62.44	
Bureau of the Census	1,000,000.00		1.95	
Coast and Geodetic Survey		$2,057,390.00	72,570.34	
Bureau of Fisheries		1,233,210.00	13,511.51	
Bureau of Foreign and Domestic Commerce	966,510.00		262,094.82	
Bureau of Lighthouses	68,290.00	8,781,500.00	78,135.97	
Bureau of Navigation	296,990.00		20,001.60	
Bureau of Standards	1,202,360.00	40,000.00	251,832.31	$54,200.00
Steamboat Inspection Service	990,790.00		44.45	
Total	4,839,490.00	12,112,100.00	698,255.39	54,200.00
Increase of compensation	2,048,365.11			
Printing and binding		325,000.00		
Grand total	6,887,855.11	12,437,100.00	698,255.39	54,200.00

Bureau.	Allotments, fortifications act May 21, 1921.	Special act.	Total.
Office of the Secretary		$5,000.00	$319,612.44
Bureau of the Census			1,000,001.95
Coast and Geodetic Survey			2,129,960.34
Bureau of Fisheries	$10,000.00		1,256,721.51
Bureau of Foreign and Domestic Commerce			1,228,604.82
Bureau of Lighthouses		599.35	8,928,525.32
Bureau of Navigation		78,634.20	395,625.80
Bureau of Standards	265,673.66		1,814,065.97
Steamboat Inspection Service			990,834.45
Total	275,673.66	84,233.55	18,063,952.60
Increase of compensation			2,048,365.11
Printing and binding			325,000.00
Grand total	275,673.66	84,233.55	20,437,317.71

The disbursements by the authorized disbursing officers of the department during the fiscal year ended June 30, 1922, arranged according to items of appropriation, are as follows:

By disbursing clerk, Department of Commerce.

OFFICE OF THE SECRETARY.

Contingent expenses, Department of Commerce, 1920	$2.01
Contingent expenses, Department of Commerce, 1921	14,085.37
Contingent expenses, Department of Commerce, 1922	83,748.04
Rent, Department of Commerce, 1921	5,836.79

Rent, Department of Commerce, 1922	$62,212.50
Salaries, office of the Secretary, 1921	7,851.22
Salaries, office of the Secretary, 1922	180,587.12
Total	354,323.05

BUREAU OF FOREIGN AND DOMESTIC COMMERCE.

Commercial attachés, 1920	172.33
Commercial attachés, 1921	6,103.35
Commercial attachés, 1922	11,161.55
Export industries, 1922	187,840.25
Promoting commerce, Department of Commerce, 1920	247.83
Promoting commerce, Department of Commerce, 1921	14,565.92
Promoting commerce, Department of Commerce, 1922	106,529.12
Promoting commerce, Far East, 1920	20.65
Promoting commerce, Far East, 1921	2,963.99
Promoting commerce, Far East, 1922	72,859.28
Promoting commerce, South and Central America, 1921	7,664.15
Promoting commerce, South and Central America, 1922	43,699.66
Salaries, foreign and domestic commerce, 1921	8,545.21
Salaries, foreign and domestic commerce, 1922	204,385.18
Total	666,758.47

BUREAU OF STANDARDS.

Air Service, Army War transfer, 1921	297.83
Armament of fortifications, War transfer, 1921	2,734.01
Aviation, Navy transfer, 1921	29,460.40
Color standardization, 1921	709.34
Color standardization, 1922	7,374.50
Equipment, 1920	455.81
Equipment, 1921	29,545.43
Equipment, 1922	58,995.42
Equipping laboratory, 1919–20	8.50
Experiments, ordnance, Navy transfer, 1921	4,147.38
Gauge standardization, 1921	3,643.77
Gauge standardization, 1922	36,163.11
Gauge standardization, War transfer, 1922	2,324.56
General expenses, 1920	798.79
General expenses, 1921	10,196.85
General expenses, 1922	25,699.02
High temperature investigation, 1921	385.25
High temperature investigation, 1922	8,816.88
Improvement and care of grounds, 1921	1,660.86
Improvement and care of grounds, 1922	8,383.12
Industrial research, 1920	1,013.39
Industrial research, 1921	337,936.95
Industrial research, 1922	173,484.42
Industrial safety standards, 1920	9.35
Investigation of clay products, 1921	2,139.28
Investigation of clay products, 1922	21,559.33
Investigation of fire-resisting properties, 1921	2,908.27
Investigation of fire-resisting properties, 1922	17,198.76
Investigation of mine scales and cars, 1921	2,774.14

Investigation of mine scales and cars, 1922	$12,781.88
Investigation of optical glass, 1921	4,117.50
Investigation of optical glass, 1922	19,166.37
Investigation of public-utility standards, 1920	69.25
Investigation of public-utility standards, 1921	680.92
Investigation of public-utility standards, 1921–22	9,023.89
Investigation of public-utility standards, 1922	61,180.35
Investigation of railway materials, 1921	1,351.19
Investigation of textiles, 1921	1,486.16
Investigation of textiles, 1922	13,121.29
Manufacture of arms, War transfer, 1921–22	1,319.16
Metallurgical research, 1920	37.50
Metallurgical research, 1921	1,443.86
Metallurgical research, 1922	33,865.74
Ordnance stores, ammunition, 1921–22	1,482.58
Radio research, 1920	32.80
Radio research, 1921	2,333.39
Radio research, 1922	23,498.37
Salaries, 1921	17,080.53
Salaries, 1922	394,464.34
Sound investigation, 1921	856.86
Sound investigation, 1922	4,591.48
Standardization of equipment, 1920	2.29
Standardization of equipment, 1921	2,885.17
Standardization of equipment, 1922	70,425.62
Standardizing mechanical appliances, 1920	468.59
Standardizing mechanical appliances, 1921	4,040.82
Standardizing mechanical appliances, 1922	10,349.14
Sugar standardization, 1921	2,925.26
Sugar standardization, 1922	26,857.95
Testing Government materials, 1921	972.45
Testing machines, 1921	1,214.69
Testing machines, 1922	25,768.64
Testing miscellaneous materials, 1920	13.50
Testing miscellaneous materials, 1921	2,814.33
Testing miscellaneous materials, 1922	25,715.61
Testing railroad scales, 1920	15.75
Testing railroad scales, 1921	2,352.87
Testing railroad scales, 1922	32,633.19
Testing structural materials, 1920	111.02
Testing structural materials, 1921	7,970.31
Testing structural materials, 1922	140,475.53
Testing structural materials (Int. civil), 1921	30.26
Total	1,752,853.12

STEAMBOAT INSPECTION SERVICE.

Clerk hire, 1921	9,304.36
Clerk hire, 1922	99,995.26
Contingent expenses, 1920	110.74
Contingent expenses, 1921	19,457.40
Contingent expenses, 1922	123,932.31
Salaries, office of Supervising Inspector General, 1921	896.53

Salaries, office of Supervising Inspector General, 1922	$21,208.23
Salaries, Steamboat Inspection Service, 1921	55,534.51
Salaries, Steamboat Inspection Service, 1922	540,781.23
Total	871,220.57

BUREAU OF NAVIGATION.

Admeasurement of vessels, 1921	446.11
Admeasurement of vessels, 1922	2,918.67
Clerk hire, shipping service, 1921	6,210.78
Clerk hire, shipping service, 1922	59,173.58
Contingent expenses, shipping service, 1921	1,614.32
Contingent expenses, shipping service, 1922	7,030.36
Enforcement of navigation laws, 1921	4,688.87
Enforcement of navigation laws, 1922	55,292.32
Enforcement of wireless communication laws, 1921	5,094.51
Enforcement of wireless communication laws, 1922	71,704.27
Preventing overcrowding of passenger vessels, 1920	1.55
Preventing overcrowding of passenger vessels, 1921	2,662.49
Preventing overcrowding of passenger vessels, 1922	11,872.79
Salaries, Bureau of Navigation, 1921	1,728.52
Salaries, Bureau of Navigation, 1922	37,935.82
Salaries, shipping service, 1921	2,811.69
Salaries, shipping service, 1922	23,597.35
Total	294,784.00

BUREAU OF FISHERIES.

Biological station, Mississippi River Valley, 1920–21	68.39
Developing aquatic sources of leather, 1921	180.00
Fish hatchery, Bozeman, Mont	203.76
Fish hatchery, Clackamas, Oreg	1,056.80
Fish hatchery, Duluth, Minn	4.00
Fish hatchery, San Marcos, Tex	272.25
Fish hatchery, Washington	2,637.13
Fish hatchery, Woods Hole, Mass., 1920–21	28,052.20
Fish hatchery, Wyoming	8,965.83
Fish hatchery, Wytheville, Va., 1920	1.61
Investigating damages to fisheries	1.15
Marine biological station, Florida	1,126.64
Miscellaneous expenses, 1920	142.49
Miscellaneous expenses, 1921	58,384.81
Miscellaneous expenses, 1922	439,274.97
Pay, officers and crew of vessel, Alaska fisheries service, 1921	1,020.00
Protecting seal and salmon fisheries, Alaska, 1920	34.71
Protecting seal and salmon fisheries, Alaska, 1921	8,875.70
Protecting seal and salmon fisheries, Alaska, 1922	113,526.17
Salaries, Bureau of Fisheries, 1921	27,608.98
Salaries, Bureau of Fisheries, 1922	378,469.06
Total	1,069,906.65

BUREAU OF LIGHTHOUSES.

Aids to navigation, Alaska	$920.07
Aids to navigation, Chesapeake Bay, Md. and Va	27.46
Aids to navigation, Conneaut Harbor, Ohio	45.25
Aids to navigation, Fairport Harbor, Ohio	94.28
Aids to navigation, Florida Reefs, Fla	15,717.35
Aids to navigation, Indiana Harbor, Ind	3,000.00
Aids to navigation, Pearl Harbor, Hawaii	5,441.94
Aids to navigation, St. Johns River, Fla	305.95
Aids to navigation, St. Marys River, Mich	50.71
Aids to navigation, Toledo Harbor, Ohio	20.80
Aids to navigation, Washington and Oregon	3.75
Detroit River lights, Mich	48.06
Diamond Shoal Light Vessel, N. C	280,260.00
Fifth lighthouse district gas buoys	588.86
Galveston Jetty Light Station, Tex	76.41
General expenses, Lighthouse Service, 1920	8,086.02
General expenses, Lighthouse Service, 1921	45,610.93
General expenses, Lighthouse Service, 1922	56,535.90
Joe Flogger Shoal Light Station, Delaware River	151.20
Light vessels for general service	44.63
Point Jiguero Light Station, P. R	130.41
Repairing and rebuilding aids to navigation, Atlantic coast	74.02
Repairing and rebuilding aids to navigation, Gulf of Mexico	92.14
Repairs and rebuilding aids to navigation, seventh and eighth lighthouse districts	821.63
Salaries, Bureau of Lighthouses, 1921	2,906.89
Salaries, Bureau of Lighthouses, 1922	63,625.62
Salaries, Lighthouse Service, 1921	229.17
Salaries, Lighthouse Service, 1922	5,270.83
Salaries, Lighthouse Vessels, 1921	.75
Salaries, Lighthouse Vessels, 1922	19.47
Tender for third lighthouse district	365.63
Vessels for Lighthouse Service	561,155.05
Total	1,051,721.18

MISCELLANEOUS.

Increase of compensation, 1921	29,902.90
Increase of compensation, 1922	490,433.26
Total	520,336.16
Grand total	6,581,903.20

By disbursing officers, Lighthouse Service.

Aids to navigation, Alaska	$4,342.17
Aids to navigation, Atchafalaya Entrance Channel, La	1,873.08
Aids to navigation, Chesapeake Bay, Md. and Va	197.25
Aids to navigation, Conneaut Harbor, Ohio	3,972.93
Aids to navigation, Fairport Harbor, Ohio	7,753.18
Aids to navigation, Florida Reefs, Fla	5,721.68

Aids to navigation, Guantanamo Bay, Cuba	$36.00
Aids to navigation, Indiana Harbor, Ind	62,382.01
Aids to navigation, Mississippi River, Miss	6,078.12
Aids to navigation, Pearl Harbor, Hawaii	10,585.39
Aids to navigation, St. Johns River Fla	2,446.38
Aids to navigation, St. Marys River, Ohio	17,938.49
Aids to navigation, Toledo Harbor, Ohio	736.65
Aids to navigation, Washington and Oregon	731.93
Depot for second lighthouse district	14,506.19
Detroit Lighthouse Depot, Mich	675.55
Detroit River Lights, Mich	5,801.01
Diamond Shoal Light Vessel, N. C	5,879.18
Execution Rocks Light Station, N. Y	97.80
Fifth lighthouse district gas buoys	7,173.00
Galveston Jetty Light Station, Tex	5,323.89
General expenses, Lighthouse Service, 1920	20,525.07
General expenses, Lighthouse Service, 1921	765,561.87
General expenses, Lighthouse Service, 1922	3,233,352.72
Kellett Bluff Light Station, Wash	153.41
Light-keepers' dwellings	13,303.06
Nantucket Harbor Fog Signal, Mass	2,489.25
Point Borinquen Light Station, P. R	75.97
Point Jiguero Light Station, P. R	424.36
Point Vincente Light Station, Calif	14,050.00
Radio installations on lighthouse tenders	2,250.00
Repairing and rebuilding aids to navigation, Atlantic coast	33,082.50
Repairing and rebuilding aids to navigation, Gulf of Mexico	7,594.08
Repairing and rebuilding aids to navigation, seventh and eighth lighthouse districts	22,081.45
Retired pay, Lighthouse Service, 1921	1,665.28
Retired pay, Lighthouse Service, 1922	71,944.11
Riprap protection for light station, third lighthouse district	49,170.45
Salaries, keepers of lighthouses, 1920	60.00
Salaries, keepers of lighthouses, 1921	35,108.63
Salaries, keepers of lighthouses, 1922	1,258,973.89
Salaries, Lighthouse Service, 1921	4,284.64
Salaries, Lighthouse Service, 1922	381,852.73
Salaries, Lighthouse Vessels, 1921	65,996.09
Salaries, Lighthouse Vessels, 1922	1,629,728.83
Sand Hills Light Station, Mich	91.00
Sand Island Light Station, Ala	353.70
Southwest Pass Light Vessel, Mississippi River	864.00
Spectacle Reef Light Station, Mich	20,705.74
Staten Island Lighthouse Depot, N. Y. (office laboratory)	945.00
Staten Island Lighthouse Depot, N. Y. (machine shop)	4.66
Tender and barge, eighth lighthouse district	19,870.11
Vessels for Lighthouse Service	21,477.25
Increase of compensation, Department of Commerce, 1921	27,372.17
Increase of compensation, Department of Commerce, 1922	870,177.91
Total	8,739,841.81

By special disbursing agent, Coast and Geodetic Survey.

Alterations to mine sweepers, Coast and Geodetic Survey, 1922–23	$853.45
Alterations to vessels, Coast and Geodetic Survey, 1921	66.25
Alterations to vessels, Coast and Geodetic Survey, 1920–21	15.53
General expenses, Coast and Geodetic Survey, 1919–20	3,327.50
General expenses, Coast and Geodetic Survey, 1920	29.71
General expenses, Coast and Geodetic Survey, 1921	30,235.16
General expenses, Coast and Geodetic Survey, 1922	76,531.71
Party expenses, Coast and Geodetic Survey, 1920	29.66
Party expenses, Coast and Geodetic survey, 1921	83,817.88
Party expenses, Coast and Geodetic Survey, 1922	337,628.09
Party expenses, Coast and Geodetic Survey, 1921 (I. civil transfer)	1,991.86
Pay and allowances, commissioned officers, 1921	25,155.38
Pay and allowances, commissioned officers, 1922	384,761.16
Pay, etc., officers and men, vessels, 1921	73,875.86
Pay, etc., officers and men, vessels, 1922	352,212.37
Repairs to vessels, coast survey, 1920	175.00
Repairs of vessels, coast survey, 1921	3,004.05
Repairs of vessels, coast survey, 1922	44,581.03
Salaries, Coast and Geodetic Survey, 1921, transferred from War Department	393.34
Salaries, Coast and Geodetic Survey, 1922	290,620.91
Increase of compensation, Department of Commerce, 1920	8.00
Increase of compensation, Department of Commerce, 1921	12,071.74
Increase of compensation, Department of Commerce, 1922	130,574.96
Total	1,851,960.60

By special disbursing agents, Bureau of Standards.

Radio research, 1922	$1,647.73
Industrial research, 1921	1,839.93
Total	3,487.66

By commercial agents of the department investigating trade conditions abroad.

Commercial attachés, 1922	$156,683.63
Export industries, 1922	41,129.01
Promoting commerce, Department of Commerce, 1922	196,483.25
Promoting commerce, Far East, 1922	70,705.12
Promoting commerce, South and Central America, 1922	49,854.55
Increase of compensation, Department of Commerce, 1922	6,008.66
Total	520,864.22

By disbursing clerk, Bureau of the Census.

Expenses of the Fourteenth Census, 1920–22	$2,838,212.75
Increase of compensation, Department of Commerce, 1920	4.00
Increase of compensation, Department of Commerce, 1921	24,268.47
Increase of compensation, Department of Commerce, 1922	404,402.16
Total	3,266,887.38

By special disbursing agents, Bureau of Fisheries.

Miscellaneous expenses, Bureau of Fisheries, 1922	$9,591.21
Pay, officers and crew of vessels, Alaska fisheries service, 1922	21,471.69
Protecting seal and salmon fisheries of Alaska, 1922	24,877.75
Increase of compensation, Department of Commerce, 1922	3,984.65
Total	59,925.30

Warrants drawn on the Treasurer of the United States to satisfy accounts settled by the General Accounting Office, State and Other Departments Division, during the fiscal year ended June 30, 1922, classified according to items of appropriation:

Office of the Secretary:	
Contingent expenses, Department of Commerce, 1920	$39.05
Contingent expenses, Department of Commerce, 1921	5,558.33
Contingent expenses, Department of Commerce, 1922	10,854.94
Certified claims—	
Contingent expenses, Department of Commerce, 1917	1.32
Contingent expenses, Department of Commerce, 1918	.54
Contingent expenses, Department of Commerce, 1919	62.44
National security and defense, industrial cooperative service, 1919	.25
Total	16,516.87
Bureau of Foreign and Domestic Commerce:	
Commercial attachés, 1920	110.00
Commercial attachés, 1921	605.56
Commercial attachés, 1922	223.63
Export industries, 1922	9,123.60
Promoting commerce, Department of Commerce, 1920	1,088.40
Promoting commerce, Department of Commerce, 1921	1,352.92
Promoting commerce, Department of Commerce, 1922	1,295.31
Promoting commerce, Far East, 1920	5.34
Promoting commerce, Far East, 1921	88.44
Promoting commerce, Far East, 1922	283.53
Promoting commerce, South and Central America, 1921	358.69
Promoting commerce, South and Central America, 1922	109.18
Certified claims—	
Commercial attachés, 1919	1.36
Promoting commerce, Department of Commerce, 1917	2.69
Promoting commerce, Department of Commerce, 1918	1.93
Promoting commerce, Department of Commerce, 1919	42.48
Promoting commerce, Far East, 1919	1.39
Promoting commerce, South and Central America, 1917	.70
Promoting commerce, South and Central America, 1918	1.23
Total	14,696.38
Bureau of Standards:	
Equipment, 1921	248.61
Equipment, 1922	245.84
General expenses, 1920	1,138.77
General expenses, 1921	12,437.91

Bureau of Standards—Continued.	
General expenses, 1922	$26,158.48
Investigation of fire-resisting properties, 1921	516.21
Investigation of fire-resisting properties, 1922	209.26
Investigation of public-utility standards, 1920	15.00
Investigation of public-utility standards, 1921	90.37
Metallurgical research, 1921	2.60
Metallurgical research, 1922	14.00
Radio research, 1922	31.00
Standardizing mechanical appliances, 1921	216.04
Sugar standardization, 1921	6.00
Sugar standardization, 1922	17.68
Testing machines, 1922	198.13
Testing railroad scales, 1921	1,510.02
Testing railroad scales, 1922	1,202.56
Testing structural materials, 1920	106.02
Testing structural materials, 1921	9.97
Testing structural materials, 1922	350.92
Industrial research, 1920	9.76
Industrial research, 1921	1,229.35
Industrial research, 1922	69.99
Certified claims—	
Armament of fortifications, Commerce transfer	27.83
Color standardization, 1918	130.00
Gauge standardization, 1919	38.00
General expenses, 1915	.70
General exenses, 1917	.35
General expenses, 1919	165.88
Investigation of public utility companies, 1918–19	581.50
Investigation of public utility standards, 1919	2.85
Military research, 1917–18	82.86
Military research, 1918–19	831.07
Testing structural materials, 1918	17.06
Naional security and defense, military research, 1919	85.93
National security and defense, Roberts by-product coke oven, 1919	1.56
Total	48,000.08
Bureau of Navigation:	
Refunding moneys erroneously received and covered into the Treasury	25.00
Refunding penalties or charges erroneously exacted	78,264.36
Contingent expenses, Shipping Service, 1921	342.67
Contingent expenses, Shipping Service, 1922	12.45
Enforcement of navigation laws, 1921	2.76
Enforcement of navigation laws, 1922	84.71
Enforcement of wireless communication laws, 1921	40.25
Enforcement of wireless communication laws, 1922	29.33
Certified claims—	
Enforcement of navigation laws, 1919	1.60
Enforcement of wireless communication laws, 1917	.85
Total	78,803.98

Steamboat Inspection Service:	
Contingent expenses, 1920	$11.41
Contingent expenses, 1921	200.12
Contingent expenses, 1922	557.70
Certified claims—	
Contingent expenses, 1918	12.10
Contingent expenses, 1919	82.25
Total	863.58
Bureau of Fisheries:	
Biological station, Mississippi River Valley, 1920-21	72.00
Developing aquatic sources of leather, 1921	12.00
Fish hatchery, Wyoming	8.76
Marine biological station, Fla	106.39
Miscellaneous expenses, 1920	566.70
Miscellaneous expenses, 1921	5,627.35
Miscellaneous expenses, 1922	9,379.54
Protecting seal and salmon fisheries of Alaska, 1920	394.28
Protecting seal and salmon fisheries of Alaska, 1921	215.53
Protecting seal and salmon fisheries of Alaska, 1922	631.17
Certified claims—	
Miscellaneous expenses, 1906	1.91
Miscellaneous expenses, 1913	1.43
Miscellaneous expenses, 1917	1.25
Miscellaneous expenses, 1918	8.52
Miscellaneous expenses, 1919	51.92
Protecting seal and salmon fisheries of Alaska, 1919	31.75
National security and defense, food fish supply, 1918	.26
National security and defense, demonstration plant, 1919	.65
Total	17,111,41
Bureau of the Census:	
Expenses of Fourteenth Census, 1920-1922	302,213.10
Certified claims—Collecting statistics, 1919	1.95
Total	302,215.05
Coast and Geodetic Survey:	
Alterations to vessels transferred from Navy, 1920-21	50.00
Alterations to vessels, 1921	1,115.51
General expenses, 1920	8.36
General expenses, 1921	1,936.35
General expenses, 1922	1,677.06
Party expenses, 1920	1,635.09
Party expenses, 1921	22,981.67
Party expenses, 1922	9,404.58
Pay, etc., officers and men, vessels, 1921	15.76
Repairs of vessels, 1920	1,970.58
Repairs of vessels, 1921	8,823.47
Repairs of vessels, 1922	1,911.21

Coast and Geodetic Survey—Continued.	
Certified claims—	
General expenses, 1919	$0.85
Motor-driven vessels and launches, 1919	46.50
Party expenses, 1919	1,503.89
Repairs of vessels, 1919	27.00
Total	53,107.88
Bureau of Lighthouses:	
Aids to navigation, Alaska	1,254.32
Aids to navigation, Atchafalaya Entrance, Louisiana	7.44
Aids to navigation, Florida Reefs, Fla	19.78
Aids to navigation, Guantanamo Bay, Cuba	6.31
Aids to navigation, Hudson River, N. Y	1.75
Aids to navigation, Pearl Harbor, Hawaii	10,989.02
Aids to navigation, Washington and Oregon	37.12
Radio installations on lighthouse tenders	10,182.80
Relief of employees of Bureau of Lighthouses	599.35
Repairing and rebuilding aids to navigation, Atlantic coast	11.44
Repairing and rebuilding aids to navigation, seventh and eighth lighthouse districts	346.76
Vessels for Lighthouse Service	1,909.44
General expenses, Lighthouse Service, 1920	41,746.66
General expenses, Lighthouse Service, 1921	157,554.20
General expenses, Lighthouse Service, 1922	61,345.02
Salaries, keepers of lighthouses, 1922	15.17
Salaries, lighthouse vessels, 1921	6,286.09
Salaries, lighthouse vessels, 1922	8,012.10
Certified claims—	
General expenses, Lighthouse Service, 1915	1,666.46
General expenses, Lighthouse Service, 1916	3.44
General expenses, Lighthouse Service, 1917	33.59
General expenses, Lighthouse Service, 1918	3,462.25
General expenses, Lighthouse Service, 1919	60,567.01
National security and defense, aids to navigation, Caribbean Sea, 1919	6.75
Total	366,064.27
Miscellaneous:	
Increase of compensation, 1921	6.67
Claims for damages by collision with lighthouse vessels	843.27
Total	849.94
Grand total	898,229.44

EXPENDITURES DURING THE FISCAL YEAR ENDED JUNE 30, 1922, ON ACCOUNT OF ALL APPROPRIATIONS UNDER THE CONTROL OF THE DEPARTMENT, GIVING THE TOTAL AMOUNT EXPENDED BY EACH BUREAU.

Bureau.	By disbursing clerk of the department.	By special disbursing agents of department.	By General Accounting Office.	Printing and binding.	Total.
Office of the Secretary	$393,753.80	.....	$16,516.87	$16,723.15	$426,993.83
Bureau of the Census	.....	$3,266,887.38	302,215.05	.....	3,569,102.43
Coast and Geodetic Survey	.....	1,851,960.60	53,107.88	41,829.96	1,946,898.44
Bureau of Fisheries	1,163,972.23	59,925.30	17,111.41	14,302.52	1,255,311.46
Bureau of Foreign and Domestic Commerce	738,146.35	520,864.22	14,696.38	145,076.00	1,418,782.95
Bureau of Lighthouses	1,059,959.84	8,739,841.81	366,907.54	20,100.20	10,186,809.39
Bureau of Navigation	334,484.01	.....	78,803.98	30,181.15	443,469.14
Bureau of Standards	1,939,863.86	3,487.66	48,006.75	30,952.00	2,022,310.27
Steamboat Inspection Service	951,723.11	.....	863.58	19,042.26	971,628.95
Total	6,581,903.20	14,442,966.97	898,229.44	318,207.25	22,241,306.86

The following statement shows the expenditures during the fiscal year ended June 30, 1922, 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 Navigation, Standards, Fisheries, Census, and Lighthouses, the Office of the Supervising Inspector General, Steamboat Inspection Service, salaries and expenses of the Steamboat Inspection Service at large, the public works of the Lighthouse and Fisheries Services (shown in detail in the first of the foregoing tables of disbursements)	$6,581,903.20
By the authorized disbursing officers of the Lighthouse Service	8,739,841.81
By the special disbursing agent, Coast and Geodetic Survey	1,851,960.60
By the special disbursing agents, Bureau of Fisheries	59,925.30
By the commercial agents of the department investigating trade conditions abroad, as special disbursing agents	520,864.22
By the disbursing clerk, Bureau of the Census	3,266,887.38
By the special disbursing agents, Bureau of Standards	3,487.66
By warrants drawn on the Treasurer of the United States to satisfy accounts settled by the Auditor for the State and other Departments	898,229.44
Printing and binding	318,207.25
Total	22,241,306.86

MISCELLANEOUS RECEIPTS.

Coast and Geodetic Survey: Sale of charts, publications, old property, etc	$30,113.27
Bureau of the Census: Sale of publications, etc	245.00
Bureau of Fisheries:	
Sale of 10,060 sealskins	117,146.70
Sale of 2 fur seal pups	2.00
Sale of blue-fox skins	664.96
Sale of fertilizer from Pribilof Islands	139.13
Sale of seal oil	543.73
Meals furnished employees at isolated stations	2,868.22
Sale of old property	5,707.85
Reimbursement for loss and damage to Government property	105.36
Bureau of Standards:	
Reimbursement for loss and damage to Government property	50.00
Test fees	102,875.06
Steamboat Inspection Service: Miscellaneous refunds	61.53
Bureau of Lighthouses:	
Sale of old property, etc	16,064.68
Rentals	4,977.20
Bureau of Foreign and Domestic Commerce:	
Photostatic work done	35.44
Reimbursement for damage to Government property	21.00
Bureau of Navigation:	
Tonnage duties	1,843,148.34
Navigation fees	200,445.80
Navigation fines	56,443.44
Miscellaneous refunds	3.70
Total	2,381,662.41

The following unexpended balances of appropriations were turned into the surplus fund June 30, 1922, in accordance with the act of June 20, 1874 (18 Stat. 110-111):

Salaries, office of the Secretary of Commerce, 1920	$6,298.95
Increase of compensation, Department of Commerce, 1918	18.75
Increase of compensation, Department of Commerce, 1920	3,122.83
Increase of compensation, Department of Commerce, 1921	35,432.49
Contingent expenses, Department of Commerce, 1919	.24
Contingent expenses, Department of Commerce, 1920	1,395.85
Rent, Department of Commerce, 1920	584.04
Collecting statistics, Bureau of Census, 1919	446.63
Salaries, Bureau of Foreign and Domestic Commerce, 1920	9,717.77
Commercial attachés, Department of Commerce, 1917	4.75
Commercial attachés, Department of Commerce, 1918	407.38
Commercial attachés, Department of Commerce, 1919	127.00
Commercial attachés, Department of Commerce, 1920	10,608.67
Promoting commerce, Department of Commerce, 1917	20.08

Promoting commerce, Department of Commerce, 1918	$9.47
Promoting commerce, Department of Commerce, 1919	78.92
Promoting commerce, Department of Commerce, 1920	4,024.27
Promoting commerce, South and Central America, 1919	1.44
Promoting commerce, South and Central America, 1920	18,199.97
Promoting commerce in the Far East, 1919	123.88
Promoting commerce in the Far East, 1920	8,060.09
Salaries, office of Supervising Inspector-General, Steamboat Inspection Service, 1920	200.00
Salaries, Steamboat Inspection Service, 1920	39,566.79
Clerk hire, Steamboat Inspection Service, 1920	1,986.77
Contingent expenses, Steamboat Inspection Service, 1919	23.70
Contingent expenses, Steamboat Inspection Service, 1920	8,653.07
Salaries, Bureau of Navigation, 1920	702.28
Salaries, Shipping Service, 1920	1,857.76
Clerk hire, Shipping Service, 1920	3,348.36
Contingent expenses, Shipping Service, 1920	276.68
Admeasurement of vessels, 1920	35.67
Preventing overcrowding of passenger vessels, 1919	.90
Preventing overcrowding of passenger vessels, 1920	732.93
Enforcement of navigation laws, 1920	2.32
Enforcement of wireless communication laws, 1920	225.08
Salaries, Bureau of Standards, 1920	24,296.39
Equipment, Bureau of Standards, 1920	2,648.84
General expenses, Bureau of Standards, 1918	36.70
General expenses, Bureau of Standards, 1920	11,917.70
Improvement and care of grounds, Bureau of Standards, 1920	102.05
Color standardization, Bureau of Standards, 1920	62.75
Determining physical constants, Bureau of Standards, 1920	4.00
Equipping laboratory, Bureau of Standards, 1919–20	1,981.74
Gauge standardization, Bureau of Standards, 1917–18	.55
Gauge standardization, Bureau of Standards, 1919	3.00
Gauge standardization, Bureau of Standards, 1920	559.61
High temperature investigations, Bureau of Standards, 1920	69.08
Industrial research, Bureau of Standards, 1919–20	454.58
Industrial research, Bureau of Standards, 1920	4,354.06
Industrial safety standards, Bureau of Standards, 1920	534.18
Investigations of clay products, Bureau of Standards, 1920	182.65
Investigation of fire resisting properties, Bureau of Standards, 1920	679.96
Investigation of mine scales and cars, Bureau of Standards, 1920	113.49
Investigation of optical glass, Bureau of Standards, 1920	801.65
Investigation of public utility companies, Bureau of Standards, 1918–19	2.80
Investigation of public utility standards, Bureau of Standards, 1920	561.66
Investigation of railway materials, Bureau of Standards, 1920	365.64
Investigation of textiles, etc., Bureau of Standards, 1920	159.56
Metallurgical research, Bureau of Standards, 1920	499.87
Military research, Bureau of Standards, 1917–18	1.00
Military research, Bureau of Standards, 1918–19	4.74
Platinum and rare metals, Bureau of Standards, 1920	17.77
Radio research, Bureau of Standards, 1920	171.58

Retaining wall, Bureau of Standards, 1920	$2,325.73
Sound investigation, Bureau of Standards, 1920	107.80
Standardization of equipment, Bureau of Standards, 1920	17,897.29
Standardizing mechanical appliances, Bureau of Standards, 1920	755.55
Standard materials, Bureau of Standards, 1920	218.45
Sugar standardization, Bureau of Standards, 1920	743.66
Testing machines, Bureau of Standards, 1920	650.05
Testing miscellaneous materials, Bureau of Standards, 1920	141.82
Testing railroad scales, etc., Bureau of Standards, 1920	986.12
Testing structural materials, Bureau of Standards, 1918	162.34
Testing structural materials, Bureau of Standards, 1919	3.40
Testing structural materials, Bureau of Standards, 1920	2,347.11
Salaries, Coast and Geodetic Survey, 1920	60,133.28
Party expenses, Coast and Geodetic Survey, 1914	.02
Party expenses, Coast and Geodetic Survey, 1920	38,999.09
General expenses, Coast and Geodetic Survey, 1919–20	716.54
General expenses, Coast and Geodetic Survey, 1920	137.20
Pay, etc., of officers and men, vessels, Coast and Geodetic Survey, 1920	55,845.82
Repairs of vessels, Coast and Geodetic Survey, 1920	5,303.40
Salaries, Bureau of Lighthouses, 1920	5,850.42
Retired pay, Lighthouse Service, 1920	3,230.56
General expenses, Lighthouse Service, 1918	24.12
General expenses, Lighthouse Service, 1919	482.34
General expenses, Lighthouse Service, 1920	22,338.11
Salaries, keepers of lighthouses, 1920	20,652.72
Salaries, lighthouse vessels, 1920	15,958.49
Salaries, Lighthouse Service, 1920	815.21
Depot for second lighthouse district	32.42
Execution Rocks Light Station, N. Y	42.02
Staten Island Lighthouse Depot, N. Y	1,575.68
Joe Flogger Shoal Light Station, Delaware River	51.62
Aids to navigation, Atchafalaya Entrance, La	19.56
Southwest Pass Light Vessel, Mississippi River, La	11,000.00
Light vessels for general lake service	629.78
Aids to navigation, Toledo Harbor, Ohio	211.92
Sand Hills Light Station, Mich	5.07
White Shoal Light Station, Mich	21,186.23
Salaries, Bureau of Fisheries, 1920	33,100.59
Miscellaneous expenses, Bureau of Fisheries, 1917	3.70
Miscellaneous expenses, Bureau of Fisheries, 1918	3.70
Miscellaneous expenses, Bureau of Fisheries, 1919	24.05
Miscellaneous expenses, Bureau of Fisheries, 1920	711.74
Buildings and improvements, Fur Island, Alaska	.38
Pay of officers and crew of vessel, Alaska fisheries service, 1920	12,549.41
Protecting seal and salmon fisheries of Alaska, 1919	.50
Protecting seal and salmon fisheries of Alaska, 1920	939.23
Biological station, Mississippi River Valley	2.64
Biological station, Mississippi River Valley, 1920	301.75
Fish hatchery, Cape Vincent, N. Y., 1920	158.66
Fish hatchery, Wytheville, Va., 1920	10.21
Total	546,261.88

National security and defense:	
Aids to navigation, Caribbean Sea, 1919	$67.50
Commodity experts, 1919	104.04
Military research, 1919	2.11
Roberts by-product coke oven, 1919	2.09
Tompkinsville, N. Y., Harbor, 1919	3.09
Total	178.83
Grand total	546,440.71

In the last nine years the Department of Commerce has turned back unused into the Treasury the following amounts:

June 30, 1914	$347,162.48	June 30, 1920	$1,149,363.28
June 30, 1915	247,482.22	June 30, 1921	4,042,434.38
June 30, 1916	227,941.92	June 30, 1922	546,440.71
June 30, 1917	177,995.27		
June 30, 1918	149,009.51	Total	7,363,874.87
June 30, 1919	476,045.10		

APPOINTMENT DIVISION.

The accompanying table shows, by bureaus, the number of permanent positions in the department on July 1, 1922, and the increase or decrease in each bureau as compared with July 1, 1921. 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 in field construction work 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 4,022, as compared with 3,573 for the fiscal year 1921. At the close of the fiscal year there were 1,328 employees in the service of the department serving under temporary appointment or employment.

The total number of permanent positions referred to in the accompanying table, together with the employments and enlistments just mentioned, on July 1, 1922, was approximately 12,683, as compared with 13,005 on July 1, 1921.

Bureau.	Statutory.	Non-statutory.	Total.	In District of Columbia.[1]	Outside District of Columbia.	Increase (+) or decrease (−).
Office of the Secretary	183	.....	183	183	.....	.....
Bureau of the Census	604	1,060	1,664	843	821	[2]−1,536
Bureau of Foreign and Domestic Commerce	156	439	595	381	214	+262
Bureau of Standards	342	626	968	930	38	+103
Bureau of Fisheries	430	32	462	80	382	+38
Bureau of Lighthouses	56	5,853	[3]5,909	40	5,869	+148
Coast and Geodetic Survey	338	640	978	358	620	+115
Bureau of Navigation	[4]45	185	230	41	189	+9
Steamboat Inspection Service	274	92	366	14	352	−38
Total	2,428	8,927	11,355	2,870	8,485	−899

[1] 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.

[2] The decrease in the Bureau of the Census is due to the discontinuance of the remainder of the employees appointed temporarily for the Fourteenth Decennial Census period, which terminated June 30, 1922.

[3] Includes the following positions, appointment to which is not made by the head of the department: 577 mechanics, skilled tradesmen, and laborers employed in the field construction work in the Lighthouse Service and work of a similar character at the general lighthouse depot at Staten Island, N. Y.; 1,695 lamplighters and light attendants, and 1,401 members of crews of vessels.

[4] Includes two stenographers and typewriters authorized by law for not exceeding six months each during the year.

Summary of Changes in the Personnel of the Department for the Fiscal Year Ended June 30, 1922.

Bureau.	Appointments.[1]						Promotions.	Reductions.
	Permanent.				Temporary.	Grand total.		
	Competitive.	Excepted.	Unclassified.	Total.				
Office of the Secretary	23	2	7	32	.....	32	23	.....
Bureau of the Census	174	.....	984	1,158	590	1,748	495	9
Bureau of Foreign and Domestic Commerce	49	154	6	209	42	251	152	1
Bureau of Standards	182	32	16	230	196	426	345	1
Bureau of Fisheries	85	18	9	112	40	152	31	3
Bureau of Lighthouses	297	2	.....	299	86	385	418	229
Coast and Geodetic Survey	44	2	15	61	11	72	39	4
Bureau of Navigation	40	21	14	75	37	112	29	.....
Steamboat Inspection Service	24	.....	.....	24	.....	24	9	1
Total	918	231	1,051	2,200	1,002	3,202	1,541	248

Bureau.	Separations.[2]						Miscellaneous changes.[3]
	From permanent positions.				From temporary positions.	Grand total.	
	Competitive.	Excepted.	Unclassified.	Total.			
Office of the Secretary	34	2	8	44	1	45	69
Bureau of the Census	1,249	.....	947	2,196	393	2,589	141
Bureau of Foreign and Domestic Commerce	51	40	3	94	27	121	192
Bureau of Standards	116	5	9	130	200	330	100
Bureau of Fisheries	37	3	6	46	71	117	33
Bureau of Lighthouses	291	.....	.....	291	132	423	101
Coast and Geodetic Survey	29	1	4	34	18	52	17
Bureau of Navigation	31	9	16	56	39	95	45
Steamboat Inspection Service	63	.....	.....	63	3	66	6
Total	1,901	60	993	2,954	884	3,838	704

[1] 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.
[2] Includes separations by reason of resignation, discontinuances, removals, deaths, transfers within the department, and transfers from the department to other departments or independent establishments.
[3] Includes reappointments by reason of change of station, name, designation, extension of temporary appointments, etc.

While a large proportion of the separations shown in the foregoing table was necessitated by reason of the reduction of the temporary census force on June 30, 1922, when the Fourteenth Census period terminated, the turnover of the personnel in the department is excessive. This can mainly be attributed to an abnormal condition of dissatisfaction and restlessness among the employees resulting from inadequate salaries and a discouraging outlook for promotion.

Promotion may be described as one of the links of a chain which connects efficiency with the service. A weakness in the link may cause a break in the chain, resulting in the dissolution of the partnership so essential to successful administration. One of the features of the chain is its flexibility and its adaptability to conditions of strain. The same element of flexibility should be present in promotion schemes in the Government service, but it is not, mainly because of the restriction imposed by the provision of statutory positions. A clerk, young and ambitious, comes into the service, does good work, develops rapidly, and becomes qualified for higher responsibility and compensation. But he finds that he is faced by the barrier of rarely occurring vacancies in the higher grades and, therefore, few promotions available. His case becomes one of waiting for a dead man's shoes, as only by a death or a resignation can he find opportunity to advance. The result is a disappointed employee, who realizes that his ambitions are chilled and his usefulness is thereby

impaired. It is claimed that lump-sum appropriations are often abused. Even if such were the case, a slight percentage of such abuse would be more than compensated for by the advantageous flexibility in the matter of salaries. A responsible supervisory officer in the business world would not expect to show a successful force with his hands tied so that he could not give a promotion when deserved, but supervisory officials in the Government service with such restriction are expected to produce good results. If such an official can not be trusted in the matter, he is not competent to fill the position he holds. But if restriction is necessary, let it be a restriction which will apply only against such maladministration as might be provided against by an acceptable efficiency rating scheme or by final adjudication by an appropriate governmental body. An employee should be able to look forward to a periodical promotion, or, in its absence, to learn by inference that he is not making good. Much of the restlessness in the Government service leading to an extensive and therefore expensive turnover is caused by its lack of flexibility in the provision of positions.

While the department is endeavoring to maintain its policy of filling vacancies in the higher grades by promotion, the loss of so many high-grade employees because of the hopeless outlook for the future has in some cases been such that their vacancies could not be readily filled, causing considerable loss to the service. The Government service should offer a career, and not merely a training ground for high-grade positions in the business world, as is now so frequent, and it is hoped that the recent movements along the line of reclassification and efficiency ratings will lead to this desideratum.

The Government clerk is still struggling to make post Civil War salaries cover post World War prices, and if there was not such a word as "necessity" and its synonyms in the English language, I think he would have given up the struggle long ago. According to a statement recently made in a public speech by a prominent Government official, the purchasing power of the wages of two large classes of employees who, for reasons known or unknown, had elected to go on strike, are 51 and 30 per cent, respectively, greater in 1921 than in 1913. As the cost of living during that period had increased 58 per cent, it is evident that the wages in question had been so adjusted that they are potentially greater now than at the earlier date. During that same period the salaries of Government employees had received no adjustment. It is true the temporary bonus had been given, but it is entirely inadequate to meet the rise in living costs. To the $960 employee it makes 25 per cent increase, to the $2,400 clerk 10 per cent increase, to those whose compensation is $2,740 or over no adjustment whatever is given. He has to meet a 58 per cent rise in prices with an increase in salary ranging from 25 per cent

to none. When we consider these conditions we wonder how some are solving the problem of living. The $1,200 salary of 1913, to offer equal purchasing power, should now be $1,897. The one ray of hope appears to be in reclassification with the accompaniment of adjustment of salaries. A bill with this object in view has been under consideration in Congress. The original proposition involved about 8 per cent increase over present compensation, but such extravagance was unthinkable, and the bill was amended so that later it would provide adjustment ranging from a 2 per cent increase to a decreased compensation. The proverb that refers to Justice as having leaden feet would find a good illustration in the treatment of the question of salaries of Government employees. Even with the bonus it is practically impossible to satisfactorily fill vacancies in the $900 and $1,000 clerical positions which Congress insists on our carrying, particularly when a stenographer and typewriter is required. If regrading of salaries is not effected, those clerical positions should be abolished.

During the war the demand for experienced employees in connection with the creation of numerous war organizations in the civil service necessitated the restriction set forth in section 7 of the act approved October 6, 1917, prohibiting the transfer of an employee to a position paid from a lump-sum appropriation in another executive department or independent establishment at a higher salary, or his promotion within a year when transferred at an equal or lower salary. While such a restriction was advisable at that time no advantage accrues from its retention. On the contrary, it is disadvantageous, as it is inimical to the progress of employees whose qualification and experience entitled them to the promotion which often they can secure only in establishments other than that in which they are serving, and frequently prevents a department from making desirable acquisitions to its force. I am convinced that the representation of officials of the Federal civil service generally, and the efforts in Congress to secure legislation relieving this restriction, should meet with success.

Legislation with the object of reclassifying the positions in the Federal civil service is still in embryo. Bills with this aim have been introduced in Congress but progress thereon is slow. The civil service employee is looking to this movement as the one hope for improvement in salaries and general working conditions. A correlation of duties and responsibilities to compensation and the latter to the cost of living would indeed be a godsend to the employee and a benefit to the service. On October 24, 1921, an Executive order was issued directing the Bureau of Efficiency to undertake the task of allocating on a business basis the positions in the Government service in the District of Columbia. This was done as of November 15,

1921, and using this as a basis, under the same authority, the bureau is endeavoring to establish a system of efficiency ratings throughout that service. There is no question but that an efficiency rating system carefully established, periodically revised, and adequately supervised, will be of great assistance in considering recommendations for promotions, etc., and will remove much of the personal bias which can not be entirely eliminated in considering the merits of employees.

The annual survey of the leave records of the employees of the department indicates that the extent of the utilization of leave privileges varies little from year to year. For the last calendar year, while the average annual leave was slightly higher than 1920, the average sick leave was reduced by a smaller amount, the total average being less than two-tenths per cent of a day greater than that of the preceding year. The investigation developed that only 67 per cent of the department's employees used all or practically all their annual leave (a small percentage took none at all), that only 5 per cent used all their sick leave (30 per cent used none at all, and that only 4 per cent used the maximum of both annual and sick leave. The following table sets forth this matter in further detail:

STATEMENT SHOWING BY BUREAUS THE TOTAL AND AVERAGE AMOUNTS OF ANNUAL AND SICK LEAVE, STATED SEPARATELY AND TOGETHER, TAKEN BY THE EMPLOYEES OF THE DEPARTMENT IN THE DISTRICT OF COLUMBIA, ARRANGED ACCORDING TO SEX, DURING THE CALENDAR YEAR 1921.

MALE.

Bureau.	Number.	Annual leave.[1]		Sick leave.		Total.		Average, 1920.
		Days.	Average.	Days.	Average.	Days.	Average.	
Office of the Secretary	84	2,283	27.18	424	5.05	2,707	32.23	34.10
Bureau of the Census	244	6,895	28.26	1,091	4.47	7,986	32.73	31.56
Bureau of Foreign and Domestic Commerce	92	2,507	27.25	569	6.18	3,076	33.43	34.66
Bureau of Standards	540	14,542	26.93	2,820	5.22	17,362	32.15	31.42
Bureau of Fisheries	37	984	26.59	178	4.81	1,162	31.40	31.38
Bureau of Lighthouses	21	591	28.14	164	7.81	755	35.95	40.82
Coast and Geodetic Survey	173	4,874	28.17	1,057	6.11	5,931	34.38	35.64
Bureau of Navigation	13	333	25.62	78	6.00	411	31.62	31.20
Steamboat Inspection Service	6	169	28.17	24	4.00	193	32.17	34.60
Total and average	1,210	33,178	27.42	6,405	5.29	39,583	32.71	32.59

[1] In the count of the annual leave all periods of one-half day and over were counted as a full day; periods of less than one-half day were omitted.

STATEMENT SHOWING BY BUREAUS THE TOTAL AND AVERAGE AMOUNTS OF ANNUAL AND SICK LEAVE, STATED SEPARATELY AND TOGETHER, TAKEN BY THE EMPLOYEES OF THE DEPARTMENT IN THE DISTRICT OF COLUMBIA, ARRANGED ACCORDING TO SEX, DURING THE CALENDAR YEAR 1921—Continued.

FEMALE.

Bureau.	Number.	Annual leave.		Sick leave.		Total.		Average, 1920.
		Days.	Average.	Days.	Average.	Days.	Average.	
Office of the Secretary	59	1,714	29.05	545	9.24	2,259	38.29	43.16
Bureau of the Census	304	9,048	29.76	2,469	8.12	11,517	37.88	36.86
Bureau of Foreign and Domestic Commerce	80	2,363	29.54	770	9.62	3,133	39.16	39.51
Bureau of Standards	100	2,915	29.15	1,109	11.09	4,024	40.24	37.48
Bureau of Fisheries	25	736	29.44	270	10.80	1,006	40.24	40.83
Bureau of Lighthouses	8	236	29.50	64	8.00	300	37.50	48.66
Coast and Geodetic Survey	33	980	29.70	349	10.57	1,329	40.27	41.14
Bureau of Navigation	16	465	29.06	198	12.38	663	41.44	42.61
Steamboat Inspection Service	3	90	30.00	24	8.00	114	38.00	40.00
Total and average	628	18,547	29.54	5,798	9.23	24,345	38.77	38.32

TOTAL.

Office of the Secretary	143	3,997	27.95	969	6.78	4,966	34.73	37.99
Bureau of the Census	548	15,943	29.09	3,560	6.50	19,503	35.59	34.44
Bureau of Foreign and Domestic Commerce	172	4,870	28.31	1,339	7.78	6,209	36.09	36.76
Bureau of Standards	640	17,457	27.28	3,929	6.14	21,386	33.42	32.39
Bureau of Fisheries	62	1,720	27.74	448	7.23	2,168	34.97	34.89
Bureau of Lighthouses	29	827	28.52	228	7.86	1,055	36.38	42.00
Coast and Geodetic Survey	206	5,854	28.42	1,406	6.82	7,260	35.24	36.47
Bureau of Navigation	29	798	27.51	276	9.52	1,074	37.03	36.50
Steamboat Inspection Service	9	259	28.78	48	5.33	307	34.11	37.55
Total and average	1,838	51,725	28.14	12,203	6.64	63,928	34.78	34.61

During the fiscal year 1921, 26 of the department's employees were retired under the general civil service retirement act with an average annuity of $600.26, and a like number were retired under the lighthouse retirement act with an average annuity of $650.96. There were serving in the department at the end of the year under authorized extension 42 employees of retirement age. The modification made in the retirement act by the Executive order of June 7, 1922, placing under its provision unskilled laborers whose compensation is not less than $600 per annum, and by the law approved July 17, 1922, covering under the act all employees whose compensation is less than $600, will be appreciated by the service. Other modifica-

tions might well be made, especially in view of the fact that the system is at present entailing no outlay on the part of the Federal Government. The maximum annuity might well be increased, and the injustice of deducting 2½ per cent from those receiving higher salaries, whereas the maximum annuity they can receive is that which may be earned by a $1,200 employee, has not been removed.

DIVISION OF PUBLICATIONS.

The following table shows the expenditures for printing and binding for each of the bureaus, offices, and services of the department, exclusive of the Bureau of the Census, during the fiscal years 1921 and 1922, and the estimated cost of completing the work on hand June 30, 1922. Expenditures for the Bureau of the Census are not included for the reason that during the decennial census period (July 1, 1919–June 30, 1922) the cost of printing and binding for that bureau was paid from the appropriation for the Fourteenth Census.

Bureau, office, or service.	Cost of work.		Estimated cost of work not completed June 30, 1922.
	1921	1922	
Office of the Secretary (Secretary, Assistant Secretary, Solicitor, Chief Clerk, and division of publications)	$11,785.75	$15,412.51	$1,061.17
Appointment division	398.76	549.79	116.68
Disbursing office	759.20	289.14	87.28
Division of supplies	580.64	471.72	34.67
Coast and Geodetic Survey	36,873.02	41,829.96	5,932.42
Bureau of Fisheries	22,435.04	14,302.52	2,231.37
Bureau of Foreign and Domestic Commerce	163,639.24	144,508.61	16,369.91
Bureau of Lighthouses	16,496.25	13,785.07	451.99
Lighthouse Service	8,917.13	6,315.13	9.71
Bureau of Navigation	24,987.71	14,988.36	52.96
Shipping Service	9,657.94	7,175.66	7.45
Radio Service	919.49	1,222.92	11.78
Bureau of Standards	38,899.38	30,952.00	7,377.61
Office of the Supervising Inspector General, Steamboat Inspection Service	906.16	605.52	15.51
Steamboat Inspection Service	18,919.40	18,436.74	38.97
Customs Service	8,822.06	7,361.60	184.62
Total	364,997.17	318,207.25	33,984.10

The act of March 28, 1922 (Public, No. 183), provides an appropriation of $425,000 for printing and binding for the Department of Commerce for the fiscal year 1923. This is the first time such an appropriation has been made direct to the department. Heretofore Congress each year has made an allotment to the department of an appropriation made to the Public Printer.

The following statement relates to the distribution of the department's publications on a sales basis. The Superintendent of Documents was not able to furnish figures for 1922 at the time this report was sent to press. Since the adoption by the department of the policy of putting its publications on a sales basis, there has been an increase each year in both the number of copies sold and in the amount received therefor, which indicate the usefulness of the material contained in publications issued by the department. This distribution not only does not involve any expense to the Government, as the amount received from sales fully covers the cost of printing additional copies from electrotype plates, but eliminates a wastefulness usually incident to the less equitable previous system of free distribution to the full extent allowed by law.

Coast pilots, inside route pilots, tide tables, and charts are sold by the Coast and Geodetic Survey; other publications of the department are sold by the Superintendent of Documents.

Sales.	Copies.			Receipts.		
	1919	1920	1921	1919	1920	1921
By Superintendent of Documents:						
Annual subscriptions	2,476,986	2,843,658	2,371,228	$19,301.10	$19,151.90	$17,934.40
Through miscellaneous sales	117,197	152,314	300,376	23,829.81	30,609.75	43,649.97
Total	2,594,183	2,995,972	2,671,604	43,130.91	49,761.65	61,584.37
By Coast and Geodetic Survey: Coast pilots, inside route pilots, tide tables, and charts				24,620.71	35,902.47	36,100.33
Grand total				67,751.62	85,664.12	97,684.70

DIVISION OF SUPPLIES.

The following is a summary of the work undertaken and accomplished by the division of supplies along the lines of simplification, coordination, and standardization of methods of procedure and forms relative to purchases, sales, contracts, and property accountability during the fiscal year ending June 30, 1922.

PURCHASES.

By circular letter of June 8, 1921, the Bureau of the Budget directed that all advertisements for bids be sent to the surplus property division or corresponding agency of each of the executive departments before being made public, and that each department advertising material for sale inform every other department prior to the advertisement of the exact nature of the advertisement which it proposes to publish. In carrying out this plan, the department

issued instructions that its branches report to the division of supplies all serviceable property which became surplus. The division of supplies established card records of this surplus against which it checks the requirements of the various branches as shown in copies of proposal advertisements for purchases, which are required to be forwarded to this office.

By circular letter of July 27, 1921, the Bureau of the Budget established the office of Chief Coordinator, General Supply, for the coordination of purchase and sale transactions of the Government and pursuant to the organization provided by said circular the chief of the division of supplies was designated by the Secretary as director of purchases and sales for the Department of Commerce. In furtherance of the coordination of purchases, the Bureau of the Budget by circular letter dated August 25, 1921, established a Federal purchasing board, to be composed of one representative from each of the executive departments and independent establishments and to be presided over by the Chief Coordinator, General Supply, as chairman. The chief of the division of supplies was designated by the Secretary as the representative of the Department of Commerce on this board for the purpose of conducting a study of the purchasing practices and policies of the units of the executive branch of the Government. The Federal Purchasing Board ascertained the 10 chief commodity requirements of the Government and established a subcommittee to study the purchasing methods of each of these commodities and to make recommendations as to whether or not any changes were possible or desirable.

This department's representative was designated as a member of the committees on (*a*) Paints and ingredients, (*b*) automobile tires and tubes, and (*c*) packing.

While these are not among the 10 chief commodity requirements of this department, they are among the principal commodity requirements of the Government. Each of these committees canvassed the various branches of the Government and from the information thus obtained submitted reports to the Federal Purchasing Board. Neither of the reports contained any recommendations for substantial changes in the present methods, as it was not considered that any substantial saving would result from a central purchasing agency for these commodities on account of the wide diversity in requirements among the several branches of the Government, the very many delivery locations, and the lack of properly distributed storage facilities. Reports have been submitted by the subcommittees, except for fuel oil, and in none of them are any recommendations for substantial changes in present purchasing methods submitted with the exception of the committee on purchase of coal. This committee submitted a majority and minority report. The latter, signed by F. R. Wad-

leigh, as chairman, recommended the establishment of a central committee to supervise and control purchases, but the majority report, which recommended no substantial changes in present methods, was adopted.

While the department has always kept in mind the possibilities of economy in coordinating purchases in all the branches of the Government, it has particularly watched for opportunities to establish better methods and greater economy in purchasing. Believing that the quickest and most obvious opportunities for improvement existed in the purchasing done by the department in the District of Columbia, recommendation for centralizing such purchases was submitted to the department by the division of supplies. The Chief Coordinator also made a study of the purchasing functions of the department and submitted a recommendation for consolidating the purchasing done in the District of Columbia. This proposition was submitted to the Assistant Secretary and Solicitor of the department for consideration and, after hearing representatives of the bureaus, the plan was put into operation by the Secretary July 1, 1922.

With this first step consummated, it is hoped that the division of supplies will be in a position soon to go over the study of purchases made by field officers of the department and it is confidently believed that substantial economies can be made by coordinating under uniform methods, and possible central supervision, the purchases of the principal commodities used by such services; for example, purchases of coal, gasoline, and oils. In connection with purchases, the Secretary has approved the requirement that all purchases amounting to more than $5,000 be submitted through the Director of Purchases and Sales for approval by the Secretary.

The Bureau of the Budget established the position of surveyor general of real estate under the Chief Coordinator, General Supply, and required that purchases and leases amounting to $500, and leases for more than a year, be submitted to the official named for approval. Each department was requested later to submit to the surveyor general of real estate on card forms prepared by the Bureau of the Budget a report of each parcel of real estate owned and leased.

The Bureau of the Budget also established a Federal real estate board, with the surveyor general of real estate as ex-officio chairman. The chief of the division of supplies was designated as the department's representative on this board.

The purpose of the board is to supervise and coordinate all activities connected with real estate or interest therein. The departments are required to submit all projects in connection with real estate or interests therein to the Federal real estate board for clear-

ance before final execution, providing the project involves an expenditure of more than $500 or a lease for more than one year. The real estate activities of the Department of Commerce are centralized under the director of purchases and sales. A record of real estate holdings is being made and will be pushed to completion as rapidly as possible. When established, this record will show every parcel of real estate held by the department and every lease made by the department, except minor leases in the Lighthouse Service amounting to less than $25. The coordination of the real estate activities of the department has already resulted in substantial economies in assisting in finding Government quarters for offices which have been paying rent, in finding more reasonable space for offices that have been paying excessive rents, and in reductions in space occupied where such action was possible and consistent with good administration. Some saving has been accomplished on account of the discontinuance of field offices in the Steamboat Inspection Service. The total reduction in rentals for the fiscal year 1923 over the fiscal year 1922 is approximately $20,000.

CONTRACTS.

By circular letter dated November 22, 1921, the Bureau of the Budget established an interdepartmental board of contracts and adjustments, composed of a representative of each of the executive departments, with a view to standardizing contract forms, securing the adoption of uniform policies as regards construction work and uniform practices of interpretation and negotiations, both preceding and following the actual execution of contracts. Pursuant to this plan, each department established its own board of contracts and adjustments. The chief of the division of supplies was selected as chairman of the Department of Commerce board and acts as the department's representative on the interdepartmental board of contracts and adjustments. The interdepartment board has held weekly meetings for several months in the effort to adopt standard forms of contracts for use throughout the departments. The form and substance of a standard contract for this department have been practically agreed upon by the department's board and four types of contracts covering (*a*) purchase of supplies, (*b*) engineering construction work, (*c*) repairs and alterations to vessels, (*d*) construction of vessels, will shortly be submitted to the Solicitor and to the interdepartmental board.

PROPERTY ACCOUNTABILITY.

There has been established in the division of supplies a uniform card record of inventory and cost accounting for the vessels operating under the department. From the records that will be carried on

these cards the department can compare the operating cost and efficiency of each vessel with its previous performance record and with the record of other vessels of similar type and duty in the service of the department.

NEED FOR ADDITIONAL CLERKS.

It will be noted that the division of supplies has undertaken considerable additional work, all of which is along the lines of further simplifications and uniformity in Government business methods Much of this work remains to be completed, and its completion is seriously hampered on account of the lack of clerical assistance.

DEPARTMENT LIBRARY.

The department's library is undoubtedly the most complete statistical library of the Government. It is recognized as having the largest collection of commercial reports, census reports, and statistics relating to economic conditions in foreign countries, and is constantly referred to by other Government establishments and individuals.

There are at present approximately 110,000 books and pamphlets on the library shelves, of which 2,055 bound volumes and 1,956 pamphlets were added during the year 1922, as compared with 1,335 bound volumes and 894 pamphlets for the previous year; 748 books were recatalogued and reclassed, and 2,507 duplicates and discards were disposed of; 415 books were sent to the bindery; 1,828 weekly, monthly, and quarterly periodicals, 97 daily papers and 60 foreign official gazettes were currently received, recorded, and regularly routed to 1,293 individuals or divisions; and 636 books were borrowed from the Library of Congress and other libraries.

The library coordinates with the work of the various bureaus and aside from the regular routing the material is reviewed carefully for articles of value. In this way the department is able to keep in close touch with interest vital to its work.

It is difficult for those not intimately connected with the work of the library to realize the scope and extent of the service rendered in solving the great variety of problems that arise, but its value is evinced by the increased demands on its facilities and on the expert services of the staff.

Under the present system books and periodicals received by the department and the bureaus are made to serve a number of people. Centralization of the material has effected a saving of time and money and added greatly to the efficiency of the department.

OFFICE OF THE SOLICITOR.

During the fiscal year ended June 30, 1922, 122 contracts, totaling $1,484,004.17, together with 11 contracts of indeterminate amounts; 46 leases amounting to $67,456.55; 38 revocable licenses amounting

to $2,955; 10 deeds in the sum of $2,000; 66 contract bonds amounting to $392,193.52; 69 official bonds amounting to $460,175; and insurance policies amounting to $5,046,100 were examined (approved, disapproved, drafted, redrafted, or modified).

The number of legal opinions rendered, formal and informal (memorandum), totaled 293. Legislative matters handled, which concern the Department of Commerce (drafting and redrafting of bills, reports relative thereto, etc.), numbered 46. Power of attorney cards, authorizing agents to execute official and contract bonds for surety companies, examined, totaled 2,291. In addition, 1,839 miscellaneous matters, embracing everything submitted for the advice or suggestion of the solicitor, or for the formulation of department action, not included in the foregoing items, were handled by this office.

Very truly, yours,

E. W. LIBBEY,
Chief Clerk and Superintendent.

BUREAU OF THE CENSUS.

DEPARTMENT OF COMMERCE,
BUREAU OF THE CENSUS,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the past year:

FOURTEENTH DECENNIAL CENSUS.

June 30, 1922, marked the termination of the three-year decennial census period, within which, under the census law, the reports of the Fourteenth Decennial Census were required to be completed and published. By that date the manuscript and statistical tables for all the reports required for the Fourteenth Decennial Census had been sent to the printer. During the progress of the work all the fundamental statistics and many of the detail figures had been published as bulletins or advance statements. There remained the reading and checking of printer's proof for a number of large quarto volumes and the preparation of several monographs analyzing the statistics. These monographs could not be prepared until after the figures were in final form.

The bureau has thus established a record in census taking. At no preceding census of this or any other nation has such a mass of detailed statistical information on such a variety of subjects been gathered, tabulated, arranged in logical order, and made public. No other nation has ever attempted to cover, at the same time, such an extent of territory with such diversity of political organization, containing so large a number of inhabitants with so widely varying characteristics and industries. Yet not only has the work been finished within the time required by the law, but the bureau has met

and fully satisfied the demand for prompt publication. So far as this census is concerned, the charge can not be made that the figures published are ancient history. Beginning a few months after the field canvassers started work and continuing until the close of the census period, there has issued from the bureau a constant stream of statistical information in the form of press announcements and bulletins. These advance publications have covered every feature of the census. It is safe to say that never before has the public been supplied with such an array of facts concerning the elements of our population, their social condition, and their industrial activities so shortly after the data were collected.

Moreover, at no preceding census within the past 50 years or more have there been encountered so many serious obstacles. This was the first census ever taken in midwinter, and the weather, especially in the Northern States, was unusually severe, so that the work of enumeration, particularly in the rural districts, was greatly hampered. Another handicap resulted from the fact that the census was taken at a time when, because of the prevailing high salaries, wages, and prices, it was extremely difficult to secure competent persons to accept employment as enumerators at the relatively low rates of pay which the Bureau of the Census was able to offer. When due consideration is given to these obstacles and to the gigantic character of the undertaking itself, it is no exaggeration to say that its completion within the short period of three years is a marvel of statistical work.

Not the least commendable feature of the Census Bureau's achievement is the fact that, despite the obstacles encountered and the high wages and prices prevailing at the time the Fourteenth Census was taken, the entire cost of the census work was kept below the total appropriated, $23,550,000. In fact, after paying the entire cost of the decennial census, and after the transference of $275,000 to the general reserve fund and $250,000 to the Bureau of Standards, there still remained approximately $250,000, a sum sufficient to defray the greater part of the cost of the field work on the biennial census of manufactures for 1921.

Following are brief descriptions of the several inquiries which constituted the Fourteenth Decennial Census.

POPULATION.

The census of population is the oldest and most fundamental of the decennial inquiries. From little more than a mere count of the population at the first census, taken in 1790, it has grown to a comprehensive enumeration and classification of the inhabitants of the

United States and of each State, county, and city, grouping them according to color or race, sex, age, marital condition, place of birth (State or foreign country), place of birth of parents, nationality or mother tongue for foreign-born persons and for foreign parents of natives, number of years in the United States for foreign-born persons, citizenship, occupation, school attendance, literacy, ability to speak English, tenure of home, and encumbrance on home.

The statistics in greatest demand were first issued in summary form as press announcements and later in full detail as printed bulletins. The contents of one series of bulletins were rearranged and included, together with certain other statistical material, in Volume I of the Fourteenth Census reports, which was issued in August, 1921. Another series, with practically no rearrangement, now appears as Volume III; and still another will soon be bound together as Volume II.

Occupations.—Incomplete data as to the occupations of the population were first secured at the census of 1820. The occupation classification has become increasingly complex from census to census until it now embraces 572 separate occupations and occupation groups, comprising a total of more than 20,000 individual occupation designations.

The report on occupations will form Volume IV of the Fourteenth Census reports. The completion of the manuscript for this report before the close of the census period is an achievement which has not been paralleled at any previous decennial census.

The occupations report will show, for the United States, for the individual States, and for cities having 25,000 inhabitants or more, the numbers of persons gainfully occupied, classified according to sex, color or race, nativity, nativity of parents, and age. One section is devoted to children gainfully occupied, and another to the marital condition of women gainfully occupied.

A special tabulation has been made of the data for married, widowed, or divorced women 16 years of age and over in Rochester, N. Y., for the purpose of bringing out the economic status of such women, number of children, whether children are in school, ability to speak English, nativity, etc.

AGRICULTURE.

The census of agriculture supplies data for a complete inventory of the nearly six and one-half million farms and the live stock in nearly two million inclosures not on farms. The principal items in the inventory are: Number and acreage of farms; acreage of improved land; and value of farm property, with separate figures for

land, buildings, implements and machinery, and live stock. In addition the reports give statistics as to the production of all farm crops and live-stock products during the calendar year 1919.

Another important subject is tenure, under which farms are classified as operated by owners, managers, or tenants, the last-named class being subdivided as share tenants, croppers, share-cash tenants, cash tenants, and standing renters. Farm operators are classified according to sex and color or race, white farm operators according to nativity, and foreign-born operators according to country of birth. Farms operated by their owners are classified as mortgaged or free from mortgage; and for mortgaged farms operated by full owners statistics are given as to amount of mortgage, ratio of debt to value, and rate of interest paid.

At the census of 1920 the agricultural schedule for the first time contained inquiries as to automobiles, tractors, motor trucks, telephones, and gas and electric light on farms, and water piped into farmhouses.

The agricultural census figures have been published in two series of bulletins. Each of the bulletins in one series gives figures for a particular State, by counties, while each bulletin in the second series presents statistics for a certain subject or group of subjects, for the United States as a whole, and for the individual States. The bulletins constituting the first series have been bound together as Volume VI (in three parts) of the Fourteenth Census reports, and those of the second series will constitute sections of Volume V.

IRRIGATION AND DRAINAGE.

IRRIGATION.—The first decennial census to contain a report on irrigation was the eleventh (1890). It was not until 1910, however, that complete statistics on this subject were collected and tabulated. The Fourteenth Census statistics on irrigation, which are comparable with those contained in the Thirteenth Census reports, show, by States, counties, and drainage basins, the following items of information: Cost and character of enterprise; areas of land irrigated under State and Federal laws and whether water was obtained from National, State, or private works; average yield of crops on irrigated and nonirrigated land; length of ditches; number and capacity of reservoirs; and number of wells and pumping plants, together with other pertinent facts.

DRAINAGE.—The census of 1920 was the first to include an inquiry concerning drainage of agricultural land. On the Fourteenth Census date approximately 69,000,000 acres were embraced in enterprises organized to provide drainage by cooperation among the

owners of the land to be benefited. Some of the drainage enterprises were established before 1860, but for more than three-fourths of the area covered the enterprises have been organized since 1900.

The report on drainage shows character and amount of crops grown on drained land and expenditures for public drainage works, completed and under construction; number of acres drained by pumping and kind of pumping equipment; and gives a description of the enterprises, whether open ditch or tile drains, etc.

The irrigation and drainage reports will be bound together to form Volume VII of the Fourteenth Census reports.

MANUFACTURES.

The census of manufactures (including forestry and forest products) supplies another series of facts required for the decennial inventory of the Nation. Prior to the Twelfth Census (1900) the statistics of manufactures were collected every tenth year; from 1900 to 1920 the inquiry was made at five-year intervals; and the Fourteenth Census act, approved March 3, 1919, provides for a biennial census of manufactures, comparatively simple in scope and relating mainly to quantities and values of manufactured products, in addition to the detailed quinquennial inquiry.

At the earlier censuses an attempt was made to secure data not only for manufacturing industries proper but for all mechanical industries and neighborhood and hand trades, such as are carried on in blacksmith shops, carpenter shops, dressmaking establishments, etc. At the census of 1900 it was found that the number of these smaller shops had increased so enormously that it was impossible to make a complete canvass of them and secure data that would be of any value. A line of demarcation was therefore attempted, and the census was restricted to what were believed to be, strictly speaking, manufacturing establishments; that is, those conducted under what is known as the factory system. This line of separation of the industries, first made at the census of 1904, has been continued and further perfected at each succeeding enumeration. It is very difficult to make a satisfactory separation of the industries in this respect, but for practical census purposes it is necessary that such a separation be made.

Each census of manufactures has included data on the following subjects: Capital invested; persons engaged; salaries and wages paid; cost (and in some instances quantities) of materials used; amounts paid for rent, taxes, and other principal items of expense; quantities of the several kinds of fuel consumed; number, type, and horsepower of primary power machines; numbers of other kinds of machines; and value of products (and in some instances quantities of different kinds of products). These statistics have been presented for about

700 industries and are shown separately for the individual States and for individual cities having 50,000 inhabitants or more. For cities having from 10,000 to 50,000 inhabitants, statistics for all industries combined are presented in the State reports. Comparisons are made to show growth of industries in different localities, the concentration of industries in certain districts, regularity of employment, and other factors characteristic of the industrial development of the country.

The importance of prompt publication of the statistics of manufactures, as well as those for other branches of the census, in convenient form for ready reference is fully appreciated. The demand for prompt publication has been met more satisfactorily at the fourteenth than at any preceding census. Associations of manufacturers were especially anxious that the practice, inaugurated at the census of 1914, of publishing an octavo abstract of the census of manufactures should be continued at the recent census. Arrangements were accordingly made to publish such a volume, and the complete copy for it (about 550 pages) was sent to the printer before July 1, 1922. This abstract is the most comprehensive and at the same time convenient summarization of the statistics for all branches of manufacturing industry of the country that has ever been issued by the Federal Government.

The manufactures reports will appear in three volumes. The first, Volume VIII of the Fourteenth Census reports, will contain 9 sections, each giving detailed statistics in regard to a certain subject or branch of the manufactures census, such as number of persons engaged in manufacturing enterprises, hours of labor, power used in manufacturing, fuel consumption, etc. The next, Volume IX, will be made up of the several State reports, previously issued in bulletin form. The third, Volume X, will present, in separate sections, reports for 58 selected industries and groups of industries, each giving detailed statistics for the United States as a whole and for States and principal cities.

MINES AND QUARRIES.

At each decennial census there are also collected data regarding mines, quarries, and petroleum and natural-gas wells. In the collection of these data the Bureau of the Census cooperates with the United States Geological Survey, which annually compiles statistics on mineral production.

The State reports on mines and quarries were published in 14 bulletins, each presenting figures for several contiguous States. Separate statistics for the more important mining industries were also compiled and were issued in 7 bulletins. The mines and quarries statistics are presented in substantially the same general form as the

manufactures statistics, but in less detail. They show, for each State and for each important industry, capital invested, persons engaged, salaries and wages paid, cost of supplies, amounts paid for rent and taxes, etc.

The report on mines and quarries will appear as Volume XI of the Fourteenth Census reports.

CENSUS OF BLIND AND DEAF.

The Fourteenth Census included a special collection and compilation of statistics regarding the blind and deaf. The enumerators' returns showed the fact of blindness or deafness, and to each person enumerated as thus afflicted there was mailed a special schedule or questionnaire. As the result of a thorough follow-up canvass, returns were secured from nearly four-fifths of the enumerated blind and deaf population, as against slightly more than one-half of the enumerated blind in 1910 and somewhat more than two-fifths of the enumerated deaf in 1910.

The reports, which will be published shortly, consist of general tables classifying the blind and deaf with reference to age, sex, nativity, cause, age at which blindness or deafness occurred, hereditary factors or influences, ability to read or communicate, education, occupation, and economic status, together with brief explanatory text.

MORTGAGES ON HOMES.

The Fourteenth Census act required an inquiry to be made concerning "tenure of home and the amount of encumbrance thereon." The subject of tenure had been covered in previous censuses to the extent of ascertaining whether the home was owned or rented, and if owned, whether encumbered; and in the case of farms owned wholly by their operators the amount of mortgage debt was called for by a question on the agricultural schedule. But as regards homes other than farm homes, no inquiry since 1890 had been made regarding the encumbrance or amount of mortgage debt.

The data as to value, mortgage debt, and rate of interest were secured by mail, questionnaires being sent to the owners of all homes, except farm homes, shown by the population returns as mortgaged and as occupied by their owners. Reports were received for 66.3 per cent of such homes, and the returns are probably as nearly complete as can be obtained through a canvass by mail. The aggregate value and the amount of mortgage debt on all homes covered by the inquiry have been estimated on the basis of the averages for those homes for which returns were secured.

For farms the data as to value, mortgage debt, and interest were obtained from the agricultural schedules and are published in the reports of the census of agriculture.

The report presents a classification by tenure for all homes not on farms, and gives statistics as to value, mortgage indebtedness, and rate of interest for mortgaged nonfarm homes occupied by their owners.

CENSUS PUBLICATIONS.

As explained in my previous report, every effort was made at the Fourteenth Census to place the results in the hands of the public with the least possible delay. The practice of giving out the more important and fundamental figures through the medium of press announcements was followed to a much greater extent than ever before, and the results have been highly satisfactory, judging from the manner in which these announcements have been received and the interest they have aroused. The total number of Fourteenth Census press announcements issued was 12,304, of which number 7,519 related to population, 3,340 to agriculture, 237 to irrigation, 294 to drainage, 857 to manufactures, and 57 to mines and quarries.

Moreover, aside from the press announcements, the complete and detailed statistics in their final form have been published in printed bulletins (later to be brought together in bound volumes) at relatively earlier dates in most cases than at preceding censuses.

The achievement of the Bureau of the Census in thus promptly publishing its statistics has been made possible in part by improvements in methods and in part by the development of its tabulating machinery, as explained in the annual report of the Director of the Census.

The bound volumes constituting the complete census reports are 11 in number, 4 of which (including the occupations report) relate to population, 2 to agriculture, 1 to irrigation and drainage, 3 to manufactures, and 1 to mines and quarries (including oil and gas wells). These volumes are of quarto size and will contain a total of approximately 12,000 pages.

In addition there will be published an octavo abstract of about 1,200 pages in which will be presented the more important figures for all branches of the census; and for manufactures alone an octavo abstract of 550 pages will give condensed statistics in somewhat greater detail than those appearing in the general abstract.

As explained in the annual report of the Director of the Census for the fiscal year 1921, arrangements have been made for the publication of a series of interpretative special studies or monographs analyzing in detail the census statistics on certain subjects. The first issue of this series, now in proof and soon to be published, covers the subject of the growth of population. Others in course of preparation relate to such subjects as growth in manufacturing and mining industries, integration and specialization of industry, the

foreign stock, illiteracy, farm mortgages, farm tenancy, wages in manufacturing industries, and women in gainful occupations.

As already explained, all the manuscript for the Fourteenth Census reports was sent to the Government Printing Office prior to the close of the fiscal year. Because of the overburdening of the Government Printing Office by an unusually large amount of work for Congress and for the various executive departments, the Director made an arrangement with the Public Printer to expedite the work on the census reports by taking over the reading of the remaining proof and assuming entire responsibility for it. This arrangement will lighten the work of the Government Printing Office materially and hasten the publication of the remaining census reports.

ANNUAL AND OTHER INQUIRIES NOT INCLUDED IN DECENNIAL CENSUS.

Independently of the decennial census work, the Bureau carries on numerous annual and other inquiries provided for by law. These include the biennial census of manufactures; the annual collection of data as to births and deaths in registration areas; the annual collection of financial statistics of States and of cities having more than 30,000 population; quarterly inquiries on tobacco stocks and fats and oils; monthly compilations of statistics of current business; monthly inquiries as to stocks of hides and leather, active and idle wool machinery, number of active cotton spindles, consumption and stocks of cotton, and production, consumption, and stocks of cotton seed and cottonseed products; and semimonthly canvasses, made during the ginning season, to ascertain the amounts of cotton ginned to specified dates.

BIENNIAL CENSUS OF MANUFACTURES.

The first biennial census of manufactures (provided for by the Fourteenth Census act, approved March 3, 1919) covers the calendar year 1921. The canvass for the collection of the data was begun in January and the field work was virtually completed before July 1, 1922. An effort was made to collect as many reports as possible by mail before the field agents entered on duty, with the result that 42 per cent of the schedules were secured in this manner.

OFFICIAL REGISTER, 1921.

The 1921 edition of the Official Register of the United States was issued within the fiscal year. It contained 1,328 pages, with 258,000 names as against 1,704 pages, with 325,000 names, in the 1919 register.

The classification, examination, and tabulation of the returns were begun before the close of the fiscal year. The preliminary totals for some of the leading industries have already been given out, and it is

hoped that the preliminary figures for virtually all industries will be made public before the close of the present calendar year.

It is the expectation that the biennial censuses of manufactures will to some extent be merged with the monthly, quarterly, and semi-annual collections of data as to production, consumption, and stocks of certain important commodities, such as boots and shoes, leather, iron, steel, etc. The evolution of the work is now in process, and is expected to bring about greater economy and at the same time lead to more satisfactory results.

VITAL STATISTICS.

The collection and compilation of vital statistics is one of the most important of the regular annual inquiries conducted by the Bureau of the Census. For more than 20 years the bureau has been fostering the adoption by State governments of adequate legislation for the registration of births and deaths; and as the States enact such legislation and give satisfactory evidence of proper enforcement, they are included in the Federal registration area. Largely through the efforts of the Bureau of the Census, the death-registration area has grown from 10 States and the District of Columbia in 1900, with 40 per cent of the total population of the United States, to 37 States, the District of Columbia, and 13 cities in nonregistration States in 1922, with 85 per cent of the total population. The birth-registration area, established in 1915, has grown from 10 States and the District of Columbia in that year, with 31 per cent of the total population of the country, to 29 States and the District of Columbia in 1922, with 66 per cent of the total population. It is hoped that ultimately all the States will be included in the registration area for both births and deaths.

The bureau has published 21 annual reports giving detailed mortality statistics, 6 annual reports giving detailed birth statistics, and 2 volumes of life tables showing expectation of life and related data for the population of certain States.

The annual birth statistics show, for the registration area and for the States and cities included therein, number of births by sex, color, and month of occurrence; births of white children by country of birth of father and mother; total deaths; births per 100 deaths; birth and infant-mortality rates; deaths from important causes for 12 subdivisions of the first year of life; and other details.

The annual mortality statistics show, for the States and cities which constitute the registration area, the number of deaths, by month of occurrence, sex, color, nativity, parent nativity, age, and cause. The compilation of the mortality statistics has been handicapped somewhat by the bureau's inability to secure from the Commission for the Revision of the International Classification of Causes

of Sickness and Death, at Paris, a revised copy of the International List of Causes of Death.

A special compilation of mortality rates for the years 1910 to 1920, inclusive, was made and sent to the printer within the fiscal year. These rates, which are based on revised estimates of population made from the census returns of 1910 and 1920, are grouped according to sex, age, and color of decedent, country of birth, or mother for selected areas, and cause of death.

The Weekly Health Index, which has been published by the Census Bureau since 1917, now gives mortality statistics for 64 large cities. These cities report weekly the total number of deaths and the number of deaths of children under 1 year of age, and these data are published with death rates and infant-mortality rates.

There have been prepared and sent to the printer a set of abridged life tables, relating to 27 States and the Territory of Hawaii, which will give, by sex, data as to expectation of life, etc., for the population at certain ages, as enumerated at the census of 1920. These abridged life tables, in comparison with the detailed tables for 1910, will provide valuable and interesting data as to changes in mortality rates and expectation of life.

FINANCIAL STATISTICS OF STATE AND CITY GOVERNMENTS.

For 20 years the Bureau of the Census has been publishing annual reports giving statistics of the financial transactions of the municipal governments for all cities having 30,000 inhabitants or more. These reports show total and per capita receipts from revenues; total and per capita payments for expenses, interest, and outlays; total and per capita indebtedness; estimated true value and assessed valuation of property; and taxes, revenues, rates, methods of assessment, etc. They make possible a comparison of the transactions of each city with those of other cities, and, it is believed, have led to better and more economical administration of public funds.

As stated in my report for 1921, it was believed that the cities should contribute at least a portion of the cost of preparing these financial reports, since their great value was generally acknowledged by the city officials themselves. I accordingly communicated with the city officials, requesting their cooperation in this respect, and at the same time arranged for a simplification of the schedules so as to reduce the expense of preparing the returns. But although the officials of a number of cities signified their willingness to cooperate with the bureau, the great majority declined. In fact, so large a proportion declared their disinclination or inability to prepare the census reports that it was impossible to continue the

work for the fiscal year 1922. It is the intention, however, to resume the publication of financial statistics of cities after the inquiry regarding wealth, public indebtedness, and taxation has been made. This inquiry, which, under the law, is made once in 10 years, will relate to the year 1923 and, so far as the cities are concerned, will secure the same data that would have been obtained through the regular annual inquiry.

For some years past the Bureau of the Census has been compiling and publishing annual reports giving statistics for the financial transactions of State governments, similar in scope to the reports for the cities. An attempt was made to secure the cooperation of State accounting officials in the preparation of these reports, but these officials, like the city officials, contended that it was impossible for them to prepare the census schedules.

The entire matter of cooperation between city and State officials and the Bureau of the Census in the preparation of the financial reports has been carefully considered by the National Association of Comptrollers and Accounting Officers, and the association has adopted a resolution to the effect that the financial statistics of States and cities should be compiled by agents of the Bureau of the Census and at the expense of the Federal Government. This also is the attitude of the census advisory committee,[1] as voiced at a number of its meetings.

MONTHLY SURVEY OF CURRENT BUSINESS.

This publication was inaugurated in July, 1921, in order to provide under one cover, for the guidance of business men, a compilation of important current statistics on business, gathered from governmental, commercial, and private sources. It is distributed to more than 4,000 subscribers and to newspapers, trade associations, and all representatives of the United States Consular Service abroad.

The growth of the Survey of Current Business in editorial matter has been rapid. The preliminary bulletin included merely the statement of actual figures and of index numbers on about 250 items. As the Survey became more widely known a larger number of trade associations offered to furnish data on their respective industries, and, as the result of this cooperation, the Survey now covers over 700 items. Summaries of production, stocks, sales, and prices are now included in each issue, comparing the progress of the various industries during each month by means of index numbers referring to a common base period. Recently these summaries have been further supplemented by compilations of index numbers for the combined pro-

[1] This committee, which was established about four years ago as representing the American Statistical and American Economic Associations, consists of W. S. Rossiter (chairman), Edwin F. Gay, Dr. Wesley C. Mitchell, and Profs. Walter F. Willcox, Edwin R. A. Seligman, Carroll W. Doten, and Allyn A. Young.

duction of various classes of raw materials, such as minerals, animal products, crops, and forest products.

The data from trade associations have in some cases been supplemented by the collection of figures direct from individual firms not reporting to the associations. In this manner a more nearly complete total has been secured for each industry. Individual firms engaged in automobile production, fabricated structural steel sales, wood chemical operations, and locomotive production are now reporting their figures monthly. Special statements are released to the press as soon as the automobile and structural steel figures are complete each month. On fabricated structural steel alone over 100 individual firms are now reporting regularly. In addition, individual firms are reporting lumber prices at the mills for a special compilation which is released each month. Negotiations are in progress for the further extension of individual reports to other industries.

The number of trade association reporting their statistics has grown from 7 in the preliminary number to more than 70. In addition, compilations from over 30 Government departments and 27 technical periodicals are used as sources of information.

This development in the size and character of the Survey of Current Business has led to two important changes in the method of issuing the subject matter to its readers:

First, in order to save time, printing cost, and bulk, the detailed tables, which present yearly data back to 1913 and monthly data back to the beginning of 1920, have been published only once each quarter, begininng last November; and during the intervening period summaries showing the data for two months, with percentage and index-number comparisons, carry on the figures presented quarterly in detailed tables. Reference to the previous quarterly number supplies any further information required. The August, 1922, quarterly contained 200 pages.

Second, the inauguration of a semimonthly statistical service to subscribers while the printed bulletin is being prepared. This service consists of the issue of mimeographed sheets twice a month containing all the latest figures received, but without any computations; it thus enables the subscriber to obtain the actual figures on most of the items a week or two before the complete publication is printed.

The rapid growth in subscriptions and the many appreciative letters received from business men and others stamp this publication as a distinct advance in the dissemination of reliable business statistics. Through the Survey of Current Business it is possible to obtain a bird's-eye view of the entire industrial and commercial situation of the United States each month, based on actual reported facts instead of on guesswork and opinion. The valuable cooperation of

the many associations and individual firms in supplying data for the numerous phases of this work is hereby gratefully acknowledged.

OTHER NONDECENNIAL INQUIRIES.

The usual compilations of statistics relating to cotton and cotton-seed, stocks of leaf tobacco, fats and oils, active and idle wool machinery, and hides, skins, and leather were carried on during the year without any material changes. The scope and character of these inquiries are set forth in the anual report of the Director of the Census.

PRESERVATION OF RECORDS.

The Census Bureau has accumulated a vast store of valuable records containing the names and personal descriptions of the population reported at each enumeration. From the census of 1790 to and including that of 1840 these records showed the name of the head of each family and the number of persons in the family, with a few data as to color, sex, age, and other personal characteristics. Beginning with 1850, the name of each individual has been recorded, with more comprehensive and detailed information as to personal characteristics.

The bureau is in receipt of a constant stream of inquiries from other departments and bureaus of the Federal Government, from State and local governments, and from individuals and organizations for information contained in these records. During the earlier periods of our history practically no birth or death records were kept by local authorities. The census returns, therefore, are in many cases the only public records from which information concerning individuals can be obtained. These records have proved of inestimable value to the soldiers of the Civil War, who are required to furnish statements of their ages to the Pension Bureau. They are in constant use for genealogical and other historical purposes. Children wishing to secure employment under State or Federal laws make frequent reference to them for evidence as to age. They contain information of great value in legal proceedings for the settlement of estates, criminal prosecutions, etc. Persons of foreign parentage who were born in the United States but are temporarily residing abroad sometimes find it necessary to apply to the Census Bureau for evidence of their birth in the United States in order to secure passports.

The necessity of preserving these records and arranging them in convenient files for reference has been brought so forcibly to my attention that I have recently arranged for their removal to the Census Building, where they have been put into better form for reference than at any earlier time since the organization of the Gov-

ernment. Unfortunately, however, many of them are still in bad condition. As a result of the fire of January 10, 1921, in the Commerce Building, a large number of the schedules of the census of 1890 were seriously damaged by the flames or by water.

In view of the great historical value of these records and of the constant reference made to them, it is believed that provision should be made at once for binding such of the schedules as are in proper condition for binding, and for putting the others into the best possible form for reference. Accordingly, there has been incorporated in the pending urgent deficiency bill a provision authorizing the use for this purpose of $30,000 from the amount appropriated for the collection of statistics during the fiscal year 1923.

QUARTERS.

The great reduction in the clerical force following the completion of the decennial census work made it possible to accommodate in the Census Building the entire personnel and equipment of the bureau. Accordingly, all the employees and records formerly housed in the Commerce Building were removed to the Census Bureau before the close of the fiscal year, so that the entire bureau, with all its equipment, has been brought together under one roof.

COOPERATION WITH OTHER FEDERAL OFFICES.

In the course of the past year much has been accomplished in the direction of securing closer cooperation with other bureaus with a view to mutual usefulness and the prevention of overlapping or duplication in work.

The arrangements for cooperation with the Department of Agriculture are worthy of particular mention. A number of the statistical inquiries conducted by the Bureau of the Census touch upon or parallel the work of that department, and in view of this condition a joint committee was appointed by the Secretaries of Agriculture and Commerce to consider a readjustment of their work. As the outcome of this action a definite line of demarcation between the statistical work of the two departments was established. Under this arrangement the Bureau of the Census is to collect or to continue collecting statistics for certain subjects which are related to or have a bearing upon agriculture, while other specified subjects are to be covered by the Department of Agriculture, the results being turned over to the Bureau of the Census for incorporation in its reports.

Another instance of cooperation is afforded by the Monthly Survey of Current Business. In the preparation of this publication the Bureaus of Foreign and Domestic Commerce and of Standards

collaborate with the Bureau of the Census, while many bureaus in the other departments assist by regularly supplying data relating to the subjects within their several fields of work.

In making the field canvass for the decennial census of mines and quarries the Bureau of the Census works in harmony with the Geological Survey, which secures annual data as to output of mineral products.

A similar arrangement is in effect with reference to the biennial census of manufactures, which covers certain industries using mineral products as raw materials, for which industries the Geological Survey collects annual data as to production.

The Bureau of the Census has cooperated with the United States Geological Survey in the compilation of statistics from the returns of the manufactures census of 1919 for the use of the superpower survey, which has for its purpose the development of available water powers to supplement and equalize the power equipment of public-service, manufacturing, and other enterprises and effect economies in fuel consumption.

Arrangements have been made with the Department of Labor and Industries of Massachusetts under which that office cooperates with the Bureau of the Census in the collection of manufactures data in Massachusetts.

The Bureau of the Census has devised for its own use a card system of cost accounting. This system makes use of the mechanical equipment employed in tabulating the census returns, and has proved highly satisfactory. It enables the bureau to prepare, with a minimum of time, labor, and expense, either general or detailed cost statements, in accordance with the "Classification of objects of expenditure," adopted by the General Accounting Office, office of the Comptroller General. It is believed that considerable economy might be effected by the adoption of similar systems by other departments, thus localizing the compilation of the cost statistics and reducing the expense of such compilation to the Government as a whole. The punching of the cards could be done directly in the offices making the compilations, while the grouping and totalization of the items could be done by the Census Bureau with its sorting and tabulating machines.

RECOMMENDATIONS FOR CHANGES IN CENSUS LAWS AND METHODS.

It is my belief that in order to carry on the work of future decennial censuses with a maximum of efficiency and a minimum of delay it will be necessary to secure a more satisfactory salary scale and to make certain changes in methods of procedure and possibly in the scope of some of the inquiries.

SALARY SCALE.

The Bureau of the Census entered the decennial census period badly handicapped, so far as its official and clerical forces were concerned, many of its trained and competent employees, necessarily underpaid because of the low salary scale provided by law, having left to accept more lucrative positions elsewhere in the Government service or the business world. The additional positions provided for the Fourteenth Census period, which included a large number of intermediate salary classes ($1,260, $1,320, $1,380, etc.), made it possible for the bureau to promote its clerks more rapidly and thus brought about a marked improvement in the stability of the permanent force and in the esprit de corps generally. But when the law providing for the permanent organization on July 1, 1922, was enacted, and even prior to that time, when it became evident that a severe cut in salaries would be made and the intermediate classes abolished, there began another exodus, which is still going on. Many of the most capable young men and women secured during the decennial census period and appointed on the permanent roll have already left or are contemplating resignation.

In building up the permanent census force it is highly important to secure employees who have been trained in at least one decennial census, in order that they may be available not only for the regular work during the intercensal period but for service in supervisory capacities when the large temporary force for the next census is taken on. Service in the bureau, therefore, should be made sufficiently attractive to hold the more capable of these trained employees, but wholesale reductions in salaries at the close of each decennial census period penalize service in the Census Bureau and destroy the morale of its force. The most competent of the employees do not want to remain in an office where such a condition exists, and the best of the eligibles on the Civil Service Commission's registers prefer to secure employment elsewhere.

I recommend, therefore, that the salary scale for the permanent force of the Bureau of the Census be raised to an extent sufficient to place it on a par with other Federal offices.

CENSUS DATE.

So far as the statistics of population are concerned the change in the census date from April 15 in 1910 to January 1 in 1920 served no useful purpose, but resulted in delay—in some localities considerable. The provision changing the census date was inserted in the law at the recommendation of the Department of Agriculture and of the various interests making use of agricultural statistics, it being believed that more accurate data could be obtained concerning agricul-

tural activities if the canvass were made shortly after the end of the year to which it related. The weather during January, however, is a serious handicap to the enumerators, especially in the Northern States. In many instances the work was seriously delayed, and it became necessary to take unusual precautions to insure a complete canvass.

I recommend, therefore, that future decennial or quinquennial censuses of population be taken as of April 15.

PRELIMINARY ANNOUNCEMENTS OF POPULATION BY SUPERVISORS.

It is believed that the announcement of the total population of the United States and of the individual States and cities would be hastened if the supervisors in the various districts were authorized to make a preliminary count and announce the population, subject to correction, for the counties, cities, and other political subdivisions of their districts.

COTTON USED IN MANUFACTURE OF EXPLOSIVES.

The act of August 7, 1916, provides that "the Director of the Census shall collect and publish 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, during the year 1915 and quarterly thereafter, and the quantity held in such establishments at the end of each quarter." At the time this law was passed the consumption of cotton in the manufacture of explosives was so great that it had an effect on the price, and it was, therefore, important to know the quantities thus consumed. Such information, however, is no longer of value, and I renew the recommendation made in my report for the fiscal year 1921 that this provision of the law be repealed.

STOCKS OF LEAF TOBACCO.

The law authorizing the collection of stocks of leaf tobacco required that the bureau revise, from the records of the Commissioner of Internal Revenue, the list of establishments to be canvassed, and provides that only dealers having in stock an average of 50,000 pounds at the close of the four quarters of the year shall be canvassed. The new regulations of the Bureau of Internal Revenue are in such form that it is difficult to revise the list of establishments to meet the requirements of the law; but if reports were obtained from all dealers, regardless of the amounts of tobacco held in stock by them, it would be possible to revise the list of dealers at any time by securing from the several collectors of internal revenue lists of registrations closed during the quarter and of registra-

tions added during the quarter. It is recommended, therefore, that the law be amended so as to provide for securing reports from all dealers in leaf tobacco. It is also recommended that, in order to save time and expense, the law be so amended as to authorize the making of the affidavits before postmasters.

COTTON GRADING.

There is considerable demand for statistical information as to the quantities of the several grades of cotton held in stock in the United States. Obviously, under present conditions it is impossible to secure reliable information of this character, since much of the cotton is not accurately graded until it reaches the more important cotton markets or concentration points, the grading in the less important markets not being uniform. Since practically all the cotton produced in the United States enters into either interstate or foreign commerce, it is within the power of Congress to enact legislation requiring such cotton to be graded and stapled under governmental regulations at central grading stations. The Government could provide the necessary personnel and facilities, but the cost of the grading, which probably would not amount to more than 30 or 40 cents a bale, should be paid by the owner of the cotton.

With uniform grading thus provided for throughout the cotton-growing region, it would be possible to obtain from the grading stations the numbers of bales of the several classes graded, and from consumers and exporters the numbers of bales of the several grades consumed or exported.

I accordingly recommend the enactment of legislation providing for the grading and stapling of cotton under the supervision of the Federal Government.

Very truly yours,

W. M. STEUART,
Director of the Census.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE.

DEPARTMENT OF COMMERCE,
BUREAU OF FOREIGN AND DOMESTIC COMMERCE,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the fiscal year ended June 30, 1922. This period has witnessed a notable expansion in the services of the Bureau of Foreign and Domestic Commerce. Its functions have been broadened in scope and, at the same time, have been brought into a much more intimate, vital relationship with American business life than has existed at any previous period of the bureau's activity. The increased usefulness of the bureau as a trade-promotive agency has resulted very largely from its reorganization on a new basis—the basis of expert, specialized attention to specific groups of commodities.

Fifteen new commodity divisions and one new technical division (commercial laws) have been created during the fiscal year and have been placed in charge of men chosen because of their experience and familiarity with a given line. These men have been selected, in most instances, in accordance with the desires and recommendations of the interested industries. Thus the commodity divisions, as regards their executive staffs, have been formed mainly from the industries with which they are concerned, and their primary purpose has been to serve those industries in the most direct and acceptable manner that could be devised. Close cooperation has been established between the bureau and those trade organizations and individual firms that are working for the steady enlargement of American export trade.

The increase of 56 per cent in the personnel of the bureau, as compared with the preceding year, has meant a widened field of investigation, a clearer insight into fundamental problems, a greater fund of pertinent data, more adroit methods of presentation—in short, a more effective system of building up the oversea commerce of the United States.

The details of this development are outlined in the paragraphs that follow.

CHANGES AMONG BUREAU EXECUTIVES.

With the establishment of two new Assistant Director positions and the assignment of Charles E. Herring to Berlin, O. P. Hopkins was given Mr. Herring's post; Leland Rex Robinson was appointed as an Assistant Director; while the two other Assistant Director places were filled by the promotion of Louis Domeratzky from chief of the division of foreign tariffs and Thomas R. Taylor from chief of the Latin American division. These are presidential appointments. Mr. Hopkins entered upon his new duties August 23, 1921, while the three other appointments became effective August 29, 1921.

Henry Chalmers succeeded Mr. Domeratzky on September 1, 1921, as chief of the tariff division. Philip S. Smith succeeded Mr. Taylor as chief of the Latin American division on October 16, 1921, having been transferred from the foreign service. Upon his resignation on April 30, 1922, Ralph H. Ackerman was appointed to the position. George B. Roorbach was made chief of the research division on September 8, 1921. Norman S. Meese succeeded George F. McLeod as chief of the division of district offices on January 3, 1921. On August 15, 1921, the Russian division was absorbed by the newly created eastern European division, of which E. Dana Durand, former Director of the Census, was appointed chief. Alan G. Goldsmith entered upon duty on August 10, 1921, as chief of the western European division, succeeding C. C. Kochenderfer.

The names of the men appointed as chiefs of the newly created commodity divisions are mentioned in the sections in which the work of the several divisions is discussed.

COMMODITY DIVISIONS.

FUNCTIONS AND SERVICES COMMON TO ALL COMMODITY DIVISIONS.

In general, the 15 commodity divisions of the bureau are similarly organized, and their activities have proceeded along much the same lines. To avoid repetition, the types of effort and of service that are common to these divisions will be mentioned in these preliminary paragraphs, while the strictly distinctive features of each division's work will be discussed under the several divisional headings.

Each division has had a special section in Commerce Reports—the weekly commercial magazine of the department—supplying for this section articles that have been checked over, revised, or actually prepared by the divisional experts. The several divisions have all been successful in their efforts to add to the circulation of Commerce Reports.

Numerous special circulars have been distributed, embodying information of value to exporters. Articles have been prepared for publication in trade journals. Many trade opportunities and similar data have been sent out to business men likely to be interested in them.

Three of the divisions—industrial machinery, hides and leather, and shoes and leather manufactures—have issued pamphlets describing the services that they are prepared to render to their respective industries.

Each division has increased the number of names on the bureau's Exporters' Index.

Most of the commodity divisions have brought about more detailed and logical classifications of American export statistics applying to their particular industries.

Nearly every division has prepared extensive questionnaires to be answered by Government representatives abroad, as a means of obtaining data of precisely the kind desired by American business men.

Practically all the commodity divisions are cooperating closely with committees of trade associations or other representatives of American industry.

All of them have established elaborate informational files, so classified and arranged as to be accessible at a moment's notice. All have given out, not only specialized information and advice, but a great quantity of general data on quality and quantities of shipments, average prices, packing requirements, rating of firms, freight rates, lists of importers and dealers, and business conditions throughout the world.

AGRICULTURAL IMPLEMENTS DIVISION.

The agricultural implements division, of which George B. Bell is chief, has established close relations with the National Association of Farm Equipment Manufacturers. Monthly export statistics have been arranged and interpreted. Data have been collected on the production and exports of foreign countries. Analyses of several important markets have been made. A chart has been prepared showing the value and destination of all implements and farm tractors exported from the United States in 1921, by months and articles. An arrangement has been effected whereby the Census Bureau will collect production statistics for the industry for the year 1921. It has also been arranged to collect monthly statistics of production of pumps, tractors, threshers, windmills, and harvesting machinery. Special attention has been given to Russia's need for farm implements and machinery and the problems arising therefrom.

AUTOMOTIVE DIVISION.

The automotive division, with Gordon Lee as chief and M. H. Hoepli as assistant chief (acting chief at the end of the fiscal year), has grown from 2 to 11 persons, and its weekly outgoing correspondence in June, 1922, was eight and one-half times as great as in October, 1921.

Contact has been formed with the automotive trade associations, representing 1,500 manufacturers, and about 1,500 nonassociated firms were circularized. A revision of trade lists was effected. A study of automotive production facilities in France, England, and Italy was made for the Conference on the Limitation of Armaments. An investigation was undertaken regarding the reimportation of American motor trucks from war surplus stocks in Europe.

Attention has been given to the prosecution of fraudulent exporters. An automotive world census has been taken. Questionnaires were sent to members of trade associations with the object of arriving at standard export practices. With the cooperation of the foreign-tariff division and the American minister at Berne, a modification of the Swiss customs regulations was brought about, resulting in more favorable treatment for American cars. A foreign-trade meeting was held in April in the office of the division and was addressed by department and bureau officials and others.

William I. Irvine left for the Far East as a trade commissioner to investigate automotive markets. Mr. Lee, the division chief, left in June for a two months' tour through the West, on which he will give about 40 addresses.

Special studies were prepared on the automotive markets of the Netherlands, East Indies, Argentina, Bolivia, and Chile. Work was done on a manual that the National Automobile Chamber of Commerce is issuing.

ELECTRICAL EQUIPMENT DIVISION.

R. A. Lundquist, who made investigations for the bureau in Asia, Africa, and Australasia as a trade commissioner, is chief of the electrical equipment division. His division has collected technical and commercial data on the public-service power stations of the world. In cooperation with the Electrical Manufacturers Council, it arranged for more definite statements on the exports of electrical goods from the United States. Periodic statements have been compiled showing the exports from the principal electrical manufacturing countries of the world to the leading consuming countries. Cooperation with the telephone industry has been arranged. Definite opportunities for the sale of electrical products abroad have been continually placed in the hands of manufacturers. The division has kept in close touch with large foreign projects and has prepared

periodic reports as to their changing status. Many American electrical manufacturers have been aided in selecting representatives in foreign countries. Mr. Lundquist's personal experiences in foreign markets have been very helpful in this connection.

FOODSTUFFS DIVISION.

Of the more than 40 national trade associations interested in foodstuffs, those that have been most active so far in cooperating with the bureau's foodstuffs division are the National Canners' Association, the Interstate Cottonseed Crushers' Association, the American Corn Millers' Federation, the California Rice Growers' Association, and the Institute of American Meat Packers. E. G. Montgomery is chief of this division. The daily correspondence was three times as large in June as in September. Summaries have been prepared of the world situation in sugar, cotton, and wheat.

J. A. LeClerc was sent to Europe as a special trade commissioner, in cooperation with the American Corn Millers' Federation, to investigate the possibilities for increasing the demand for corn-mill products. A considerably increased trade is reported as a result of this trip. Alfred P. Dennis was designated to report on the European food situation, with particular reference to crops. Close cooperation has been established with the Department of Agriculture and with the interests that it represents. Material has been sent out regularly to more than 800 trade and agricultural papers. A program was worked out for collecting information on oil and oil-bearing products from the Far East. A complete analysis was made of international trade in oil and oil products.

The National Canners' Association planned a very extensive program which will take at least a year to complete. This contemplates the collection of information on food laws affecting the importation of canned goods into foreign countries and the preparation of a series of pamphlets covering the trade in canned goods, especially in Latin America. The food laws have largely been collected, and the first two pamphlets are now practically ready for printing.

FUEL DIVISION.

Henry C. Morris and F. R. Wadleigh have been at the head of the bureau's fuel division. Contacts with the principal trade associations were established immediately after the division was organized. Personal visits to the division by executives of exporting companies have had important results. About 500 reports on fuel, from official sources, have been received each month. Between 300 and 400 trade journals, association and company publications, etc., have been read monthly and partly abstracted. A very considerable volume of trade

statistics that are most eagerly sought for by exporting companies have been sent out by the division. More than 10,000 commercial inquiries on fuels have been handled by the division and the district offices.

A Trade Information Bulletin on the Petroleum Trade and Industry of Rumania was sent to the printer just before the close of the fiscal year, and others, on the United Kingdom, France, Spain, and Italy, are in course of preparation. The division participated in studies of coal storage and an investigation of the possibility of stabilizing and simplifying coal marketing by the establishment and adoption of uniform grades, sizes, and names of coal.

Mr. Wadleigh performed noteworthy work as chairman of the committee on coordination of Government coal purchases, and his assistance in obtaining and interpreting data useful in analyzing the coal strike has been invaluable.

After July 1 the fuel division will be divided into a petroleum division under Mr. Morris and a coal division under Mr. Wadleigh.

HIDE AND LEATHER DIVISION.

The hide and leather division, with Wilbur J. Page as chief, was organized in January. Its informational files have grown steadily, until they now contain about 8,000 articles and reports from all sections of the world. The Tanners' Council appointed a foreign-trade committee to work with the division. Meetings were held in Boston on April 18 and in Washington on June 14. The council now looks to the division for assistance and cooperation in a great variety of matters. Starting with the trade returns for April, the division has taken over from the Tanners' Council the detailed compilation and analysis of the exports of leather and the imports of raw hides and skins. Cooperation has also been effected with the Massachusetts Leather Manufacturers' Association, the National Association of Importers of Hides and Skins, and the National Association of Tanning Extract Manufacturers.

Surveys of the raw hide and skin markets of the world, of the leather industry in the principal foreign countries, and of the leather markets of the world have been prepared or are in course of preparation. Information has been assembled on quebracho in Brazil and on the chromic iron-ore deposits of the world. The theft and pilferage problem is being analyzed. The division has distributed 83 trade opportunities from all parts of the world.

INDUSTRIAL MACHINERY DIVISION.

Walter H. Rastall, who had made an investigation of machinery markets in Far Eastern countries for the bureau, was made chief of the industrial machinery division upon its organization in the fall of

1921. This division gives attention to those kinds of machinery that are used in factories, in mines, and in the construction of engineering works. Among the first problems attacked was that of having American steam boilers (for export) comply with the laws governing the construction and operation of such boilers in each country of destination. A reasonably complete selection of such laws has been made, and brief statements regarding the situation in each particular country have been distributed. In cooperation with the automotive division a survey of the world's highways has been made, and, in cooperation with the transportation division, a survey has been made of the railways of the world; construction operations have been called to the attention of interested manufacturers.

Contacts have been established with groups of machinery manufacturers. Special surveys of the foreign markets for refrigerating machinery, machine tools, and other kinds of equipment have been made, followed by a thorough sales analysis. Special and confidential circulars have been issued to the number of 240. Mr. Rastall has prepared an elaborate report on his investigation in the Far East. It is now in the hands of the printer, and it will probably contain about 325 pages, with many maps, charts, and halftone illustrations.

IRON AND STEEL DIVISION.

Since there is no association of steel manufacturers for foreign-trade promotion, the bureau's iron and steel division, of which Luther Becker is chief, has maintained its contact with the industry largely through direct relations with individual exporters. A committee of two representatives of the National Association of Manufacturers has cooperated with the division. Contact has also been maintained with other export associations interested in steel, as well as with associations having to do with nonferrous metals.

Commercial inquiries from the trade occupied most of the time of the division's personnel. Inquiries answered in the week ended May 27 totaled 420, as compared with 20 for the week ended October 22. Personal interviews with steel men were productive of excellent results. The industry was kept fully advised of foreign inquiries involving steel construction work, such as the Yellow River bridge enterprise in China, the Sydney Harbor bridge in Australia, and railway bridges in Siam. Tender forms and specifications were made available whenever this was possible. A hundred or more foreign-trade publications were read each month in the division in the search for information. Trade Information Bulletins concerning iron and steel comprised: The Brazilian Iron and Steel Industry, The Steel-Making Facilities of Great Britain, and Iron and Steel Industry and Trade of Poland. The division has also handled

matters relating to minerals. Beginning with the new fiscal year, minerals of all kinds will receive the attention of a special section to be added to the iron and steel division.

LUMBER DIVISION.

Axel H. Oxholm, who had carried out investigations in northern Europe as one of the bureau's trade commissioners, was selected as chief of the lumber division. This has developed into a most important export organization, with more than 800 lumber firms listed as its supporters. Representatives of the division have covered more than 15,000 miles of travel in the United States conferring with exporters.

The division has been preparing a directory of lumber concerns interested in foreign trade. Almost 900 have qualified as bona fide exporters and will be listed in this directory. Each of these firms has given a detailed account of its business. The division has begun the publication of a series of lumber conversion tables to familiarize Americans with foreign standards of measurement. It has also begun the preparation of a short report on American forest resources, lumber industry, and lumber export trade for the use of foreign importers. Supplementing this will be pamphlets describing the qualities and uses of the principal American woods. More than 125 business problems and questions pertaining to the exportation of lumber are being handled each week by this division, many of these involving much research work.

The division has revised the bureau's World Trade Directory so far as it affects lumber. It has connected American exporters with first-class agents and brokers abroad. Several trade disputes have been settled—the settlement in one case averting a move to prevent American lumber from entering a foreign market. With the cooperation of the statistical division, monthly statistics have been published covering the exports of lumber and wood products by species, customs districts, and countries of destination. Steps have been taken to enlarge this service. Foreign lumber statistics have been compiled and interpreted. The division has taken up the matter of uniform contracts for the lumber export trade and has made appropriate recommendations. It is also preparing a treatise on the grade marking of lumber in foreign countries.

PAPER DIVISION.

The paper division was organized at the end of January, with Grosvenor M. Jones as chief. Late in May Mr. Jones left the division to start organizing the work of the finance and investment division, and Constant Southworth acted as chief until the end of

the fiscal year. The division has performed a steadily increasing amount of work. There has been cooperation with trade associations, such as the American Paper and Pulp Association. The associations furnished figures on production, shipments, etc., for publication in the Survey of Current Business. The division has issued one Trade Information Bulletin and a number of confidential circulars. A proposed canvass of the paper industry to secure information regarding the experience and needs of paper manufacturers in the field of exporting was outlined by the division. Through Commercial Attaché Tower at London, the division arranged for the procuring of 500 gallons of rubber latex from East Indian plantations, in order that paper manufacturers may experiment with a newly invented process for the use of rubber latex in making paper. It arranged to divide up the shipment according to the demands. Laboratory experiments already have established the fact that certain characteristics of paper are improved by the introduction of latex.

RUBBER DIVISION.

Paul L. Palmerton, chief of the rubber division, started April 29 on an investigation of European markets for American rubber goods and of the competition that European rubber manufacturers will offer to Americans in other foreign markets. Herman C. Spindler has been acting chief during the latter part of the fiscal year. The division has prepared and released 27 loose-leaf booklets, containing all the available facts affecting the importation of rubber goods into the various markets covered, namely, all South American countries, the older European States, Egypt, and British South Africa. The division cooperated with the Rubber Association of America in the publication of a booklet describing the superiority of the straight-side type of tire over the clincher or beaded-edge type.

One hundred and fourteen firms are now receiving monthly the detailed statistics of rubber-goods exports, prepared by the rubber division from the customs reports in the division of statistics. Beginning with April, releases of articles to the India Rubber World, the India Rubber Review, and the Rubber Age have been made twice monthly. Two Trade Information Bulletins have been issued under the imprint of the division—Plantation Rubber in the Netherlands East Indies and British Malaya and Market for Rubber Products at Havre, France.

Close relations have been maintained with the Rubber Association of America, whose foreign-trade division held a meeting April 21 in the Commerce Building. Lists of firms exporting rubber goods were prepared by the division on the basis of replies to a questionnaire sent to 600 manufacturers. The distribution of some 40 trade

opportunities has been handled by the division directly with these firms.

The growth of correspondence with the industry is shown by a comparison of the number of letters written for four successive 10-week periods, beginning September 3, 1921, the figures being 259, 947, 1,152, and 1,225. Early in this calendar year, Mr. Palmerton made an extended trip in the United States, visiting rubber manufacturers and exporters in Ohio, New York, and Massachusetts.

An employee of the Rubber Association of America has worked in cooperation with the bureau in preparing and distributing foreign mailing lists and tariff information. Two hundred lists of foreign dealers in rubber goods and eight foreign tariff schedules have been distributed thus far.

SHOE AND LEATHER MANUFACTURES DIVISION.

In September the shoe and leather division was created, with Arthur B. Butman as chief. In January it was divided into two parts—(1) the hide and leather division and (2) the shoe and leather manufactures division, Mr. Butman continuing as chief of the latter division. Among the organizations supporting and cooperating with this division are the National Boot and Shoe Manufacturers' Association, the New England Shoe and Leather Association, the National Shoe Wholesalers' Association, the New England Shoe Wholesalers' Association, the St. Louis Shoe Manufacturers' and Shoe Wholesalers' Association, the Boot and Shoe Manufacturers' Association of Philadelphia, the Shoe Polish Manufacturers' Association of America, and the National Association of Leather Belting Manufacturers.

Of much interest and value was the booth of the Bureau of Foreign and Domestic Commerce at the boot and shoe exposition held in the Coliseum, Chicago, January 9 to 13; an attractive exhibit had been shipped from Washington. Many hundred visitors obtained information at this booth. A world survey of the sources of supply of cattle hides and sheepskins was prepared for the Limitation of Armament Conference, together with a list of American shoe factories and a statement of production. There were compiled and transmitted to the National Belting Manufacturers' Association statistics covering imports of cattle hides by countries of origin for the years 1913–1920. A schedule, "Leather tanned, curried, and finished," was drafted and submitted to the Census Bureau officials for use in the taking of the 1922 industrial census of this industry. A world survey of the boot and shoe industry, as well as surveys of the manufacture of other leather goods, will be undertaken by this division.

SPECIALTIES DIVISION.

The specialties division was organized in October, 1921, with Carl H. Green as chief, to promote foreign trade in tools and hardware, office appliances, fixtures and supplies, musical instruments, jewelry, scientific instruments, optical and photographic goods, and sporting goods. Later, ceramics, glass and glassware, plumbers' supplies, novelties, theater and school equipment, domestic furniture, and other lines were added. Mr. Green resigned in December, 1921. R. A. Lundquist, chief of the electrical equipment division, took charge of the division and acted as its head until the close of the fiscal year.

National associations, such as the Music Industries Chamber of Commerce, the National Association of Office Appliance Manufacturers, and the Sanitary Potters' Association, organized foreign-trade committees to cooperate with the specialties division, which has also been in close touch with other associations. Detailed preliminary statistical studies have been made covering various commodities. A survey of the international trade in sporting guns is practically completed. Special researches and statistical compilations have covered miscellaneous products from pins to merry-go-rounds.

From October 29, 1921, to the end of the fiscal year, 1,509 inquiries were answered by letter, 701 memorandums were prepared, 391 trade opportunities were handled, and 4,024 trade letters from consular officers and bureau representatives were received by the specialties division.

TEXTILE DIVISION.

The textile division, of which E. T. Pickard is chief, has actively cooperated with 22 of the larger textile trade associations, with combined memberships of nearly 11,000 merchants and manufacturers, representing more than 85 per cent of the total textile and allied industries. Among the outstanding examples of this cooperation one may mention the negotiations for the formation of a syndicate of textile merchants to take over the liquidation of the vast war-accumulated Government stocks; advice with the office of the chief coordinator of the Budget and the War Department regarding the most desirable method of current disposal of Government surplus textile stocks; and cancellation of wasteful Government textile purchase proposals and the establishment of a more scientific policy.

Among the larger general results accomplished by the textile division are the establishment of semiannual surveys of the several European cotton textile industries; the inauguration of weekly international market-price comparisons for cotton gray cloth; the completion of annual and quarterly censuses of the wool and cotton crops

of the world; radical improvements in textile export statistical classifications; the bringing about of tests for the determination of standards by the Bureau of Standards, on behalf of manufacturers, merchants, and large consumers of cordage, sheetings, pillow cases, and numerous other textile articles; and simplification in the reports required by the Census Bureau for its biennial censuses of manufactures.

Mr. Pickard went to Cuba early in the spring in the interest of cotton-goods exporters who had shipped large quantities of goods to that market and were unable either to collect payment or recover the goods.

A sale to a foreign relief organization of 400,000 yards of Government surplus tent duck was consummated through the efforts of the division, and similar efforts were fostered in the disposal of surplus underwear stocks.

Textile inquiries were coming into all the offices of the bureau in September at the rate of about 75 per week, whereas in June more than 1,000 were being received weekly. The division prepared 200 articles for Commerce Reports, 50 special and confidential trade bulletins, and mailed out about 25,000 special trade letters in the course of the year. Besides this, members of the Washington staff held in other cities more than 400 personal interviews and conferences and addressed groups of merchants totaling nearly 4,000, in addition to 500 visitors received at the Washington headquarters.

TRANSPORTATION DIVISION.

The transportation division, with Eugene S. Gregg as chief, has four main sections: (*a*) Shipping facilities, services, and rates; (*b*) railroads, rates, services, and the sale abroad of rolling stock; (*c*) other forms of communication; (*d*) trade statistics from the shipping viewpoint.

A guaranty that ocean freight rates on lumber will be stabilized for periods of three months was obtained by the division for a traffic association whose members ship 500,000 cars a year. A survey of the export trade possibilities of a south Atlantic port was made for its city commission. The division obtained the ocean rates on a dozen characteristic classes of goods from Liverpool and Hamburg to the main competitive markets of the world. Studies of the trade in certain regions have been made for steamship companies. Many inquiries concerning port facilities, regulations, and charges have been answered. The division compiled for distribution lists of reliable freight forwarders for several of the main ports. It has prepared sections on packing and shipping requirements, facilities, and rates, for monographs prepared by commodity divisions. A comprehensive railway questionnaire was sent to Government representa-

tives abroad, and many of the replies have been extensively used. Railway rates on rubber goods between Genoa and Milan were obtained. A study was made for a machinery company in Michigan, to determine through what port this company could ship its goods most economically to certain South American and Far Eastern markets. An improvement of the cable service with the Near East was secured. A dispute about radio services to Cuba was settled. Surveys of facilities, costs, and traffic on the more important American inland waterways were made. A report was prepared on the types of craft on South American rivers. Surveys of inland waterway facilities and traffic in foreign countries have been made for many individuals and organizations. The foregoing are typical examples of the services that are constantly being rendered by the transportation division.

The division has established contact with the American Steamship Owners' Association, the Atlantic Coast Shipbuilders' Association, and the Railway Car Manufacturers' Association. The inquiries of the division increased fivefold from October to July.

REGIONAL DIVISIONS.

GENERAL CHARACTERISTICS OF WORK.

The regional, like the commodity, divisions have certain functions in common, and these may be briefly indicated here. All these divisions have furnished material for regular sections in Commerce Reports. All have prepared for that magazine monthly reviews of conditions in their respective territories, on the basis of cabled reports from the bureau's foreign representatives, whose work has been constantly supervised by the regional divisions in Washington.

Through confidential or special circulars, these divisions have made available material which it was not deemed advisable to publish in Commerce Reports or in the press. They have disseminated data through commercial bodies, trade journals, and the newspapers.

There has been a great volume of correspondence in connection with inquiries from American business men. Many visitors to the bureau have had personal interviews.

The creation of commodity and technical divisions during the year relieved the regional divisions of certain work that they had previously performed. On this account the character of the work changed somewhat, though in actual volume it increased instead of diminishing. The time that had been given to inquiries relating to commodities was devoted to the furnishing of basic material on economic and financial conditions. With respect to numerous broad commercial problems, assistance was given to commodity divisions. The regional divisions have examined and clipped or abstracted a mass of material appearing in foreign publications.

WORK OF FIELD REPRESENTATIVES IN LATIN AMERICA.

The work at Buenos Aires was in charge of Commercial Attaché Edward F. Feely, assisted by Trade Commissioner George F. Brady. The office carried out a three months' survey of the quantities and values of merchandise left for account of American manufacturers and exporters in the Buenos Aires customhouse. Subsequently, arrangements were made with the American banks to send the office at the close of each month a statement of the number and value of American bills received. Developments in connection with Argentine petroleum deposits were followed with great care, leading to the entrance into this field of two large American companies and the intention of two others to begin operations soon. Two American firms were aided in securing representation for oil-well supplies and machinery. Reports were submitted on petroleum deposits and legislation. Aid was given to an American concern in obtaining the contract to install a telephone system in Montevideo. Information and specifications on many tenders for Government supplies were forwarded to the bureau. Through the initiative of the Buenos Aires office, the first successful shipment of fresh fruit from Argentina to the United States was made in February.

The Rio de Janeiro office has been in charge of Commercial Attaché W. L. Schurz, aided by Assistant Trade Commissioners Bernard H. Noll and W. E. Embry. The attaché has constantly furthered American participation in the Brazilian Centennial Exposition. He has furnished much information on such subjects as the Brazilian public debt, the fall in exchange, the national currency, and the general economic condition of the States and municipalities. Numerous reports have been made on large improvement projects.

Commercial Attaché Charles A. McQueen, at Santiago, has followed closely the opportunities for American sales in Chile and has rendered constant aid to American concerns. He has aided in the collection of accounts due Americans. He has completed surveys and reports on merchandise claimed to be defective. He has helped to solve other trade disputes. Credit conditions have been studied and counsel given.

The Mexico City office has been in charge, at various times during the year, of Commercial Attaché Alvin Hovey-King, Trade Commissioner P. L. Bell, and Assistant Trade Commissioners R. M. Connell and John P. Bushnell. General economic reports have formed the main feature of the work. Investigations have been conducted on the markets for various American products, collections have been handled, credit information has been compiled, and a directory of American firms with Mexican interests has been organized. American firms have been enabled to obtain contracts and secure represen-

tatives, and the organization of several American branch commercial organizations has been facilitated.

Acting Commercial Attaché W. E. Dunn has been in charge of the Lima (Peru) office during most of the year. Twenty-nine commercial claims were handled, involving about $50,000; 16 have been settled and 11 remain to be heard from. The passage of a bill was made possible, reducing Peruvian import duties on portable houses from 35 to 5 per cent, resulting in noteworthy sales by Americans. American shoes were exempted from a decree that prohibited the importation of foreign shoes through Mollendo and Ilo. The office has been active in connection with the revision of the Peruvian tariff, which has been in progress. It secured a suspension in the application of an increase in the consular invoice fee from 2 to 4 per cent—the saving to a single American concern amounting to $10,000. Progress was made on the preparation of a handbook of Peru.

The work at the Habana office (opened September 14, 1921) has been in charge of Acting Commercial Attaché Chester Lloyd Jones, aided by Assistant Trade Commissioner C. A. Livengood. The sugar crop and the bonded-warehouse problem have occupied much attention. Reports have been prepared on the surplus of previous Cuban sugar crops, governmental regulation of marketing, the probable current crop, and the tariffs that will be levied abroad on Cuban sugar. The rights of American shippers in the matter of goods valued at $68,000,000 to $80,000,000—caught in the Cuban port congestion and commercial depression—were safeguarded through the unceasing efforts of the attaché's office, acting in close cooperation with the Department of State and the bureau's division of foreign tariffs. This was one of the most intricate and difficult tasks performed in recent years by Government representatives in Latin America. Many firms were enabled to locate goods they had considered lost or were able to reclaim them and avoid sales for customs duties. Many extensive reports have been prepared, including special reports for General Crowder. Trade-promotion work in answer to specific requests by American firms has shown a wide variety.

LATIN AMERICAN DIVISION AT WASHINGTON.

During the past year the Latin American division investigated the circumstances attending vicious propaganda against American goods in a certain country. In another country, postponement of opening of bids for large quantities of railway material was obtained, enabling Americans to compete. The division participated in an interdepartmental study of marine pilferage and insurance. A study was made of packing for export. An analysis was made of the plan of a South American financier for a system of revolving

credits to the merchants of his country. Plans were furthered for the disposal of rejected American merchandise in South American ports, and in Cuba, in cooperation with other divisions, an inventory of such merchandise was effected and permission for its reexportation obtained from the Cuban Government. Close watch has been kept to determine the nature and extent of reviving European competition in the Latin American field. An eminent economist has been sent to make a study of financial and economic conditions in the more important commercial countries of South America. An active part has been taken in arranging for the participation of this Government in the approaching Brazilian Centennial Exposition, and close contact has been maintained with a private enterprise erecting a building for the housing of American commercial exhibits. Service has been rendered to American manufacturers of automobiles and of road-building machinery in connection with the Good Roads Congress to be held in Brazil this fall. Several opportunities for making loans to Federal, State, or municipal governments have been brought to the attention of American bankers. Service has been rendered to construction companies contemplating the contracting for and financing of public works. One such case, that of port works in Chile involving about $35,000,000 in contracts, is now receiving the attention of American concerns.

An important service of the division is the review of trade and economic conditions published monthly in Commerce Reports, based on cabled reports from the bureau's field offices.

The division has issued Trade Information Bulletins on Cuba and Other West Indies, Chilean Currency and Exchange in 1921, and The Trade of Argentina in 1921. It also published a circular on the petroleum industry in Mexico. A confidential circular on economic, trade, and credit conditions in one of the Latin American countries was another contribution of value.

In September, Philip S. Smith, who had been engaged as a trade commissioner of the bureau making studies on industries in the more important commercial countries of South America, came to the division as its chief, succeeding T. R. Taylor on his promotion to an assistant directorship of the bureau. Early in February Mr. Smith resigned to join the editorial staff of a large publishing house specializing on trade publications and was succeeded by Ralph H. Ackerman.

ACTIVITIES OF FIELD REPRESENTATIVES IN FAR EAST.

The bureau's China organization has distributed semimonthly informational reports through the American chambers of commerce in China. Through the efforts of Commercial Attaché Julean Arnold, better trans-Pacific rates for China-American mail were

secured. The activities of Trade Commissioner Frank Rhea on behalf of American concerns interested in business with the Chinese Ministry of Communications have been of great value. The Peking office has worked in close harmony with the American representative of the International Consortium and many memorandums touching upon matters of interest to the consortium have been prepared. This office has been in close contact during the year with a number of development projects of considerable magnitude which fall beyond the scope of the consortium and the successful consummation of which will mean much to the furtherance of American interests in China. On the 1st of April, 1922, Commercial Attaché Arnold was detailed to represent the United States Government as chairman of the American delegation on the China tariff revision committee, sitting at Shanghai.

The bureau's Shanghai office was opened in December, 1920, and until November, 1921, was under the direction of Trade Commissioner Lynn W. Meekins. In November, 1921, Trade Commissioner Lansing W. Hoyt took the place of Mr. Meekins, upon the latter's return to the United States. The Shanghai office is the direct point of contact between the bureau and the American business community in China. Valuable assistance has been rendered to many American concerns new to the China field. There has been close cooperation with the American Chamber of Commerce for China.

Trade Commissioner Halleck A. Butts, appointed acting commercial attaché, was in charge of the Tokyo office during the fiscal year, in the absence of Commercial Attaché James F. Abbott while engaged in work at Chita and Washington. Assistant Trade Commissioner Paul P. Steintorf reported for duty in October. Local calls upon the office from American salesmen, Japanese trading companies, and merchants increased three or four fold over the preceding year. Correspondence with American firms is increasing. The office has been called upon to effect readjustments and to secure rulings with respect to customs, patent and trade-mark matters, telegraphic service, and alleged port discriminations. The office secured the erection of an American building at the Tokyo Peace Exhibition, benefiting about 30 manufacturers.

Until November the Melbourne office was in charge of Trade Commissioner A. W. Ferrin, who returned to Washington at that time for conferences with American business men and to write a handbook of Australia. He was succeeded by Trade Commissioner J. W. Sanger. Mr. Sanger has secured much publicity favorable to American commercial interests. He has helped to bring about tariff reductions on American goods, notably cash registers, watches, and caterpillar tractors. He has acted informally as an interme-

diary in many cases involving trade disputes. The Melbourne office continues to be used as a point of clearance for America of invitations for tenders covering the Morwell power project. A number of successful bidders during the past year have been American. The office has kept closely in touch with the project involving the construction of the Sydney Bridge, as well as more recent proposals to purchase a large supply of telephone equipment for the Postmaster General's department. The specifications and schedules inviting these tenders have passed through the Melbourne office. The trade commissioner supported the successful efforts of an American bank to open an office in Sydney. During the past year the work of the Melbourne office has practically doubled.

Trade Commissioner John A. Fowler, who had been making extensive investigations into commercial and economic conditions in the Netherlands East Indies and British Malaya, returned to this country about November 1 to make the results of his studies available for American business men. He has written a comprehensive handbook of the field that he covered.

Trade Commissioner C. C. Batchelder, who had been making a general investigation in India, reached San Francisco July 6, 1921. After his return to Washington he acted as chief of the Far Eastern division during the absence of Frank R. Eldridge on his trip to the Far East. Mr. Batchelder will go back to India, by way of Europe, early in the current fiscal year.

FAR EASTERN DIVISION AT WASHINGTON.

The tour of inspection by Mr. Eldridge, chief of the division, lasted from September to March and took him to Japan, China, Malay, Burma, India, and Ceylon.

The division gave most effective assistance during the Washington conference. Studies were prepared on a variety of important technical and commercial subjects.

During the year American firms were aided in preparing bids for the Yellow River Bridge. Overdue payments to American suppliers of railway material were brought about. The China radio situation was studied. Business men with far eastern interests have been kept closely in touch with economic developments, and such occurrences as price recessions in Japan, silver fluctuations in China, etc., have been forecast with surprising accuracy.

The recently formed advisory committee of the division, consisting of half a dozen business men of eminent standing in foreign trade, with large interests in the Far East, is designed to assist the division in attacking major problems.

EFFORTS AND ACHIEVEMENTS OF REPRESENTATIVES IN WESTERN EUROPE AND SOUTH AFRICA.

Walter S. Tower, formerly chief of the bureau's iron and steel division, assumed charge of the London office in October, the former commercial attaché, Alfred P. Dennis, having been assigned to special duty in connection with the investigation of European markets for foodstuffs. Commercial Attaché Tower has been aided by Assistant Commercial Attaché Candler Cobb, Trade Commissioners Alexander V. Dye and H. D. Butler, and Assistant Trade Commissioners H. B. Allin Smith and W. M. Park. The office has been reorganized on the commodity system. So far as possible its work has been coordinated with that of other foreign representatives of the Government in order to avoid duplication. Valuable work was performed for the ambassador and the counselor of the embassy. The inquiries answered and reports submitted cover the following range: Market prospects for American goods in the United Kingdom; representatives to handle the British market for American manufacturers or exporters; British products (noncompetitive with American goods) suitable for import to the United States; adjustment of trade difficulties to which American interests were a party; and tariff regulations, both British and American. The most comprehensive report made was the complete survey of economic and financial conditions in the United Kingdom during 1921, which has been published as a supplement to Commerce Reports.

Commercial Attaché William C. Huntington has been in charge of the Paris office since his return from the United States in August, 1921. His office personnel has included Assistant Commercial Attaché John F. Butler and Assistant Trade Commissioner Frederick G. Singer. Technical reports prepared on the basis of questionnaires from commodity divisions have been the most valuable type of material submitted to the bureau, the reports on the French railway transportation act and on the Rhone hydroelectric proposition being especially noteworthy. The handling of visitors has occupied much time. Appointments have been arranged for important American business men with French Government officials and business executives. Important personal contacts in all lines have been built up. The attaché wrote for Commerce Reports a notable series of articles on "Taxation of American business in France." He settled a number of serious commercial disputes between American and French interests. He frequently intervened with French Government bureaus on behalf of American firms. He obtained a pier at Havre for an American steamship line. American construction engineers were introduced to the French Minister of Liberated Regions and were accorded unusual consideration. The payment of war profits to the

French Government by several American firm branches was adjusted by the attaché to their satisfaction.

Commercial Attaché Charles E. Herring, who took over the Berlin office in October from Howard W. Adams (upon the latter's departure for The Hague), has been aided by Trade Commissioner Donald L. Breed and Assistant Trade Commissioners Owen S. Payne, Ernest M. Zwickel, and William T. Daugherty. This office has been a most important branch of the bureau's foreign organization. The attention of American interests has been called to numerous commercial propositions. A steadily increasing number of inquiries has poured into the office. A large amount of excellent information on the German economic situation has been supplied, the monthly surveys especially being widely commented on. The special reports have included such subjects as "Export price control," "Currency depreciation and price increases," "The internal value of the German mark," "Government subsidies, price regulation, and production costs," "The cotton textile industry of Germany," and "Some aspects of the German automotive industry." The office has assisted many American business men arriving in Germany to establish connections with the proper persons.

Commercial Attaché H. C. MacLean and Assistant Commercial Attaché A. A. Osborne have been the officials at the Rome office. Special studies have included analyses of the Italian cotton industry, lumber industry, metallurgical industries, automobile industry, and the market for such American products as coal, lumber, canned goods, foodstuffs, hardware, etc. Close studies have also been made of the agricultural situation and of developments with respect to proposed commercial treaties and the Italian tariff. Italian connections have been obtained for American exporters, most of whom report encouraging sales. The attaché attended the meeting of the International Chamber of Commerce at London, was a delegate to the sixth general assembly of the International Institute of Agriculture, and, with the ambassador, was an unofficial observer at the Genoa conference. Many trade disputes have been settled. The attaché was instrumental in securing the largest contract awarded in Italy during the past few years to an American, involving more than $13,000,000. At the time of the suspension of the Banca Italiana di Sconto he was active in the negotiations with the Italian Government regarding the Italian Discount & Trust Co., an American subsidiary, and furthered arrangements whereby the American subsidiary was enabled to reopen. He prevented the confiscation of a quantity of American ammunition at Genoa. Several of the restrictions of a year ago upon American trade with Italy have been removed during the past year, largely through the initiative of the attaché.

Commercial Attaché Charles H. Cunningham has been in charge of the Madrid office. There were about 1,200 business visitors, requesting appeals from Spanish tariff rulings, assistance in adjusting disputes, information on market possibilities and trade tendencies, etc. The attaché devoted much time to protecting the interests of American exporters by direct negotiations with the framers of the Spanish tariff; the articles on which more satisfactory rates were obtained include tractors, binder twine, automobiles, motor cycles, aluminum, copper, cash registers, motion-picture films, pianos, bacon and hams, cornstarch, etc. The attaché saved for Americans contracts in Spain involving 100,000 tons of American wheat which were consummated before the Spanish foreign wheat embargo. A total of 20,000 tons of American lubricating oil was released from the retroactive feature of the Spanish tariff. Many connections in Spain were made for American firms, and one company states that $200,000 worth of business was secured in 1921 as the result of such a service. Collections for American firms were facilitated. Numerous trade opportunities were reported.

The Copenhagen office has been in charge, successively, of Trade Commissioner T. O. Klath, Commercial Attaché Norman L. Anderson, Trade Commissioner O. S. Payne, and Assistant Trade Commissioner Harry Sorensen. Trade-promotion activities have been hampered by commercial depression, but Americans called on the office for much information. Tenders on bids for railway material were made available. Reports on Scandinavian market conditions have been made; trade lists have been furnished; the standing of individual firms has been made known. The advertising of American products has been promoted.

Acting Commercial Attaché Samuel H. Cross has directed the Brussels office. Many commercial and economic reports were prepared. Apart from periodic reports on Government finance and key industries (collieries, textiles, glass, metallurgy), practically all the minor industries of the country were reported on at least once. Various aspects of the reparations problem have been investigated. A division of the commercial reporting work has been effected between the attaché's office, the Brussels consulate general, and the consulates at Antwerp and Ghent. Since March the Antwerp consulate has helped to prepare the monthly cable summary. Cooperation with the American-Belgian Chamber of Commerce has continued. Agencies have been placed for American manufacturers. In behalf of American explosive manufacturers, the office secured licenses for the importation and transportation of their products in Belgium, thus facilitating sales to munitions plants and

the Belgian War Department. The office helped to interest American engineers and capitalists in the construction of a proposed vehicular tunnel under the Scheldt at Antwerp. American contractors were also placed in contact with Belgian interests contemplating the construction of a new hotel, a hospital, and a scientific laboratory in Brussels.

J. A. Vander Laan, secretary, was in charge of The Hague office till the latter part of January, when it was taken over by Trade Commissioner H. W. Adams, with Mr. Vander Laan continuing as assistant. American firms have been aided in arranging satisfactory settlements of their claims against Dutch importers. Trade representatives have been secured for American firms. Much practical information on Dutch market prospects has been furnished.

In the absence of Trade Commissioner Vladimir Geringer for a short period at the beginning of the fiscal year, the Prague office was under the direction of Donald L. Breed, then assistant trade commissioner. The outstanding feature of his work was a comprehensive report on Hungary. On September 17 Mr. Geringer resumed direction of the office. Much assistance has been rendered to American commercial interests both at home and in Europe. Mr. Geringer intervened with the Minister of Railways and brought about the repair of a branch railway that was essential to the marketing of an American company's product. When American exports of lard and bacon to Czechoslovakia were threatened by a prohibitive import duty, the Prague office brought about their retention on the free list. Mr. Geringer has been active in other tariff controversies and succeeded in several instances in effecting more liberal treatment of American goods. Many American companies have been aided in securing licenses to do business in Czechoslovakia. The trade commissioner has assisted American business men who came to Czechoslovakia to investigate opportunities for investing American capital in local enterprises, such as paper mills, steel-ceiling manufacturing plants, locomotive works, and real estate. He assisted in a study of conditions which resulted in the establishment of an American publishing house. Many commercial claims were adjusted. Criminal proceedings instituted against an American company were set aside. Through Mr. Geringer's efforts, also, repeated orders were placed with American exporters for tires, typewriters, radio apparatus, dental supplies, tobacco, and other commodities.

Trade Commissioner William Ford Upson has been in charge of the Vienna office except for a few weeks at the beginning of the fiscal year, when Trade Commissioner George Wythe was in charge. The services rendered were of a varied character, such as giving information and advice on the possibility of business operations,

furnishing trade lists and credit ratings, giving introductions, recommending agents, negotiating and revising contracts, and intervening with Austrian Government officials. The special reports by the office covered such subjects as Austrian foreign trade, banking laws, the economic conference of Portorose, methods of making payments in Austria, and various Austrian industries. An outstanding feature was the comprehensive economic report on Austria for 1921. A Government guaranty was obtained for American packers importing lard and other products into Austria. A special permit was secured enabling a large American soap manufacturer to import his product. Through the instrumentality of the Vienna office an order for $1,500,000 worth of tobacco was placed with an American firm by the Austrian Government Tobacco Monopoly.

Trade Commissioner Perry J. Stevenson, in charge of the office at Johannesburg, South Africa, has made many special investigations, the subjects including such matters as the markets for automobiles, tires, and tractors, as well as the trend of industrial development and policy. American business men have made many calls on the office. The trade commissioner has played an important part in securing local agents for many American products. South Africans were furnished with information about the United States for trade-promotion purposes. Twenty-two articles were written for the local press. Many important contacts have been established during the year, and a closer cooperation with the Chamber of Commerce of the United States in South Africa has been brought about.

WESTERN EUROPEAN DIVISION AT WASHINGTON.

C. C. Kochenderfer resigned as chief of the western European division in August, 1921, and his place was taken by Alan G. Goldsmith.

In the fall of 1921 the division was reorganized into sections—the United Kingdom section, covering the United Kingdom, South Africa, Canada, and African territories under British mandates; the central European section, covering Scandinavia as well as central European countries; the Romance section, covering France, Belgium, Spain, Portugal, Italy, Switzerland, and their African possessions; later a general-service section was added for the consolidation and distribution of material relative to the entire division.

Trade Information Bulletins issued by the division have included such subjects as Price Regulation and Production Costs in Germany, Franco-German Trade, The Internal Value of the German Mark, Export Trade of the United States and Germany, and German Reparations, Budget, and Foreign Trade.

For several weeks the division published a press review, which gave pertinent extracts from approximately 300 journals in the European field; a scarcity of funds made it impossible to continue this.

Elaborate trade, production, and financial statistics were prepared by the division for publication in the Survey of Current Business. Extensive reports have been prepared for other Government departments. For the State Department much financial material was assembled at the time of the Washington conference. For Congress special studies were made of competitive conditions abroad.

A western European advisory committee has been established under the chairmanship of a prominent New York banker and consisting of two well-known bankers, three important manufacturers, and a leading economist, with membership located in New York, Philadelphia, New Orleans, Chicago, Boston, and Middletown, Ohio.

WORK ACCOMPLISHED BY REPRESENTATIVES IN EASTERN EUROPE AND SIBERIA.

The bureau's Warsaw office has been in charge of Trade Commissioner (subsequently Acting Commercial Attaché) H. B. Smith. His reports have been extensive and have covered a wide variety of subjects. Among them may be mentioned a general survey of economic conditions in Poland and reports on the textile industry, the iron and steel industry, the industries of that part of upper Silesia acquired by Poland during 1921, and several reports on the agricultural situation. There has been close cooperation with other representatives of the American Government in Poland. Mr. Smith has taken an important part in the negotiations for the sale of surplus railway cars by the United States War Department to the Polish Government. Much valuable service has been rendered to American business men. American concerns were aided in the adjustment of various disputes and claims and in the negotiation of important Government contracts; one of the claims amounted to $900,000. Advice was given to Americans regarding investments and concessions. The office was instrumental in protecting American interests with respect to emigrant remittances to Poland.

The Bucharest office was opened in November, 1921, under Trade Commissioner Louis E. Van Norman. In considerable part the work has necessarily been of a preliminary character. Numerous valuable reports have been made. Certain chapters for the bureau's forthcoming handbook of Rumania have been prepared. Mr. Van Norman helped to adjust various claims, one of these involving more than $3,000,000.

Trade Commissioner H. Lawrence Groves, with headquarters at Riga, Latvia, has continued to represent the bureau with respect to

Latvia, Esthonia, Lithuania, and Finland. He has kept the bureau informed concerning the broad economic and commercial situation. Mr. Groves has aided a number of representatives of American firms in establishing sales connections in the Baltic States, looking not only to local trade but to ultimate trade with Russia.

Trade Commissioners Felix Cole, Leighton W. Rogers, Carl J. Mayer, and H. B. Barton have been added to the bureau's staff during the year to conduct investigations regarding Russia and its relations to other countries. Trade Commissioners Cole and Rogers have visited European capitals and other cities and have sent in important information regarding internal conditions in Russia and the economic and trade relations of that country with other European States. Trade Commissioner Mayer has been located at Vladivostok, keeping the bureau advised of the economic and commercial situation. He has compiled data concerning the agricultural, forest, mineral, and fishery resources of the Pri-Amur region and of Siberia in general. He was able to assist in an important way in protecting American interests with respect to goods (shipped to Russia during and immediately after the war) which, unable to reach their destination, have remained in storage at Vladivostok. Trade Commissioner Barton, during the last six months of the fiscal year, maintained his headquarters at Tiflis, Georgia. He has sent in valuable information regarding the resources and the industrial and commercial conditions of the Caucasian territory. He has aided American business men by interviews and correspondence.

EASTERN EUROPEAN DIVISION AT WASHINGTON.

The eastern European division was established in August, 1921, with E. Dana Durand as chief, and its organization was completed in November. It took over the former Russian division and was also given jurisdiction over Yugoslavia, Rumania, and Bulgaria. Arrangements have been made for a consolidation, beginning July 1, 1922, of the Near Eastern division with the eastern European division, under the name of the eastern European and Levantine division.

The changes in recent years and the existing abnormal conditions have made information concerning this region vitally essential and at the same time rather difficult to secure in as definite and dependable form as is desirable.

A handbook of Rumania was completed, in manuscript, during the year, and considerable progress has been made on handbooks for Siberia and Poland. Among the extended articles compiled and issued by the division there may be mentioned Polish Economic Recovery, an article on Upper Silesia, and the Trade Information Bulletins on Public Finance of Poland and Finance and Banking

in Finland. A Trade Information Bulletin written by Acting Commercial Attaché Smith was entitled Forest Resources of Poland.

Material regarding Russia, compiled by the division from the reports of bureau representatives or by means of translations and abstracts from Russian periodicals, is in part published in Commerce Reports and in bulletins and circulars. The rest is available to business men, upon request, and to American officials concerned with the determination of policy with respect to Soviet Russia. In the case of Russia, the peculiar character of the sources of information has made it especially necessary for the eastern European division to aid the commodity divisions in compiling and interpreting information as to the various Russian industries falling within their respective fields. Several articles published under the various commodity heads in Commerce Reports represent directly the work of the eastern European division. An extended bulletin on the Russian sugar industry was prepared during June.

The division has been consulted by a number of financial groups which were considering loans and investments in eastern European countries, and has furnished them a mass of information.

The division has called the attention of the American investing public to the need of exercising special care in the purchase of securities expressed in terms of depreciated currency.

FIELD REPRESENTATIVES IN THE NEAR EAST.

Commercial Attaché Paul L. Edwards reached Constantinople January 30, 1922. Subsequently he proceeded to Athens, Greece, where he had been assigned temporarily, arriving there February 27. In June he was transferred to Habana. During his short stay in Constantinople Mr. Edwards displayed great activity in studying local and international economic problems. He was appointed by the American High Commissioner as a representative on the Allied Advisory Trade Commission, an economic body reporting to and advising the Allied High Commissioners. In Athens he intervened effectively in many cases involving complaints either against or by American firms, furnished commercial, financial, and general economic information to numerous inquirers from the United States, and submitted informative reports to the bureau. Most of his time after the enactment of the Greek internal forced loan law of April 7, 1922, was given to matters arising therefrom, as they affected business concerns of the United States.

Julian E. Gillespie, assistant trade commissioner, was in charge of the Constantinople office during most of the year and acted also, by special designation of the United States High Commission at Con-

stantinople, as the commercial attaché of the commission. He was designated technical adviser to the Advisory Trade Commission; among the matters coming before this body were the Res Miri tax on alcohol, the 11 per cent ad valorem tariff, the manipulation of oil and inflammables in Constantinople, the veterinary taxes, tax on cinemas and theaters, municipal taxes, lighthouse taxes, and numerous matters concerning food and trade control. Mr. Gillespie's other activities included direct aid to American business men in Constantinople, letters to American concerns; attention to local foreign business men; preparation of reports suitable for publication; and general and specific trade-promotion work. During the period December 14, 1921, to February 18, 1922, Mr. Gillespie was absent from Constantinople, visiting Angora, Anatolia, and making an economic survey of that region. During his absence the Constantinople office was in charge of William B. Collins. The work of the office increased materially over the preceding year. Upon various occasions, by his prompt and vigorous intervention, Mr. Gillespie saved considerable amounts to importers of American products; by his constant watchfulness over American commercial interests he obtained other substantial results.

NEAR EASTERN DIVISION AT WASHINGTON.

During the fiscal year the Near Eastern division (of which James A. Robertson continued as chief) cooperated in the attaining of two objects of far-reaching importance, namely: (1) The carrying in American vessels of Egyptian cotton shipped to the United States, thus breaking the monopoly of the British liners; (2) the drafting of new regulations by the United States consulate at Patras, Greece, with respect to the sanitary handling of currants destined for export to the United States.

Information was given to business men with respect to the operation of the Greek internal forced loan law, enacted April 7, 1922, and regulations made in consequence thereof. This law and its regulations caused a good deal of confusion in the minds of Americans engaged in business with Greece. Business men were constantly aided in financial and trade matters connected with the Near East. Numerous confidential and special circulars were issued. Information that could not be published in Commerce Reports was made available through trade bodies, the press, and other media. There was general supervision of the Handbook of Greece, which is now in course of editing. The volume of work accomplished was greater than during the preceding year.

TECHNICAL DIVISIONS.

DIVISION OF FOREIGN TARIFFS.

The services of the division of foreign tariffs during the past fiscal year may be briefly summarized under four types:

1. Supplying up-to-date and reliable information as to the current duties and regulations of all foreign countries, for guidance in current transactions.

2. Forewarning of impending changes and assisting informally in efforts to moderate proposals in foreign countries for sharp advances in duties or unduly severe regulations on the admission of American goods.

3. Assisting in the solution of customs difficulties in which American goods have found themselves in foreign ports, either because of misunderstanding of the proper regulations and procedure, or arising from a general decline in trade which left American goods to accumulate unclaimed.

4. Aiding in the protection of the good will established by the sale of American branded products abroad, through warning of attempts at unauthorized registrations of distinctive American trademarks and advising as to the basis for contesting them.

Services of all the above-mentioned kinds have been rendered to American business men in a very great number of instances, hundreds of specific problems being satisfactorily solved.

The division has also aided numerous governmental and other organizations. In connection with the current revision of the American tariff, the Senate Committee on Finance and the House Committee on Ways and Means have repeatedly called upon the tariff division for specific information regarding the tariff situation and developments in particular foreign countries. Especially noteworthy were the surveys prepared for the Senate committee, reviewing the measures of control of import trade adopted by France and Germany during and since the war. The attention of the tariff-making committees has been called to special acts passed by foreign countries and also to the attitude and intentions of foreign Governments, organizations, and merchants with regard to the American tariff.

The United States Tariff Commission has frequently called upon the bureau's tariff division for information as to the tariffs and trade policies of foreign countries, for their comparative value in connection with the proposed American measures. Members of its staff were given full access to the bureau's files.

An analysis of the comparative import duties and consumption taxes being collected on sugar by practically all important foreign countries was made for the use of General Crowder, as adviser to the

Cuban Government, in connection with the American tariff situation as regards sugar. This analysis was made available also to representatives of the principal American associations of sugar producers and refiners.

There was prompt and effective assistance by the State Department, and its representatives abroad, in the solution of such difficulties as the Cuban warehouse situation, arising from the heavy accumulations of undelivered American goods, and the removal of the 20 per cent tare on American automobiles in Switzerland. On the other hand, the information and judgment of the division of foreign tariffs were called upon and made freely available to the officials of the State Department in connection with numerous problems.

A number of special studies were prepared for use in connection with the Washington Conference on the Limitation of Armaments. A comparative analysis was presented of the customs treatment of the leading Chinese export products by the other countries represented at the conference. A compilation was prepared of the export duties on petroleum products imposed by the principal oil-producing countries, and of the import duties collected by the principal oil-importing countries. The situation with regard to the protection of foreign trade-mark and patent rights in the Orient was also made the subject of special analysis.

Cordial cooperation was received from officials of the American Customs Service, as well as from the officials of the Post Office Department concerned with foreign mails and parcel post.

The division cooperated with the Inter-American High Commission on problems affecting commercial relations between the United States and Latin American countries, principally consular and customs regulations, the uniform commercial-travelers treaty, and the Pan American Trade-Mark Bureau.

By arrangements made between the foreign-trade department of the United States Chamber of Commerce and the bureau's tariff division, the requests of American concerns for assistance in foreign customs difficulties, addressed to the chamber, were given special attention. A representative of the chamber was aided in preparing a review of the trend of commercial policy and tariff legislation in European countries since the war. This information was embodied in a pamphlet and later republished in The Nation's Business.

The tariff division is also cooperating with the International Chamber of Commerce on all problems relating to international commercial policy, tariff legislation and administration, and other regulations on trade. Several important projects for changes in the manner of publishing and administering tariffs, which are to be considered at the Rome congress of the chamber next March, have

been submitted for judgment to the chief of the tariff division and are now being considered.

The chief of the division addressed various groups of business men on current problems in regard to foreign tariffs and regulations and the services rendered by the bureau.

In the summaries of the work of the various field offices of the bureau, as given in preceding pages, it was noted that considerable attention has been given to the study of the reaction of newly-drawn customs tariffs upon American export trade and to representations in behalf of American commercial interests. Such activities on the part of the field officers of the bureau are under the direction of the tariff division and have, of course, been carried on in every case with the express permission of the American diplomatic representatives in the given countries. Action is taken in such cases as involve probable discrimination against American merchandise or at the express instance of the foreign importers of American goods.

Out of the more than 100 independent countries, revisions of the basic tariff systems, of more or less general scope, were effected during the past year in more than 40. The publication of analyses or abstracts of these major changes, in addition to the hundreds of minor changes in tariff duties and trade regulations of more limited scope, increased the number of items published by the division of foreign tariffs in Commerce Reports from 718, during the preceding year, to 1,048 in the fiscal year 1922.

The number of reports calling for study, and often translation and research, has averaged in recent months between 200 and 250 a week.

There was an increase of about one-third in the division's outgoing mail, as compared with the preceding year. Not including telephone inquiries, interdivisional requests, and information secured by visitors in person, the number of requests for information or advice replied to by the division of foreign tariffs during the past year totaled 5,227, as compared with 3,939 in 1921. The greater number of the replies were accompanied by specially prepared statements or memoranda. During the spring months the outgoing letters averaged 135 a week. These figures do not include trade-mark notices (numbering between 400 and 500 during the year), or the increasing number of special bulletins, or any material of a circular character.

DIVISION OF COMMERCIAL LAWS.

The division of commercial laws was organized in July, 1921, with Archibald J. Wolfe as chief. The need of such a unit had been urged by trade bodies, business organizations, and Government departments. The many perplexing legal problems resulting from

commercial disturbances in various parts of the world made the new division a source of instant help and advice in acute business situations.

One of the most gratifying achievements of the division was the investigation of existing facilities abroad for the collection of overdue accounts. A series of articles in Commerce Reports enabled many Americans to collect most of their outstanding accounts with a minimum of cost.

With the help of the State Department a list of dependable attorneys for all countries has been prepared.

Where satisfactory collection facilities are not available the division of commercial laws has undertaken to intervene in the actual settlement of trade disputes, with the cooperation of the bureau's foreign representatives and of consular officers. As regards the arbitration of commercial disputes, the division has cooperated with the United States Chamber of Commerce, the International Chamber of Commerce, the Chamber of Commerce of the State of New York, and a number of committees, and it examined and commented upon drafts of bills designed to improve arbitration methods. As a result of its activities a world-wide investigation into means and prospects of commercial arbitration in all countries was begun, and the results of the inquiry are now coming in.

The division has collected a library and accumulated a vast amount of data on the laws of foreign countries. It is to be immediately notified of any important changes.

The important problem of determining the liability of cargo carriers in international commerce, which led to the drawing up of The Hague rules, 1921, was thoroughly investigated by the division, and a pamphlet on the subject was prepared.

The division is installing a service for compiling the laws and regulations in foreign countries on commercial insurance.

Among the reports prepared by the division are the booklets on The Hague Rules, Incorporation in China, Branches of Foreign Corporations in France, New Cuban Law on Sugar Crop Financing, Doing Business in Hungary, and Commercial Laws in the Canal Zone.

Investigations on the following topics have been made through bureau field men and American consular officers: Regulations of interest to engineering companies undertaking contracts abroad; powers of attorney in foreign countries; foreign consignment laws; protesting drafts in foreign countries; bankruptcy and insolvency laws of foreign countries.

A number of manufacturers profited by the suggestions of the division in the matter of improving agency sales contracts.

The division has cooperated with a committee of six representative New York jurists specializing in international law and also with a committee appointed by the National Association of Credit Men.

The division sent out 2,957 letters during the fiscal year. Actual service of a legal character, as distinguished from routine inquiries, was rendered in 1,026 instances, excluding inquiries answered through branch offices.

RESEARCH DIVISION.

Among the more important studies that have been prepared during the year by the research division are the following: Reports for the Conference on the Limitation of Armaments, including the general direction of the country reports and the preparation of specific reports on the copra trade of the Pacific, Australia, New Zealand, Dutch East Indies, British East Indies, British Malaysia, and Central and South Pacific Islands; Vegetable Oil and Oil Materials in International Commerce; The Development of the Motion-Picture Industry Abroad; Wholesale Prices in the United States; various analyses of foreign trade; the relation of exports of farm products to production; international trade statistics; translations of foreign import and export schedules; the planning and supervising of the bureau's exhibit for the Brazilian Exposition. In addition, there have been prepared, in connection with commodity work, reports on feldspar markets abroad, on markets for refractories in the Far East, on foreign periodicals, on margarine trade in European countries, on expositions and fairs in 1922, and several other studies.

The research division has acted as a commodity division for those commodities not covered by regularly organized divisions in the bureau. Much of its correspondence (averaging 275 letters per month) and a good deal of its research work have been devoted to the answering of trade inquiries concerning commodities as well as inquiries on general economic, financial, and statistical subjects. In connection with this work the division has distributed circulars on financial subjects to banks; a translation of the Japanese law for the encouragement of the manufacture of dyes and a bulletin on Markets for Chemicals in the Dutch East Indies and British Malaya have been sent to the chemical trade; a questionnaire on advertising media has been prepared and submitted to consuls; an exhibit of foreign advertising was assembled for the Milwaukee convention of the Associated Advertising Clubs of the World, etc.

The division has also worked in close cooperation with the American Refractories Manufacturers' Association. As a result of the work done for it, the association has decided to make a thorough investigation of the possibilities of foreign trade and has detailed

an expert to work up, in the bureau, the results of the questionnaire prepared by the research division.

The division has prepared the forty-fourth number of the Statistical Abstract of the United States, covering 1921. This has been improved by the addition of new material, the elimination of obsolete matter, and a basic revision of the arrangement of the contents. Preliminary plans have been made for publishing next year a statistical abstract of foreign countries. The division has rendered much statistical and other expert service to other divisions of the bureau. One section listed and classified the nearly 1,000 periodicals that are being received by the bureau from all parts of the world and planned an effective routing system by which individuals and divisions received regularly the journals that were of interest to them. Besides classifying and planning the routing, this section established a scheme for routing, clipping, and abstracting periodicals for distribution to the divisions interested. The work of this section, having been organized, has now been transferred to the department library and to the various regional divisions.

The statistical service section has compiled for other divisions a great amount of foreign statistical material, much of which has been published in special bulletins and in Commerce Reports. This section has also supervised all graphic work for Commerce Reports and other publications of the bureau.

The division supervised questionnaires originating in the bureau for transmission to Government representatives abroad. About 45 have been sent out.

The division has prepared reference lists to published material in the bureau, and bibliographies in connection with research work and the answering of trade inquiries. About 2,700 requests for such information were handled during the year.

The research division has had general charge of the preparation of the foreign-country material that is contributed by the bureau to the Survey of Current Business and has prepared monthly statistical material for the Bulletin of the League of Nations, the International Institute of Commerce, and other similar organizations. It has also done a very considerable amount of translation from foreign languages.

DIVISION OF STATISTICS.

The putting into effect on January 1, 1922, of the revised and extended export classification constituted the most important feature of the work of the statistical division, of which John Hohn has continued as chief. As compared with 710 classes in the old schedule, the new classification lists 1,250 separate items. Quantities are shown

for all commodities, making it possible to compare trade fluctuations in volume as well as in value, which could not be done previously except for bulky staple goods. Instead of the former alphabetical listing, the articles in the new schedule are classified in 10 great groups, according to origin or use, bringing related items together for each industry and line of trade. Each group is divided into subgroups, according to kind of material or product, and these are further subdivided into headings of distinctive lines of industry, with the individual commodities shown under each heading. The detailed classes are numbered on the decimal plan, making the schedule flexible and permitting future expansion or contraction according to the development of each line of trade, without changing established class numbers.

The special monthly statistical statements, showing complete details of imports or exports of leading commodities by countries, not printed in the Monthly Summary, were increased from 92 tables with 440 columns in 1921 to 162 tables of more than 1,000 columns in the first half year of 1922. These statements are mailed each month to more than 12,000 addresses.

A compilation showing the tonnage of principal articles imported and exported at each customs district of the United States in the trade with each country during the calendar year 1920 was prepared for the transportation division of the bureau.

The division of statistics compiles and prepares for publication tables of imports, exports, vessels entered and cleared, and other statistics of United States trade with foreign countries and noncontiguous territories.

The new export classification has increased the work of compiling the statistical reports to such an extent that the Monthly Summary has been issued about 10 days later since January, 1922, than in the previous year. A revision of the import classification is under way, to conform to the new tariff bill now before Congress, to be effective with its passage. This is likely to result in further delay. No great improvement in timeliness of publication may be expected until the statistical work in the New York customhouse, now under the Treasury Department, is transferred to the Department of Commerce and the consolidated statistical service is furnished with additional personnel and equipment commensurate with the increased work. Efforts to have the transfer made by various procedures have thus far been unsuccessful on account of legal complications. With the foreign-trade statistical service divided between two departments, it is impossible to keep the work up to date at all times and to make improvements demanded by American producers and traders.

The tables of "Tonnage of vessels entered and cleared," in the Monthly Summary, show tonnage entered and cleared "with cargo"

separately from the total, beginning with January, 1922, in order to give a better view of the actual trade with each country as shown by the vessel movement. A new statement giving the tonnage of "tankers" entered and cleared by countries has been added for the purpose of distinguishing oil shipments from other cargo.

The import and export tables by articles and countries for Commerce and Navigation in 1921 were prepared to show figures for five years, the fiscal year 1913 and the calendar years 1918 to 1921, for the purpose of comparing prewar with postwar trade.

There is an increasing demand for inclusion of parcel-post shipments in the statistics of exports. This trade has been growing in recent years, but as it does not pass through the customhouses no statistical returns of it have been made. It is probable that the Post Office Department could require, by regulations, declarations for mail shipments of a commercial character. With some addition to the equipment of the Bureau of Customs Statistics, of the Treasury Department, the mail declarations could be handled with the declarations for freight shipments and included in the statistical reports by articles and countries.

There is a strong demand from the great producing centers of the Middle West for statistics of exports by points of origin. There is also an increasing demand from railways and other commercial and transportation interests for statistics showing the tonnage of commodities passing in and out of the different ports.

The foreign-trade statistics are compiled by customs districts, conforming approximately to State lines. Many of the districts include several ports. The trade statistics could be compiled for each port, but that, like other projects mentioned above, would require additional mechanical equipment and would increase the size of the statistical publications.

The statistics of imports compiled by customs districts do not include all goods landed at the ports in the district, but represent entries handled and passed upon at the customhouses. Imported goods landed at New York or other seaports and transported under bond without appraisement to other ports (mostly interior) are credited in the statistical reports to the port or district where the goods are entered for warehouse or consumption and released to the importer. A supplementary report showing such goods by "ports from which and to which shipped" could be compiled (if increased equipment is provided) and would enable interested persons to ascertain the business of each port.

All the foregoing projects deserve serious consideration and would supply information of value. They can scarcely be undertaken while the compilation of trade figures is carried on as at present, but

if the planned consolidation is accomplished and increased appropriations are provided by Congress there is no reason why the demands should not be supplied.

COMMERCIAL INTELLIGENCE DIVISION.

Shortly after the beginning of the fiscal year 1922, the commercial-intelligence work was raised to the rank of a division, H. W. Gruber remaining in charge. Its activities, which up to that time had been confined largely to the Latin American field, were extended to cover the world. More comprehensive means were provided for collecting data on the continent of Europe, the Far East, and several of the large trading centers in Central and South America. Trade letters, directories, etc., were transferred from the various divisions and centralized under one direction.

Through the cooperation of the Consular Service and this department's own foreign representatives, sales-information reports are now on file covering all the leading business houses, manufacturers, and traders throughout the world. The World Trade Directory (the name applied to the card file containing the reports) was increased at the rate of approximately 500 new reports a week, or 25,000 during the year, and now totals more than 70,000 reports. In addition, much of the material on hand was verified and brought up to date.

As this vast amount of new information became available, trade lists were revised, amplified, and corrected to keep pace with constantly changing conditions, and new "starred" lists were compiled covering all the important commodities of world trade. The improvement in the lists has been marked. Requests for trade lists have increased 50 per cent over the preceding year.

Detailed reports are furnished in response to specific requests. About 20,000 requests for such special reports have been received.

In the division several desks are set aside at which representatives of business firms may copy additional desirable information regarding prospective clients which it is not possible to include in the bureau's mimeographed lists.

ADMINISTRATIVE DIVISIONS.

EDITORIAL DIVISION.

Beginning September 1, Commerce Reports was changed from a daily to a weekly publication, and this innovation was accompanied by radical departures in the presentation of the material. All articles relating to a given commodity or class of commodities are now grouped together, under an appropriate heading. There are also

special sections for each of the regional divisions. All the reports are subjected, before publication, to the scrutiny of experts. Cable reviews of foreign conditions form a regular feature. The pages are now of quarto size, instead of octavo, as in the old daily. The magazine has an attractive cover. The number of paid subscribers to Commerce Reports has increased 75 per cent during the year.

The number of reports received from the Consular Service increased from 19,825 in the fiscal year 1921 to 29,535 in 1922. As regards reports from the commercial attaché and trade commissioner services, the increase was from 4,962 to 5,512. The number of "Foreign trade opportunities" published in Commerce Reports increased from 1,926 to 2,960.

The editorial division resumed, during the year, the practice of publishing the annual reports of consular officers as supplements to Commerce Reports. These are being issued in the former octavo size.

Supplements of another class, which the bureau began issuing in February, are called Trade Information Bulletins. By the end of the fiscal year 46 of these had been published. They are decidedly shorter than the monographs and are issued more expeditiously. The subjects of the bulletins embrace all the manifold aspects of foreign trade.

Six monographs were edited in the Special Agents Series and 10 in the Miscellaneous Series. Among the more important of these have been the handbooks of Venezuela and Australia and the new edition of the Commercial Travelers' Guide to Latin America.

In July, 1921, the department began the publication of a monthly supplement to Commerce Reports, entitled "Survey of Current Business," compiled by the Bureau of the Census, the Bureau of Foreign and Domestic Commerce, and the Bureau of Standards, most of the work being done by the first-named bureau. This has contained a wealth of statistical data.

Through the institution of a press-release arrangement, all Foreign Trade Opportunities are now made available at the same time throughout the United States, and, consequently, business men in the vicinity of Washington have no advantage in this respect over those in Los Angeles or New Orleans.

About 5,000,000 readers are now reached each week by press items based on the work of the representatives of the Departments of State and Commerce. Many newspapers throughout the country are giving space every week—ranging from a column to more than a page—to the informational service of this department.

Griffith Evans has continued as editor of Commerce Reports and chief of the editorial division.

FOREIGN SERVICE DIVISION.

This division has charge of the administration of the foreign field service of the bureau. During the past fiscal year the bureau established new foreign offices in Athens, Bucharest, Habana, and Vladivostok, making the total number of such offices 27. The personnel of the foreign service increased 26 per cent.

On January 20, 1922, five of the commercial attachés located in Europe met in Paris for a discussion of problems. This conference proved very beneficial.

The foreign service division inaugurated a monthly informational cable service to the foreign representatives. This service was supplemented by a monthly letter concerning economic developments in the United States.

Twelve foreign representatives returned to the United States during the year to inform American business men regarding conditions abroad.

Harold Dotterer has continued as chief of the foreign service division.

DISTRICT OFFICE SERVICE.

During the fiscal year 1922 the bureau established one new district office at Manila and six new cooperative offices at Omaha, Milwaukee, Fort Worth, Pensacola, Rochester, and Atlanta—making a total of 33 field offices now in operation.

The work performed by the bureau's field offices in the United States has increased greatly during the past year. There were 51,497 callers desiring information, as compared with 39,541 during the preceding year. The number of letters handled was 227,972, against 162,858.

There has been increased cooperation with other branches of the Federal Government, as well as with State governments.

The divisions of the bureau at Washington have furnished to the field offices, for distribution, a greatly increased volume of timely material that, in nearly every instance, has been placed in the hands of the American concerns best able to use it, well within 24 hours after its receipt by the district manager.

The title of the men in charge of the district offices has been changed from "district-office manager" to "district manager," and the names of the offices themselves have been changed so as to designate the region served; for example, the Boston office has been made the "New England district office."

There has been a substantially greater demand than in previous years for "exhibits" (charts, specifications, plans, etc.) offered by

the bureau in connection with trade reports, together with much more numerous requests for trade lists, confidential circulars, etc.

The work of the division of commercial laws has aided greatly in the handling of trade disputes by the district offices. A plan now being completed provides that the United States Chamber of Commerce is to play a much greater part than heretofore in the settlement of such disputes.

During the past year, a good many fairs, exhibitions, conventions, and similar gatherings have provided exhibition space for the bureau, which has had displays of publications, samples, etc., with local officers of the organization present as foreign-trade advisers.

DIVISION OF CORRESPONDENCE AND DISTRIBUTION.

This division (of which Royal H. Brasel has continued as chief) comprises two distinct sections, "correspondence" and "distribution."

Supervision of the incoming and outgoing correspondence of the bureau is centralized in the first-named section. Correspondence handled directly by it, without reference to other divisions, includes requests for bureau publications, for lists of American manufacturers, for general Trade Opportunities and other confidential information, for names of importers in the United States, and inquiries concerning the general services of the bureau.

General correspondence relating to the administration of the Exporter's Index is carried on and the file of applications for listing in that index is maintained in this division. The Exporters' Index is a classified file of American firms and individuals interested in foreign trade, and this record is the basis of the bureau's distribution of confidential and semiconfidential information.

The stock of bureau publications is maintained in this division. The division continually furnishes stenographic and typing assistance to other units in the bureau.

Approximately 590,000 commercial inquiries were answered by the bureau and its district and cooperative offices during the fiscal year, excluding requests for trade lists and Trade Opportunity addresses. This is one-third more than were handled in the previous fiscal year. More than half a million of these were answered by the bureau in Washington and its seven district offices in the United States. There has been a general upward trend in the number of inquiries handled.

About 127,000 requests were received for the information reserved from "Foreign trade opportunity" announcements printed in Commerce Reports.

Nearly a million copies of lists of prospective foreign purchasers were supplied to American business men, an increase of 73 per cent as compared with the preceding year.

More than 350,000 copies of confidential and special circulars, comprising 744 separate statements, were sent out during the year to firms on the Exporters' Index. Approximately 106,000 copies of "selling letters," calling attention to special publications issued by the bureau, were distributed.

During the year, 178 new mailing lists were established. The bureau now has a total of 213 different mailing lists, carefully classified by commodities and topics, which are used currently for the effective distribution of bureau material. These have been consolidated into one file, the task involving an enormous amount of clerical work. The mailing list for special monthly statistical statements included about 19,000 names at the close of June, 1922, as compared with 1,742 at the end of the preceding fiscal year.

MISCELLANEOUS ACTIVITIES OF BUREAU.

INDUSTRIAL MOTION-PICTURE FILMS.

Work in connection with the motion-picture activities of the bureau, for the purpose of exploiting American industries abroad, was started on January 1. Since that time four films have been completed—"The story of a watch," "The story of an electric meter," "The story of an automobile," and "The story of compressed air." The total cost of these has been approximately $75,000, this sum having been expended by the various industrial organizations that have cooperated with the bureau. The Government has been subjected to no expense whatever in the production of these films other than the salary and incidental expenses of the single engineer in charge.

Four other films—"The story of paper," "The story of water power," "The story of transportation," and "The story of steel"—are under way and will probably be completed early in August.

These films are to be circulated through the Government agencies in foreign countries, as well as through numerous civic and educational organizations which have used such films extensively in the past. They are to be shown at the Brazilian Centennial Exposition at Rio de Janeiro.

This work is carried on under the personal direction of M. F. Leopold, engineer of the United States Bureau of Mines, who has been assigned to the Bureau of Foreign and Domestic Commerce by a cooperative arrangement between the two bureaus.

LIAISON WORK.

Frank R. Eldridge, jr., chief of the bureau's Far Eastern division, has served as contact officer to facilitate relations with the Department of State and other Government departments, in order to elimi-

nate duplication of effort, unnecessary correspondence, and possible misunderstanding. Such relations have made satisfactory progress. An effective arrangement has been established between the bureau and the Consular Service. Through a series of questionnaires prepared by the bureau's experts, it has been made possible for the consuls to undertake to satisfy the precise wants of American business men.

RECOMMENDATIONS.

Among the considerations which should be borne in mind in connection with the plans for the immediate future of this bureau are the following:

1. The extension of its activities and staff toward the fulfillment of the obligations originally placed upon it at the time of its foundation in connection with the study and promotion of domestic commerce. Its activities have been confined almost exclusively to the promotion of foreign trade, but the economic situation of the country now demands imperatively a more scientific investigation of the obstacles confronting domestic commerce. This need not involve, for the time being, any basic changes in the organization of the bureau; it would require the addition of experts to its existing divisions and especially to its district offices throughout the United States.

2. The strengthening of the foreign service of the bureau by the establishment of new offices in areas not yet covered and by the assignment to the present offices of more experts in special commodities and trade subjects. The specialization of the work of the bureau's establishment in Washington in divisions devoted to particular commodities, regions, and technical subjects has met with such enthusiastic support from the merchants and manufacturers of the country that similar improvement of the oversea staff is now urgently required.

3. The extension and elaboration of the commodity plan of organization of the bureau by the addition of experts in commodities not yet adequately covered by the present staff. These include some of the most important items in our export trade.

4. The statistical work of the bureau, which comprised originally all of its functions and still remains as its largest single undertaking, should be very considerably strengthened. It is earnestly hoped that the function of collecting foreign-trade statistics may be transferred from the Treasury Department to this bureau so as to improve the efficiency and general usefulness of that work.

5. The fiscal affairs of the bureau should be given careful attention. Some divisions have had more than 100 per cent turnover

creasing diversity of activities. The appropriation estimates for the coming year are to be renamed and more clearly classified and subdivided as an aid to Congress and the officers of the Bureau of the Budget. The growth of the staff of the bureau, both foreign and domestic, will necessitate a material strengthening of the accounts section.

6. The salaries of many statutory positions are still badly in need of improvement. Most of them were fixed years ago when the responsibilities of the bureau were a mere fraction of their present proportions. It has been impossible to fill many important positions on the staff because of this defect in the present organization. Some divisions have had more than 100 per cent turnover in the course of the past year because of the inability to secure competent employees at the salaries stipulated in statutes drawn up years ago.

Very truly yours,

JULIUS KLEIN,
Director, Bureau of Foreign and Domestic Commerce.

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BUREAU OF STANDARDS.

DEPARTMENT OF COMMERCE,
BUREAU OF STANDARDS,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the past year:

The outstanding feature of the past fiscal year has been the great amount of attention which has been paid to industrial standardization, to the elimination of waste in the industries, and to simplification of industrial products. The relations between the bureau and the industries of the country have always been very close, and during the war the bureau was often able to aid American manufacturers in the solution of difficult problems growing out of war conditions. It is now particularly gratifying to note that this cordial cooperation is continuing in peace times, and that the assistance which the bureau is rendering appears to be regarded by the industries of the country as of equal if not greater importance than the help which it was able to give them during the war.

SIMPLIFIED PRACTICE.

The new division of simplified practice, which was organized in January, 1922, as one of the divisions of the Bureau of Standards, is vigorously engaged, on a basis of cooperation with American business groups, in developing a nation-wide program with a view to lending the hand of the Government to the elimination of collective wastes in commerce and industry. These wastes, it is estimated, imply a loss of 30 per cent of American energies.

Our war experience, followed by the report, Waste in Industry, prepared by the Federated American Engineering Societies, proved conclusively the urgent necessity of utilizing standardization, the elimination of freak varieties, and the concentration of the processes of manufacturing and distribution upon the articles of greatest interchangeability. Accordingly, the division of simplified practice

was established as one of the units in a general program to eliminate industrial and commercial wastes as a fundamental means of stabilizing employment, developing our foreign commerce, increasing the quantity of our products and, in general, securing for every American citizen a higher standard of living.

The chief function of the division of simplified practice is to supplement the work heretofore conducted by other divisions of the Bureau of Standards by setting up a centralized agency to bring producers, distributors, and users of specific commodities together and to support the recommendations of those interested when they shall mutually agree upon simplifications of benefit to the industries and the public concerned.

Excellent illustrations of the opportunity for simplified practice are found in the work already done by several national industries. The National Paving Brick Manufacturers' Association brought to the division of simplified practice the need for simplifying the number of sizes of paving bricks. They estimated that there were about 30 sizes and varieties. After a preliminary conference with the department, they undertook in the name of the department an exact survey of the field, and found that instead of 30 there were 66 sizes and varieties of paving brick actually being manufactured and sold.

As a result of that survey, a conference was called by the department of the manufacturers, municipal engineers, various associations in the ceramic industry representing engineers, architects, and buyers, as well as the manufacturers of bricks. In a one-day meeting 30 representatives of organizations reduced the sizes and styles of paving brick by mutual consent from 66 to 11, and recommended that these sizes be adopted by their various associations and groups as recognized sizes in the paving-brick industry.

At a later conference of the standing committee appointed by the first conference, a further reduction from 11 to 7 was effected.

The metal and wood bed industry, together with the spring and mattress groups, realizing the advantage to be gained through simplification, asked the cooperation of the department in aiding their industry, and upon completion of surveys by the several associations, a general conference was called of representative manufacturers, distributors, and users, and again in a single day four sizes of beds of one standard length were adopted as recognized sizes in that particular industry. It was also agreed at the same time that the mattress and spring manufacturers should conform to the sizes agreed upon by the bed industry.

The results of these conferences are published in the Simplified Practice Recommendations of the department.

Surveys preparatory to calling conferences for the elimination of excess varieties and sizes are now being conducted by the parent asso-

ciations in the following industrial fields: Warehouse commercial forms; lumber; hardware; paints and varnish; sash, door, and millwork; clay products; cigar boxes; metal lath; common brick; storage batteries; spark plugs; automobile tires; ball bearings; milk-bottle openings and caps; and hollow building tile.

Similar opportunities for simplification in dimensional size and varieties exist in hundreds of lines, and although the division has only been operating for six months, contacts have been made with more than 65 industries, most prominent of which are those manufacturing farming equipment; electrical lighting fixtures; cordage; railway car wheels; stoves; machine tools; boxes and food containers; refrigerators; barrels; pianos and musical instruments; copper and brass products; structural slate; small tools; jute products; safes and vaults; tents and awnings; fabricated structural steel; metal culverts; flags; linoleum; and sheet glass.

Initial requests for action come from all branches of the trades. In some cases programs for simplification come from groups of retailers and others are made by the manufacturers. In general, these programs tend to reduce the amount of capital tied up in inventories by both manufacturers and retailers, to reduce the unit cost of manufacture by making it possible to introduce mass production methods, and also make more effective use of materials, equipment, and machinery by standardization of the work going through the plant. It intensifies competition on articles of greatest interchangeability and tends to open up new opportunities for small and specialized manufacturers.

WEIGHTS AND MEASURES.

Correct weights and measures are of fundamental importance in any civilized country, and investigations in the field of metrology have, therefore, received a great deal of attention during the year. In connection with length measurements, a thorough investigation has been carried out on the means for doing such work and on the instruments employed in the length-measurement laboratory, particularly the micrometer caliper. As a result, the facilities for conducting work of the very highest grade are now better than ever before. The principle of the interferometer has been applied to the determination of the errors of precision screws, such as are used in the construction of dividing engines, and the method seems well adapted to this purpose. The usual large number of routine length measurements have been made, and in addition a comparison was carried out between some of the bureau's modern standards of length and the oldest standard of this sort in the United States which has yet come before the bureau—the standard yard and ell of Fairfax County, Va., presented by the British Government in 1744.

Important and very satisfactory comparisons have been carried out between several sets of the bureau's high precision weights and the fundamental standards of mass for the country. The work was conducted with an error of less than 1 part in 50,000,000. Over 5,000 precision weights of various classes were tested during the year, and American-made weights now show a very high grade of workmanship, comparatively few rejections being found necessary. Among the weights tested have been several State standards, several standards for manufacturers, and the usual sets for commercial use. Some repair work on the bureau's own sets of analytical weights, such as are used in its chemical work, has been made during the year. A large number of equivalents between rare foreign weights and the metric or customary United States units have been checked up, and numerous tables on this subject have been found to be in need of revision.

In cooperation with the Naval Observatory, the bureau is investigating the diurnal variation of clock rates, but no definite conclusions as to whether such a variation does occur can yet be drawn. During the year the Horological Institute of America was formed, with the principal object of improving conditions in the watch making and repairing industries. The bureau has undertaken to test watches repaired by anyone seeking the institute's certificate of proficiency as a repairman. Arrangements have been made for the installation of radio equipment for receiving the time signal from the Arlington radio station, which will greatly improve the facilities of the section.

Considerable research work has been carried out on the density and thermal expansion of sodium chloride solutions, and an agreement has at last been reached between all interested parties on a standard scale for expressing the so-called "gravity" of petroleum oils. A special scale, differing from the regular Baumé scale, has at last been adopted as standard for the petroleum industry only, and the bureau will now test hydrometers according to this scale. A formula has been worked out for the ready calibration of horizontal cylindrical tanks with bulged ends, such as railroad tank cars, when the tanks are partially filled with liquid. A mimeographed circular on this subject will be issued. A total number of 13,453 tests of volumetric glassware were made during the year, and 71 per cent of the ware submitted passed the bureau's tests. This is a great improvement over the record of one year ago.

An investigation has been started on the accuracy of orifice meters, through which thousands of dollars worth of natural gas is being metered each year. Special equipment for this work is available at Edgewood Arsenal, and the War Department has kindly permitted the bureau to use its facilities. Work is also in progress on standard

methods of determining and rating the capacities of dry gas meters, and on the measurements of compressed gases.

The thermal expansion of dental inlay materials has an important bearing on the durability of fillings, and in connection with its work on the thermal expansion of different substances the bureau is giving particular attention to this question. It is believed that results of great value will be secured. An ultramicrometer for detecting very small changes in length has been constructed and calibrated, but there appear to be some difficulties in applying the apparatus to practical work.

Exceptional progress was made in the calibration of railroad track scales. The extensive repairs made to the scale-testing equipments last year enabled them to be kept in efficient service practically continuously during the first 10 months of the past year. Eight hundred and ninety-four track scales and 17 master scales were tested in 33 States and the District of Columbia. Forty-eight and one-half per cent of these scales were within the required tolerance, which is a satisfactory result, as indicating progress when compared with other years. Several privately owned test cars have been calibrated. There is still urgent need of a central depot for housing the bureau's master track scale. This was purchased several years ago, but because of lack of a suitable place in which to set it up, the bureau has not been able to use it. It is believed that a small depot in Chicago would serve the maximum number of railroads, and it is hoped that funds for erecting a suitable building and for installing the scale will soon be available. The schedule for testing mine scales was carried out so far as possible, but was naturally greatly interfered with by the strike. The general condition of such scales is still very unsatisfactory, out of 129 scales tested in Illinois only 21, or 16.3 per cent, having been found correct within the tolerance.

Many tests of miscellaneous weighing and measuring devices, including dial scales, personal weighing scales, dynamometers, gasoline dispensing pumps, etc., were made during the year. Several investigations are under way to secure information in connection with weights and measures tests and practices, and the results will be reported to the next weights and measures conference. Other important work has been carried out on the best methods for testing the large scales used for weighing grain, on railroad depot scales, and in the testing of scale levers and other parts, so as to write a logical specification for such material. Technologic Paper No. 208 has been issued and describes a method developed by the bureau for weighing by substitution, which is an important matter in testing the accuracy of large weights and for weighing heavy objects. The mathematical character of scale errors is being investigated.

As in the past, close cooperation has continued between State and municipal weights and measures officials and the bureau. The Fifteenth Annual Conference on Weights and Measures, held at the bureau last May, was extremely successful, and many important matters were discussed. Among these may be mentioned tolerance on loaves of bread, automatic indicating scales, leather-measuring machines, testing of heavy capacity scales, methods of wholesaling gasoline, serialization of type of weighing and measuring devices, and the manufacture of precision standards of weight. A complete revision of the bureau's compilation of the weights and measures laws of the different States has been carried out, and it is hoped that this may be printed in the near future. Some important progress has been made on a compilation of data concerning foreign weights and measures, which is of considerable interest to exporters.

In cooperation with the paper section, an investigation was made of micrometers used for measuring the thickness of paper, and other important work dealt with the errors in pipe threads. Numerous tests have been carried out for the National Screw Thread Commission, and a constant temperature room for use in the testing of precise end standards has been fitted up. Through the cooperation of the Ordnance Department of the Army, a small but thoroughly equipped shop has been maintained at the bureau for experimental work in gauge making and has proved of much value. Several instruments for use in the comparison of gauges have been built during the year. A total of 2,318 gauges of different kinds were tested both for the Government and the industries.

Several general investigations involving weights and measures, but of a somewhat different character from those outlined above, have been conducted during the year. Among them may be mentioned cooperative work on the standardization of rig irons for oil-well drilling equipment and an investigation of the relative performance of different types of adding machines for the Post Office Department.

ELECTRICITY.

As heretofore, the bureau's activities in the field of electricity have included not only the work with electrical units, standardization of measuring instruments, etc., but also the more technical subjects, such as radioactivity, radiocommunication, properties and performance of electrical equipment, and investigations relating to public utilities, and the preparation of safety and other codes.

The demand for testing precision resistance standards and resistance apparatus has been greater than during any previous year in the history of the bureau. The change in the resistance of a conductor with change in its potential has been examined and an im-

proved method has been developed for producing at a distance a magnified record of mechanical motions. The arrangement thus produced is of considerable importance in seismometry, and the bureau has assisted in investigations of earth motions in southern California, using the type of apparatus just mentioned.

Work on the determination of the resistance of the bureau's former standards of resistance has been carried out during the entire year and an important research in cooperation with the Laboratoire Centrale d'Electricité, the National Physical Laboratory, and the Aluminum Co. of America has determined the electrical properties of aluminum with the same degree of accuracy as has previously been done for copper. The effect of frequency on the inductance and resistance of single-layer coils has been studied and a research on the capacitance and power factor of paper condensers has been completed.

The best methods of measuring dielectric loss have been studied, and at the request of the Signal Corps of the War Department the properties of insulators for submarine cables have been investigated.

Ballistic work in cooperation with the Navy Department has been carried on as heretofore. This has included a study of variation of gun pressure with time, the development of apparatus for measuring ejection velocities, the determination of pressures in the recoil cylinders of guns, and measurement of velocity of projectiles inside the bore of a gun. A camera capable of taking 250 pictures per second has been built for photographing projectiles in flight, and the amount and character of the stresses in turrets and turret structures have been determined.

At the request of the Bureau of Engineering, Navy Department, the torsional vibrations of the crankshaft of a Diesel engine are being measured.

The number of electrical instruments tested for the Government was substantially the same as last year, but a considerable falling off was noted in instruments submitted by outside parties. Close cooperation has been maintained with makers and users of electrical instruments, and specifications have been recommended for adoption to govern purchase of such apparatus by the Government.

Considerable time has been spent in consultation with manufacturers of instruments, with the object of studying the demands for standardization of such apparatus.

The usual work on ignition apparatus for gasoline engines has been carried out and many different types of spark plugs, magnetoes, etc., have been tested. The field covered by magnetic measurements has been considerably extended and many practical problems involving the relationship between magnetic properties of a material and its other physical properties have been studied.

An important investigation on thermomagnetic analysis, a field heretofore neglected in this bureau, has been commenced, and it is believed that valuable information will be obtained.

A satisfactory magnetic compass, to be used under some conditions in tanks belonging to the United States Army was developed.

The calibration of standard electric lamps is now an important matter, 440 such lamps having been standardized during the year. Work on miniature standard lamps has also been carried out, and this is becoming of first importance, because of the use of these small lamps on automobiles. In the field of photometry, it has been realized that in the case of modern gas-filled lamps, the sphere is the only satisfactory method for determining candlepower and increased attention has been given to this subject. Flame standards have been studied and corrections applied, which eliminate some of the differences heretofore observed. New specifications governing the purchase of incandescent lamps by the Government were issued. It has been found necessary to revise this publication again, owing to the need for slight changes which were found desirable after use. Usual inspection and life tests of electric lamps have been continued, and important work has been started on standardization of the requirements governing automobile headlights. Very important work can be done by the bureau in this field, which will result in the elimination of conflicting laws in different localities.

During the past year tremendous interest has been shown in radio communication, due largely to the development of inexpensive receiving apparatus for radio telephone work. So many inquiries have been received by the bureau covering what might be termed the commercial radio field, that research work has to a certain extent been interfered with; however, such inquiries are desirable for the purpose of keeping the bureau informed as to the trend of developments.

Experimental work has been continued on electron tubes and special tubes for use as amplifiers have been developed. A radio-controlled relay was designed and a complete radio telephone set installed on a 36-foot motor-driven surfboat of the Coast Guard, which operated successfully under difficult conditions.

The question of regulations to avoid interference in radio broadcasting has been studied and a scientific paper has been issued on radio fog signaling. Radio receiving sets for general use have been investigated and large numbers of commercial sets have been tested with the object of improving and standardizing such equipment.

The bureau was represented on the Inter-Departmental Advisory Committee governing radio broadcasting and at the Radio Telephony Conference called by the Department of Commerce to consider problems of broadcasting.

During the summer of 1921 a member of the bureau served in the United States delegation to the International Radio Conference, at Paris, and also at a meeting of the International Union of Scientific Radio Telegraph, held at the same place.

Five hundred and fifty-four batteries of various types have been tested during the year, including batteries for all classes of service and for many of the departments of the Government as well as for manufacturers. An important conference was held during the year on the standardization of dry cells, and through hearty cooperation of manufacturers and users a very important work along this line has been carried out. The number of standard sizes of cells has been greatly reduced, which will give a cheaper and more satisfactory product to the public. A circular on the electrical characteristics of dry cells was issued, and specifications have been prepared at the suggestion of the Navy Department covering airplane batteries, and recommendations have been made to cooperate with several technical committees on starting and lighting batteries for automobiles. Resistance and potential measurements of dry cells have been made, and the sulphurization of storage-battery plates has been studied. Work has also been carried out on development of a more satisfactory separator for use in storage batteries. The testing of foreign makes of dry cells has been continued, and quite an interesting exhibit of such batteries, manufactured in Europe, is now maintained at the bureau. Measurements of the current and voltage in starting a 12-cylinder Liberty airplane engine were made at the request of the Army Air Service, this information being obtained with the aid of an oscillograph.

The measurement of radium has formed an important part of the bureau's work. A total of 31,407 equivalent milligrams of radium, with a value of $3,500,000, have been certified in these laboratories.

A larger amount of work on self-luminous materials has been conducted than ever before, but no work has been done during the year on the measurement of X rays.

The important work in connection with electrolysis has included the development of a new earth current meter of great value in making electrolysis surveys.

A study is being made of soil corrosion of pipes. This has necessitated the burying of samples of pipe in various parts of the country in order to determine the effect of various soil conditions on water and gas pipes.

An electric telemeter for measuring stresses in structures has been developed and in practical use has been performing successfully.

The third edition of the Electric Safety Code, prepared by the bureau, has been adopted as standard in several States, and a pic-

torial booklet of the rules showing application by illustration is in course of preparation.

An Electrical Safety Conference has been organized and a committee has been formed to assist in preparation of standards for lightning protection.

A combined electrical and fire code has been prepared and industrial safety standards worked out in cooperation with other interested organizations.

Other codes dealt with during the year have covered protection of heads and eyes of industrial workers, operations in connection with logging and sawmills, and the safety code governing elevators. This last-named code involved a study of elevator conditions in the city of Baltimore in cooperation with the city officials.

Investigations covering the utilization of gas have been continued and a short paper on How to Get Better Service with Less Natural Gas in Domestic Gas Appliances was issued as Circular No. 116 of the Bureau of Standards. It was also issued by a private printer who supplied 85,500 copies to different companies.

In connection with an investigation conducted by the Public Service Commission of Maryland, the most economical heating value standard for manufactured gas has been determined. Comprehensive work has been continued on standards for gas service in different localities and a gas safety code is practically completed.

General standards for electric light and power service have been studied and Bureau of Standards Circular No. 56, Standards for Electric Service, has been revised and a new edition will be issued at an early date.

Other work has dealt with standards for heating service and street lighting service, the former including field investigations of central heating plants in Ohio, Indiana, and Illinois.

Circular No. 112 on Telephone Service was issued during the year and apparently met a long-felt want, as the first edition was quickly exhausted.

At the request of the Chief Coordinator, for general supplies, a thorough investigation has been made of telephone conditions in Government departments in Washington and recommendations made for improving and cheapening this service for the Government. A complete revision of the supply schedule for telephone service was made at the request of the General Supply Committee, and new billing forms for telephone service in the Government were drawn up.

At the request of the Signal Corps, tests have been made of coast defense fire control equipment, and in cooperation with the radio section many tests have been conducted on radio receivers and submarine cables.

TEMPERATURE AND HEAT.

Work in connection with measurements of temperature and heat, as always the case, covers a very broad field, since this work includes every kind of heat and temperature measurement from the testing of clinical thermometers to experiments with automobile and airplane engines. A considerable reduction has taken place in the number of clinical thermometers tested during the year, and an important change in the type of thermometers submitted has been noted. While last year over 95 per cent of these were for veterinary use, during the present year only about 10 per cent were for such a purpose. In all, about 15,085 were tested. While several foreign countries are now making the testing of clinical thermometers by the Government compulsory and also a number of the States are beginning to show an interest in the subject, no step has yet been taken to require the testing of such thermometers by the bureau.

In connection with the American Society for Testing Materials, cooperative work has been carried out on the standardization of specifications for laboratory thermometers and a third edition of Circular No. 8 on Testing of Thermometers, including new regulations and fee schedules, was issued during the year.

The determination of the temperature coefficient of resistance is one of the most valuable tests of the purity of platinum, and many samples of this metal were tested in the laboratory.

Some time has been given to the perfection of devices for the automatic control of temperature, which is a very important point in connection with many industries. Improvements in the quality of metal available for constructing rare metal thermocouples has been brought about through the bureau's investigations, and material as good or better than the product of German manufacturers is now being refined both in America and England.

The work on the preparation of standard samples for the determination of thermoelectric fixed points is proceeding satisfactorily, and they will soon be available for distribution. The preparation of extremely pure materials for the determination of certain fixed points on the high-temperature scale is being carried out in cooperation with the chemistry division and an optical pyrometer for very accurate work at high temperatures has been developed.

The investigation of atomic properties has been continued, but the importance of the subject would warrant much more attention than the bureau is able to give it.

Two papers have been published on enhanced spectra, and an extensive investigation of X rays excited by low voltage electronic impact has been published.

A book written by two members of the staff and entitled, "The Origin of Spectra," will probably be published in the near future.

An elaborate series of measurements on the specific heat and specific volume of superheated ammonia vapor has been completed, and the bureau's work on the thermodynamic properties of ammonia, begun eight years ago, has been practically finished. This is a notable accomplishment and already a Mollier chart on the properties of ammonia has been issued. When the entire set of tables is complete, the thermodynamic properties of ammonia will have been better defined than the same properties of any other material.

Work on the thermodynamic properties of steam in cooperation with the American Society of Mechanical Engineers has been commenced and is a matter of extreme importance at the present time on account of the very high pressures which are being used in steam turbines. Apparatus is being perfected for investigation of thermal conductivity and heat transmission, but the work has not progressed very far during the year because of the limited personnel available.

Extensive repairs to the compressor used for the production of liquid air were completed during the year, but in spite of this work the plant was operated quite frequently and liquid air supplied for the bureau's requirements and to a limited extent to outside investigators.

Important work on the development of improved vacuum-insulated containers has been carried out, and a vessel is now under construction which is designed to have about 10 times the insulation efficiency of the best Dewar vessel.

The extensive program of fire tests of brick walls begun last year has been continued and is now nearing completion. The panels used in this work are 11 feet high and 16 feet wide, and every part of the work from the building of the panel by ordinary contract labor to the final test in the furnace is designed to duplicate, if possible, actual conditions. Twenty-three of the 30 tests which will comprise the complete series on 4, 8, and 12 inch walls have been completed.

Work has continued on the investigation of the fire-resistive and other properties of hollow building tile in cooperation with the Hollow Building Tile Association, and the results of tests on concrete columns which have been mentioned in previous reports have been published in the Proceedings of the American Concrete Institute.

The strength of materials at high temperatures is being studied in special apparatus, and a thorough study is being made of the building codes in use throughout the country. Other work has included a study of fire hazards and safety devices and the standardization and interpretation of fire tests.

Work in the altitude laboratory, where airplane engines can be tested under conditions duplicating actual flight, has included im-

portant work for the Air Service of the Army and Navy, the performance of several engines having been completely determined.

The investigation of ignition systems has been handled jointly with the electrical division and the performance of various spark plugs and other devices has received attention.

Carburetion problems in connection with airplane engines and automobiles are being thoroughly studied. Motor cars have been specially fitted up for tests under actual road conditions, one car in particular being provided with all the necessary recording equipment to give its complete performance in actual service.

Various blended fuels have been tested in cooperation with the Bureau of Mines, and the effect of different fuels on engine performance is being studied. A paper entitled "The Background of Detonation" was published by the National Advisory Committee for Aeronautics.

Under the auspices of the engineering division of the Air Service of the Army, many problems dealing with the lubrication of internal-combustion engines are being studied so that eventually satisfactory specifications for lubricating oils can be prepared. The cooling of aircraft engines is likewise an important matter and in cooperation with the engineering division of the Army Air Service an investgation has been started to determine the cooling conditions in air-cooled aviation engines.

Important results have been accomplished through the testing of brake linings, and the product of many manufacturers shows a notable improvement, much of which is due to the bureau's work, since before this investigation was started no satisfactory test had been developed for this material.

It is believed that the testing of the rear axles of motor trucks, which was started for the motor transport division of the Quartermaster Corps, will be completed during the coming year, and the results should assist in the selection of the most efficient and reliable axle for Government use and should likewise enable the industries to improve their product.

Combustion phenomena are being studied, particularly the velocity of flame propagation under various conditions, and many minor tests of engines and appliances have been carried out.

OPTICS.

Many fundamental investigations of importance have been conducted during the year in the field of optics. International cooperation has again been brought about on the determination of standard wave lengths, and it is gratifying to note that the International Astronomical Union at its meeting in Rome adopted nearly all the

bureau's work and suggestions, such as the retention of the cadmium red line as the primary standard for precision length measurements.

The investigation of arc spectra has been continued, emphasis being placed upon the less common materials such as the rare earths and the noble metals of the platinum group.

Spectroscopic analyses covering a great variety of materials were continued and about 70 spectrum tubes containing various gases were prepared and furnished to other laboratories for optical testing or spectrum standards.

Cooperation between the bureau and the sugar industry has been particularly close, and owing to the discontinuance of much of the laboratory work by the industries, the bureau has been called upon for more investigations than ever before. The best means for utilizing molasses have been studied, and as but little information is available in this country the work has made necessary a thorough reading of many foreign patents. As in the past, close cooperation has been maintained with the laboratories of the United States Customs Service and with the bureau's assistance an entire laboratory was designed and built in Baltimore.

The matter of efficient decolorizing agents is important in many industries, and the bureau is engaged in developing accurate methods for testing such materials which will be a great improvement over the unsatisfactory way now in use.

An investigation to determine the best means for producing levulose is being carried out, and it is hoped that a satisfactory and inexpensive method for producing this valuable sugar may eventually result.

The rotation dispersion of sugars has been thoroughly studied in connection with several of the rare sugars which have been produced by the bureau in a high state of purity.

Quartz plates used to check up the readings of saccharimeters have been tested for the industry, since upon the accuracy of these plates the important matter of testing sugar depends.

During the past year a study has been made of the inversion of sucrose and on the feasibility of substituting permanent light filters, such as colored glass, for the bichromate filter now adopted as standard for saccharimeters.

The decomposition of invert sugar in the presence of hydrochloric acid and the study of crystallization has been continued during the year. The delicate thermostatic control apparatus for growing large and perfect crystals has been in satisfactory operation all the year.

The bureau is determining with as high precision as possible the refractive indices of the pure sugar solutions over the complete range of concentrations and at various temperatures.

Work on the polarimetry of oils and on the study of raffinose in beet-sugar products is being carried out, the latter being of particular importance to beet-sugar producers in the mid West.

Some work has been done on the diffusion process in sugar manufacture, and quite a large number of saccharimeters sent in by the industries have been adjusted and standardized by the bureau.

The viscosity of sugar sirup has been studied, and a new formula devised for accurately and quickly determining this property. Many referee analyses of molasses have been carried out, and the factors influencing the formation of molasses in the beet-sugar industry are being studied.

The reaction of sugar products—that is, whether such material is acid or alkaline—is the subject of investigation. A new equipment has recently been secured which will aid in the prosecution of this work. Through the bureau's help, pure dextrose is now produced commercially, the plant designed by the bureau being now in successful operation.

Work is being done on the laboratory for sugar technology, but the apparatus is not yet complete. Independent investigation by a European scientist on the 100° point of the saccharimeter scale confirms the bureau's work on this subject, and it is believed that eventually international agreement concerning this point will be secured.

The gradation of sugars by sieve analysis is being studied though no further experimental work has been done. Many standard samples of sugar have been distributed, and the best methods of storing sugar and for measuring its color, as well as the very important problem of saving waste sugar, have received attention.

The production of a monochromatic light source is an important matter and during the year progress has taken the form of the development of a zinc lamp which it is believed will prove satisfactory. The production of table sirups of high density is an important point and is receiving attention by the bureau, as is also the optical properties of quartz at high temperatures and the polariscopic determination of double refraction in glass and the standardization of commercial sugars.

In colorimetry the production of a standard source of white light is of fundamental importance, and it is gratifying to note that progress has been made in this determination during the year. It is believed that eventually a color will be adopted which will be accepted by physicists throughout the world. Thus far the temperature of the source which approximates white light appears to be about 5,200° absolute centigrade, the color being similar to average noon sunlight at Washington, D. C. The method of determining this source is described in Scientific Paper No. 417.

The color grading of artificial illuminants and of daylight in terms of color temperature is being investigated, and particular attention has been paid to the spectral center of gravity scale for this purpose.

The spectral distribution of energy from a complete radiator has been studied, and the two methods for determining the visibility of radiant energy, the direct comparison method and the flicker method, have been investigated. This work is practically completed.

In cooperation with the Munsell Color Co., an investigation into the various outstanding problems of physiologic optics has been started, and with the assistance of the Bureau of Chemistry the spectral transmissive properties of dyes are being determined.

Other work has included the transmissive properties of vegetable coloring matters and the spectral transmission of spectrometers.

The testing of photographic lenses for the Air Service of the Army has been carried out during the year, and a new and improved apparatus for silvering glass has been constructed. A method for producing luminous cross wires for optical instruments has been studied at the request of the Navy Department, and a magnifying stereoscope has been designed for the Coast and Geodetic Survey. The need of the Geodetic Survey for an instrument which would measure the distance from a plane-table station to near landmarks has led to the design and construction by the bureau of a field telemeter which has given satisfactory results. The errors of the ring spherometer have been studied, and apparatus for measuring the transmission of optical glass has been redesigned and improved. Other instruments which have received attention include a horizontal angle measuring instrument, several new laboratory telescopes, the modification of special cameras for the Navy, and the preparation of drawings for standard prisms.

In the field of radiometry, a special roof covering for balloon hangars was investigated, and the radiation characteristics of quartz mercury vapor lamps for therapeutic purposes have been studied for the Public Health Service.

The radiation of numerous stars has been determined at the Lowell Observatory, Flagstaff, Ariz. This completes important work begun several years ago and indicates an energy distribution range from 3,000° C. for red stars, to 10,000 or 13,000° C. for blue stars.

The reradiation of the sun's rays by stars has been studied by means of the water cell. Photoelectrical investigations have included the study of several substances, and Scientific Paper No. 412 has been published on the subject.

Several experiments have been made to determine the possibility of direct transformation of light into an electric current, but no

results which would indicate that this is possible have so far been secured.

Assistance has been rendered to the fire department of the District of Columbia in connection with smoke masks, this problem coming properly within the field of optics, owing to its connection with dispersoids. Other important work in this field has included the study of turbidity in water supplies and the ultramicroscopic examination of various substances.

The extreme sensitivity of interference methods of measurements—that is, through the use of light waves—has made possible the determination of dimensional changes of very small samples. This has greatly aided in the work on thermal expansion, the determination of the index of refraction, and the calibration of end standards such as precision gauges. Light waves have even been applied directly to the ruling of line standards, and a line standard produced in this way and tested by the International Bureau at Paris was found to be of unusual accuracy.

In the field of photographic technology, the inertia of photographic plates and films has been thoroughly studied, and a paper entitled "The Sensitometry of Photographic Emulsions" has been issued. The color sensitizing of photographic plates by bathing is also described in a paper entitled "Studies in Color Sensitive Photographic Plates and Methods of Sensitizing by Bathing."

A method was developed for deciphering writing on charred documents which consists of placing the remains of the paper in contact with a photographic plate and leaving the same in complete darkness for a considerable period. Emanations from the charred paper causes a darkening of the plate which does not occur where the paper is covered with ink.

CHEMISTRY.

Work in chemistry has included a great deal of work in cooperation with those divisions of the bureau engaged in physical testing, besides strictly chemical investigations. During the past fiscal year special attention has been paid to a study of nickel deposition with the hope that those conditions of operation which will yield the most satisfactory results with the least expense and loss can be defined. In this research great assistance has been rendered by members of the American Electroplaters Society.

The work in gas chemistry has been conducted almost exclusively with funds transferred from the Air Service of the Army and Navy, and naturally their problems have received the greatest attention.

Several systems of producing hydrogen for aeronautical purposes have been investigated, including the steam-iron process, the ferrosilicon process, and several others.

Two hundred and ninety-nine different kinds of balloon fabric were tested during the year, and an improved apparatus for determining the permeability of these materials was developed. A method for showing the purity of the gas in a balloon without the necessity of drawing any of the gas from the balloon has also been constructed and is now ready for a service test. Other important work has been carried out on automatic gas analysis apparatus and the absorption of gas in liquids, and a circular is being prepared on pressure-volume-temperature relations of gases. The work on chemical reagents has been somewhat limited owing to the small personnel available, but it is realized that this is an important matter, and it is hoped that it will soon be prosecuted with greater vigor.

Research on the chemical and physical properties of the platinum metals has been continued, and, as in past years, a large number of standard samples of pure metals and alloys have been distributed. In cooperation with British, Scotch, and Italian analysts, a number of analyses of British standard pure metals were carried out. In cooperation with the American Society for Testing Materials, standard analytical methods are being developed, and the usual umpire analysis and routine work on ferrous and nonferrous metals have been conducted.

Important investigational work has been done on improved coatings for balloon fabric and on better methods for the analysis of rubber. In connection with the physical work on textiles, many analyses have been made to determine the composition of such materials.

To settle an international controversy regarding the dyeing of sealskins, important information was secured from the bureau, and its experts were called as witnesses in connection with the case, with the result that the final decision rendered was favorable to this country.

A large number of routine tests on dyes, inks, typewriter ribbon, carbon paper, glue, mucilage, and paste were carried out for the General Supply Committee and other branches of the Government.

An improved method for taking fingerprints was developed for the postal savings division of the Post Office Department, and a great many tests of lubricants for gasoline engines and other machinery were conducted.

Progress has been made in the study of oxidation of petroleum oils, and assistance has been rendered in drawing up specifications for these materials.

The work on soaps, cements, corrosion of metals, etc., has, as usual, involved a large amount of routine testing and important

cooperative work on the framing of suitable specifications to regulate the purchase of such supplies by the Government.

The method developed some time ago by the bureau for the determination of available lime in quick and hydrated limes has been subject to discussion during the past year, and the method has been tentatively approved as satisfactory.

Some cooperative tests in connection with corrosion and its prevention, and also on analysis of water for mechanical purposes, have been carried out.

Many analyses of paints, varnishes, and bituminous materials have been carried out, and in cooperation with the Federal Specifications Board numerous Government standard specifications have been issued.

Investigational work on the technique of testing paints and on the durability of roofings has likewise been conducted, and important information is being collected that will lead to the preparation of specifications for bituminous roofing materials.

ENGINEERING PHYSICS.

In the extensive field designated by the bureau as engineering physics, a great variety of investigational and testing work has been conducted during the year. This includes such important activities as those in connection with engineering instruments and mechanical appliances, sound, aeronautic instruments, and aerodynamical physics. Each of these fields in itself is a large one and has included advisory work on related subjects, such as the preparation of specifications and codes to govern plumbing installation in houses, the standardization of builders' hardware, and similar work. The bureau maintains one of the few current meter-rating stations in the country and 376 current meters were tested during the past year. Six hundred and one miscellaneous engineering instruments, such as the above-mentioned current meters and anemometers, speedometers, pressure gauges, radiator valves, etc., have also been tested in these laboratories. Other work has included the routine testing of fire extinguishers, largely for the Steamboat Inspection Service, the development of a satisfactory relief valve for hydrogen cylinders employed by the Army Air Service, and the investigation of elevator safety devices. Statistics prove that 74 per cent of fatal elevator accidents to the public occur at the hoistway door, and the bureau considers the development of a satisfactory interlocking device to be of the first importance. The laboratory set-up for testing such appliances is nearly completed.

A new sound source devised last year has been improved so as to be more readily controlled, and in connection with the measurements of sound intensity considerable progress has also been made. A

sound chamber larger than any other heretofore available has been built, consisting of a room for the sound sources, with one room at the side and another above, so that the sound transmission properties of large size wall and floor panels can be investigated. Assistance has been rendered to architects in advising them concerning the acoustic properties of buildings. This work has included a study of existing structures and suggestions concerning the plans of new buildings. In cooperation with the Navy Department, preparation is being made for a thorough investigation of the voice tubes used on naval vessels, and at the request of the Army Air Service a device for indicating the position of an airplane relative to the ground by means of sound has been developed. In cooperation with the Signal Corps, investigational work and development of apparatus for artillery sound ranging has been conducted, and to aid a number of projects under way in the laboratory a new and improved high-speed oscillograph camera has been constructed. A time-scale apparatus involving the use of tuning forks has been supplied to other divisions of the bureau, and a radio time recorder has been developed in cooperation with the Coast and Geodetic Survey. A solenoid chronograph for measuring projectile speed with an accuracy of at least 10 times as great as anything heretofore available in America is being developed for the Ordnance Department of the Army, and the gauge developed last year for measuring pressure in guns has been found to be satisfactory in actual trial. Other work in connection with ballistics and projectiles has included the determination of the principal moment of inertia of small-arms projectiles and the making of a yaw instrument for measuring the yaw motion of a projectile in flight.

Apparatus for measuring simultaneously the angular speed of a rotating system, together with the period and amplitude of existing torsional oscillation, is being constructed in the bureau's shops. Since most of the work in connection with aeronautic instruments has been conducted with funds provided by the Army, Navy, and National Advisory Committee for Aeronautics, practically all of the activities of the bureau in this field have been confined to work for these organizations.

The altitude effect on air-speed indicators has been studied and a second report on this subject has been sent to the National Advisory Committee for Aeronautics for publication. Work for the same committee on the properties of diaphragms has also been carried out. Experiments on elastic metallic strips subjected to tension and on Bourdon tubes have formed a part of the work. Many compasses of different types for use on airplanes have been inspected and their performance determined. A ground speed and drift indicator and air speed and water speed indicator have all

been developed in the laboratories during the year. A new electrically driven gyroscope indicator has been designed and constructed for the Army Air Service. It possesses certain advantages over other types of instruments and so far has been satisfactory in its performance. Preliminary work has been completed on the design of a turn indicator and an angle of incidence recorder.

A precision barometer has been completed and delivered to the engineering division of the Air Service, as well as an altimeter, which automatically compensates for changes in temperature. Another device similar to the above, but provided with recording mechanism, has been developed and found to operate satisfactorily, while laboratory tests on a precision barograph which the bureau has constructed indicate that it will prove more satisfactory than instruments of this type previously constructed.

A statoscope provided with an automatic electrically operated valve and a combined statoscope and rate-of-climb indicator which will function as either of these instruments have been constructed. A rate-of-climb recorder, more compact than one designed approximately one year ago, has been constructed for the Army Air Service, and for the same service the bureau has built an experimental model of an astronomical position finder. Nearly every type of airplane sextant in use has been examined and reports rendered concerning them, while a successful distant reading compass is in process of being made.

The Magellan medal of the American Philosophical Society was awarded to two members of the bureau's staff for their design of an earth inductor compass. Some work has been done on a latitude indicator for airplanes and also on an altitude and azimuth indicator, but the work is still in the preliminary stage.

Maps and map boards are being investigated with an idea of improving this equipment.

A horizontal angle indicator, which is an important instrument in connection with range finding from captive balloons, has been designed and working drawings completed, so the actual instrument can be constructed in the near future. A comprehensive study of existing types of bomb sights has been carried out with the idea of simplifying such instruments.

Other important work has included the design of an electric resistance thermometer, a ballonet volume indicator for dirigibles, manometers for use on balloons and airships, a device for recording photographically the oscillations of aircraft, a special chronograph for aircraft use, and a complete set of testing instruments, including an altimeter, air speed indicator, tachometer, oil pressure gauge, air pressure gauge, radiator thermometer, cockpit thermometer, and a set of correction curves.

The bureau is now equipped with three wind tunnels for studying the properties of devices designed to function in a wind stream. One of these tunnels, completed during the past year, has a diameter of 10 feet, and in it a wind speed of 75 miles per hour can be obtained. The other two tunnels are 54 inches and 36 inches in diameter, the small one giving a maximum speed of 180 miles per hour.

The comprehensive investigation on aerial bombs which has been in progress for three years has been continued, and the forces acting on models equipped with various forms of fins have been particularly studied. By means of models the merits of various devices for shielding airships when landing and leaving their hangars have also been determined.

In connection with work on the preparation of safety codes, a study has been made of wind resistance of ice-coated electric wires using a smooth metal cylinder of approximately the diameter of a wire covered with ice, suspended in one of the air tunnels. Studies have been made of the characteristics of the wind streams in the tunnels and in cooperation with the Weather Bureau tests have been made on Robinson anemometers for recording wind speeds.

For the Ordnance Department of the Army the head resistance and cross-wind forces on models of projectiles and aircraft bombs have received attention.

A report has been prepared on the jet propulsion of aircraft, and although this method does not seem likely to prove of any practical value, the report may serve to indicate what should not be attempted by inventors.

STRUCTURAL, ENGINEERING, AND MISCELLANEOUS MATERIALS.

In the testing of structural and miscellaneous materials the year has been a notable one in the increased interest which the industries are taking in standardization. Many conferences, arranged largely through the bureau's efforts, have taken place and closer cooperation between producers, consumers, and the Government has been the result.

The theory underlying the behavior of columns or compression members in steel structures is in an unsatisfactory condition, brought about by a lack of authoritative data on the subject. For this reason a very thorough investigation is being conducted on the behavior of columns under load, in which the bureau is cooperating with several large steel mills. A thorough study is likewise being made of the fatigue resistance of thin sheet metal, particularly duralumin, which is largely used for aircraft. Some work is under way on the verification of testing machines, and in this connection, the bureau's experience in the testing of scales has proved of great value. Quite a different line of work, but also one of importance, has been an inves-

tigation of the durability of dental alloys, conducted by the bureau for the Public Health Service. The crinkling stresses of steel tubing, which is used in building airplanes, have been studied, and the correct design for steel diaphragms, used between the shrapnel and the explosive charge in shrapnel shells, has been the subject of an investigation for the Navy Department. An investigation is being conducted on the best kind of steel for making balls used in the Brinell hardness testing machine, and for the Army several tests designed to duplicate as closely as possible service conditions have been made on motor-truck wheels.

The couplings used for the casing pipe of oil wells have proved to be weak in some cases, and in cooperation with interested parties an investigation is being carried out of the best material and construction for parts of this kind. A very extensive investigation of the strength of large steel columns of H-shaped cross section is now being conducted in cooperation with manufacturers of such columns. The strength of brick walls and of girder hooks used in structural operations, as well as welded structural members, is being determined at the request of certain of the steel industries.

Work is progressing in connection with the preparation of specifications for concrete, and several sessions of the American Society of Civil Engineers, the American Concrete Institute, and the American Society for Testing Materials have been held to discuss this problem. A technologic paper is being prepared on the strength of concrete floor slabs and on the reinforcement of slabs supported at two edges.

Another investigation of considerable economic importance is being carried out to determine whether rerolled steel is suitable for concrete reinforcement. It would appear that such steel may safely be used for such purposes. Other work covers the durability of concrete in alkali and sea water, and a general investigation of the characteristics of building stone from all sections of the country. Exposure tests are being made to determine the effectiveness of various brands of colorless waterproofing materials designed to protect the surface of stone buildings and on the durability of elastic pointing materials.

The discoloration of Indiana limestone, which has formed rather a serious drawback to the use of this material, is being investigated, with the hope that means will be found for its prevention. The durability of stucco forms the subject of another line of research, and in order to study the possible advantages of concrete construction for houses, several inspection trips have been made by members of the staff. In cooperation with the authorities of the city of Los Angeles a thorough study is being made of the corrosion of concrete and clay sewer pipe used in that city, an entirely new line of work that will probably yield results of great value. Work on an air analyzer for determining the fineness of cement and similar materials

has been continued, as has also the distribution of standard samples of cement for checking the value of sieves. The use of caustic magnesia cement and the constitution of Portland cement are being studied by means of extensive service tests and laboratory work. Many miscellaneous investigations and the usual large amount of cement testing for the Government service have been carried out during the year.

It has been found, as the result of work on hydrated lime and concrete, that when lime but no water is added to concrete the strength is increased and the flow is decreased. Panel tests are under way to determine the durability of lime plaster, and the apparatus designed by the bureau to measure plasticity is now being produced commercially, and four of these instruments have been tested at the bureau. The sand-carrying capacity of lime, methods for making plastic hydrates, and the constitution of hydrated lime form the subject of other investigations. In order to assist manufacturers to improve their product, the bureau is undertaking to measure the properties of commercial limes sent to it for test. It is also studying the action of lime on clay, the properties of lime-cement-sand mortars, and means for exercising control over the time of set of lime plaster. Work is being conducted on means for improving the adhesion between gypsum plaster and concrete, and on the effect of temperature of calcination on the properties of calcined gypsum.

A method has been devised for casehardening the molds used for casting pottery, which will greatly increase their durability; and the problem of a reliable method for determining anhydrite in gypsum, which is a harmful impurity, is receiving attention. Other work is being carried on to determine the effect of clay in gypsum for plastering purposes to decide on the best method for the measurement of consistency, and on the possibility of rendering gypsum more weatherproof and thus better adapted for exterior work. Some tests are being conducted on various gypsum plaster boards and wall boards, and on the properties of plastering sands, but it has been found impossible to write a specification for this material. The best that can be done is to correctly advise the user concerning the properties of different kinds of sands.

To aid in the work on rubber, several new pieces of equipment have been added to the laboratory during the year. The power loss in automobile tires is being studied by means of a special dynamometer, and already some interesting results have been obtained. Many different kinds of materials made up largely of rubber, such as packings, insulating tape, insulated wire, rubber heels and soles, rubber tubing, etc., have been tested for various branches of the Government, and in cooperation with the Department of Agriculture the work on rubber jar rings for canning is being continued. Increased dura-

bility of these rings will greatly lessen the loss caused by spoiling of canned fruits and vegetables. Compounding ingredients and methods for rubber analysis are also receiving attention.

The investigation of the comparative durability of sole leather filled with sulphite cellulose extract and sole leather filled with ordinary tanning materials has been completed, and the results published in Technologic Paper No. 215. The suitability of various synthetic tanning materials is being investigated, and important work is being carried on in cooperation with the Bureau of Fisheries to determine the suitability of shark leather for various purposes. Investigations, which it is hoped will lead to improvement in the quality of rubber heels, are being carried out in cooperation with the manufacturers. Some additions have been made to the machinery in the experimental tannery, which will allow work to be done on heavy leather samples of considerable size and on entire skins in the case of light leathers. A number of specifications covering leather and similar materials have been prepared for use of the Government.

Important progress can be reported on the standardization of textiles. Specifications have been prepared covering numbered duck, and the same problem in connection with hosiery, cordage, sheeting, press cloth, and conveyor belting is receiving attention, and while much work remains to be done to satisfy the various and to a certain extent conflicting interests involved, some valuable results have already been secured.

The heat-retaining properties of fabric, such as those used for blankets, are being studied with the object of properly defining these qualities, so that eventually specifications can be prepared. The problem is a complicated one, as many factors are involved. The processes used in the making of balloon fabrics are being investigated for the Air Service to determine the effect on the physical properties of the finished material. Another important piece of work has for its object the determination of new uses for low-grade cotton fabrics, and it is believed that when the properties of such materials are correctly understood, there will be no difficulty in employing it for many purposes. Aid has been given to the Tent & Awning Manufacturers Association and the Cotton Duck Association in settling a dispute growing out of the method for measuring the weight of fabric.

At the request of growers of Arizona Egyptian (Pima) cotton, quite a thorough investigation was made to determine the best uses for this material. Mail bags made of this cotton are now being given service tests by the Post Office Department. Some progress is being made on the design of a machine to study the abrasion of fabrics, and a great deal of interest is being shown in the subject.

Many tests to determine the percentage of cotton and wool in fabrics have been made for the Federal Trade Commission. Other work has included tests on cartridge-bag cloth, fish lines, fasteners for cartridge belts, lead lines for sounding purposes at sea, sheeting, suitings, printers' blankets, and a determination of the yardage of bandages which had been sold to the Government during the war and which proved to be too short.

While it has not been necessary to purchase much additional equipment for paper testing, a great deal of work has been turned out in this field during the year. One of the most important investigations is that to determine a satisfactory tearing test for paper, since this is the test ordinarily employed by experts in judging the quality of this material. It is believed that a suitable standard tearing test will be developed as a result of this work. Another important investigation has been conducted on instruments for measuring the thickness of paper and satisfactory specifications have been developed covering such devices. The efficiency of blotting papers depends on many factors and has been the subject of a thorough study. A practical test has been developed for determining their suitability for various uses.

The effect of relative humidity on the properties of paper is the subject of another line of work, and it would seem that in testing paper the relative humidity should be maintained within rather narrow limits. Tests have been made to determine the best quality of paper for blue-printing purposes, carbon paper, etc. The sizing quality of paper and stains to detect the material from which they are made are other subjects which have been covered in the laboratory. Increased interest is being shown in photomicrography as applied to paper, and the bureau is devoting considerable time to this subject. A satisfactory means for measuring the color of paper is much needed and in cooperation with the optical experts of the bureau a special instrument is being developed for determining this quality. An elaborate investigation is under way to determine whether the millions of tons of flax straw and tow which are now wasted each year can not be used for the manufacture of paper, and other important investigational work is in progress to find whether or not American clays can be used as paper fillers. In the standardization of paper, important progress has been made. A standard nomenclature for the paper industry, the adoption of standard-sized sheets, etc., form part of this work. Aid has been given several branches of the Government in preparing specifications for paper.

The bureau's work in the field of lubrication has included an investigation, which is still in progress, on the possibilities of reclaiming used lubricating oil, which, if it can be carried out successfully on a large scale, will save a very large sum each year. Viscosimeters,

which are instruments used to measure the viscosity of oils and similar substances, have been standardized, and some work has been carried out on the development of an oil friction testing machine.

METALLURGY.

Among the important problems in the field of metallurgy in which the bureau has been engaged during the year may be mentioned a study of the methods of analysis for gases in metals and a determination of the effect of these entrained gases on the behavior of metals in various stages of manufacture and on the properties of the finished metal products. Work on several important problems relating to railroad materials has been completed, one of which, the investigation of thermal stresses in chilled iron and steel car wheels, may lead to important developments in the design and manufacture of these wheels, with an indirect effect on weight of cars and speed of trains. The effect of using titanium in the manufacture of steel rails has been studied, and the results of an investigation on sound ingot practices have been published.

The present program relating to bearing metals has been completed, and methods of abrasion testing will next be considered. Papers have been published on alloy steels containing zirconium and other elements, properties of steels at elevated temperatures, and tests of centrifugally cast steel; the development of methods of metallographic etching for various metals has been studied, and there were prepared for publication several papers dealing with microconstituents and structures.

The investigation being carried out by a joint committee on the effect of sulphur on several grades of steel has led to a preliminary publication dealing with the relation of the sulphur content to the properties of rivet steel. A study of the rolling characteristics of medium carbon steel, the properties of pure alloys of iron, carbon and manganese, and the testing of wrought iron is ready for publication. Standard tests for molding sands are being developed with a joint committee representing the industry.

Some of the investigations started cover the corrosion of rust-resisting chromium and other steels, a comparison of the cutting qualities of high-speed steels, the preparation of platinum alloys of the highest purity, and several investigations principally of military interest.

Mention should also be made of the work of the research associates in metallurgy, relating to investigations in nickel and monel metal, malleable iron embrittlement by sherardizing, magnetic estimation of iron in brass, and the hot working of ingot iron as affected by sulphur, oxygen, and copper.

A notable event was the establishment of a committee advisory to the bureau on ferrous metals. This committee consists of delegates from technical societies interested in steel and iron, and is representative of the entire industry and will enable the bureau to keep in closer touch with the needs of the industry.

The organization of a committee on metals under the Federal Specifications Board in which the metallurgical division is taking an active part was also an important matter.

Other activities started the past year through the instrumentality of joint committees are investigations relating to gauge steels, mine drill steels, molding sands, welded rail joints, and thermal stresses in steel wheels.

The most important instrumental development was the design and construction of an automatic apparatus for thermal analysis, permitting the elimination of one operator in taking heating and cooling curves.

CERAMICS.

The cooperation between the Bureau of Standards and ceramic industries and users has never been so close and important as during the year.

The National and State Governments themselves are larger consumers of tableware and similar articles than is generally supposed. The importance of standard specifications for such materials is, therefore, very great. The same argument applies to ceramic materials for industrial and building purposes, and the past year has resulted in important progress in standardization of refractories, industrial porcelains, window glass, etc. Methods of test for china and semi-porcelain tableware have been developed and specifications prepared. The results of this work have shown that American hotel china is superior in some respects to the best imported plates, and there is no reason why domestic material can not be used exclusively for such service. The physical properties of hotel china bodies have been studied and research work carried out to determine the effect of thickness of plates on resistance to impact, a matter of extreme importance in chinaware which must stand the rough usage to which it is subjected in hotels, restaurants, and similar places.

The properties of foreign and domestic ball clays are being thoroughly studied, since it has always been supposed that English clays are the only ones suitable for the manufacture of high-grade ceramic products. It would appear that with the proper treatment the American clays can meet the requirements as satisfactorily as the foreign material. Somewhat similar work has been conducted on foreign and domestic clays as fillers for paper and on clays for coating

paper. The Bingham plastometer has been found very useful in connection with this work.

In cooperation with a group of manufacturers' organizations, including the American Press Brick Association, the Hollow Building Tile Association, Common Brick Manufacturers' Association of America, and National Paving Brick Manufacturers' Association, investigation work has been conducted on the water smoking and dehydration of clays. It appears as a result of this work that the time necessary for burning can be considerably reduced with corresponding economy in fuel. During the year specifications have been prepared for glass tumblers, glass tableware, and containers, and for window and plate glass.

The standardization of milk bottles has also been taken up. There is a very real need for such work, as the requirements in different States are not uniform, which results in considerable hardship on dealers and in dissatisfaction among users.

Other work has included the issuing of a circular on specifications for lime for glass making and studies of the strength of window glass, the disintegration of glass in water, and the best type of glass to use for ampoules or the containers employed in medical work for packing vaccines and intraveneous solutions. The Glass Containers Association of America has maintained a fellowship at the bureau, and important progress has been made on means for preventing the scumming of bottles.

Twenty-seven experimental melts of various kinds of optical glass were made during the year, amounting approximately to 29,000 pounds of glass. The technique of melting, molding, and annealing have been thoroughly studied, and incidentally 2,647 pounds of good glass have been delivered to the Navy Department's optical shop for use in the manufacture of lenses. An improvement has been made in the quality of optical glass pots and stirring rods by an alteration in the method of burning. The method of inspection for striæ has likewise been improved, and some important work has been carried out on the thermal properties of glass.

In connection with the Federal Specifications Board, a conference has been held at the bureau at which all of those Government departments interested in the purchase of refractories were represented. Variations in the methods of purchase used by different departments were brought out, and an advisory committee has been formed to keep in touch with the various commercial organizations and technical societies interested in the subject.

Investigational work is being conducted by the bureau on samples submitted by consumers with the ultimate object of preparing specifications covering refractories. The method of manufacturing glass pots and regulating the resistance to corrosion has been considerably

improved during the year, and very successful pots with a capacity of 1,000 pounds each are now regularly made in the laboratory.

Cooperative investigations have been carried out on architectural terra cotta in cooperation with the National Terra Cotta Association, with the idea of improving this material and studying the uses for which it is best fitted. As information is very limited concerning wet processes for enameling cast iron, this process has been investigated during the year and some very satisfactory compositions have been secured.

The work on fish scaling of enamels has been continued, and the previous conclusions of the bureau in regard to the causes and control of this defect have been confirmed. Preliminary report has appeared in the Journal of the American Ceramic Society. Tentative specifications have been issued for enameled kitchen ware, and the relation of composition and properties of sheet steel enamels has been studied.

BUILDING AND HOUSING.

The division of building and housing, which was created somewhat more than a year ago, has made important progress during the period covered by this report. The construction industry is one of the most important to the people of the country, and the bureau is doing everything in its power to aid this industry in meeting the public needs. This division is the only Federal organization with the duty of surveying the entire building field from the point of view of the general welfare.

Important progress has been made in the formulation of building and plumbing codes and in connection with city zoning, the work having been divided among several cooperating committees with the object of securing results as soon as possible. A study has been made of the building codes of practically every city and town having such regulations, and a preliminary set of recommended provisions governing small-house construction was issued last April. In connection with the plumbing code, actual tests are in progress to determine the relative merits of different fixtures, which must necessarily precede the writing of any specifications. A zoning primer, written in popular style and explaining the elements of zoning, has been issued and has been widely copied in various newspapers and the real-estate press.

A monthly table, giving the current prices of 24 items of building material as paid by contractors in about 60 cities, has been sent regularly to interested parties. The division is serving as a clearing house for other statistics relating to building construction which are obtained by other branches of the Government.

Economic and statistical studies, such as an investigation of the housing shortage, the proportion of family income usually paid for

rent, the number of families as compared with the number of dwellings, etc., are being carried out, and the results will be reported to all those interested.

Aid is being furnished to individual home builders through replies to inquiries and by means of the reports mentioned above. Assistance has likewise been given to community associations interested in improving building conditions in their localities.

OFFICE.

The office work of the bureau is somewhat more complicated than would be the case in a commercial institution, owing to the varied and highly specialized character of the researches which it conducts, and the results of which are all more or less dependent upon the efficiency of the clerical staff. In order to make the bureau's work available to the public, publications must be issued, reports of tests sent out promptly, and a very large correspondence carried on with scientific men all over the world.

During the past year the office handled accounts covering nearly $2,000,000 spent for technical supplies and research; personnel records covering a staff of about 900 scientific, technical, clerical, and other employees, divided among 193 grades and titles; accountability records on nearly 100,000 pieces of apparatus, equipment, tools, and furniture, and about 250,000 communications. The library now contains more than 23,000 volumes of technical books and receives nearly 600 scientific periodicals, printed in 12 languages. A complete file of current trade catalogues is maintained in the purchase section, so that when any new apparatus or equipment is required information concerning the sources from which it may be obtained can be secured with the least possible delay. Sixty-seven publications were issued during the year and many more manuscripts were prepared for the printer. The publications of the bureau are all listed in its Circular No. 24, a new edition of which has been prepared and will soon be ready for distribution by this bureau. All those interested in the work of the bureau should consult this circular, which gives, in addition to the title and price of the publication, a complete abstract of its subject matter.

Very truly yours,

S. W. Stratton,
Director, Bureau of Standards.

BUREAU OF FISHERIES.

DEPARTMENT OF COMMERCE,
BUREAU OF FISHERIES,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the past year:

COMMERCIAL FISHERIES.

The depth of the period of depression affecting the fisheries and the fishery industries, referred to in the report for 1921, has passed, and a slow but definite improvement is now apparent. During the calendar year 1921 the depression was extreme, both the catch and the quantities of fish preserved being smaller than in the previous year. The landings of fresh and salted fish at Portland and Gloucester, Mass., and Portland, Me., were over 27 million pounds less in quantity and 2½ million dollars less in value than in 1920. In Alaska the salmon pack decreased 1,832,637 cases and its value $15,970,056. The pack of sardines in Maine and the total catch of fish in California in 1921, as compared with 1920, are further examples of the decreased production of the fisheries. The prices received by the fishermen have also been lower, a condition that continued into the first half of the calendar year 1922.

This depression was practically world-wide, and reports from important fishing countries of Europe indicate that conditions were worse there than in the United States. While specific statistical data for the first half of the calendar year 1922 are not available, operations generally indicate a firmer tone in the market, and canners and manufacturers of scrap and oil are proceeding with more assurance than in the preceding year.

The bureau has endeavored to assist the industry in coping with the difficulties encountered during this period, particularly along practical lines, in the merchandising and preservation of fishery products. Its market surveys in Louisville, Ky., Pittsburgh, Pa.,

Chicago, Ill., Minneapolis and St. Paul, Minn., and Seattle, Wash., have been received with favor by the trade. These supply information concerning the consumption, sources of supply, avenues of transportation, extent of the wholesale and retail trade, the likes and dislikes of the consumer, and other factors entering into the business which have never been brought together before. The need for such reviews in various parts of the country is shown by the low consumption of fish and the difficulties encountered by producers in finding outlets for their catch.

Producers have awakened to the necessity of effecting improvements in the handling, transportation, and distribution of fresh and frozen fish, and in placing them in the hands of the consumer in better and more attractive condition. They are handicapped, however, by lack of facilities for investigation and experiment, and the most urgent need of the bureau is means for supplying this deficiency which the industry can not meet. Investigations in this field, to be of permanent value, are time-consuming and expensive. There are many problems to be solved, but it has been the policy of the bureau to limit its undertakings to those which, when concluded, will bring the greatest benefit to the largest number of persons.

The great interest shown in freezing fish in brine, and the potential value of development of a practical commercial method for using the process, has caused the bureau to adopt this as one of its major projects for investigation. A review of the present state of the subject has been published, attention has been called to means for properly glazing brine-frozen fish, and at the close of the fiscal year apparatus was under construction for experiments on a small commercial scale.

One of the heaviest financial burdens imposed on the fishermen is the cost of nets, which are subject to rapid deterioration in use and have to be frequently replaced. A review of the state of knowledge of net preservation and experiments with preservatives now in use or recommended by European investigators developed the lack of knowledge of the fundamental facts on which real progress must be based. Coincidently with experiments toward the development of a more satisfactory preservation, an investigation was undertaken of the weight added to nets by various types of preservatives, their effects on the flexibility, shrinkage, strength, and wearing qualities of the twine under various conditions of exposure, and their relative effects in preventing fouling by organic growths. The investigations are drawing to a close and a report on the results will be prepared for the use of the industry as promptly as practicable.

The oil used for frying sardines undergoes changes which impart an objectionable quality to the product and eventually render the oil

unfit for further use. A report on the nature, causes, and degree of this deterioration was published during the year. This work was undertaken with the purpose of preventing the deterioration of the oil or developing methods for its restoration to a usable condition, but the results indicated that the changes were of such character as to make realization of that purpose improbable. An attempt therefore has been made to develop a substitute process which would eliminate the fry bath. The successful canning of sardines is largely dependent on the removal of excess water from the fish. In the experiments made, the best results have accrued from thorough brining and drying, followed by packing the fish raw and cooking them in the subsequent processing in the cans. Storage and shipping tests are now in progress. The process appears to possess some merit.

The personnel of the bureau available for these technological investigations is inadequate in number and pitifully underpaid considering the needs of the industry and the number and difficulty of the problems awaiting solution. No small part of its time has been occupied in supplying information, suggestions, and advice concerning practically every broad phase of the fishery industries. If the bureau is to discharge its duty to the fisheries, its technological staff must be augmented and the salaries must be commensurate with the service required.

The statistical work of the bureau has been more energetically prosecuted than ever. The usual data for the more important fishing ports have been collected, compiled, and published; certain special fisheries such as those for shad and alewives in the Potomac and Hudson Rivers have been canvassed; a bulletin on the fisheries of Maryland and Virginia and one on the fish-canning and fish by-products industry were published; in cooperation with the Bureau of Markets, Department of Agriculture, monthly bulletins on the cold-storage holdings of fish were issued; and the bureau has cooperated with the Bureau of the Census in the collection of statistics of fish-oil production.

ALASKA FISHERIES.

The yield of the salmon industry of Alaska was greatly reduced in 1921 as compared with previous years, but nevertheless it produced 87 per cent of the value of the total output of the fisheries and for this reason received the major attention of the bureau. In addition to the limited regular personnel, a large temporary patrol force was utilized during the active fishing season of 1921, and in 1922 it was still further increased, constituting the largest force the bureau has ever put into the field. Conservation of the industry is believed best secured through the prevention of illegal fishing or other violations of the laws.

The production of halibut; herring; trout; shrimp; and mild-cured, pickled, and fresh salmon was greater in 1921 than in the previous year, but, on the whole, the industry declined both in production and value, the heaviest loss being in salmon canning. In 1921, 15,070 persons were employed in the fisheries, the active investment of capital was $39,001,874, and the value of products was $24,086,867. The output of canned salmon was 2,596,826 cases of forty-eight 1-pound cans each, valued at $19,632,744, a decrease of approximately 41 per cent in quantity and 45 per cent in value as compared with the previous year.

In October and November, 1921, three hearings were held for the consideration of necessary changes in the regulations regarding salmon fishing, and as a result the department issued orders, effective January 1, 1922, whereby all commercial fishing in the streams and lakes of Alaska, and within a zone extending 500 yards off the mouths of all streams, is now prohibited, with the exception of the Ugashik and Karluk Rivers, where, owing to peculiar geographic conditions, specified districts remain open to fishing.

On February 17, 1922, an Executive order was issued creating a reservation designated as the Alaska Peninsula Fisheries Reservation, extending eastward from the Aleutian Islands Reservation to a line from Foggy Cape, on the eastern end of Sutwik Island, to Cape Menshikof, on the northern shore of the Alaska Peninsula, and including the Shumagin Islands and the territorial waters adjacent to these lands, and also the lands of the Aleutian Islands Reservation. Regulations governing fishery operations within this reservation were also issued, and permits were granted by the department for 1922 to plants already established within the reserved area.

No change has been made in the Alaska fishery law since its adoption, June 26, 1906, although efforts have been made repeatedly by the Department of Commerce, Alaskan representatives, and those engaged in the fishery industry to obtain a revision. Various bills have at times been pending in Congress, but little progress was ever made because of opposition which developed to certain features of the proposed legislation. The limited authority of the department has been supplemented by the issuance of Executive orders in some instances, which have permitted the restriction of operations within specified areas. This is a means, however, which properly may be used only in emergencies, and does not obviate the need of general revision of the fisheries law to cover new branches of the industry which have developed and new situations which have arisen in recent years.

ALASKA FUR-SEAL SERVICE.

The importance of the work of the fur-seal service is growing from year to year with the increase in the size of the seal and fox herds and the larger number of skins taken. As a result of experi-

ments improved methods of handling the fur-seal skins are being gradually put into effect on the islands.

Sealskins secured in 1921 numbered 23,681, practically all of which were from animals 3 and 4 years old. The number taken in 1922 through the regular killing season that ended on August 5, was 30,261, of which 29,153 were from 3-year-olds. The census of the seal herd as of August 10, 1921, indicated 581,443 animals of all ages, of which 176,655 were breeding females, and the same number were newborn young.

Under the contract with Fouke Fur Co. for the dressing, dyeing, and sale of the fur-seal and fox skins from the Pribilof Islands, two public auction sales were held at St. Louis in the fiscal year 1922. A total of 22,976 dressed, dyed, and machined fur-seal skins were disposed of, and gross proceeds of the sales were $722,060, net proceeds being $313,492.33 after deduction of all expenses, including payments to Great Britain and Japan under the sealing convention of July 7, 1911.

There is also a considerable return from the herds of blue foxes which are maintained on the Pribilof Islands. Special attention has been given to the development and care of these herds which, it is believed, will steadily become more valuable from year to year since a dependable supply of food is available from the commercial killings of seals. The fox pelts taken during the winter of 1920–21, numbering 1,125 blues and 14 whites, were sold at public auction in St. Louis in September, 1921, for $109,398. During the winter of 1921–22 foxing operations yielded a total of 712 blue and 21 white pelts, which will be sold in due course. A suitable reserve of breeding animals was also made for the maintenance of the herds.

The work on the Pribilof Islands is carried on by the bureau's staff of about 15 white employees and the communities of natives numbering in all over 300 persons. In return for the general services performed, the natives are furnished food, fuel, clothing, and miscellaneous supplies, and provided with living quarters, medical attention, and school facilities. Cash payments are also made for certain work in connection with the taking of seal and fox skins. Annual supplies for the Pribilof Islands were transported chiefly by the radio tender *Saturn* of the Navy Department, but smaller shipments were made by commercial vessels at various times during the year. Vessels of the Coast Guard also rendered many courtesies in the transportation of passengers and small lots of supplies.

A party headed by the Assistant Secretary of Commerce is making a trip in the summer of 1922 to the Pribilof Islands and other islands of the North Pacific Ocean, to which fur seals resort. Special attention will be given to the methods of taking the seal census and determining the quotas of animals which may properly be killed for

their skins. Observations of the Japanese and Russian herds will also be made as opportunity affords, with a view to the securing of information which may be helpful in the management of the American herd.

BIOLOGICAL INQUIRIES AND EXPERIMENTS.

The original function of the Bureau of Fisheries was to inquire into the causes of the decrease of aquatic resources, to seek means of checking decreases, and to promote increases. The conservation of the fisheries by sound protective measures and the avoidance of futile and restrictive legislation, the efficient application of fish culture, and in many cases the development of new sources of supply, all rest on the foundation of accurate information concerning the life histories and specific peculiarities of the organisms dealt with. The knowledge must be acquired before it can be applied.

During the fiscal year the bureau has been engaged in the acquisition of such information to the extent permitted by its available funds and personnel. From the multiplicity of problems to be solved those have been selected which appear most capable of solution with regard to the qualifications and experience of its staff. These investigations dealt specifically with a number of the more important economic fishes, oysters, pearl mussels used in the button industry, water pollutions, fish diseases, and other factors affecting fish culture, general conditions affecting important fisheries at large, and, principally through cooperation with other agencies and at little or no expense, studies of the physics, chemistry, and biology of interior waters as affecting the maintenance and increase of local fish supplies. The more important only of these can be mentioned in this abstract.

Extensive investigations of the runs of salmon in southeastern and central Alaska were conducted, those in the Karluk River region of Kodiak Island yielding results of particular interest and value. Every spawning stream tributary to Karluk Lake was examined and upward of a million red salmon were observed on the limited spawning grounds of the district. A rack was constructed in Karluk River early in the season and a count of the salmon ascending the stream showed a total escapement of 1,322,000 fish to September 17. The escapement for spawning as related to the commercial catch, which the bureau has under observation also at Litnik, Alaska, and Quinault Lake and Baker Lake, Wash., is receiving merited attention from the fishing interests.

Investigations of the migrations and life histories of salmons in the streams of the Pacific Coast States have been continued.

The whitefish and its relatives yield nearly one-half of the quantity and value of the fisheries of the Great Lakes, and by reason of the

central location of the waters from which they are taken have peculiar importance as a food supply in a region remote from the source of sea foods. The value of this fishery, the vigor with which it is prosecuted, and the accessibility of the fish to capture, have induced extensive resort to fish culture by both the Federal Government and the several States. It is of particular importance, therefore, that the life history and habits of these fishes should be thoroughly known that fatal mistakes may be avoided, favorable opportunities for their preservation and increase be availed of, and unsuspected supplies be revealed.

The investigation of whitefishes and related species has been under way for several years, and in 1921 was extended to Lakes Ontario and Superior. As a result of the work it has been discovered that there live in deep water in Lake Ontario three species of the family in sufficient abundance to support a fishery, but which have never been taken in the fishermen's nets.

Oyster investigations have been continued in Great South Bay, N. Y., and Long Island Sound, where in recent years conditions have been such as seriously to threaten the ruin of the business. For a considerable period there has been either no set of young oysters or those which have set have died before reaching a size suitable for transplanting. The failure of the set in Long Island Sound appears to be due to damage to the spawning beds in the warmer inshore waters from the discharge of industrial wastes. The colder, less-polluted offshore waters are not conducive to active spawning. Some progress was made in the location of areas reasonably free from pollution and with the requisite water temperature on which spawning beds may be established.

In Great South Bay the investigations have made it possible to indicate with approximate accuracy the optimum time for planting cultch, and as a result of the information furnished a heavy set was obtained, but practically all of it died before it had reached a stage of growth at which it could be shifted to other grounds. The cause of this mortality has not been exactly determined, but it has been shown that it is due to the nature of the bottom or the stratum of water immediately adjacent thereto, and that it can be prevented by raising the oysters a few inches. Experiments are now being made to determine the feasibility of using some form of cultch which will elevate the oysters to a level of more favorable environment.

To furnish fundamental data concerning the hydrographic, biological, and pollutional conditions in Long Island Sound, the lack of which has made the work of investigators more difficult, the bureau toward the end of the fiscal year began a survey by the steamer *Fish Hawk* under the direction of the naturalist of the *Albatross*.

Water pollution in relation to fishes has been investigated also in the Saginaw drainage system of Michigan in cooperation with the University of Michigan and the Michigan Department of Health, and on the Illinois River in cooperation with the Illinois State Natural History Survey, the Chicago Drainage District, and the United States Public Health Service. The fish pathologist has made investigations into the mortality among fishes in various parts of the country and of fish diseases at certain of the bureau's hatcheries.

The field work for an investigation of the fishes of Chesapeake Bay was completed during the year, and the critical study of the material was begun. The general fishery situation in the bay during the year was good. While certain species have declined in numbers, others are maintaining their numbers in the face of increased fishing, and at least one species, the croaker, has notably increased in abundance. The commercial fishermen have shown great interest in the work and have been helpful in supplying data.

During the year 292,443,000 fresh-water mussel larvæ were implanted on fishes and liberated in the rivers of the Mississippi drainage system. This work, which has been conducted on a large scale for a number of years, is credited by pearl-button manufacturers and fishermen with having an important part in maintaining and increasing the available supply of mussels.

PROPAGATION OF FOOD FISHES.

While regulatory measures for the protection of the fisheries within the territorial limits of the several States do not come within the scope of the bureau's functions, Congress early recognized that the Federal Government could assist in the maintenance of threatened, and the rehabilitation of exhausted, fisheries through artificial propagation of useful species. This has been an important phase of the bureau's operations for 50 years, and to this work there has been added, within the last decade, the related duty of rescuing millions of food fishes annually left stranded on the recession of the periodical floods of the Mississippi River and its tributaries. The propagation of the commercial food fishes is important not only on account of its magnitude but also for the reason that most of the eggs incubated and hatched are taken from fishes caught for the market and therefore represent the salvage of what otherwise inevitably would be destroyed. While it is recognized that the principal commercial fishes are of greater importance to the country at large than are the fishes of the minor interior waters, the benefits accruing to the general public from stocking the smaller lakes and streams with desirable food and game fishes are not inconsiderable, as, in addition to the recreation which these fish afford, they furnish in many large areas of the country the only fish food which is avail-

able to the consuming public. While some of this work might be, and to a considerable extent is, undertaken by the several States, it appears proper that Federal aid should be given to the work, as in certain respects it has a national significance. The stocking of interstate and boundary waters, of the lakes and streams of the national parks and forests, and of the great reservoirs used for power and irrigation purposes, in many cases has national rather than State or local implication.

During the fiscal year 1922 forty-three species of fish were propagated and distributed by the bureau, including those which were handled in connection with the rescue operations. The eggs secured from all available sources numbered 6,423,397,830, while the total distribution of fertilized eggs, fry, and fingerling fish totaled 5,125,-101,320, not including a considerable number which remained on hand at the several hatcheries at the close of the year. Approximately 99 per cent of the fish handled were food fishes important in commerce, and a large percentage of the available funds was expended on the multiplication of these fishes, which included marine fishes of the Atlantic coast, including cod, pollock, haddock, flounders, and mackerel, anadromous fishes of the Atlantic coast such as the shad and striped bass, five species of salmon and the steelhead trout on the Pacific coast, the whitefishes, lake trout, pike perch, carp, and other species of the Great Lakes, and the buffalo fish of the Mississippi Valley. During the year the number of food fish rescued from the overflowed lands of the Mississippi Valley aggregated approximately 180 millions, about 20 millions in excess of the number rescued in the preceding year.

All fish of the commercial species were planted in places selected by the bureau, but the food and game species for stocking minor interior waters were furnished principally in response to applications of individuals, fish and game commissions, national park and forest reserve officers, and clubs interested in the conservation and increase in the fish populations of the streams in their territory. During the year 10,376 such applications were honored.

It has been observed with satisfaction that there is a growing public sentiment in favor of fish conservation, resulting in the greater efficiency of the bureau's planting operations. A number of States which formerly ignored this matter are now seeking advice and aid in the framing of laws for fish protection and for the establishment of fish hatcheries under State jurisdiction. The policy of fostering close cooperative relations with the various State fish and game authorities has been followed up and extended wherever circumstances would permit. During the fiscal year 1922 the bureau engaged in cooperative fish-cultural work with 26 of the State fishery departments, with beneficial results to all concerned in every

instance. In some cases the work has consisted in the operation of egg-collecting fields conjointly, in others of an exchange of eggs of different species, with the view of effecting economy in the distribution of the resulting fish, and in still other cases the bureau has incubated at its hatcheries eggs purchased from commercial fish-culturists by State fish commissions having no hatching facilities of their own. Again, some of the States have furnished transportation for the bureau's cars or messengers in making distribution of fish within their borders.

During the year the bureau furnished in round numbers 325,000,000 fish eggs to various State fishery departments. Upward of 62,000,000 eggs were also furnished to the Canadian fisheries authorities, with whom close cooperative relations have likewise been maintained. The assignments to the Canadian Government consisted of whitefish eggs, in return for the privilege of collecting spawn of that species for the bureau's hatcheries in Canadian waters, and eggs of the rainbow and brook trout and of the landlocked salmon in exchange for an equal number of eggs of the Atlantic salmon. Eggs of the rainbow trout and lake trout in smaller numbers were furnished to the Republic of Switzerland and Czechoslovakia and to the Territory of Hawaii.

During the year a new type of container for the transportation of live fishes was developed by the bureau, the general use of which promises appreciably to reduce the cost of fish distribution.

Very truly yours,

HENRY O'MALLEY,
Commissioner of Fisheries.

LIGHTHOUSE SERVICE.

DEPARTMENT OF COMMERCE,
BUREAU OF LIGHTHOUSES,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the service during the past year:

MORE IMPORTANT ACTIVITIES OF THE LIGHTHOUSE SERVICE DURING THE YEAR.

In addition to the three initial radio fog signal stations established last year on Ambrose Channel and Fire Island Light Vessels and at Sea Girt Light Station, in the vicinity of New York Harbor, radio fog signal stations were placed in commission during this year on San Francisco Light Vessel, California, and on a relief light vessel in the third district. Radio fog signal apparatus was also installed on light vessel *No. 105*, which was completed during the fiscal year, and is soon to be placed on station on Diamond Shoals off Cape Hatteras, N. C. Materials have been ordered for radio fog signal installations on two light vessels stationed in Massachusetts waters, two in Pacific coast waters, one off Cape Charles, Va., and at Cape Henry Light Station, seacoast of Virginia.

Hereafter the Lighthouse Service will maintain regular radio communication with 20 light vessel stations, including all the principal outside vessels; this will be of great advantage in reporting cases of distress at sea and in the operation of the light vessels. A plan was agreed upon with the Navy Department for taking over the radio equipment, and for relief of the Navy men detailed for duty on some of these vessels.

Three new lighthouse tenders were completed and placed in commission during the year. New light vessel *No. 105* was completed and is being equipped for service at an early date on the important station Diamond Shoals, N. C. Five new light vessels are being constructed, their status ranging from about 23 to 45 per cent completed at the end of the fiscal year. These vessels are being built under an appropriation of $1,000,000 made by act of March 4, 1921, this

being a part of the $5,000,000 vessel rebuilding program which was authorized by act of June 5, 1920, but for which no further appropriation has been made.

During the year important improvements were completed or in progress at lighthouse depots at Chelsea, Mass., Staten Island (general depot), N. Y., Galveston, Tex., and Detroit, Mich.; to aids to navigation on the Hudson, Delaware, St. Johns, Mississippi, Detroit, and St. Marys Rivers; to aids on Chesapeake Bay, Florida Reefs, Fairport and Conneaut Harbors, Ohio, Indiana Harbor, Ind., and Guantanamo Bay, Cuba, at Point Jiguero Light Station, P. R., Dry Tortugas Light Station, Fla., Galveston Jetty Light Station, Tex., Poverty Island Light Station, Mich., Spectacle Reef Light Station, Mich., and South Pass Range Rear Light Station, La.; and rebuilding and repairing aids to navigation damaged by successive storms on the Atlantic and Gulf coasts.

There were 49 aids to navigation established in Alaska during the year, of which 9 were lights and 2 were gas buoys. The total number of aids to navigation in Alaska is now 582.

SUMMARY OF MORE URGENT NEEDS OF THE LIGHTHOUSE SERVICE.

1. There is urgent need of legislation permitting the readjustment of pay of the technical and supervisory and clerical staff of the Lighthouse Service. These are now distinctly and greatly underpaid, considering the extent and responsibility of the work, the technical requirements, the cost of living, the purchasing value of the dollar, the rates of compensation now in effect in comparable services, both within and without the Government, and in other parts of this service itself.

2. Provision is greatly needed for replacing a number of vessels of the Lighthouse Service which have been worn out in service or which will soon have to be condemned. The vessels now under construction, or being reconditioned, will meet only a portion of the immediate requirements. It is not safe or economical to continue the use of vessels no longer fit for service.

3. Provision is greatly needed for improved depot facilities in several of the districts, particularly at or near Norfolk, Va., Newport, R. I., Key West, Fla., and Honolulu, Hawaii, and additional funds are needed for the completion of the important depots at Boston, Mass., Charleston, S. C., and Ketchikan, Alaska.

4. Legislation is greatly needed for extending the retirement system in the Lighthouse Service to cases of disability incident to the work other than injuries received in the line of duty, already provided for.

5. Legislation is important to better define the relations of the Lighthouse Service to the Navy under the act of August 29, 1916, providing for its transfer in time of national emergency.

6. It is important that provision be made for the more urgent of the long list of special works for the Lighthouse Service, which, after careful investigation, have been approved as meritorious. These, besides the vessels and depots above mentioned, include a lighthouse and fog signal at Cape Spencer, Alaska; the installation of radio fog signals; the protection of Stannard Rock Light Station, Lake Superior; and improvements to the aids to navigation in Galveston Bay and Houston Channel, Tex.; Potomac River, Md.; Ludington, Mich.; west coast of Florida; Sandusky Bay, Ohio; Fairport, Ohio; Erie, Pa.; Marquette, Mich.; and Grays Harbor, Wash.; and the depot at Ediz Hook, Wash.

More complete explanations of these and other recommendations are given in the following statements:

SPECIAL LEGISLATION NEEDED.

INCREASE OF STATUTORY SALARIES.

The legislation most urgently needed for the Lighthouse Service at the present time is a revision of the salaries now fixed by statute and which have not been adjusted to meet changed conditions since the reorganization of this service in 1910, so as to permit the service to again attract, as it formerly did, a high grade of suitable and efficient employees. In highly technical work, such as that of the Lighthouse Service, there is great waste through loss of time and ineffective work, when, as has become more and more the case in the last few years, the service does not offer sufficient compensation to attract to it a personnel suited to its special needs nor to retain many who do enter it. The proportion of trained and efficient personnel has diminished to a serious extent during recent years.

There are at the present time very great and unjust inequalities in the scales of compensation of branches of the Government having duties of similar responsibility and requiring similar qualifications, and certain portions of the personnel of the Lighthouse Service especially suffer in this respect. This applies particularly to statutory salaries in district offices and in the bureau at Washington. The fact that Congress has, both directly and indirectly through lump-sum appropriations, provided in recent years much more liberal pay schedules for new organizations and has made substantial increases in pay for the military services and has extended these to several services with civil duties, but subject to transfer to the Navy in time of war, as is the Lighthouse Service under the laws enacted, has greatly increased the difficulty of operating the Lighthouse

Service with its inadequate and unadjusted salary scales. At present officers in the Lighthouse Service charged with important responsibilities are in some cases receiving less than half the compensation of persons in other services in similar status and with no greater responsibilities or requirements.

The Lighthouse Service is one of the largest and most extended technical organizations of the Government, a great variety of duty and extent of responsibility are required of its staff, they are subject to duty in the most expensive cities as well as in remote outlying possessions, and they are responsible for the efficient maintenance of a plant of great value and importance. The service is operated with a minimum of overhead technical and office staff, and the amount required to bring about some reasonable readjustment of compensation would be a very small proportion of the expenditures for this work, or even of the amounts by which the service has reduced its operating expenses.

PROVISIONS FOR RETIREMENT FOR DISABILITY AND OTHER CHANGES IN LIGHTHOUSE SERVICE RETIREMENT LAW.

For the persons in the Lighthouse Service covered by the act of June 20, 1918, it is very desirable that the retirement provisions be extended to cover cases, not due to vicious habits or misconduct, where an employee is found to be disabled for useful service before reaching the age fixed in the act. Because of the responsible and arduous character of much of the work, especially on vessels and at light stations, such provisions will add materially to the efficiency of the service, and relieve cases of serious hardship now arising. There is provision for retirement of persons incapacitated for duty in the Coast Guard and in the Army and Navy. In the general civil-service retirement law of May 22, 1920, there is provision for retirement, after 15 years' service, for disease or injury not due to vicious habits. Persons coming under the lighthouse retirement act of June 20, 1918, are the only ones in the military or civil service of the Government to whom some such provision does not now apply, and legislation is needed to remedy this. Some other modifications in the retirement law are desirable in the interest of efficient organization.

EXTENSION OF MEDICAL RELIEF FOR LIGHT KEEPERS.

Light keepers are now entitled to medical relief at hospitals and stations of the Public Health Service. These hospitals are, however, inacessible for a large number of light keepers who are stationed at remote or isolated points. Equal benefits should be extended to all light keepers, and legislation is needed to provide medical relief for all, and this has been concurred in by the Public Health Service and the Secretary of the Treasury.

OTHER MEASURES FOR RELIEF OF PERSONNEL.

Legislation is needed to permit the adjustment, within a moderate amount, of claims by lighthouse employees for loss or damage to personal property, such as clothing, furniture, etc., caused by storms, collisions, or fire at light stations, depots, and on vessels. Legislation is also needed to give corresponding employees of the Lighthouse Service certain necessary privileges now accorded by law to similar services, including the purchase of commissary supplies, transportation of families and of household effects when ordered to permanently change station, and transportation on Army transports. The law for the transfer of the Lighthouse Service to the Navy in time of war should be modified to better define the status of the personnel on such transfer.

AIDS TO NAVIGATION.

Legislation is needed for the better protection of aids to navigation. Such aids, especially those located in the water, are often damaged by passing vessels, and it is difficult in many instances to locate the party at fault. More stringent requirements are necessary as to failure to report such injuries, etc. Sums received in payment should also be made available for repair of aids.

Several of the special works above mentioned as urgently needed require authorizing legislation.

ECONOMIES IN THE OPERATION OF THE LIGHTHOUSE SERVICE AND REDUCTION OF APPROPRIATIONS.

The safety of shipping and protection of lives depend on the reliability and efficiency of the lights, fog signals, buoys, and other aids to navigation. It is necessary to maintain high standards in this work, and any saving of expense by going below reasonable standards as to equipment, structures, or personnel would not be true economy. An aid to navigation that can not be depended upon may be worse than none.

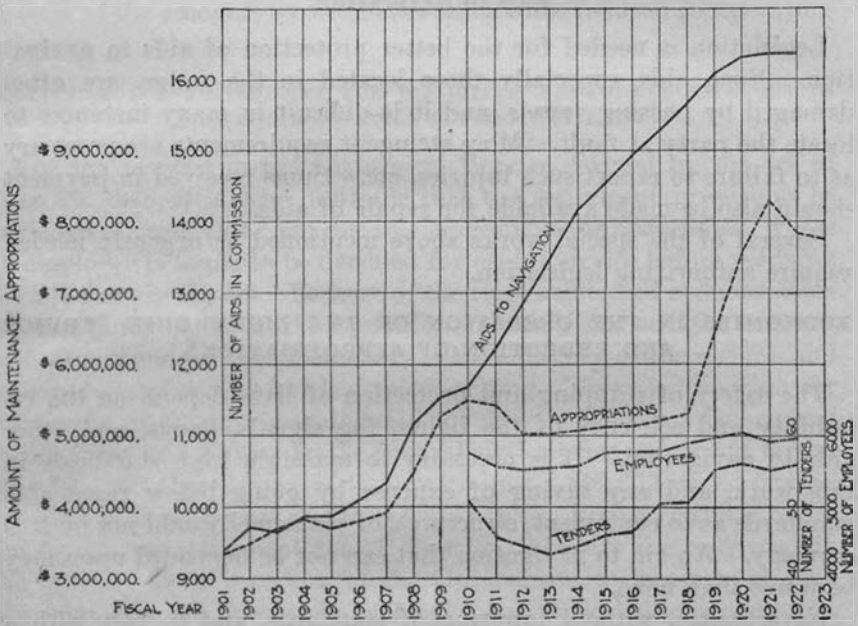
Nevertheless, without lowering of standards, and in fact with a steady improvement of plant and service, material economies have in recent years been effected in the operation of the Lighthouse Service. Some of these are briefly mentioned as follows:

REDUCTION OF TOTAL MAINTENANCE APPROPRIATIONS.

There has been a reduction of $561,000 per annum (about 7 per cent), in the appropriations for maintenance of the Lighthouse Service, from the peak of war-time costs in 1921, to the present fiscal year. The appropriations for maintenance for 1923 are still about 45 per cent higher than for 1918, but this increase is materially less than that for comparable services, and covers not only the continued

higher costs of supplies and services, but an increase of 699 in the number of aids maintained. A portion of this increase in maintenance can not be removed, as it represents reasonable increases in compensation of classes of employees, as light keepers and vessel men, heretofore seriously underpaid. Furthermore, there are parts of the personnel of the service still much underpaid, and a large amount of improvement and upkeep work, deferred during the war, must also now be cared for.

Under the act of June 17, 1910, reorganizing the Lighthouse Service, reduction of $433,700 was made in the maintenance appropriations for 1912, as compared with 1911, and for 7 years thereafter the Lighthouse Service was maintained on annual appropriations less than those for 1911, notwithstanding a large steady increase in the



United States Lighthouse Service. Diagram showing number of aids to navigation maintained, and amount of appropriations for maintenance, yearly from 1901, and employees and vessels from 1910. The number of aids to navigation increased from 1910 to 1922 by 4,711, or 40 per cent.

number of aids to navigation maintained. Savings due to the reorganization were effected by the discontinuance of 11 local offices and 5 tenders of the service, and a reduction of 200 in the number of employees, and otherwise. The yearly variations in the amount of appropriations and in the number of aids maintained, employees and vessels, are shown in the diagram. The effect of the reorganization is indicated by the drop in three of the curves between 1910 and 1913.

SAVING IN IMPROVED APPARATUS AND CONSTRUCTIONS.

Large economies in operation have been effected by the use of automatic lighting and fog-signal apparatus, obviating the need of keepers at certain stations. In the past 12 years 95 stations have been changed from attended to automatic, at a saving of approximately $100,000 a year. Notwithstanding a considerable increase during this time in the number of lights maintained, the number of light keepers has actually diminished from 1,530 to 1,445. The service now maintains 747 automatic lights on fixed structures and 638 buoys having automatic gas lights; these are all aids of the greatest value to shipping, maintained at moderate expense in comparison with their usefulness.

Buoys equipped with automatic fog-signals as well as lights are being constructed to replace two inside lightships, and this change will save $30,000 annually.

A large future economy is being effected through the construction of more permanent structures at light stations, depots, etc., as resources permit. This is also a measure of efficiency, greatly increasing the reliability of the aids. Much of the special apparatus of the Lighthouse Service is now being made at the General Lighthouse Depot, Staten Island, N. Y., at a material saving as compared with former contract prices.

ECONOMY IN ILLUMINATING APPARATUS AND PURCHASE OF ILLUMINANTS.

There has been a great increase of efficiency in the use of kerosene oil as an illuminant, through the installation in recent years at all the principal lighthouses of incandescent oil vapor lamps in place of the wick lamps formerly used. With this lamp, in which the kerosene is vaporized and burned under a mantle, there is an increase of 8 to 10 times in the illuminating power obtained in burning kerosene; and for the principal lights there is also a considerable saving in the consumption of kerosene. With this lamp the cost of kerosene for 1 candlepower for 1 year has been reduced from 80 to 10 cents.

A large saving has been effected in the purchase and distribution of kerosene for the Lighthouse Service through the installation of storage tanks and the delivery of oil in bulk. Installations of tanks and arrangements to this end have been in progress for several years, and the coming year practically all of the kerosene will be purchased in bulk or handled in large containers, so far as it is practicable to deliver it at the light stations; the saving in so doing is, at present prices, about $50,000 per annum. Continued test is made of other illuminants and methods, including electricity where commercial current is available; a considerable number of electric incan-

descent lamps are now in use for minor harbor lights with satisfactory results, especially in reducing the cost of attendance.

Because of the great increase in the cost of cut-glass lenses, pressed lenses have been adopted for gas buoys, at a considerable saving; and the introduction of rapidly revolving mechanism has permitted the use, at principal stations, of much smaller lenses, giving greater concentration of the light in a smaller number of beams, effecting a large saving in equipping new lighthouses.

DISCONTINUING OF AIDS TO NAVIGATION.

Although the changing needs of shipping, with the use of deeper draft vessels and the demands in new regions, such as Alaska, have caused a steady net increase in the total number of aids to navigation maintained, a large number are discontinued each year as no longer necessary. A special examination made in 1921 resulted in the discontinuance of aids or the changing of attended to automatic lights, and a readjustment of the complements of keepers at stations, effecting a saving of $36,000 in annual maintenance and of $43,400 in the value of property available for other uses. In the ordinary work of the service from 500 to 600 aids to navigation are discontinued annually.

REDUCTION OF COSTS OF VESSELS.

The Lighthouse Service has at present 117 vessels in commission, of two classes, tenders and light vessels, and their cost of maintenance is nearly one-half of the total operating cost of the service. The total number has remained substantially the same since 1910, notwithstanding the considerable increase in the work. Since 1910 the number of light-vessel stations has been reduced from 54 to 49, several having been replaced by fixed aids or buoys, with an approximate saving of $25,000 per annum. In the same interval there has been a small increase in the number of tenders, because of the increase of 4,659 in the total number of aids to navigation, and in gas buoys and unattended lights; the number of aids maintained per tender has increased from 230 to 292. The use of tenders has been economized in many ways, especially by coordination of all the work in each district, and by their equipment with radio, better controlling their movements.

Since war-time conditions there has been a net reduction of $400,000 in the operating costs of vessels, through revision of pay schedules and subsistence allowances, while at the same time a beneficial system of longevity increase of pay has been introduced for all persons on vessels, and provision has been made for operators to maintain regular radio communication on 26 light vessels.

Since the close of the war extensive use has been made of equipment available from other departments, at a large saving. Nine vessels used as mine layers by the War Department have been transferred to the Lighthouse Service and are being converted into tenders as needed; it is estimated that the resulting saving in the cost of construction of new vessels for this service will ultimately be $1,500,000. Equipment of boilers, boats, etc., transferred from the Navy Department and the Shipping Board will result in a saving to this service estimated at $150,000.

PERSONNEL.

The ultimate economy of a work depends more on the efficiency of personnel than on any other factor. Economy will not be attained by any course which lowers the standard of personnel or reduces it in numbers below the actual needs. This service for years has been maintained with practically the same number of employees, the total in 1910 being 5,750 and in 1922, 5,985, an increase of only 4 per cent, while the number of aids to navigation has increased 40 per cent during the same period. The total number of persons at the headquarters of the service in Washington has diminished from 53 in 1910 to 40 in 1922; the latter is two-thirds of 1 per cent of the total force, probably a less proportion in Washington than that in any other service of the Government. The vessels of the service are maintained with complements of the smallest number necessary to accomplish the work, the total number of officers and men on the largest seagoing lighthouse tenders being only 32 to 34.

The well-being, and consequently the efficiency, of the personnel of the Lighthouse Service has been greatly improved in recent years by various measures, particularly the special retirement law for the field force, the general retirement law, and increases of pay granted light keepers, vessel men, and shopmen. Although these measures involve some expense they represent a true economy in improved efficiency and morale. Unfortunate legal restrictions have prevented practically any proper adjustment being made of the pay of the civil engineers and other technical men, supervisory officers, and clerical forces. It would require an increase in the appropriation of only about 1 per cent to extend the readjustment to these, and the failure to do this is not economy, as it will undoubtedly cost much more than the amount required by reason of loss of trained personnel and decreased effectiveness.

ECONOMY IN PUBLICATIONS.

The expense of printing the publications of the Lighthouse Service, average of the last three years, is about $14,500 per annum, a reduction of $5,000, or 27 per cent from the cost 10 years before,

notwithstanding the large increase in the unit costs for printing and paper during this interval and the large increase of 40 per cent in the number of aids to navigation included in these publications. This economy has been brought about largely by the rearrangement and simplification of the light and buoy lists and the annual report. There has been no loss in usefulness of the publications, but, on the contrary, a distinct increase in convenience and completeness of material contained and improved service to mariners by greater frequency and regularity of issue.

URGENT NEED FOR REPLACEMENT OF VESSELS.

The annual reports for 1919, 1920, and 1921 gave full statements of the urgent need for the construction of additional vessels for the Lighthouse Service to replace those worn out in service, those lost through various casualties, and to meet the considerable growth of the service. The duty of the two types of vessels, tenders for buoy work and supply purposes, and light vessels for floating lighthouses, was explained, as well as the severe usage and hazardous service to which these vessels are exposed.

These conditions have been alleviated for the present with regard to large seagoing tenders by the transfer to this service from the War Department of six large mine-planting vessels which are being reconditioned for lighthouse work.

The need for new light vessels is increasing. There are no vessels in other departments or the Shipping Board available for transfer which are suitable for use as light vessels, due to their special design and construction requirements. To maintain the serviceability of the light vessels, it is necessary to construct an average of two each year. Since 1910, and particularly since the beginning of war conditions, there has been a considerable deficiency in the building of vessels sufficient to keep up this program.

Of the light vessels now in use, 22 are more than 30 years old, and 11 are over 50 years old. Many of the lightships are not in condition to be safely placed on exposed stations. The cost of repairs and overhaul becomes so heavy that it is not economical to keep in commission vessels after they have reached a reasonable limit of usefulness. The effect of continuing the use of these old vessels is often a greatly diminished output of work with the same or greater cost of operation and upkeep. Of more importance than the question of efficient and economical operation, however, is that of safeguarding life. Both lighthouse tenders and lightships are engaged on hazardous duty, and their officers and crews should not be required to serve on vessels which have passed a reasonable limit of usefulness, nor can the Lighthouse Service properly perform its part in the safe-

guarding of life and property on the navigable waters of this country without necessary vessel equipment.

Congress, by the act of June 5, 1920, after full hearings, authorized a building program for vessels for the Lighthouse Service of $5,000,000, and an appropriation of $1,000,000 of this amount was made in the act of March 4, 1921. Under this and previous appropriations the following vessels are now under construction: Light vessels to replace *No. 20*, Cross Rip, Mass., *No. 3*, Handkerchief, Mass., *No. 11*, Scotland, N. J., *No. 34*, Charleston, S. C., and *No. 43*, relief, eighth district; tender to replace *Goldenrod*, fourteenth district. On the last contract much lower bids were received than for a number of years, and this appears to be a favorable time for vessel construction. No further vessels can be built, however, under available appropriations. During the fiscal year three tenders and four light vessels which had been condemned as unfit for further service were sold, the very small prices obtained indicating their extremely worn-out and unserviceable condition.

From careful estimates and examinations as to the condition and further serviceability of vessels of the Lighthouse Service it is found that, in addition to those provided for by vessels now building, 14 light vessels and 5 tenders should be replaced within the next five years. As it will require from two to three years after appropriation is made before vessels are available for service, funds should be provided now for 8 of these vessels, being those more urgently needed, and first named in the following list:

ADDITIONAL VESSELS FOR WHICH APPROPRIATION IS NOW NECESSARY OR SHOULD BE AVAILABLE WITHIN THE NEXT THREE YEARS.

Light vessel to replace *No. 4*, relief, second district, second class	$200,000
Light vessel to replace *No. 70*, San Francisco, Calif., second class	200,000
Tender to replace *Oleander*, fifteenth district, river class (special)	150,000
Light vessel to replace *No. 57*, Grays Reef, Mich., third class	150,000
Light vessel to replace *No. 56*, North Manitou Shoal, Mich., third class	150,000
Light vessel to replace *No. 51*, relief, third district, second class (completion of vessel)	90,000
Recondition mine planter to replace *Lilac*, ninth district	35,000
Recondition mine planter to replace *Madrono*, eighteenth district	35,000
Light vessel to replace *No. 5*, Stone Horse Shoal, Mass., second class	200,000
Light vessel to replace *No. 68*, Fire Island, N. Y., second class	200,000
Light vessel to replace *No. 69*, Overfalls, Del., second class	200,000
Tender to replace *Holly*, fifth district, class B	300,000
Tender to replace *Arbutus*, fifth district, class B	300,000
Tender to replace *Daisy*, third district, class C	100,000
Light vessel to replace *No. 48*, Cornfield Point, Conn., second class	200,000
Light vessel to replace *No. 1*, Martins Industry, S. C., second class	200,000
Light vessel to replace *No. 60*, Eleven Foot Shoal, Mich., third class	150,000
Light vessel for Barnegat, N. J., second class	200,000
Light vessel for Grays Harbor, Wash., second class	200,000

AIDS TO NAVIGATION.

During the fiscal year there was a net increase of only 18 in the total number of aids to navigation maintained by the Lighthouse Service, this being the smallest increase in a number of years, due to the large number of aids discontinued. There was a net increase of 32 lights, 9 gas buoys, and 4 float lights, and a decrease of 27 unlighted aids. The total number of aids to navigation in commission June 30, 1922, was 16,373, including 5,799 lights of all classes, and 595 fog signals (not including sounding buoys).

During the year 49 new aids were established in Alaska, including 9 lights, 1 gas and whistling buoy, 1 gas and bell buoy, 1 gas buoy without fog signal, and 37 other aids. The total number of aids to navigation in Alaska at the end of the fiscal year was 582, being a net increase of 34 over that of the preceding fiscal year.

Improvement in illuminating and fog-signal apparatus of existing aids was continued during the year. Fixed lights were replaced by flashing or occulting lights at 35 stations, including 3 light vessels; incandescent oil vapor was substituted for less efficient illuminant at one station; and acetylene or electric incandescent illuminant was substituted for other illuminants at 74 stations, including 3 light vessels and 27 lighted buoys. New fog signals were established at 4 important stations and the fog-signal apparatus at 9 stations improved by the substitution of more efficient apparatus.

ADMINISTRATION.

The general organization of the service remained unchanged during the fiscal year.

The appropriations for the maintenance of the Lighthouse Service for the fiscal year 1923 are $383,710 less than the estimates submitted and $95,000 less than the total maintenance appropriations for the preceding fiscal year. Although Congress appropriated the amount estimated for by the department for the current fiscal year, under "General expenses, Lighthouse Service," this estimate had been curtailed on account of the appeals of Budget officers for economy and retrenchment by the Government, and was $400,000 less than the amount appropriated for the year last preceding the submission of the estimates. Therefore, notwithstanding the downward trend in prices of certain materials and supplies, much important and necessary repair work which has been accumulating during the past several years because of lack of funds will have to be again deferred owing to insufficiency of the current appropriation.

A readjustment was made of pay scales on vessels of the Lighthouse Service on the Atlantic and Pacific coasts and the Great Lakes, and a system of longevity pay for all officers was introduced. The

longevity system for crews, which has been in force on coast vessels for about a year, with satisfactory results, was extended to the crews of vessels on the Great Lakes.

Various economies effected in the maintenance of the service have been mentioned under that head.

In accordance with its policy of cooperation the Lighthouse Service has taken advantage of opportunities to render service to other Government agencies in various ways during the year, where this has been practicable.

Systematic inspections have been continued in the various lighthouse districts of the technical work, business methods, and property accounts.

ENGINEERING AND CONSTRUCTION.

The more important items of construction completed during the fiscal year were the new lighthouse depot at Chelsea, Mass., so far as the funds available from the special appropriation permitted; improving the wharves at the General Lighthouse Depot, Staten Island, N. Y.; improving aids to navigation in the vicinity of Joe Flogger Shoal, Delaware River; aids to navigation, Mississippi River, below New Orleans; installation of an air diaphone fog signal at Galveston Jetty Light Station, Tex.; rebuilding Point Jiguero Light Station, P. R., which has been destroyed by earthquake; and keepers' dwellings at Poverty Island Light Station, Mich., South Pass Range Rear Light Station, La., and Diamond Head Light Station, Hawaii.

Other important works in progress at the close of the fiscal year included the following: Improving aids to navigation in Hudson River, N. Y.; a light and fog-signal station at Great Salt Pond, R. I.; enlarging the machine shop at the general lighthouse depot, Tompkinsville, N. Y.; riprap protection for certain light stations in the third lighthouse district; repairing and rebuilding aids to navigation, Atlantic coast, damaged by storm and ice; aids to navigation, eastern shore of Chesapeake Bay, Md. and Va.; additional gas buoys, fifth lighthouse district; improving and establishing new aids, St. Johns River, Fla.; improving and establishing new aids on Florida Reefs, Fla.; a dwelling for Dry Tortugas Light Station, Fla.; repairing and rebuilding aids to navigation, seventh and eighth lighthouse districts; repairing and rebuilding aids to navigation, Gulf of Mexico, damaged by hurricanes; a new light station at Sabine Pass Jetty, La.; riprap protection at Sand Island, Ala.; improvements to aids to navigation at Conneaut Harbor and Fairport Harbor, Ohio; establishing aids to navigation in Detroit River, Mich.; repairs to pier at Spectacle Reef Light Station, Mich.; improving aids in St. Marys River, Mich.; improvements to aids to navigation

at Indiana Harbor, Ind., and Chicago Harbor, Ill.; improvements at Detroit, Mich., lighthouse depot; light depot, sixteenth lighthouse district; aids to navigation, Alaska; aids to navigation, Coquille River, Oreg., and in Washington and Oregon; keepers' dwelling at Yaquina Head, Oreg.; and light station at Point Vincente, Calif.

During the year arrangements were made for the transfer to the Department of Commerce of a double dwelling and its site, owned by the United States Shipping Board at Lorain, Ohio, to be used as dwellings for the families of two of the keepers at Lorain Light Station.

IMPROVEMENTS IN APPARATUS AND EQUIPMENT.

During the year radio fog-signal installations have been made on 3 light vessels and preparations made for similar installations on 5 other light vessels and 1 light station.

Besides the radio fog-signal installations mentioned, radio-communication apparatus was placed on 1 light vessel and 1 tender; at the end of the year 46 light vessels and 29 tenders were equipped with radio apparatus. This equipment on vessels has proved of material value in the operation of the service.

Improvements in intercoastal communication by the installation of telephones at light stations were continued during the year by the Coast Guard. On June 30, 1922, 297 light stations had telephone connections.

Special attention has been given to the installation of storage tanks for kerosene at depots and light stations and the purchase of the kerosene locally.

As a large part of the apparatus and equipment used by the Lighthouse Service is of a special character, for which there is no commercial demand, improvements depend chiefly on the work of the personnel of the service. It is therefore the policy to encourage experiments and tests in the various districts where problems present themselves. Although no funds are set aside, and no special personnel employed for this purpose, substantial progress is made from year to year as the result of efforts in the various districts and in the bureau's office along this line. Among the more important improvements which have received attention during the fiscal year in the interest of efficiency and economy of operation, the following may be mentioned:

On several occasions it has been found desirable to establish a bell buoy at a location near enough to an existing bell buoy but which may cause a confusion of sounds. To avoid this danger a gong buoy was designed which works on the same principle as a bell buoy but which gives an entirely different sound. This gong buoy has been placed on station and has proved so satisfactory to mariners

that steps are being taken to design a larger set of gongs for use with larger buoys.

A hygroscope controlling device for fog signals has been developed in the fifth district, and is now connected experimentally so as to control the electric driven 2,000-pound fog bell at Lazaretto Lighthouse depot. The device automatically starts and operates the fog bell during fog and periods of low visibility, such as rain, mist, and snow.

During the year acetylene lanterns, which have heretofore been purchased from the manufacturers, have been made at the general lighthouse depot at a considerable saving and have been found satisfactory.

After prolonged laboratory and service tests of artificial silk mantles for use in incandescent oil vapor illuminating apparatus, it has been found that the silk mantles are more efficient and economical than the cotton mantles heretofore used, and they are now being used.

The work of converting oil-gas buoys to adapt them to the use of acetylene has been carried on during the year, as a measure of efficiency. The use of acetylene and electric welding apparatus has been extended to cutting and fitting new parts as well as welding broken or worn parts, etc. Encasing piles with concrete, against damage by the Teredo, has proved satisfactory. Carbon dioxide cooling plants have been installed on lighthouse vessels, replacing the use of ice and ice boxes.

The use of primary electric batteries and small incandescent lamps for minor lighted aids is being investigated, the object being to develop a reliable and economical substitute for oil lamps, thus reducing the cost of attendance and supplies and increasing the efficiency of the aids. An experimental installation is now under test at the general depot.

PERSONNEL.

On June 30, 1922, there were 5,985 persons employed in the Lighthouse Service, including 90 technical, 155 clerical, and 5,740 connected with light stations, vessels, and depots. This service is charged with the maintenance of aids to navigation along 49,012 statute miles of coast line and river channel.

SAVING OF LIFE AND PROPERTY.

Incidental to the regular work of the service many opportunities arise for rendering aid to those in distress because of the location of the light stations and vessels. During the fiscal year 119 instances of saving life and property or rendering valuable aid were reported,

often at a great risk to the lighthouse employees. Many of these acts were especially meritorious, and the employees were individually commended by the Secretary of Commerce.

LIGHTHOUSE DEPOTS.

The lighthouse depots are a very essential feature of the efficient conduct of the work of the Lighthouse Service; they are the supply, repair, and vessel headquarters for the various districts. The depots are well distributed along the coasts of the country, but it is important that various improvements be made to give much needed depot facilities.

Work on the construction of a new lighthouse depot at Chelsea, Mass., for the second lighthouse district, under an appropriation of $85,000 made by act of July 1, 1918, was completed to the extent of the funds available. The work done during the year consisted of the construction of east and west slip docks, some rough grading on the reservation, and the construction of buoy skids and a chain platform. An additional appropriation estimated at $71,000 will be needed to fully complete and equip this depot.

Under an appropriation of $60,000 made by act of March 28, 1918, for repairs to the wharves at the general depot, Staten Island, the work of replacing portions of the old wooden wharves by concrete decks having cast-iron pile columns was completed.

The act approved March 28, 1922, appropriated $60,000 for improvements to the wharf at the lighthouse depot, San Juan, P. R., and $50,000 for completing improvements to the lighthouse depot, Detroit, Mich.

The act of June 20, 1918, authorized $275,000 for improvements at the lighthouse depot at Portsmouth, Va., or establishing a new depot, but no appropriation has been made for this work. This is the principal depot of one of the largest lighthouse districts and is the headquarters for five tenders and two light vessels during the greater part of the year. The facilities for berthing these vessels are entirely inadequate, and the efficient operation of the vessels is much hampered in consequence. The inadequacy of space for storing and handling buoys also causes much delay and loss. Increased facilities for this depot are urgently necessary.

In addition to the above, provision is needed for improved depot facilities in several of the districts, particularly at or near Newport, R. I.; Honolulu, Hawaii; Key West, Fla.; and New Orleans, La. Additional funds are needed for the completion of the important depots at Boston, Mass.; Charleston, S. C.; Ketchikan, Alaska; and Goat Island, Calif. The act of June 5, 1920, authorized $60,000 for completing the lighthouse depot at Charleston, S. C.; $250,000 for a new depot at Key West, Fla.; $16,500 for two keepers' dwellings

at Goat Island Lighthouse Depot, Calif.; and $120,000 for a new depot at Honolulu, Hawaii; but no appropriation has been made for these works.

TENDERS AND LIGHT VESSELS.

Fifty-six tenders have been in operation during the year, having steamed a total of 481,258 nautical miles, or an average of approximately 8,600 miles for each tender, in the work of maintaining buoys, carrying supplies and construction materials to light stations, supplying light vessels with coal, water, etc.; also transporting officers and employees to stations or on inspection duty, as well as duty in cooperating with other Government services and the saving of life and property when occasion required.

Three new tenders, the *Oak*, *Hawthorn*, and *Aster*, were completed and put in commission, and three of the old tenders, the *John Rodgers*, *Mistletoe*, and *Jessamine*, which had been laid up during the year as unserviceable, were sold for nominal amounts.

After a survey of the surplus vessels available for transfer from other branches of the Government, nine mine-planting vessels were transferred from the War Department, without cost, these vessels being of a type suitable for the Lighthouse Service after necessary alterations are made. A statement of the need of vessels is given elsewhere.

During the fiscal year 60 light vessels were in commission, and they averaged 270 days on station for each vessel.

New light vessel *No. 105* was completed during the fiscal year and is being equipped for service at an early date on Diamond Shoals, N. C. Five new light vessels are in progress of construction, and at the end of the fiscal year ranged from 23 to 45 per cent completed.

Very truly yours,

GEORGE R. PUTNAM,
Commissioner of Lighthouses.

American waters, including a notice of all new charts or any new editions published by the survey.

One additional item is required to perfect this part of the service which the bureau renders the public. The charts are constantly being corrected in a multitude of minor details, each of which is important but not sufficiently to justify new editions with the resulting cancellation of existing copies. As a rule, the information regarding these changes has been furnished the navigator in the Notice to Mariners, so that it is to some extent possible for him to make the necesssary corrections on his own charts. It would be a great convenience to him, however, if a draftsman could be assigned to each of our field stations. The mariner could then bring his charts to the station and have them corrected during his stay in port. In fact, the service would be more than a convenience, for this draftsman could make corrections which the navigator can not make because of his lack of skill to depict them, and the latter could then use the charts wtih assurance of their adequacy, which he must lack as long as he makes the corrections himself. The British have long maintained such a service, but the Coast and Geodetic Survey has thus far been unable to inaugurate it because of lack of provision of the necessary personnel.

Another important item in which marked progress has been made during the year is in making our records accessible, and at the same time protecting them, in a measure at least, from the hazard of fire and from unnecessary exposure and handling.

To-day these valuable records, although not afforded the protection which would result from their housing in a fireproof building, are yet for the first time given the maximum protection from destruction and deterioration which is possible so long as the bureau occupies its present quarters.

The extent to which these records are involved in the bureau's need for new and modern housing will be evident when we recall that they are the results of a century of continuous activity. If destroyed, no amount of money could reproduce them, for they picture facts and conditions that no longer exist. They constitute the only record of their kind in the field of activity delegated to the survey, a record which is constantly consulted by persons interested in specific problems which in many cases can be solved only by the assistance thus afforded.

Another step forward has been taken in the handling of our charts and other nautical publications which has resulted in a greater income to the Government. This is an increase of 50 per cent in the prices at which these publications are sold to the public. This increase was made to meet the greatly increased cost of all materials used in chart production in order to conform to the law which

requires that these publications shall be sold as nearly as practicable at the cost of paper and printing. Inasmuch as the entire amount received is returned to the Treasury of the United States, this means that nearly double the former return from the sale of charts, coast pilots, and tide tables goes to the credit of the Government.

IMMEDIATE INCREASE IN SALARIES A VITAL NEED.

In my preceding reports, and especially in my report for 1921, I discussed at some length the fundamental trouble in this bureau, and, referring to the bureau as an efficiently functioning organization, I laid stress above everything else upon the deplorable situation of the underpaid employees of the Coast and Geodetic Survey. Unfortunately this condition has not been changed, and while many other things have been done to benefit the bureau, it is my opinion that the bureau as a business organization can not function properly until this fundamental trouble is corrected.

In 1886 steps were taken through the proper channels to make a readjustment, or reclassification as it is better known, of the Government salaries, but after 36 years, with much money spent on investigations of this subject, conditions are unchanged, and from the standpoint of economy and wise administration it appeals to me that it would be infinitely better to curtail some of the existing projects if necessary and use the money to remedy this pressing evil.

There is no better way to illustrate the deplorable situation regarding the underpaid employees of the Government than to use as a parallel what has recently transpired at one of our large universities. The trustees of this university have announced that hereafter no instructors will be engaged who are married. In other words, instructors are paid such low salaries that they can not support and rear a family while connected with the institution. Their condition is very similar to that of the trained men in the Government to-day. These are hard facts but nevertheless they are true and should be faced frankly, as the existing conditions are just the opposite of economy and good business.

The Government is to-day in dire need of the services of well educated and trained men and women, but the only way in which it can attract them is to give salaries at least as large as those paid to trained workers in commerce and industry. The Government is, or should be, in the market to buy the services of the highest type of men and women. It will either go empty-handed or will have to be satisfied with inferior material if it will not pay the price, and must therefore suffer the inevitable consequences.

The existence of underpaid intellectual workers in the Government and in the faculties of our universities and colleges is a blot

on our body politic. Those in whom the remedy lies should at once take serious thought of this most serious condition.

EXTRAVAGANCE TO OPERATE BUREAU IN OLD BUILDING.

During the past seven years the necessity of a proper building for the housing of this bureau has been reiterated in my annual reports. During this time, and until the situation is remedied, the output of the bureau has been and will necessarily be produced at too large a unit cost. This is due to the fact that the buildings occupied by the bureau are wholly unsuited to the purposes for which they are used.

The bureau is housed in seven different buildings, only one of which was designed to serve its needs, and even this one is a war-time product. The other six were constructed 50 years ago, two for dwellings, another for a stable for the two buildings to be occupied as dwellings, and two others to be used as hotels. Yet these buildings of different sizes, different floor elevations, separated in groups and connected by open and inclosed bridges, constitute the home of an organization that prepares and prints the charts of all of the navigable waters of the United States and its possessions.

There is a direct loss, indefinite in calculation but nevertheless very apparent, with the bureau housed in the present unsuitable quarters. While the bureau is an industrial organization, its operation is based on governmental appropriations and not on competition with other industrial organizations. Were the existence of the bureau dependent on competition with outside industrial organizations, the higher unit cost of production resulting from improper housing facilities would manifest itself at once and force remedial steps.

Records that must be consulted by draftsmen and compilers are necessarily stored in the most nearly fireproof building of the bureau, 350 feet distant from the drafting hall. Valuable time is lost in going to and from the fireproof building to search out records that are needed. The archives in which these records are kept should therefore be adjacent to the drafting hall, but this is impossible as the bureau is housed at present. Again, to obtain proper light facilities the engravers and lithographers are distributed throughout various separate buildings, and to reach the lithograph plant the chief of the division having the work in charge must pass through five different buildings. The paper stock from which the charts are printed, because of lack of room, is stored in a building removed from the one in which the printing presses are operated, and must be transported to the presses by hand. This cumbersome method of production of a nautical chart is duplicated in every other output

of this bureau, and year by year the products of the bureau are brought forth at an excessive unit cost. The only remedy is a new building designed to permit production at the lowest unit cost.

GENERAL OUTLINE OF WORK DONE.

A full statement of the work accomplished during the year will be found in the complete report of the director of the bureau. Briefly outlined the accomplishments are as follows:

Important hydrographic surveys were made along the Atlantic coast at the entrance to the Chesapeake Bay and off the Mississippi Passes, as well as in the vicinity of Chandeleur Islands in the Gulf of Mexico. On the Pacific coast surveys were made of several bays and harbors, and an original survey was made of the coast waters in the vicinity of Cape Mendocino and of Cape Blanco. On the coast of Alaska surveys were made of portions of Stephens Passage and Lynn Canal, of Clarence Strait and Ernest Sound, and of the outside waters in the vicinity of Noyes Island. In the Philippine Islands surveys were made in the vicinity of Cagayan Island, the southeast coast of Palawan Islands, and the west coast of Zamboanga Peninsula. Also surveys were made in the vicinity of Lagonoy Gulf and Basilan Island.

An important accomplishment in the extension of the geodetic survey of the country to provide a station not more than 50 miles from any locality in the country was the completion of the great arc of horizontal control which extends from Huntsville, Ala., to the vicinity of Phoenix, Ariz. It furnishes accurate geographic positions in seven States and crosses an area that has been very badly in need of horizontal control for surveys, maps, and other engineering work. An event of great importance to Alaska was the beginning, in the spring of 1922, of precise triangulation and precise leveling to the northward of Cooks Inlet, which will be carried northward toward Fairbanks. For many years Government bureaus working in the interior of Alaska have been making demands on the Coast and Geodetic Survey for the establishment of precise triangulation and leveling in the areas in which they are working.

The magnetic observatories at Vieques, P. R., Tuscon, Ariz., Cheltenham, Md., Sitka, Alaska, and near Honolulu, Hawaii, have been in operation throughout the year and continuous records have been secured on the magnetographs and seismographs. The necessary absolute observations and scale-value determinations have also been made. In the field the reoccupation of repeat stations in order to bring the secular change data up to date was given first consideration. In this connection a quite thorough magnetic survey was made of the State of Florida. With the cooperation of the United States Coast Guard in furnishing transportation for an observer and the

necessary instruments, observations were secured at a number of places on the shores of Bering Sea and the Arctic Ocean.

Automatic tide gauges were kept in operation throughout the year at six stations on the Atlantic coast, three stations on the Gulf coast, four stations on the Pacific coast, one station in Alaska, and one station in the Hawaiian Islands. In addition, tidal observations in connection with hydrographic surveys were made at various stations in the United States. Current observations were made on nine light vessels of the Bureau of Lighthouses on the Atlantic coast and on five light vessels on the Pacific coast. An improvement worthy of mention is the compact field automatic tide gauge. This new gauge, which is portable, will aid in securing better observations for use in connection with hydrographic surveys and obviate the necessity of maintaining one or more paid tide observers with each hydrographic party, thus securing increased accuracy at considerably decreased cost.

WIRE-DRAG EXAMINATION OF NEW ENGLAND WATERS SHOULD BE RESUMED AND COMPLETED WITHOUT DELAY.

Too much stress as to the importance of this work can not be advanced, as greater amount of shipping and increased draft of vessels are only forewarnings that sooner or later, unless close surveys of the waters of the coast of the New England States are made by the wire drag, mishaps will result with loss of life and property. It is erroneously believed by many that because these waters have been traversed by shipping for years no disaster can happen, yet it is only a few years ago that a vessel struck a rock at the entrance to Buzzard's Bay, and only good fortune prevented the vessel from foundering. As it was, it was badly damaged, and whereas the water surrounding the rock indicated a depth of 5 fathoms, or 30 feet, over the bowlder itself there were only 17 feet of water. This only emphasizes the old question that is asked: Why don't vessels hit these submerged rocks? And the answer is: Give them time enough and they will.

Wire dragging is an important part of the hydrographic work on the Atlantic coast and for the last 15 years there have been such operations to find and locate detached rocks and bowlders which are so small that they can not be found by ordinary methods of hydrography. Hundreds of such rocks, many of which were real menaces to navigation, have been found by this method. Many of these rocks are located in areas which had been surveyed carefully by means of lead and line, of which there was no previous indication prior to their detection by wire drag, though some had been located by vessels striking them, resulting in considerable damage to the vessels.

For several years prior to and including the summer of 1919, two drag parties operated each summer on the New England coast from northern Maine to Connecticut. This work was stopped in the fall of 1919 and has not been resumed since then because of lack of sufficient appropriation to carry on the work. All of the drag equipment, which includes six launches, remained idle from the close of the 1919 season until last summer when half of the equipment was sent to Porto Rico. The other half is still idle.

Approximately 3,000 square miles of water area of the New England coast are yet to be dragged, of which a little over 1,200 square miles are in areas where there is much shipping. This area comprises five sections of the coast as follows: 540 square miles between the entrance to Penobscot Bay and the mouth of the Kennebec River; 120 square miles in the entrance to Portland Harbor; 156 square miles just south of Capt Elizabeth; 51 square miles close to the shore between Cape Porpoise and Piscataqua River; and 380 square miles between Piscataqua River and Cape Ann.

It is through these undragged areas that all vessels bound for Bath and Portland, Me., and Newburyport, Mass., must pass. Besides these cities, there are numerous small ports and summer resorts which can be reached by water only through these undragged areas, and, in addition, most of the coastwise navigation along the southern Maine, New Hampshire, and northern Massachusetts coasts is through some part of these undragged areas.

On the completion of these 1,200 square miles, which should be immediately dragged, the whole northern New England coast from Penobscot Bay to Cape Cod Bay will have been thoroughly explored, with the assurance that these waters contain no uncharted dangers to navigation.

This project is believed to be one of those most urgently in need of immediate attention and should not be deferred until the further loss of vessels and the lives of their passengers and crews attracts attention to this lack of adequate surveys.

LAND SURVEYS AND MAPS OF IMPORTANCE TO COMMERCE AND INDUSTRY.

Congress has intrusted to the Coast and Geodetic Survey the extension of horizontal and vertical control surveys over the United States and Alaska. These control surveys consist of triangulation and leveling which provide the latitudes, longitudes, and elevations of stations suitably located for the use of the engineer in his cadastral, topographic, State, boundary, and city surveying and mapping. Besides, these stations are used in much construction work, notably in drainage and irrigation projects, railroad and highway extension, and flood control.

The question has been asked, What is the practical value of the control survey? This inquiry is as pertinent as asking the practical value of the steel framework of a large office building.

The surveying and mapping of a large area, such as the United States or Alaska, simply can not be done properly without starting and checking points. If a man's activities are confined to his own city or village, he needs only a local map, but suppose he must travel into surrounding areas, then he needs additional maps. Suppose he is connecting the drainage and sewerage systems of the city and the surrounding districts, then his maps must show very accurately the distances and difference in elevation between points within the combined area in question. The several maps must be coordinated. Without accurate map data extensive engineering work can not be done without great waste of money.

The connection of the street system of a city with the State highway system necessitates an accurate knowledge of the positions on the earth's surface and their elevations of many points in the area involved.

If an extensive drainage project is undertaken, the engineer must first know the lay of the land or its configuration before he will begin constructing canals to drain the area. Many similar cases could be noted to show the dependence of engineering projects on accurate survey and map data.

Maps showing the location of an area and its configuration can not be made to conform to maps of the adjacent areas without having a single connected system of triangulation and also of leveling over the entire area. To-day there are many large areas in the United States where detailed surveying and mapping are retarded owing to the lack of control data. This involves the retardation also of the industrial and commercial development within those areas. There are many cities to-day waiting for control surveys to be carried close to them, in order that they may adopt modern methods in city planning and development. The extension of the triangulation system over the country will furnish the only reliable and unchangeable reference stations for the boundaries of the property of a State, city, county, corporation, or individual. With proper State, city, and private cadastral surveys based upon the control surveys made by the United States Coast and Geodetic Survey, much of the expensive litigation over property boundaries would be eliminated.

Even a casual consideration will convince anyone that almost every important human activity is dependent upon a knowledge of place and elevation. These can only be supplied by surveys and maps, and these in turn must depend upon the fundamental control surveys

made in our country and in Alaska by the Coast and Geodetic Survey.

I must again urge that the framework for the detailed surveys and maps and other engineering work of the United States of Alaska be given such support as its importance justifies.

OUR COASTS AND SHORE LINES MUST BE PROTECTED.

The layman, unfamiliar with the seacoast, usually thinks of the land and sea as unchanging in their relation to each other, or if he realizes that changes may be ocurring, he thinks of them as measurable only in terms of geologic periods. This, however, is very far from being the truth.

The erosions of Nantucket Island, of the south shore of Long Island, or along the New Jersey coast are striking examples of the power of the sea to degrade the shores, while Cape Cod and Sandy Hook are equally conspicuous instances of the opposite result of the conflict. From New York Harbor southward to and including the Gulf Coast the terrain adjacent to the shores consists principally of a low, flat, or gently sloping plain. The beaches are of sand, easily eroded, and subject to constant changes due to the action of the winds, waves, and currents.

For almost a century the Coast and Geodetic Survey has been engaged in making surveys and resurveys of this changeable coast, in order that the charts published by the bureau may be kept corrected to show existing conditions. The data thus accumulated constitute a record of the nature and extent of these changes, which can nowhere now be duplicated, and which is of great potential value to geologists, physiographers, and engineers. That value is largely potential as yet because it is only in recent years and in a comparatively small number of restricted localities that this encroachment of the sea has reached a stage to arouse public interest. There is no doubt, however, that with the lapse of time the beaches along our Atlantic coast will become of constantly increasing importance, and that such increase will be accompanied by an augmented interest in and demand for their protection.

In some localities, indeed, the time for action has arrived. In March, 1922, the Board of Commerce and Navigation of the State of New Jersey requested the assistance of the Coast and Geodetic Survey in a study to be made of the erosive action of the sea upon the beaches of the New Jersey coast and of engineering measures to be taken to prevent further damages.

This department assured the board of commerce and navigation that it would be glad to cooperate in every possible way, both by giving the board access to all survey records and by placing at its

disposal the knowledge and experience of survey engineers and cartographers expert in the interpretation of the phenomena to be studied.

After some preliminary discussion and a conference in New York, the board requested the Director of the Coast and Geodetic Survey to designate a representative to serve on an engineering advisory board which was to take charge of this investigation, whereupon the Director designated the chief of the division of charts for that duty.

The Coast and Geodetic Survey has undertaken the production of a composite map showing the shore line as determined by each of the topographic surveys made by the survey since the first one was undertaken in 1839. The map shows the results of four complete surveys of the coast line of the State with double that number at many of the localities where changes are most rapid. The picture which it thus affords of the evolution of the coast during the past century, supplemented by additional data resulting from other local surveys by Federal, State, and municipal agencies, will enable the board to determine with considerable accuracy the nature of the changes which have taken place during that period.

The State of New Jersey is the pioneer in this study. In so far as known by this department, this is the first time that a large scale, exhaustive investigation of the subject has been undertaken in this country. The plans formulated by the State board give promise of a thorough study of the subject which will be of immense value to all agencies who must hereafter undertake beach protection.

CURRENT AND TIDAL DATA OF VITAL IMPORTANCE TO NAVIGATORS.

CURRENTS.

In coastwise navigation it is evident that currents play a very important rôle, for not only from a standpoint of economy by the saving of many millions by making use of a favorable current, but more important still when thick weather makes it impossible for the navigator to secure his position either by terrestrial landmarks or astronomical observations, it is a matter of the utmost importance that he know the currents to which his vessel may be subject and which may, unknown to him, be carrying his valuable cargo of life and property to destruction by stranding on exposed coast lines.

PACIFIC COAST CURRENTS.

This is especially true in the case of the Pacific coast where in the more than 1,000 miles of coast line from the Mexican border on the south to the Strait of Juan de Fuca on the north, harbors are many

miles apart, sailing courses long, and periods of thick weather of comparatively frequent occurrence. In the past 20 years more than 100 vessels were stranded or wrecked on the Pacific coast of the United States, taking a toll of hundreds of human lives and millions in property, in spite of the fact that the navigators of the Pacific coast rank with the best in the world. It is unquestionable that an adequate knowledge of the currents would have prevented a considerable part of this enormous loss.

An accurate knowledge of the coastal currents can be secured only by systematic observations, and, while these involve the expenditure of money, it is to be remembered that a very small fraction of the money lost (not taking into consideration human life) because of lack of this knowledge would suffice for all observations.

The survey has already made use of all avenues for securing information at moderate cost. Advantage has been taken of the five light vessels stationed along the coast and with a small expenditure of funds valuable information has been secured.

There is now needed a systematic study of the currents between the light vessels, for these are so far apart on that coast as to give no clue to the currents that may be running in the long stretches between them. A modest appropriation that will permit the carrying into effect of plans outlined for a systematic survey of these currents will be a long step toward the safeguarding of life and property on vessels engaged in commerce along the Pacific coast.

NEW YORK HARBOR CURRENTS.

The waterways which lead to the principal port of the United States exhibit the most complicated current and tidal phenomena of any of the important ports of the world. Congress, during the past year, realized the fact that this port, which is one of the greatest in the world, had not yet had a systematic current survey, and this in spite of the fact that many millions have been expended by the Federal Government in improving those waterways.

With the cooperation of the United States Engineers Office, first district, New York, a carefully planned and efficient survey is to be made of this harbor during the fiscal year 1923, which will make it possible to predict in advance the exact time of the turning of the current in the various portions of the harbor, which will be of the greatest importance in the handling and docking of large vessels. In addition, this current survey will at the same time bring out facts of importance in the economical solution of the pressing sewage problems involved in the location of a city of many million inhabitants. Such information will be secured at no additional cost.

What is being done in New York, it is necessary to do in the others of our important harbors. On the west coast there is need of a similar survey in San Francisco Harbor. It is important to note that it will be by far the most economical procedure to do this work in a systematic manner, taking up each year that port in greatest need of such a survey.

TIDES.

With the growth of population and the increase of industries along our coasts, the importance of a thorough knowledge of the tides—their characteristics, times of occurrence, the effects of winds and unusual weather conditions, the effects of deepening of channels and general harbor improvements—is now a matter of the greatest practical necessity.

Originally the tidal work of the survey was that necessary in connection with the charting of the coastal waters; but with the increased draft of vessels engaged in commerce, the necessity for an advance knowledge of the times and heights of high and low waters at the more important ports is evident.

The subject of tides is now becoming of importance in coast protection and in harbor improvement. In this connection, the effect of winds and unusual weather on the height of the tide is an important factor—a problem the survey is studying.

With the importance of an American merchant marine fully recognized, harbor improvements involving an outlay of many millions annually are being prosecuted. In a number of cases a knowledge of the action of the tides subsequent to such improvements is wanting and when the engineer turns to this survey for information in specific cases—for the bureau is the only agency in the United States that deals with tidal matters—it can generally furnish him valuable information, but in some cases is unable to furnish the information, because appropriations are so small as not to permit a study of the matter to be made.

In one other direction the tides are of great practical importance. The question as to the rising or sinking of the coast, a matter not only of local but also of national importance, can be determined only by means of tidal observations. Fortunately, the survey has been able to so conduct the tidal work that this information is being secured without additional cost.

SEISMOLOGICAL (EARTHQUAKE) INVESTIGATIONS MEAN SAFETY OF MANY PEOPLE.

During the last century six major earthquakes have occurred in the United States, Alaska, and the insular possessions, some causing great loss of life and property. Two of these, that at Charleston in

1886 and that in the upper Mississippi Valley in 1811, then sparsely inhabited, but now densely populated, were in regions not generally considered to be subject to earthquakes. Earthquakes are of special importance in California, and this bureau is now cooperating by means of precise surveys to determine movements of the surface, with the Carnegie Institution and other organizations, in an investigation which may make possible earthquake predictions and at least to designate areas where special precautions in construction should be used and regions where important construction should be avoided.

In order to study earthquakes instruments known as seismographs must be operated at fixed observatories. They should be of the highest type, continuously operated by the most skilled observers in order that the earthquake records may be correctly interpreted. This bureau has operated seismographs at five widely separated stations for 18 years, but as the work has been supplemental to magnetic work the stations have not been of high class.

It is proposed to equip the magnetic observatories at Tucson, Ariz., and Sitka, Alaska, as first-class stations with new instruments of high grade, thus making them first-class seismological stations. These are selected as being in relatively quiet regions near to regions of great activity in the present or near past.

VALUABLE RESULTS TO BE OBTAINED.

Important assistance will be given to the California program, as it will make it possible to separate accurately local from widespread earthquakes.

Valuable information will be obtained as to conditions in the vicinity of the great irrigation projects of the West. With first-class instruments advance warning might be given of devastating earthquakes, such as occurred at Charleston.

Knowledge of earthquake regions would be useful in connection with precise triangulation and levels. In California and Japan positions and elevations are found to shift during earthquakes. This may occur elsewhere, and with accuracy to 0.1 foot in determinations a very small shift would cause trouble in future surveys.

Such observations would give useful information about the interior of the earth and would enable us to learn more about processes of mountain building and submergence of land.

In the past the outstanding work has been done by England, Russia, and Germany, and this country has done little first-grade work.

NEED OF COOPERATION WITH LOCAL ENGINEERS AND SURVEYORS.

The bureau has been in operation for more than 100 years. Due to the admirable geodetic control devised by Hassler and adopted by Congress under the administration of Jefferson, triangulation sta-

tions established in 1822 are, with few exceptions, as serviceable for points of control in making land surveys in 1922 as when first determined.

Primarily geodetic control points, including precise level bench marks, were established to form the basis for surveying projects covering large areas of the country, but the needs of these large projects have necessitated the extension of the triangulation and precise level nets to such an extent that there is now a splendid opportunity for local engineers and surveyors (county surveyors, highway engineers, city engineers, etc.) to base their local surveys on these standard data which are permanently fixed with relation to all other standard points of control throughout the country. The advantages are obvious and need but little exposition. Land surveyors and city engineers who are called upon to reestablish old boundary lines frequently have great difficulty in finding and identifying old boundary monuments, such as stones, stumps, or trees. Sometimes the surveys of adjacent counties are each based on arbitrarily selected control points, and when these surveys are carried to the boundary line of the counties overlaps or gaps are developed.

These difficulties are not met if the surveys are based on standard geodetic control and are therefore in harmony with other control points throughout the country.

A lamentable fact that has been brought to light by the bureau's efforts to assist local engineers and surveyors is that so few of these are aware of the existence of the triangulation stations, magnetic stations, and precise level bench marks in their locality. Time and again it has come to the notice of the bureau that municipalities originally separate and distinct, but which have later merged into a city, have based their original surveys on control points that were not in harmony, and it has cost a great deal of time and money to bring such surveys into proper adjustment.

In an endeavor to correct this situation special effort has been made to bring to the attention of civil engineers, city engineers, and surveyors the standard data available in this bureau. Three mediums have been used:

1. Digests are being prepared, one for each State in the Union. In these digests the counties in the State are listed in alphabetical order and under each county are shown the stations established in the county with direct reference to the publications of the bureau containing the results. Each digest is accompanied by a base map of the State showing graphically the kind of surveys made in the State and where made.

2. A circular has been prepared pointing out the advantages of using standard data in making land surveys. This circular contains

a base map of the United States showing the extent and nature of the surveys by this bureau throughout the country.

3. A canvass is being made of county surveyors throughout the United States calling their attention to the need of having accurate information as to the declination of the magnetic needle for both the date when the original compass surveys were made and also for the date when the resurvey is made. These efforts have brought gratifying results. It is believed that there is a still wider field of service for the bureau in this connection and an opportunity for much closer cooperation.

ALASKA'S CHARTS AND MAPS SHOULD NOT BE DELAYED.

The work being done in Alaska by the Coast and Geodetic Survey should receive all possible support, as Alaska is entirely dependent upon water-borne transportation for its connection with the outside world, and adequate charts are needed to protect the lives and property entering and leaving the Territory.

Many of the present charts are mere adaptations from the work of earlier explorers and navigators. The policy of the Coast and Geodetic Survey is to expedite the surveys as funds are available.

The much needed wire-drag surveys should be pushed with all possible haste.

Three vessels have recently been transferred to the Coast and Geodetic Survey by the Navy Department. These vessels were built for mine-sweeping duty by the Navy and two of them already have been altered to make them suitable for surveying work. These new vessels, on account of their size, power, etc., will help materially in expediting the charting of the Territory's waters.

In the past, scattering surveys have been made in the strenuous effort to meet the needs of commerce, but the industries have far outstripped the progress of these surveys, wholly through lack of sufficient personnel and equipment with which to keep pace.

The rapid development of Alaska along commercial lines is well illustrated by the growing number of requests for surveys and for information pertaining to areas where sites for proposed industries have been newly selected.

For some time one of the most urgent needs in Alaska surveys has been a system of control which would connect and coordinate the scattered hydrographic, topographic, and cadastral surveys of the Territory. Such control surveys were especially needed in preparing navigation charts in coastal Alaska and in placing upon a proper datum the many scattered surveys in the interior river valleys.

The report of the Governor of Alaska for 1921 mentioned the proposed extension, in cooperation with Canada, of an arc of precise triangulation from Puget Sound through southeast Alaska and

Yukon territory to the Yukon River at Eagle and thence across western Alaska to Fairbanks, extending toward the interior a scheme of triangulation which will eventually meet that which is being extended through southeast Alaska toward the upper Yukon. A speedy linking up of these two sections is to be hoped for. Had such control been available 15 years ago, the development of the interior region of Alaska would have been hastened, for many Federal surveying operations have been postponed for lack of such control.

Extensions of this single arc of triangulation are also needed badly. One branch should extend from Fairbanks to Valdez, with a spur to connect to the Alaska-Canada boundary near the upper waters of the Tanana. Another should extend from Fairbanks down the Yukon to Norton Sound.

Of only slightly less importance to interior surveys is the line of precise levels which the Coast and Geodetic Survey began in the spring of 1922 and which will be extended as rapidly as possible to Fairbanks and from there along the stage routes to Valdez. Lines from Fairbanks to Eagle and from Fairbanks to Nome are also promised as soon as the funds for such work will permit them to be run. These levels will furnish basic elevations for a large area, which will be of great assistance to local industrial surveys.

The importance of current data can not be overestimated, and the situation is yet far from satisfactory. It is essential to note that while a knowledge of the behavior of the currents is, in all waters, a matter of prime importance in the safeguarding of navigation, in Alaskan waters it is doubly so, for in Alaskan waters in many cases deep water extends to within a few feet of the shore, and soundings are therefore of comparatively little service to the navigator in apprising him of danger.

The Coast and Geodetic Survey is now working out a plan which will permit a small party to make current observations in connection with each of the surveying vessels operating in Alaskan waters.

During the past fiscal year the magnetic declination was determined at a large number of triangulation stations in southeastern Alaska, and the area of local disturbance about Port Snettisham was examined in detail. Observations on board ship showed that even in mid-channel the effect was sufficient to endanger a vessel passing through in thick weather. Observations will be extended to other areas where the presence of local disturbance is indicated. Magnetic observations are needed along the northern and western shores of Alaska and in the interior.

Observations were made along the Bering Sea coast, Alaska, Siberia, and the Arctic coast of Alaska at St. Michael, Nome, Teller City, Point Hope, Point Barrow, Demarcation Point, in Alaska, and at

Emma Harbor (Providence Bay) and Whelen (East Cape) in Siberia. This work had great value for two reasons: It connected the magnetic work of the Amundsen expedition with previous magnetic work in Alaska; it provided values of the magnetic declination in Alaska at places where our previous knowledge was very indefinite, and, accordingly, makes it possible to provide more accurate magnetic information on the charts of Bering Sea and the Arctic. The results brought out, also, the great need of a real magnetic survey in the interior of Alaska. The present situation of magnetic stations, existing only along the main lines of travel, leaves vast areas without observations of any kind. Observations are needed also in the Aleutian Islands to meet the needs of the commerce from the Pacific coast to the Orient.

The Coast and Geodetic Survey has maintained an observatory at Sitka since 1902. Continuous observations have been made of the magnetic declination, dip, and intensity without break since that time.

PURCHASE OF DUTCH HARBOR, ALEUTIAN ISLANDS, AS A FEDERAL GOVERNMENT FUEL AND SUPPLY BASE.

Nine years ago it was strongly recommended in a special report that the Federal Government purchase from the North American Commercial Co. their property at Dutch Harbor, Aleutian Islands, Alaska, as a fuel and supply base. In subsequent reports this recommendation was repeated, but to date no action has been taken.

There is stronger argument now than ever before for again advocating the purchase of this property for a Federal Government base. Under present conditions temporary or permanent headquarters for Government vessels must be at Unalaska, close to Dutch Harbor, and there is hardly an argument in favor of the continuation of this arrangement.

The Government has already paid many thousands of dollars to private companies for coal transported from Australia, Canada, and other places for use of its vessels operating in Alaska, and in addition has paid for various privileges in connection with docking where private interests are involved. Commerce is increasing and the activities in western Alaska are marked, so that it is good business, especially from the point of view of economy, to look for a permanent Federal supply base in that region.

Dutch Harbor, which is an abandoned village of the North American Commercial Co., seems clearly to be the outstanding and logical place for the Federal Government to acquire. The only wireless station in the section is located close to this village and affords easy means of communication. The harbor is excellent, has additional room for modern wharves, and has a liberal supply of fresh water.

While the buildings of the company are rather old, no doubt many of them can be restored to fairly good condition. There are coal yards and trackage for handling coal and bins already built.

The Department of Commerce would be materially helped by having such a Government station in this section of Alaska, as its maritime bureau would find it of great benefit. In addition to having a place to take on coal and oil fuel, as well as water and other supplies, conditions are such that without a great outlay of money certain repairs to vessels could be undertaken. The Bureau of Fisheries, with its important interests in, and almost year-round contact with, the Pribilof Islands, would find such a base of great help in expediting the moving of supplies to the islands and bringing back sealskins and other furs. The Lighthouse Bureau and the Coast and Geodetic Survey, both of which are engaged in important work in the Pacific Ocean, Bering Sea, and waters adjacent to the Aleutian Islands, would find this supply and fuel base of great assistance in expediting their work. But this is not all. The Navy Department, with vessels moving back and forth between the Orient and western waters, could no doubt use this Government base to advantage, as could also the Coast Guard of the Treasury Department, which has vessels carrying on patrol duty in the waters adjacent to Dutch Harbor during a number of months of each year.

The Government vessels in the past have managed to get along in an uncertain and, at times, expensive way, but if this property were acquired they would immediately feel the beneficial effects of the purchase. Many tons of fuel are used by Government vessels in this section, including both coal and oil, and the prices that have been charged by privately owned companies have been out of all reason.

Consideration should be given to this matter, as it is a long step toward conducting the operations of the vessels of the Department of Commerce and other departments of the Government in a more economical and businesslike manner.

Very truly yours.

E. Lester Jones,
Director, Coast and Geodetic Survey.

BUREAU OF NAVIGATION.

DEPARTMENT OF COMMERCE,
BUREAU OF NAVIGATION,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the past year:

American shipping registered for the foreign trade and enrolled and licensed for the coasting trade, including the fisheries, on June 30, 1922, comprised 27,358 vessels of 18,462,968 gross tons, compared with 28,012 vessels of 18,282,136 gross tons on June 30, 1921. This shows a decrease of 654 vessels but an increase of 180,832 in the gross tonnage. This does not, however, accurately define the present situation as on June 30, 1922, 1,240 vessels of 7,484,910 dead-weight tons (approximately 4,989,940 gross tons) belonging to the Shipping Board alone were laid up. Of this number there were 932 steel vessels of 5,992,196 dead-weight tons, 61 steel tankers of 560,905 dead-weight tons, 238 wooden vessels of 876,526 dead-weight tons, and 9 concrete vessels of 55,283 dead-weight tons. On the same date the figures of the British Statistical Department of the Chamber of Shipping show that in England and Wales there were 203 vessels of under 1,000 tons returned as laid up, representing a total of 63,894 net tons and 272 vessels of over 1,000 tons, representing 845,026 net tons. For the whole United Kingdom the figures are, under 1,000 tons, 258 vessels of 77,532 tons net, and over 1,000 tons, 324 vessels of 1,034,030 tons net, together making a total of 582 vessels of 1,111,562 net tons.

Following is a brief analysis of our shipping on June 30, 1917, as the United States entered the war, at the close of the fiscal year 1921, and on June 30, 1922.

June 30—	Grand total.		Seagoing.				Great Lakes.		All others.	
			Shipping Board (over 1,000 gross tons).		Private owners (over 500 gross tons).					
	No.	*Gross tons.*	*No.*	*Gross tons.*	*No.*	*Gross tons.*	*No.*	*Gross tons.*	*No.*	*Gross tons.*
1922	27,358	18,462,968	1,711	7,686,973	1,933	5,664,323	2,745	2,723,857	20,969	2,387,815
1921	28,500	18,282,136	1,798	7,993,771	1,925	5,240,630	2,942	2,839,514	21,347	2,188,221
1917	26,397	8,871,037	19	76,160	1,552	3,564,160	3,001	2,779,087	21,825	2,451,630

On June 30, 1922, there were building in American shipyards 105 vessels of 204,544 gross tons. Even these bald figures are eloquent of the extraordinary slump which has taken place in this industry in the past few years. Four years ago, under the pressure of the war, the United States had a tonnage under construction of about 4,000,000 tons. Since then there has been a steady decline until it has arrived at the state indicated by the negligible figures recorded. In 1919 the United States exceeded the United Kingdom for tonnage on the stocks and looked as if it might become a formidable competitor, but now is among the smaller shipbuilding nations, being beaten, according to Lloyd's, by England with 1,919,504 tons, Germany with 545,000 tons, France with 243,290 tons, Italy with 285,671 tons, and Holland with 226,318 tons, while she is a little ahead of Japan with 115,512 tons. It is, perhaps, well that the nature of the shipbuilding industry in this country, inflated under war pressure, is exotic, or consequences to the country would have been disastrous.

INTERNATIONAL CONFERENCE ON MARITIME LAW.

The Maritime Law International Conference at Brussels held its last plenary session in 1910. It met, however, in March and April, 1913, in subcommittee, and it is now proposed to resume the work of unifying maritime law that was left in suspense during the war. In 1910 two international conventions were signed, dated September 23, for the unification of the rules applicable to collisions in one and assistance and salvage in the other. The convention relative to assistance and salvage was ratified by this Government and became a law on August 1, 1912, while the convention for the unification of the rules applicable to collisions has not yet been ratified.

The subcommittee of 1913 adjourned after referring to the Government's representative at the conference two revised drafts relative to (1) limitation of the responsibility of shipowners, and (2) mortgages and liens.

The growth of our merchant marine and the creation of the Shipping Board make the subjects of the limitation of shipowners' liability and mortgages and liens even of greater importance than in 1910, and this Government should accept the opportunity to discuss with the other governments the draft treaties on these subjects. At a meeting held on March 10, 1922, the Maritime Law Association of the United States considered the subject and it was the unanimous view of the association that the United States should be represented at the proposed Brussels international maritime conference.

RADIO COMMUNICATION.

Perhaps in no other line of endeavor has there been more activity and progress than in the employment of radio as a means of communication, through the improvement of transmitters and receivers and extension of the use of such apparatus. The largest and most important advance has been the development of the broadcasting service. At the beginning of the year this use of radio was in the experimental stage. At the close of the year there were 382 broadcasting transmitting stations operated by electrical companies, newspapers, department stores, educational institutions, and State or municipal governments. The musical entertainment, lectures on various subjects, sermons, market reports, time signals, weather forecasts, etc., so broadcasted reaches possibly 600,000 receiving stations, with the prospect of rapid and continued growth if the service can be properly regulated.

Existing law, designed primarily to regulate wireless as a life-saving device on ships at sea, to prevent unnecessary interference between operating stations and place them in charge of competent operators, necessarily is inadequate to meet the conditions brought about by the broadcasting service and the increase in the use of this means of communication. At the suggestion of the President, therefore, a radio conference of the foremost radio experts of the Government with men of recognized attainment in the scientific field was held the latter part of February. There was laid before and approved by this conference a bill carrying out the recommendations of the conference, which was introduced in the Senate and the House on June 9, 1922. In drafting this bill it was recognized that before it could become law the rapidly advancing conditions of the art might render any specific technical regulations obsolete. The proposed legislation, therefore, was drawn in most general terms in order that the regulations might be changed as the art itself changed. This could only be done by conferring on the Secretary of Commerce, having jurisdiction of the administration of the law, broad powers of supervision, regulation, and control. It is more or less an emergency measure, the act to regulate radio communication of August 13, 1912, remaining the basic law upon the subject.

During the year seven additional commercial transoceanic transmitters were placed in operation, providing additional means for communicating with Great Britain, France, Italy, Japan, Norway, Poland, and Germany. There is one commercial station doing business with Central America and plans are under way for communication with China and South America.

Licensed commercial land stations (excluding broadcasting stations) have increased from 161 in 1921 to 354 in 1922, while amateur stations during the same period have increased from 10,809 to 15,504.

The need for a revision of certain provisions of the International Radiotelegraph Convention of July 5, 1912, is urgent, as all transoceanic and ship radio stations must operate in accordance with its terms. At the time it was ratified we had but one station, operating to a limited extent with Germany, and the matter of allocating wave lengths was not given consideration. The increase in international and ship-to-shore communication necessarily has resulted in the use of unauthorized wave lengths and presents a most important problem which can be adjusted only through an international conference.

The increase of 4,695 amateur stations during the year is gratifying. These operators constitute a reserve trained in the use and in many instances the construction of radio stations and apparatus. Some of the most useful contributions to the radio art have been made by men who but recently were classed as amateurs, while during the recent war they were found much superior to the average commercial operator in resourcefulness and technical knowledge.

The close and efficient administration of the radio service is imperative if we are to maintain its efficiency as a life-saving agency on shipboard, a means of commercial communication, and of instruction and entertainment for our people. To perform this work we must have an experienced and expert personnel. To secure and retain such men the service must be provided with adequate funds to meet the increasing demands of commercial enterprises for qualified men.

ADMEASUREMENT OF VESSELS.

The admeasurement of vessels is one of the most technical services of the bureau. On this measurement is based the collection of tonnage taxes, canal tolls, in some instances pilotage, dry dockage, and port dues of various kinds both in American and foreign ports. The necessity for accurate and uniform measurement of our vessels at the various ports is obvious, but the machinery provided the Department of Commerce for this purpose is subject to considerable improvement.

At present it is being performed by customs officers selected and appointed by the Secretary of the Treasury in most cases under civil-service examinations as to their fitness for customs work. In all but a few of the principal ports they are temporarily assigned to the work, and as they are primarily employed for customs purposes, there is practically no incentive to their perfecting themselves in the technicalities of the measurement laws and regulations.

The result has been a material lack of uniformity, and in some instances discrimination against American ships through increased tonnage. For instance, at one of our principal ports the steamer

Californian was considered as having a "closed in" shelter deck of 1,826 tons subject to taxation and canal tolls. At our principal admeasuring port this same space was considered "open" and free from taxation and toll, the latter ruling being sustained by this bureau. This involved a discrimination of $109.56 against or for the vessel at each entry in tonnage tax alone, and $2,282.50 each time she passed through the Panama Canal.

In 1913 Congress provided an adjuster of admeasurements who travels from port to port instructing the admeasuring officers in the law and regulations. This has resulted in a material improvement, but there still remains the difficulty of numerous changes in the admeasurement officers due to their assignment to other work.

To remedy this condition it is proposed to present to Congress for its consideration the transfer of the admeasurement force from the Treasury Department to the Department of Commerce having jurisdiction over the laws, and a reorganization of the admeasurement service based on the location of the shipbuilding yards of the country rather than on customs districts. The present cost of this service is approximately $110,000 a year and the proposed reorganization may involve the additional expenditure of perhaps $15,000, which will be amply justified through the benefits to the merchant marine, convenience to shipowners, and will place the admeasurement of American vessels on a par with that of other leading maritime nations.

ENFORCEMENT OF NAVIGATION LAWS.

The various services of the department and the Customs Service of the Treasury Department reported during the year 11,412 violations of the navigation laws, the largest number reported in the history of this bureau. This was due principally to the activities of the five inspection vessels which reported a total of 6,722. The number of violations of the steamboat inspection laws was 422, as against 840 for the previous year, while the number of failures to carry the proper number of able seamen was reduced from 250 to 75. This undoubtedly was due to the laying up of vessels, releasing their crews for employment on other ships. The enforcement of the numbering act of June 7, 1918, requiring undocumented motor vessels to be numbered in the same manner that automobiles are numbered, resulted in 4,426 violations as against 3,676 the previous year. In all other classes of violations there was no material change.

CONSOLIDATION OF FEDERAL SUPERVISION OF THE MOVEMENT OF MERCHANT SHIPS.

At present there is scattered throughout the Treasury, War, and Commerce Departments the administration of laws having to do directly with the movement of our merchant fleet and safeguarding

the lives of thousands on board those vessels. This results in an unnecessary duplication of the floating equipment and officers of the Federal Government with the necessary duplication of expenditures.

During a recent investigation of the conditions in the harbor at New York it was found that the Coast Guard service was operating six small vessels in those waters enforcing the anchorage regulations, boarding of vessels, and to some extent enforcing the navigation laws. The supervisor of the harbor, acting under the Secretary of War, was employing six vessels of a similar size in the enforcement of the dumping regulations. The Public Health Service was operating four vessels of a similar size in connection with the quarantine station at Rosebank, one of them being a fumigating vessel.

The cost of the above services aggregates approximately $270,000.

In addition to the above, this bureau has stationed at New York during the greater portion of the year a small motor boat engaged in the enforcement of the navigation laws at an expense of approximately $15,000.

The work performed by the above services having to do almost exclusively with the merchant marine, obviously should be under the direction of one department.

SHIPPING COMMISSIONERS.

During the year 541,952 officers and men were shipped, reshipped, and discharged, compared with 650,840 for the previous fiscal year and 378,772 for the year 1914. This decrease was due principally to the laying up of 752 vessels of the United States Shipping Board during 1921. Collectors of customs, acting at ports where shipping commissioner offices have not been established, shipped and discharged during the year 47,200 officers and men as compared with 56,366 officers and men during the previous year. American consuls shipped and discharged during the year 41,533 men.

Of 272,605 officers and men shipped before shipping commissioners 109,747 were native Americans and 38,177 naturalized Americans, 147,924 in all, or a trifle over 54 per cent, compared with 48 per cent the previous year. There has been a decrease in the number of all nationalities, excepting Germans increased to 8,098 from 1,626 for the previous year, Austrians 828 from 684, Chinese 3,756 from 3,496, and Filipinos 3,395 as against 2,825.

The work of the shipping commissioners and their deputies during the past year has been materially handicapped through the inadequate appropriations for this service. The present compensation for these deputies averages $1,236. The average should be not less than $1,600. The prompt movement of ships necessarily involves much overtime work, for which no provision is now made, and the men who adjust disputes arising as to wages, fines, etc., must be

well versed in the laws governing the employment of seamen and be qualified by temperament, ability, and training to act in a semi-judicial capacity. Such men can not be secured for the pay of an ordinary clerk.

PREVENTING OVERCROWDING OF EXCURSION STEAMERS.

During the fiscal year 1922 passengers were counted on 9,149 trips of excursion steamers, the number of passengers aggregating 4,340,759. Of this number navigation inspectors made 7,236 counts aggregating 3,329,694 passengers. On 243 occasions it was found necessary to stop passengers from going on excursion boats, the capacity of the boat having been reached. This involved the safety of 181,377 passengers.

This service has to do directly with safety to life under conditions where Federal supervision is peculiarly needed. The appropriation for the employment of navigation inspectors for a number of years was $18,000, but this amount has been reduced to $15,000 for the past fiscal year. The appropriation was further reduced for the current fiscal year to $10,000, which has made it practically impossible to give this important service proper supervision.

During the past fiscal year steerage passenger ships on 1,057 voyages brought 250,741 passengers to the United States compared with 944 such voyages and 586,195 passengers during the previous year.

MOTOR BOATS.

It is estimated that there are in the United States approximately 250,000 motor boats of which possibly 200,000 are under Federal jurisdiction. Up to July 1 last 154,230 motor boats had been numbered under the act of June 7, 1918, an increase of 4,748 during the year. The department's facilities for enforcing the laws affecting motor boats consist of five inspection vessels and customs and navigation inspectors. In addition to those the department has had the active cooperation of motor boat and yachting associations, publications, and especially the United States power squadrons. The use of these small boats is growing constantly and it is essential to the safety of millions of persons using these boats that the laws governing their equipment and navigation should be complied with. This can be secured only through cooperation of the motor boat owners themselves with the department.

The inspection forces of the Bureau of Navigation continue to cooperate with the Bureau of Internal Revenue in the collection of taxes imposed on pleasure boats. They also are cooperating as far as practicable with the Engineer Corps and the Bureau of Light-

houses in connection with the laws under the jurisdiction of those branches of the service.

NAVIGATION RECEIPTS.

The receipts from tonnage duties during the fiscal year amounted to $1,843,148.34, including $138,145 alien tonnage and light money and $197.22 Philippine Island fund, compared with $2,497,946.81 collected from the same sources last year. These taxes and also the navigation fees and fines are collected by collectors of customs in the administration of laws under the direction of the Secretary of Commerce through the Bureau of Navigation. The receipts during the past year compared with those of the previous year and 1917, the last pre-war year, were as follows:

June 30—	Tonnage duties.	Navigation fees.	Navigation fines.	Total.
1922	$1,818,330.70	$200,445.80	$56,443.44	$2,075,219.94
1921	2,208,539.69	225,822.89	63,584.23	2,497,946.81
1917	1,393,743.16	159,808.03	49,962.37	1,603,513.56

The large amount collected as alien tonnage and light money was received mainly from ships under the German flag which up to the date fixed in the proclamation of the President—November 11, 1921—was paid pursuant to sections 4219 and 4225 of the Revised Statutes, which imposed taxes of 50 cents each per net ton on foreign vessels not entitled by law or treaties of the United States to equality of treatment in respect of these charges with vessels of the United States.

NAVIGATION APPROPRIATIONS.

The appropriations for the bureau for the past fiscal year compared with those for the years ended June 30, 1921 and 1917, were as follows:

June 30—	Bureau.	Shipping service.	Tonnage adjustment.	Counting passengers.	Navigation laws.	Wireless laws.	Total.
1922	$42,780	$115,200	$3,760	$15,250	$60,000	$80,000	$316,990
1921	42,530	115,200	3,760	18,250	75,400	60,000	315,140
1917	37,780	74,425	3,000	18,250	26,500	45,000	204,955

The appropriations made directly to the Bureau of Navigation indicate but a portion of the expenses of that service, the principal field force consisting of collectors of customs and their employees, who are appointed and paid by the Secretary of the Treasury. It

has been estimated that possibly one-third of the Customs Service of the country is employed in the service of the Department of Commerce, principally the Bureau of Navigation. From the beginning of our Government up to July 1, 1886, the cost of the Navigation and Steamboat Inspection Services were offset by fees fixed by statute for the various services rendered by those officers. The collection of these fees, except in a few cases, was discontinued by the act of July 1, 1886, there being at that time a surplus in the revenue over the expenditures of the Government. This fee system was not peculiar to the United States, but was and is employed by maritime nations generally, and there is now under consideration the presentation of a fee system constructed along the lines in use prior to 1886, providing fees which will aggregate approximately the cost of the Navigation and Steamboat Inspection Services.

Very truly yours,

D. B. CARSON,
Commissioner of Navigation.

STEAMBOAT INSPECTION SERVICE.

DEPARTMENT OF COMMERCE,
STEAMBOAT INSPECTION SERVICE,
Washington, July 1, 1922.

Hon. HERBERT HOOVER,
Secretary of Commerce.

DEAR MR. SECRETARY: In response to your request I furnish the following condensed report upon the work of the bureau during the past year:

ORGANIZATION.

The following positions were embraced in the Steamboat Inspection Service at the close of business on June 30, 1922:

At Washington, D. C.:		
Supervising Inspector General	1	
Deputy Supervising Inspector General (who is Acting Supervising Inspector General in the absence of that officer)	1	
Private secretary to the Supervising Inspector General	1	
Clerks	10	
Messenger	1	
		14
In the service at large:		
Supervising inspectors	11	
Traveling inspectors	3	
Local inspectors of hulls	48	
Local inspectors of boilers	48	
Assistant inspectors of hulls	73	
Assistant inspectors of boilers	73	
Clerks to boards of local inspectors	92	
		348
Total		362

During the year, incident to the economy program, the services of 19 assistant inspectors of hulls, 20 assistant inspectors of boilers, and 3 clerks were discontinued at different offices throughout the service.

STATISTICS.

The force inspected and certificated 7,543 vessels, with a total gross tonnage of 13,931,877, of which 7,206 were domestic vessels, with a total gross tonnage of 10,975,357, and 337 were foreign passenger steam vessels, with a total gross tonnage of 2,956,520. Of the domestic vessels there were 5,864 steam vessels, 771 motor vessels, 20 pas-

senger barges, and 551 seagoing barges. There was a decrease of 552 in the total number of vessels inspected and a decrease of 2,299,124 in the total gross tonnage of vessels inspected as compared with the previous fiscal year. There were 658 cargo vessels examined to carry persons in addition to crew, under the provisions of the act of Congress approved June 5, 1920. Letters of approval of designs of boilers, engines, and other operating machinery were granted to 31 steam vessels, with a total gross tonnage of 1,016. There were inspected for the United States Government 56 hulls and 1,886 boilers. There were 2,770 reinspections of steam vessels, motor vessels, and barges.

Licenses were issued to 26,044 officers of all grades. There were examined for visual defects 7,997 applicants for license, of whom 17 were found color blind or with other visual defects and rejected. Certificates of service were issued to 10,253 able seamen, and 924 were rejected. Certificates of efficiency were issued to 17,804 lifeboat men, and 6,714 were rejected.

Steel plates for the construction of marine boilers to the number of 2,259 were inspected at the mills, and a large amount of other boiler material was inspected. There were examined and tested 160,894 new life preservers, of which number 3,356 were rejected. There were 206 balsa-wood life floats inspected, of which number 10 were rejected. There were inspected 6,113 cork ring life buoys, of which number 118 were rejected. There were inspected at factories 606 new lifeboats, of which number 4 were rejected. There were inspected at factories 87 new life rafts, all of which passed. There were tested by firing 102 line-carrying guns, all of which passed.

The total number of accidents resulting in loss of life was 231. The total number of lives lost was 266, of which 95 were passengers. Of the lives lost 178 were from suicide, accidental drowning, and other causes beyond the power of the service to prevent, leaving a loss of 88 as fairly chargeable to accidents, collisions, founderings, etc. There was a decrease of 64 in the number of lives lost as compared with the previous fiscal year. Passengers to the number of 235,802,603 were carried on vessels required by law to make report of the number of passengers carried. Dividing this number by 95, the total number of passengers lost, shows that 2,482,132 passengers were carried for each passenger lost. The number of lives directly saved by means of the life-saving appliances required by law was 1,357.

GENERAL CONDITIONS.

The depression that is being felt throughout the entire world is particularly noticeable in this country in the American merchant marine, which expanded so rapidly as a result of a war effort. While

it is true that many ships have been laid up, that has not been because Americans do not know how to maintain an American merchant marine, but because of the natural and logical reaction from war conditions. Incident to the depression in shipping, and in fact the general reaction from war conditions, it has been necessary to practice the most rigid economy in governmental expenditures. So far as shipping is concerned, there has been a marked decrease from what it was during the war, yet the work in the central office of this service has materially increased, and especially the correspondence. Much of this correspondence is routine and incident to administrative direction, yet it is a fact that, by reason of the important part that the American merchant marine had to play in the World War, people are thinking as they never thought before in the terms of ships and in the rehabilitation of the American merchant marine, and this service is repeatedly called upon to furnish information in regard to the inspection of vessels of the American merchant marine, and the licensing of men as officers, able seamen, and lifeboat men thereon.

EFFECT OF RETRENCHMENT.

It will be recalled that the force of assistant inspectors in this service was reduced by 39 on July 31, 1921, incident to the economy program, which resulted in a saving in salaries of $87,300. During the fiscal year for which this annual report is issued, a further study was made of the conditions in this service, and after careful consideration recommendation was made that the office of the local inspectors at Burlington, Vt., be discontinued, and that the work in that district be taken over by the local inspectors at Albany, N. Y.; that the office of the local inspectors at Apalachicola, Fla., be discontinued and that the work of that district be taken over by the local inspectors at Mobile, Ala.; and that the office of the supervising inspector of the seventh district, Pittsburgh, Pa., be discontinued and that the work of that district be looked after by the supervising inspector of the sixth district, Louisville, Ky.; all of these recommendations being concurred in by the department in the interest of economy, and legislation has been introduced in Congress looking to the abolishment of these offices. By the abolishment of the offices above referred to, the efficiency of this service will not be impaired and there will be a considerable saving in Government money.

This service has been able to effect a very substantial retrenchment in the matter of rents, due to a large extent to the cooperation of the Bureau of the Budget, and with the beginning of this fiscal year there will commence an actual saving in rents of $17,671. Private quarters may have to be rented for different offices of this service during the next fiscal year, which will cut down that saving;

nevertheless this service is trying as it has never tried before to make every cent of money spent for public purposes produce something.

VALUE OF COOPERATION.

The criticism has often been advanced by persons outside of the Government, and sometimes by those employed by the United States Government, that there is a lack of cooperation between the many bureau units of the executive departments, but this service has enjoyed splendid cooperation from not only the bureaus in this department but also from the many bureaus in other departments. For example, take the matter of the inspection of sanitary drinking-water systems.

The Public Health Service, Treasury Department, being charged by law to enforce sanitary drinking-water systems and other sanitary conditions on vessels, but not having sufficient inspection force, part of the work, on the request of the Treasury Department, was taken over by the inspectors of this service. This was done to carry on the work and save expenses of travel of the Public Health Service engineers, the inspectors of this service being well qualified to pass judgment on the mechanical problems involved. The vessels now so examined are American-owned vessels operating on the Great Lakes, bays, sounds, lakes other than the Great Lakes, and rivers, and coastwise to continental United States on the oceans, and Canadian-owned vessels operating on the Great Lakes touching at American ports on the Great Lakes. Vessels, American or foreign owned, operating between ports on the mainland of the United States and of foreign nations, or of insular possessions of the United States, except the Canadian vessels above referred to, are not included in the enforcement of the interstate quarantine regulations of the United States as regards water-supply systems. The sanitary examinations are made at annual inspections of the vessels. Report is made to district engineers of the Public Health Service on sources of drinking water, how the water is obtained, treatment apparatus, how stored, distribution and cooling systems, kinds of drinking cups and towels used, and details in connection with said reports. The enforcement of the law is with the Public Health Service. The work was begun by this service in April, 1922, and has since been successfully carried on without serious detriment to its work.

Another way in which there is cooperation between this service and other departments is in the matter of the inspection of vessels owned by the different departments, and of boilers in Government buildings. This work is constantly carried on in fortifications and cantonments, and buildings generally, and may well be done by this service because it knows how to do it, and by doing it a tremendous overhead expense

is saved which would not be saved if a separate corps of inspectors were employed by other bureaus of the Government for this purpose.

LEGISLATION.

Recommendation has been made in previous annual reports for new and desirable legislation that will materially assist this service in making modern its rules and regulations, and in keeping abreast of the most modern practices.

A bill has been introduced in Congress looking to the amendment of sections 4433 and 4418, Revised Statutes, in regard to the working and hydrostatic pressure of boilers. This is a matter that has been suggested from time to time by the manufacturers of boilers, and this service has been criticized because of its rules and regulations. They are deserving of criticism, but those rules and regulations can not be made modern until the necessary legislation shall have been enacted by Congress.

That in which all of us are especially interested at the present time is the expansion of the American foreign trade, and in this connection, it may be stated that section 4472, Revised Statutes, has been directly in the way of an intelligent expansion of that trade so far as it consists of dangerous articles. It is highly desirable that attention be given by Congress to the enactment of the bill that has been prepared looking to the amendment of the section, so that certain so-called dangerous articles need not be forbidden but that their transportation be regulated by the Supervising Inspector General.

It is also desirable that the motor-boat law be amended so that really constructive safe conditions may be obtained, and this may be accomplished by the extension of motor-boat inspection. This should be done, not with a view to interfering with the pleasure of anyone who wishes to own a pleasure motor boat, but with the intention of protecting people from themselves. The type of inspection in regard to motor boats would not, of course, be the same as required of great ocean steamers, but would cover certain fundamental essential conditions that would bring about safe results. Not the least of these would be a requirement that operators of motor boats pass a reasonable examination, for at the present time these licenses are issued without any examination, and it is desirable that a reasonable examination shall be passed indicating a person's inherent fitness to hold this grade of license, for otherwise that which he holds as an authority to act as operator of motor boats is simply an excellently engraved piece of paper.

Another step forward is that in the matter of the approval of hull construction and boiler construction. While the inspection of vessels as carried on by this service is quite satisfactory, yet it is not

contended that that inspection can not be improved, and the way to improve it is to have located in this office a corps of experts whose business it will be to pass upon the plans of a ship before it is built, the same as is done in the building of a house. At the last meeting of the board of supervising inspectors a rule was adopted requiring certain classes of vessels to be inclined where there was any doubt of their stability, and this will control the situation for a while, in view of the fact that shipping is suffering a depression, but just so surely as there is a revival in the shipping business, and just so surely as there is a healthy expansion of American foreign trade, then just so surely will it be necessary to adopt a new method of procedure, and that procedure should be that which has been above recommended, namely, the approval of hull construction and boiler construction in the central office of the Steamboat Inspection Service. This will entail a greater expenditure of public money, but, as to that, safety out of all proportion to the mere dollars expended will be obtained.

Very truly yours,

GEO. UHLER,
Supervising Inspector General.

INTER AMERICAN HIGH COMMISSION.

INTER AMERICAN HIGH COMMISSION,
Washington, July 1, 1922.

Hon. HERBERT HOOVER, Chairman,
United States Section, Inter American High Commission.

MY DEAR MR. CHAIRMAN: I have the honor to present a brief summary of the work of the United States section for the period between December 21, 1921, and June 30, 1922.

In that period five meetings of the section were held. The meeting of December 21, 1921, dealt primarily with the Inter American exchange situation and was held precisely on the same day as meetings of a number of other national sections of the commission, which also were devoting their attention to the subject of exchange. The meetings of January 23 and March 1 were taken up with the consideration of and action on reports of various subcommittees appointed at the meeting of December 21. The subject to which the most attention was given was the protection of trade-marks in the Western Hemisphere, various aspects of the Convention for the Protection of Trade-Marks, signed in Buenos Aires in 1910, being carefully analyzed. The meeting of April 10 was concerned chiefly with the discussion of the reports on the exchange problem received from the other sections of the commission, but it also took up the arbitration of commercial disputes between citizens of the various countries, the reciprocal treatment of branches of foreign banks, and particularly the problem of uniform customs and port procedure. Finally, the meeting of May 1 dealt with nearly all the subjects brought up for discussion since the meeting of December, 1921, as well as the proposals suggested to the section by outside organizations, one regarding treaties for the enforcement of arbitral awards in commercial disputes and the other concerning The Hague Bills of Lading Rules of 1921. At this meeting also, at the suggestion of the Chairman, certain aspects of industrial standardization were recommended for study, with a view to communications on this subject at a subsequent time to the other sections of the commission.

The staff has been engaged, as heretofore, not only in gathering and properly preparing material required for the members at these several meetings, but also in the preparation of studies undertaken

in fulfillment of some of the original resolutions by virtue of which the commission was organized. Notable among these are the studies in the field of commercial law.

The report on the laws of the American Republics concerning the "Formation and operation of domestic corporations and the operation of foreign corporations" was continued during the period under discussion, and it is hoped that it will be in circulation considerably before the end of the present fiscal period. New reports in the field of commercial law were one on acceptance (in Spanish), completed in the period for which this report is made and distributed shortly after the beginning of the current fiscal year, and another on conditional sales (also in Spanish), made available to the other sections just at the end of the last fiscal year. A comprehensive survey of bills-of-lading legislation and regulations, bringing up to date and expanding the report of 1918 on the same subject, was also undertaken in the spring.

The collection of material of an economic character, and particularly that bearing on public finance, banking, and currency of the several countries participating in the work of the commission, proceeded during the last fiscal year as it has since the original decision was taken to engage in the systematic collection of such data and its distribution among persons interested in these topics.

The staff of the section was reduced from 11 to 8 persons at the end of the fiscal year, vacancies not being filled because of the prospect of a reduced appropriation for the fiscal year 1922–23. Obviously, the success of the section in carrying on an otherwise difficult task is likely to be achieved only more slowly as a result of the limitation upon the modest financial resources of the office. I venture to express the hope that the sum of $25,000 estimated for the year 1923–24 (the same amount as that estimated for the current fiscal year 1922–23) will be approved by the Congress.

Respectfully,

L. S. Rowe,
Secretary.

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DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA