TWENTY-EIGHTH

ANNUAL REPORT

OF THE

SECRETARY OF COMMERCE

FOR THE FISCAL YEAR ENDED JUNE 30

1940

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TWENTY-EIGHTH ANNUAL REPORT

OF THE

SECRETARY OF COMMERCE

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, December 2, 1940.

To THE CONGRESS OF THE UNITED STATES
(Through the President):

I am submitting herewith the Annual Report covering the operations of the Department of Commerce during the fiscal year ended June 30, 1940.

ECONOMIC REVIEW OF THE YEAR

DOMESTIC BUSINESS

An economic review of the fiscal year 1940 must center upon one factor—the war and its impact upon the American economy. The first quarter of the year witnessed the threat of war become reality. The immediate reaction of American business was such as quickly to raise industrial activity to a record high. A rather sharp decline set in during the third quarter, but this was reversed by the end of the fiscal year, leaving income for the year as a whole very substantially in advance of 1939.

Prior to the outbreak of war in September, recovery from the sharp decline of business activity in 1938 had slowed considerably. Capital investment continued low, production low, and commodity prices weak, and activity on the New York Stock Exchange very restricted. But the outbreak of war converted this moderate recovery into a sharp and vigorous expansion that in its early stages had many of the characteristics of a speculative boom. Commodity prices rose markedly, as did those of equity shares, while securities selling on a fixed yield basis experienced a decline. Meanwhile, a veritable flood of new orders advanced industrial production very rapidly, so that by the end of November it had surpassed the previous high achieved in 1937.

It soon became apparent that much of the increase in business activity was predicated upon expectations of war-time inflation and delivery delay which were not materializing but leading only to a rapid rise in inventories. Recollection of price experience during the first World War helped stimulate a forward buying movement which, impinging at first largely on fixed supplies, rapidly boosted the prices of some commodities 30 or 40 percent. The price movement lent further support to forward buying, and the Department of Commerce index of new orders advanced from 105 in August to 168 in

September and 148 in October (Jan. 1939=100). Altogether almost $1.5 billion was added to the value of manufacturers' inventories from September through January.

Meanwhile, these developments had occurred without any significant rise in exports—the area in which the impact of war-resultant demand would be focused—until a sharp nonseasonal increase in December. All evidence accumulated at the time indicated that the character of the war at the time was not likely substantially to increase the immediate demand for American products. Consequently, new orders fell appreciably, and after January industrial production began to decline and prices weakened. Under the impetus of inventory liquidation, this downward movement proceeded at a fairly rapid pace, the Federal Reserve Board's index of industrial production falling from 126 in December to 111 in April. Moreover, in spite of slowly advancing private construction, construction as a whole also began to decline as a result of curtailment in the governmental building program.

Almost as abrupt as the decline in business activity was its sudden rise beginning in May. And this time little doubt was left concerning the impetus and strength of the advance. The collapse of France radically changed the economic and military outlook both abroad and at home. The United Kingdom and its commonwealth Allies were forced to call upon the United States for increased volume of supplies almost immediately. But of even more importance was the necessity for this country to embark upon a defense program of very large proportions. In June, $4,287 million of funds had been allocated for the 1941 fiscal year for this purpose, and it was clearly evident that still further appropriations of great magnitude were to be made. Again production climbed upward, but this time without the flurry in commodity prices, while security prices declined. In June the Federal Reserve Board index stood at 121, 16 percent higher than at the beginning of the fiscal year.

NATIONAL INCOME HIGHER

For the year as a whole, national income payments were as high as those of any year in the decade. Total income payments are estimated to have been $71.9 billion as compared with $67.9 in the previous year. The 1940 level was a billion higher than 1937 and, as prices were lower in 1940, income in terms of real goods and services was still greater. All groups shared in the larger income, though as is the case in most rapid upswings in business activity, those receiving dividends and other business income enjoyed the largest percentage gain. Profits in the second quarter of the fiscal year were unusually high as a result of the combination of rising prices, expended production, and relatively stable labor costs. Moreover, though they experienced some decline in the third and fourth quarters, profits still remained substantially above those of the previous year as well as those of the average for the decade. Reports for 373 large industrial corporations showed an increase in profits of 58 percent over the preceding fiscal year, an increase which brought profits to the second highest figure in the decade.

Labor income, including work-relief payments, advanced $2,176 million in the year to a total of $45,400 million. Salaries and wages showed an especially impressive increase, rising 5 percent over 1939. These reached their peak in December and January, on a seasonally adjusted basis, and in combination with large dividend disbursements helped produce at this time the highest rate of income payments during the year.

Agricultural income, including Government payments, also improved decidedly in the fiscal year 1940, though it remained below the 1937 level. The gain was almost entirely attributable to higher prices for farm products. The outbreak of war induced considerable activity in farm commodity markets, and farm prices advanced 13 percent from August through February. Though they weakened after February, the end of the year still found prices much above the previous year. Hence farm income for the year was about $8,810 million, which compared with $8,166 million in 1939.

INCREASE IN PRODUCTION

The general movement of production was set forth above. From August through December industrial production advanced 21 percent. More than half of this gain was sacrificed in the downswing through April, while the sudden reversal in May and June again raised output, but to a point below the December peak. Most industries participated in the entire swing, though as is usually the case, the durable goods industries experienced a wider fluctuation than the nondurables. Thus the Federal Reserve index of durable goods production advanced 32 percent in the upswing and then declined 19 percent until April, while nondurables increased 8 percent and fell back 9 percent in the same period.

A few industries of extreme military importance showed an almost continuous expansion in production during the year. Shipbuilding, for which a large amount of unused capacity existed before the war, registered the considerable increase in production of 31 percent by the end of the year. The aircraft industry was forced to increase its capacity steadily, and output had risen 100 percent by the end of the year. In the same period machinery production recorded an advance of 27 percent.

The output of steel and of automobiles, though fluctuating rather widely, rose considerably over that of 1939. About 59 million tons of steel were produced, 50 percent more than in the previous year, while the output of automobiles was the third highest in the decade. Among nondurable commodities, production of textiles and pulp and paper products registered significant gains. Here too, production moved widely as inventory purchasing raised activity in the fall to near-record levels which could not be maintained after December.

The production of electrical power continued to rise, increased industrial demand being superimposed upon the secular advance of other uses to produce a new record of 12,250 million kilowatt-hours in January. Output for the year was 12 percent above 1939.

Freight carloadings registered a 13 percent gain over the previous year. The peak was achieved in the third week of October when car-

loadings were 856,289, the largest number in any week since November 1930. Large inventory accumulation undoubtedly aided the October advance. Movement of coke and ore increased 59 and 78 percent, respectively, while coal and miscellaneous loadings also showed substantial gains. Agricultural and merchandise l. c. l. loadings showed a downward trend, which had been in evidence over the whole decade.

WIDE INVENTORY GAINS

As was pointed out above, much of the rise in industrial production from September to December of 1939 represented buying for inventory purposes. This lengthening of commitments was general, not only manufacturers of all types of commodities participating, but distributors in both wholesale and retail trade adding to stocks.

The largest gain occurred in the value of manufacturers' inventories, the Department of Commerce index rising from 95.5 in August (December 31, 1938=100) to 107.3 in December; then, after industrial production and incomes had turned down, continuing to advance until a peak of 110 had been reached in February. Liquidation during the remainder of the downswing was small, the index falling to 108.2 in June. Though the whole accumulation represented the considerable investment of $1,300 million, evidence at the end of the year pointed to an increase in business activity which would require much of the additional inventory to support a higher level of production.

In general, the durable goods industries recorded the larger accumulation—automobile, transportation equipment, electrical machinery, and iron and steel firms constituting the vanguard of the movement. However, certain nondurables, including chemicals, textiles, paper, and rubber products, also registered sizable gains.

Wholesalers' inventories scored most of their rise by October, the index advancing from 97 (December 1939=100) at the beginning of September to 101 at the end of October. Diminished demand after December added another substantial increment to wholesalers' inventories in January. Liquidation of these added stocks continued to the end of the year, leaving supplies about 7.6 percent higher than a year previous. A movement similar in general outline, but somewhat smaller in magnitude, occurred in the stocks of retail department stores.

CONTINUED ADVANCE IN CONSTRUCTION

The decade low point in construction activity was reached in 1933, after which the industry moved forward slowly, but rather steadily. This advance was continued in the first half of the fiscal year 1940. However, the record after January was less satisfactory, and construction contracts for the year as a whole fell some 4 percent below the 1939 volume. In spite of the decline, marked and significant changes occurred in the components, which presaged a resumption of the rise in the near future.

Public construction was responsible for the entire decrease, the contracts awarded for the year in 37 States as reported by the F. W. Dodge Corporation being $1,531 million as compared with $1,899 million in 1939. The decline in public construction was the result of decreased Federal appropriations and was concentrated in the second half of the year, when contract awards averaged only $105 million a month, almost one-third less than in the first half. However, large defense appropriations at the end of the year assured a recovery in this component.

Private construction, whose advance since 1933 had been very slow, increased at a more rapid pace in 1940. Total contracts for the year were $1,943 million, 14 percent greater than the preceding year. Awards were in greater volume during the second half of the year, and the peak was reached in May with $217 million of contracts, the largest since the early 1930's. An especially favorable omen was the increase in residential construction, of which contracts in the final quarter of the year totaled $416 million, the best quarter since 1929.

RISE IN EMPLOYMENT AND PAY ROLLS

Employment in the year reflected the fluctuating course of production, but over most of the period it exceeded the volume of the previous year. On the average, workers in nonagricultural pursuits numbered 35,168,000, which compared with 33,862,000 in 1939. The peak of 35,833,000 was achieved in December. Largest gains were reported in a number of manufacturing and mining industries where on the average more than 754,000 men were added to pay rolls over the year. The number of workers engaged in construction also increased as this type of activity continued to advance slowly. On the other hand, employees in trade and service industries showed only the usual very small change associated with shifts in the general level of business activity. Expanding employment opportunities in industry led to a decline in the supply of agricultural workers, and the average number engaged in this work decreased about 2 percent in the year.

Expansion of factory pay rolls, generally, was greater than the increase in the number of workers employed, due both to a gain in man-hours of employment per worker and to the payment of somewhat higher wage rates. The latter included overtime compensation in certain industries. The increase in hourly earnings in manufacturing industries was not large—from $0.637 to $0.672—but, it represented a virtually uninterrupted rise. Weekly earnings fluctuated as the number of hours per week rose, under the impetus of expanded industrial demand, from 36.7 in July to 38.6 in December. However, by June 1940, half the gain in average hours per week had been sacrificed.

RETAIL TRADE

The movement of goods through retail channels increased during the year in response to the gains noted in employment and income. Thus the yearly volume of department store sales advanced 5 per-

cent during the year, while variety-chain store sales increased 4 percent. Expanding farm income raised rural sales of general merchandise about 7 percent. Department store and variety store sales followed the broad pattern of business activity, advancing to a peak in the second quarter, receding through the second quarter to lows in April and May, respectively, and recovering at the close of the fiscal year. Monthly fluctuations in volume were unusually great, reflecting the wide swing of industrial activity. The department store index, for example, rose from 86 in June (1923–25=100) to 96 in December, then declined to 87 in May 1940, and closed the year at 91.

The rise in rural sales of general merchandise lagged behind the increase in farm income, though the level for the entire year was relatively high. The first substantial advance was made in December when the index of rural sales rose to 132 from the November level of 123. With the exception of April, this larger volume was very well maintained during the remaining part of the year, June sales being the highest for the whole period.

Nowhere was the quickened pace of retail distribution more evident than in the enlarged sales of new passenger automobiles. These totaled more than 3,150,000 for the year as compared with only 2,400,000 in the preceding 12 months. Here, too, the swing in the level of income during the year induced a wider fluctuation of sales within the period than is usually the case.

FINANCIAL DEVELOPMENTS

Increased industrial activity expanded the business of banks during the year as loans and investments rose more than $1,700 million, a gain of 3 percent over the volume at the end of the previous year. However, the flotation of corporate securities failed to advance, reaching only a total of $2,279 million, 8 percent less than in 1939 and about half the 1935–36 volume.

About $750 million of the increase in loans and investments represented a larger volume of loans to business, the major part of which gain was made concurrently with inventory buying in the second quarter of the year. At the end of the year, however, rapidly advancing business activity lifted business loans to the highest level of the period. Among investments, the principal gain occurred in holdings of United States obligations. Federal Reserve member banks adding almost $1 billion of these to their portfolios.

Deposits were of course increased by the larger volume of loans and investments. But of even more importance in bringing about the $4,700 million advance in deposits was the record inflow of gold. Political uncertainty and the needs of the belligerents cooperated to induce a net accumulation of gold from abroad amounting to $3,700 million. In the one month of June 1940, $1,163 million of gold came into the country. At the end of the fiscal year, the monetary gold stock stood at $20 billion, while excess reserves of Federal Reserve member banks had attained the unprecedented total of $6,800 million.

Refunding operations again were the principal source of corporate security flotation, amounting to $1,834 million. Of the new capital issues only $108 million, about one-third of the total, represented industrial demand. This constituted the smallest security financing for industrial expansion since fiscal year 1935.

As was to be expected in such a year of extensive change and uncertainty, stock prices registered wide fluctuations. In sharp contrast with the supposed depressing effect exerted by the threat of war, its realization served as the signal for a rapid rise in the value of equity shares. Industrial stock prices rose about 13 percent from August to the high point in September. Quotations then eased until January and, with allowance for intermediate fluctuations, maintained until May a level about 5 percent below the September high. In May, however, military developments in Europe caused a very sharp break in prices and by the end of the fiscal year the Dow-Jones index stood at 121.9, as compared with the year's peak of 155.9. During the first sharp increase in stock prices, prices of high-grade bonds declined. However, most of the ground had been recovered by May, when the break in the market extended to bonds. But the decline was of short duration and bond prices were again recovering at the end of the year.

Federal finance featured an increase in expenditures, which was not quite offset by larger receipts from taxation and other sources. Total expenditures rose $300 million to a total of $9,500 million, while a larger national income advanced total receipts from $5,700 million to $5,900 million. The gap was filled by larger borrowing, the deficit aggregating $3,600 million for the year. This was met by $1 billion of receipts in trust and other accounts, a $1 billion reduction in the Treasury's cash balance, and by $1,600 million of direct and guaranteed obligations offered to the public. The total of such obligations was $47,900 million at the end of the fiscal year.

One of the most important developments in international finance was the decline in the price of sterling from $4.68 to $4.03. The decline was very rapid, occurring at the outbreak of war when the Exchequer weakened its support of the pound. However, exchange controls and other regulations designed to check private capital movements and conserve foreign exchange resources pegged the rate at about $4.03. The controls were such, however, as to allow the existence of a small amount of exchange not subject to regulation. The price of this sterling varied much more widely, reaching a low of $3.14 in May. At the end of the fiscal year it stood at $3.81.

FOREIGN TRADE

The course of foreign trade during the fiscal year also was strongly influenced by circumstances growing out of the war in Europe. Although both export trade and import trade increased substantially as compared with the preceding year, the most obvious direct effect of the conflict was a progressive restriction, geographically, of the market for American exports and, at the same time, of the sources of imports into the United States. The German market and the former Austrian and Czecho-Slovakian markets were cut off at the outbreak

of hostilities. The German conquest of Poland in September extended the area proscribed to American trade. In April, the occupation by Germany of Denmark and Norway brought these countries under blockade and created serious obstacles to continued trade with the Baltic countries. The following month, the Netherlands and Belgium were closed to commerce by sea, and in June the defeat of France and the entrance of Italy into the war interrupted or severely curtailed shipments between the United States and practically all the remaining continental European and Mediterranean countries.

APPRAISAL OF LOSSES DUE TO WAR

The importance of these losses to the foreign commerce of the United States should be appraised with reference both to the aggregate values of the exports and imports involved and to the individual commodities entering into trade with the affected areas. In the aggregate, export trade amounting in the preceding fiscal period to $669 million, or to nearly one-fourth of total exports, was cut off or jeopardized as a consequence of developments during the year closed with June 1940. The aggregate value of import trade involved was $445 million, or more than one-fifth of total imports into the United States. By the end of the year, trade with Europe was confined largely to shipments between the United States and the United Kingdom, although trade was maintained with the Union of Soviet Socialist Republics (mainly, however, through Pacific ports), Sweden, and Finland in northern Europe, with Portugal, Spain, and Switzerland in western Europe, and, on a much reduced scale, with countries in the eastern Mediterranean area.

Reference to individual commodities in trade with countries in the war zone shows that prior to the outbreak of the war, European markets, including the United Kingdom, were absorbing two-thirds of total exports of American cotton, of metal-working machinery, and of packing-house products; three-fourths of total exports of unmanufactured tobacco and of fruits and preparations; more than half of total exports of gasoline and lubricating oils; three-fifths of total exports of copper and manufactures; and seven-eighths of total exports of wheat. European sources were providing three-fifths of total imports of paper base stocks, of chemicals and related products, and of cotton manufactures, and four-fifths of total imports of wines and spirits, of wool manufactures, and of manufactures of flax, hemp, and ramie.

Despite this showing, trade with Europe was considerably less important in the period prior to the outbreak of the present conflict that it was at the beginning of the World War in 1914. Shipments to European countries during recent years were approximately two-fifths of shipments to all countries; in the years preceding the World War, when crude materials and foodstuffs constituted a much larger proportion of export trade, they were three-fifths of the total. Imports from European countries in the recent period comprised about 30 percent of total imports; in the period before 1914 they made up 50 percent of the total. It is noteworthy also that the United States is dependent upon Europe at the present time for none of the imported materials essential to national defense.

Indirectly, the closing of most of the European and Mediterranean countries to world trade affected trade relations between the United

States and Latin America. In the last calendar year preceding the outbreak of the war, continental European markets took more than $500 million of Latin American products in the form chiefly of crude foodstuffs and crude materials for industry. The virtual elimination of these vitally important outlets, coupled with the difficulties in obtaining free exchange from sales to the United Kingdom and other countries outside the British blockade, seriously limited the ability of Latin American countries to purchase goods from the United States. For in the triangular settlements which were made prior to the war, the proceeds of exports to Europe were utilized, in effect, to pay for imports from the United States.

GAINS IN LATIN AMERICAN TRADE

The gains in trade with Latin America during the fiscal year must be attributed to a number of circumstances besides the basic fact that the United States was in a position to supply many of the commodities customarily imported into the area from European sources which were cut off by the war. Continued heavy shipments of gold and silver from Latin American countries served to maintain their supplies of dollar exchange, which were augmented by an inflow of refugee funds lodged in dollar accounts and to some extent by loans through the Export-Import Bank. With the inauguration of the defense program in the United States, trade relations with Latin American countries assumed paramount importance. Official measures were shortly taken at least partially so solve the difficulties created by war conditions through exploring all possibilities of procurement of strategic materials from Latin American countries, through increasing the consumption in the United States of commodities ordinarily imported from Latin America, through developing markets for other Latin American export commodities not ordinarily sold to this country, and through locating sources of supply in Latin America of products, such as handmade articles, which are no longer obtainable from Europe.

In spite of the impediments to commerce arising from the European war, especially toward the end of the fiscal year, the foreign trade of the United States was substantially larger during fiscal 1940 than in the preceding 12 months. Total exports rose from $2,900 million to $3,800 million, or 31 percent, as a result of an expansion in trade with all major geographic areas, including Europe. The increase in the value of shipments to European countries, which were of about the same proportions, as the increase in total exports, was confined during the first half of the year to trade with nonbelligerents; it extended thereafter to practically all countries except Germany and the German-occupied areas. Exports to Canada and to Latin America rose by approximately 40 percent, to Asia by 20 percent, to Africa by 15 percent, and to Oceania by about 10 percent. Imports into the United States increased from $2,100 million in fiscal year 1939 to $2,500 million in fiscal year 1940, or by about 20 percent, as a result of larger receipts of merchandise from non-European areas. Imports from Europe declined. About four-fifths of the rise in total export values and more than half of the rise in import values were accounted for by an increase in the physical volume of trade. Export and import prices tended upward in the months following the outbreak of the war and in the early months of 1940 and were higher

by approximately 6 percent and 7 percent, respectively, during the year as a whole than in the previous year.

Import restrictions imposed by the United Kingdom and France, together with the blockade of Germany and the countries occupied by Germany, resulted in a decline in exports of agricultural commodities from the United States during the fiscal year as compared with the preceding 12 months.

Raw cotton was the only important crude agricultural product exported in a substantially increased volume. The relatively heavy movement of cotton, which followed an unusually poor export season in 1938–39, was attributable in part to short stocks abroad and in part to fears among foreign buyers of an interruption of shipments or increased shipping costs, but primarily to the export subsidy. Exports of unmanufactured tobacco, fruits, and meats and lard were sharply curtailed as a consequence chiefly of restrictions in shipments to the United Kingdom, the major foreign market for all these items. Among other crude products, coal was shipped abroad, particularly to Canada and Latin America, in significantly larger amounts.

NET GAINS IN BOTH IMPORT AND EXPORT TRADE

The bulk of the rise in United States export trade during the year was accounted for by sharply increased shipments of semimanufactured and manufactured commodities. The articles chiefly involved were iron and steel-mill products, including scrap; aircraft, including engines and parts; metal-working and other industrial machinery; nonferrous metals (largely from imported ores refined in bond); and lubricating oil. In June, shipments of these few commodities comprised two-fifths of the aggregate value of exports. The same categories constituted only 15 percent of total exports during the several years preceding the last fiscal period.

Although shipments of aircraft, including engines and parts, reached large proportions before the end of the fiscal year, they comprised less than 6 percent of total exports of domestic merchandise during the year as a whole. Sales of explosives and of firearms and ammunition from surplus stocks were heavy in June but of relatively small importance for the period as a whole. The abrupt rise in exports of wood pulp, paper, and manufactures to Latin America and the United Kingdom was directly connected with the stoppage of customary supplies from Scandinavia after April. Exports of passenger automobiles to Europe were severely affected by war-time restrictions, and declined drastically from the level of 1938–39.

The increase in imports during the 12 months ended with June 1940 was heavily concentrated in crude and partly processed materials. Basic raw materials such as crude rubber, tin, copper, ferroalloys, wool and mohair, and vegetable fibers were imported in sharply increased amounts to meet the expanded requirements of American industry and in certain cases to build up inventories. A number of other major import items, including jute burlaps, petroleum and products, silk, and expressed oils and fats, also increased very substantially in value. Imports of manufactured articles, for which European countries are the principal suppliers, were generally reduced.

The relatively heavy expansion in exports as compared with the rise in imports during the fiscal year had the effect of increasing the

excess of exports over imports to $1,300 million from $800 million in the previous 12 months.

Since there was no offsetting increase in net payments to foreign countries for various international services and since the movement of capital funds was strongly toward the United States, the addition of half a billion dollars to the export trade balance had the further consequence of augmenting the inflow of gold from abroad. Net acquisitions of gold from foreign sources averaged more than $300 million a month to reach an unprecedented total of $3,700 million for the fiscal year. Broadly considered, the United States, in its commercial and financial transactions with the rest of the world during the period, received larger imports of foreign goods than in the preceding 12 months and a substantially larger amount of foreign gold in exchange for much larger exports of American goods and for a net addition to foreign-owned balances in domestic banks.

TABLE 1.—*Indexes of major economic changes*

Fiscal year ended June 30	Total income payments [1] (1929=100)	Compensation of employees [1] (1929=100)	Cash income from farm marketings [1 2] (1924–29=100)	Industrial production (physical volume) [1] (1935–39=100)			Value of manufacturers, inventories (Dec. 31, 1938=100)	Manufacturing (1923–25=100)	
				Total	Manufactures			Employment [1]	Payrolls
					Durable	Nondurable			
1929	[3] 99.2	[3] 99.3	----------	107	129	90	----------	103.6	108.5
1930	97.9	97.5	----------	103	120	90	----------	101.7	103.3
1931	84.6	83.6	----------	82	81	81	----------	84.1	77.3
1932	68.3	67.7	----------	65	52	73	----------	71.7	56.5
1933	55.5	54.2	----------	60	40	73	----------	65.1	42.6
1934	62.2	61.6	----------	77	68	83	----------	83.5	61.7
1935	68.4	66.5	----------	78	69	84	----------	87.5	67.7
1936	76.7	74.3	[4] 69.1	94	95	94	----------	93.8	78.6
1937	86.8	84.2	79.6	114	123	109	----------	106.3	97.7
1938	83.6	82.8	77.5	95	93	94	----------	98.2	87.6
1939	82.4	82.7	70.3	97	90	102	[5] 98.1	92.1	83.3
1940	87.9	86.8	75.5	116	122	111	104.7	100.3	96.8
Months, 1939–40:									
July	83.6	83.8	63.0	104	101	106	95.5	95.2	84.4
August	85.2	84.8	66.5	104	106	108	95.9	95.9	89.8
September	86.1	85.0	73.5	113	115	111	97.0	97.5	93.9
October	88.0	86.9	76.5	121	129	115	100.2	101.2	101.7
November	88.5	87.7	76.5	124	133	117	104.5	103.4	101.7
December	90.0	88.9	79.0	126	140	117	107.3	104.6	103.9
January	90.3	88.2	79.0	122	135	113	109.3	104.0	98.4
February	89.7	87.5	84.0	116	124	110	110.0	102.2	97.9
March	88.4	87.0	76.0	113	118	106	109.8	100.6	98.4
April	88.2	86.2	81.5	111	113	107	108.9	99.3	96.5
May	88.6	87.3	80.0	115	119	110	109.1	99.3	96.4
June	88.7	87.9	70.0	121	131	114	108.6	100.4	98.1

See footnotes at end of table.

TABLE 1.—*Indexes of major economic changes*—Continued

Fiscal year ended June 30	Freight car loadings [1] (1923–25=100)	Construction contracts awarded (value) [1] (1923–25=100)		Electric power production (1935–39=100)	Department stores sales (value) [1] (1923–25=100)	Retail sales of new passenger automobiles (value) [1] (1929–31=100)	Wholesale prices (1926=100)	Exports of U. S. merchandise (volume) (1923–25=100)	Imports for consumption (volume) [6] (1923–25=100)
		Total	Residential						
1929	107	127	107	79.0	110	[3] 145.1	96.2	[7] 132	[7] 134
1930	101	106	63	83.5	108	121.8	92.5	121	121
1931	83	76	46	79.8	99	74.4	79.0	98	101
1932	63	40	22	74.9	81	47.1	68.2	80	91
1933	54	23	10	70.1	64	33.8	62.9	64	76
1934	63	36	12	77.0	72	52.0	72.0	75	91
1935	62	28	14	80.3	76	69.2	78.0	72	93
1936	68	50	27	90.1	82	93.8	80.1	82	111
1937	80	59	44	102.7	92	115.8	84.5	90	131
1938	68	55	36	101.3	88	82.6	82.4	110	105
1939	65	75	56	106.1	86	80.1	77.2	102	101
1940	74	72	62	118.9	90	104.5	78.2	124	110
Months, 1939–40:									
July	69	67	62	110.3	86	80.5	75.4	99	98
August	70	73	67	116.3	89	76.5	75.0	107	102
September	77	73	68	115.1	91	83.5	79.1	117	112
October	80	76	68	122.8	90	93.7	79.4	131	116
November	82	83	61	120.7	95	102.8	79.2	116	119
December	78	86	60	125.0	96	108.5	79.2	140	127
January	78	75	53	126.9	92	125.8	79.4	137	124
February	73	63	56	115.0	89	130.8	78.7	130	99
March	69	62	57	119.2	89	112.5	78.4	132	106
April	70	64	62	115.9	89	112.5	78.6	123	105
May	72	64	64	120.2	87	104.1	78.4	124	106
June	75	74	69	118.9	91	122.7	77.5	136	109

[1] Monthly indexes are seasonally adjusted.
[2] Data do not include rental and benefit payments during the period such payments were made.
[3] Average for 6 months, January–June 1929.
[4] Average for 6 months, January–June 1936.
[5] Average for 6 months, January–June 1939.
[6] Data are for general imports through 1933; imports for consumption thereafter.
[7] Average of first 2 quarters of 1929.

SOURCES: Total income payments, compensation of employees, value of manufacturers' inventories, retail sales of new passenger automobiles, exports and imports, Bureau of Foreign and Domestic Commerce, Department of Commerce; cash income from farm marketings, Bureau of Agricultural Economics, Department of Agriculture; industrial production, freight carloadings, department-store sales, construction contracts awarded, Division of Research and Statistics, Board of Governors of the Federal Reserve System; manufacturing employment and pay rolls (employment indexes adjusted for seasonal variation by Board of Governors of the Federal Reserve System) and wholesale prices, Bureau of Labor Statistics, Department of Labor; and, electric power production, Federal Power Commission, beginning May 1936; theretofore Geological Survey, Department of Interior.

TABLE 2.—*Foreign trade of the United States*

[Millions of dollars]

Item	Years ended June 30					Percent increase, 1939–40 over—		
	1910–14 average	1932–36 average	1938	1939	1940	1932–36 average	1937–38	1938–39
Exports of United States merchandise	2,130	1,958	3,361	2,885	3,748	+91.4	+11.5	+29.9
Imports for consumption	1,678	1,716	2,331	2,079	2,447	+42.6	+5.0	+17.7
Exports, including reexports	2,166	1,993	3,403	2,920	3,830	+92.2	+12.5	+31.2
General imports	1,689	1,725	2,361	2,094	2,517	+45.9	+6.6	+20.2
Excess of exports	+477	+268	+1,042	+826	+1,313			
Quantity indexes (1923–25=100):								
Exports of United States merchandise [1]	[3] 70	75	110	102	125	+66.7	+13.6	+22.5
Imports [2]	[3] 63	92	105	101	110	+19.6	+4.8	+8.9

[1] Export indexes are based on domestic exports.
[2] Import indexes are based on "General imports" through the calendar year 1933 and on "Imports for consumption" thereafter.
[3] Estimated for fiscal years; for calendar-year indexes see Trade Information Bulletin No. 215, "Summary of United States Trade With the World, 1939" issued by the Bureau of Foreign and Domestic Commerce.

TABLE 3.—*Foreign trade by trade regions and economic classes*

	Millions of dollars				Percent of total				Percent increase 1939-40 over 1938-39
	1910-14 average	1938	1939	1940	1910-14	1938	1939	1940	
Total exports, including re-exports of foreign merchandise:									
To Europe	1,350	1,446	1,228	1,626	62.3	42.5	42.1	42.4	+32.4
All other continents	816	1,957	1,691	2,204	37.7	57.5	57.9	57.6	+30.3
Canada and Newfoundland	320	516	436	614	14.8	15.2	14.9	16.0	+40.8
Latin America	302	642	548	758	14.0	18.9	18.8	19.8	+38.3
Asia	121	553	510	610	5.6	16.3	17.5	15.9	+19.6
Oceania	48	103	83	92	2.2	3.0	2.9	2.4	+10.8
Africa	25	143	114	131	1.1	4.2	3.9	3.4	+14.9
Exports of United States merchandise:									
Foodstuffs	421	417	352	297	19.8	12.4	12.2	7.9	−15.6
Crude materials	713	687	512	639	33.5	20.4	17.7	17.0	+24.8
Semimanufactures	342	620	502	800	16.0	18.5	17.4	21.4	+59.4
Finished manufactures	654	1,637	1,519	2,012	30.7	48.7	52.6	53.7	+32.5
General imports:									
From Europe	836	665	620	551	49.5	28.2	29.6	21.9	−11.1
All other continents	852	1,696	1,473	1,966	50.5	71.8	70.4	78.1	+33.5
Canada and Newfoundland	119	314	300	386	7.0	13.3	14.3	15.3	+28.9
Latin America	435	540	498	622	25.8	22.9	23.8	24.7	+24.9
Asia	259	756	587	838	15.3	32.0	28.0	33.3	+42.8
Oceania	17	25	23	27	1.0	1.1	1.1	1.1	+17.4
Africa	23	61	66	93	1.3	2.6	3.2	3.7	+40.9
Imports for consumption: [1]									
Foodstuffs	398	645	572	615	23.5	27.7	27.5	25.1	+7.5
Crude materials	595	712	638	875	35.2	30.6	30.7	35.7	+37.1
Semimanufactures	307	490	431	534	18.2	21.0	20.7	21.8	+23.9
Finished manufactures	389	484	438	424	23.1	20.8	21.0	17.3	−3.2

[1] General imports prior to Jan. 1, 1934.

HIGHLIGHTS OF THE YEAR

REORGANIZATION

During the fiscal year 1940 there were several changes in the organization structure of the Department of Commerce as the result of reorganization plans issued by the President pursuant to the Reorganization Act of 1939.

Effective July 1, 1939, under Reorganization Plan II, the Bureau of Lighthouses was transferred to and consolidated with the United States Coast Guard of the Treasury Department; the Bureau of Fisheries was transferred to the Department of Interior; the Foreign Commerce Service of the Bureau of Foreign and Domestic Commerce was transferred to the Department of State and consolidated with the Foreign Service of the United States; and the Inland Waterways Corporation was transferred from the War Department to the Department of Commerce. The necessary details incident to these transfers were accomplished prior to the close of the fiscal year 1939; however, there had developed considerable interbureau procedures between these agencies now transferred from the Department and the remaining bureaus which had to be revised or altered to meet the change in status. This is particularly true with regard to the Coast and Geodetic Survey which cooperated with the former Bureau of Lighthouses in providing aids to mariners; and the Bureau of Foreign and Domestic Commerce which, under provisions of the Reorganization Plan, retains the direction and guidance of foreign service officers in investigations relating to commerce, and which receives directly the

results of such investigations. Working agreements between the Department of Commerce and the Department of State were developed, and the liaison officer of the Department of Commerce has been appointed to facilitate cooperation and to recommend such modifications or adjustments as may be desirable from time to time. Also in accordance with provisions of the plan the Department has designated representatives to serve on the Board of Foreign Service Personnel, the Foreign Service School Board, and the Board of Examiners for the Foreign Service.

Reorganization Plans numbered III and IV, effective June 30, 1940, realigned the functions of the Civil Aeronautics Authority and changed the name of the five-member Authority to the Civil Aeronautics Board, transferred certain of its functions to the Administrator of Civil Aeronautics, abolished the Air Safety Board and transferred its functions to the Civil Aeronautics Board, and transferred the Civil Aeronautics Board and the Administrator of Civil Aeronautics and their functions to the Department of Commerce with the proviso that the Board shall exercise its functions of rule making, adjudication, and investigation independently of the Secretary of Commerce. The plans further provided that the Administrator of Civil Aeronautics, whose functions shall be administered under the direction and supervision of the Secretary of Commerce and the Civil Aeronautics Board, shall constitute the Civil Aeronautics Authority. The Secretary of Commerce, by Departmental Order No. 52, designated the organization through which the Administrator exercises his functions as the Civil Aeronautics Administration.

Reorganization Plan No. IV provided for the transfer, effective June 30, 1940, of the Weather Bureau from the Department of Agriculture to the Department of Commerce to be administered under the direction and supervision of the Secretary of Commerce with the proviso that the Department of Agriculture may continue to make snow surveys and to conduct research concerning relationship between weather and crops, long range weather forecasting, and relationship between weather and soil erosion.

Since the Civil Aeronautics Authority and the Weather Bureau were under the Department of Commerce for only one day during the fiscal year 1940, no statement of their activities will be made in this report. For this fiscal year, therefore, the activities of the Civil Aeronautics Authority will be by a separate report by that agency, and the activities of the Weather Bureau will be reported by the Secretary of Agriculture.

COOPERATION WITH THE TEMPORARY NATIONAL ECONOMIC COMMITTEE

The Department of Commerce continued its active participation in the work of the Temporary National Economic Committee. Officials of the Department appeared at the opening hearings before the Committee on the construction industry. The statistical data and analyses presented at that time were designed to give the background and to point out some of the major economic problems of that industry. Department representatives also played an active role in the hearings before the Committee on Interstate Barriers to Trade.

Several of the extensive studies upon which the Department staff has been working since the committee began its investigations were

finished during the year, while others were carried to the final stages of completion. These studies will appear among the monograph series which the committee is publishing. The finished studies which were submitted to the committee include: Who Pays the Taxes?, Concentration and Composition of Individual Incomes, Export Pricing Policy of American Corporations, Direct Foreign Investments in American Industry, The Relation of Productivity to Low-Cost Housing, Taxation of Corporate Enterprise, Financial Characteristics of American Manufacturing Corporations, Business Mortality, Market Security and Price Stability, Recent Trends in British Industrial Reorganization, and Long-term and Short-term Financing of Small Business.

Two of the major studies being conducted by the Department for the committee were in final draft form at the end of the year. The first of these studies presented the Department's report on The Structure of Industry. This study will appear in six parts under the following titles: Trends in the Scale of Manufacturing Operations, Integration of Manufacturing Operations, The Merger Movement, The History of Concentration in Seven Industries, The Concentration of Production in Manufacturing, and Product Structure of Large Corporations. As the titles indicate, these studies are concerned with the description and analyses of concentration in the manufacturing segment of the economy. The concentration on an establishment and on a concern basis is analyzed, but the major portion of the work is devoted to an investigation of the concentration of production in a comprehensive list of manufactured commodities. The second large study, which was nearing completion at the end of the fiscal year, dealt with trade associations and the role played by them in manufacturing and distribution. The factual material for this analysis was derived from an extensive questionnaire to which over 1,300 trade associations responded.

FOREIGN-TRADE ZONES BOARD

During the year, the Department of Commerce continued its important interdepartmental function of participating in the activities of the Foreign-Trade Zones Board, the objects of which are of particular significance for import and reexport trade. The purpose of the statute which created the Board—consisting of the Secretaries of the Treasury, War, and Commerce, the last-named being chairman—is to provide zones in the United States where goods may be landed without application of the customs laws.

As of June 30, 1940, the board had issued two grants for the establishment of foreign-trade zones, the first to the city of New York for a foreign-trade zone at Stapleton, Staten Island, and the second to the Alabama State Docks Commission for a foreign-trade zone at Mobile. The Mobile zone which was inaugurated in July 1938, was closed shortly thereafter on the petition of the Governor of Alabama and the grant was formally withdrawn.

Following the outbreak of the European War and the disruption of international commerce, the New York Foreign-Trade Zone became especially active, the products of a number of countries being sent to the zone for transshipment to ultimate destinations. While existing conditions abroad have retarded the development of the New York

Foreign-Trade Zone in some directions, it has expanded it in others. The zone has been used in the storing and manipulation of products from Latin American countries and shippers of such products are utilizing it in increasing numbers. In this respect, the zone is serving a particularly valuable purpose in cultivating better trade relations in those areas which are of especial interest to the United States.

In connection with the national defense program, a number of essential strategic materials are now being brought into the New York Foreign-Trade Zone where they will be manipulated and later shipped into customs territory.

No applications for grants to establish foreign-trade zones were received during the fiscal year. Pending receipt of further necessary information, there were held in abeyance applications from the Board of State Harbor Commissioners of California for a zone at San Francisco, and from the Puerto Rican Government for a zone at San Juan.

BUSINESS ADVISORY COUNCIL

The Business Advisory Council, formed in 1933, has now completed 7 years of service to the Department and the Federal Government. I am happy to acknowledge the help which these public-spirited businessmen, who serve without remuneration, have provided by functioning as a clearing-house for the businessman's viewpoint on public policy. During the year 13 formal reports, which remain confidential except when otherwise determined by the Secretary, were submitted by the Council to the Secretary.

Through committees the council has extended cooperation to the Social Security Board, the Treasury Department, and the Wage and Hour Division of the Department of Labor. Fifteen council members have served on the staff of the advisory commission to the council of national defense.

Members at the close of the fiscal year were:

*W. L. BATT, Philadelphia, Pa., Chairman
*JOHN D. BIGGERS, Toledo, Ohio, vice chairman
*HARVEY COUCH, Pine Bluff, Ark., vice chairman
*M. B. FOLSOM, Rochester, N. Y., vice chairman
*CLARENCE FRANCIS, New York, N. Y., vice chairman
CLARENCE AVILDSEN, Chicago, Ill.
VANNEVAR BUSH, Washington, D. C.
C. A. CANNON, Kannapolis, N. C.
W. DALE CLARK, Omaha, Nebr.
CARLE C. CONWAY, New York, N. Y.
W. HOWARD COX, Cincinnati, Ohio
WM. H. DANFORTH, St. Louis, Mo.
*R. R. DEUPREE, Cincinnati, Ohio
WM. DICKERMAN, New York, N. Y.
FRANKLIN D'OLIER, Newark, N. J.
*GANO DUNN, New York, N. Y.
W. Y. ELLIOTT, Cambridge, Mass.
ROBERT V. FLEMING, Washington, D. C.
*J. F. FOGARTY, New York, N. Y.
H. B. FRIELE, Seattle, Wash.
*ROLLAND J. HAMILTON, New York, N. Y.
JOHN W. HANES, Elkin, N. C.
*W. A. HARRIMAN, New York, N. Y.
HENRY H. HEIMANN, New York, N. Y.
GEORGE A. HILL, JR., Houston, Tex.
THOMAS S. HOLDEN, New York, N. Y.
CHARLES R. HOOK, Middletown, Ohio
JAMES W. HOOK, New Haven, Conn.
JAY C. HORMEL, Austin, Minn.
OSCAR JOHNSTON, Scott, Miss.
CORNELIUS F. KELLEY, New York, N. Y.
H. P. KENDALL, Boston, Mass.
FRED I. KENT, New York, N. Y.
LOUIS E. KIRSTEIN, Boston, Mass.
DE LANCEY KOUNTZE, New York, N. Y.
*ARTHUR KUDNER, New York, N. Y.
PAUL W. LITCHFIELD, Akron, Ohio
STACY MAY, New York, N. Y.
THOMAS B. MCCABE, Chester, Pa.
EARL M. MCGOWIN, Chapman, Ala.
GEO. H. MEAD, Dayton, Ohio
JAMES D. MOONEY, New York, N. Y.
*D. M. NELSON, Chicago, Ill.
W. S. NEWELL, Bath, Me.
J. C. NICHOLS, Kansas City, Mo.
NICHOLAS H. NOYES, Indianapolis, Ind.
RICHARD C. PATTERSON, JR., New York, N. Y.
*GEORGE A. SLOAN, New York, N. Y.
BLACKWELL SMITH, New York, N. Y.
E. R. STETTINIUS, JR., New York, N. Y.
HARDWICK STIRES, New York, N. Y.
R. DOUGLAS STUART, Chicago, Ill.
WALTER C. TEAGLE, New York, N. Y.
*J. T. TRIPPE, New York, N. Y.
*SIDNEY J. WEINBERG, New York, N. Y.
W. H. WHEELER, JR., Stamford, Conn.
A. D. WHITESIDE, New York, N. Y.
S. CLAY WILLIAMS, Winston-Salem, N. C.
R. W. WOODRUFF, Wilmington, Del.
D. ROBERT YARNALL, Philadelphia, Pa.

* Member of the executive committee.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

Repercussions of the war.—The fiscal year 1940 brought a chain of events, beginning with the outbreak of the European war in September 1939 and culminating in the launching of our own program of national defense in May and June 1940, which markedly affected the work of the Bureau. Disruption of international trade, the proclamation of the provisions of the Neutrality Act, the further restrictions placed by the belligerent countries upon trade and foreign exchange, the search for new foreign sources and markets to replace those lost because of the war; these inevitably resulted in new demands upon the Bureau.

The Bureau's functions in meeting the demands thus created were discharged along the lines both of information and of active assistance. For example, with the outbreak of the war, the nature and volume of investments in this country by the nationals of belligerent and potentially belligerent powers became of particular importance in the formulation of American public policy. The Bureau accordingly devoted additional attention and effort to its compilations in this field, so that its current information might be made as up-to-date and as complete and accurate as possible.

Inquiries resulting from shipping problems were met by the Bureau with specific information on ship space, ocean freight rates, shipping documents, and overland transportation facilities in foreign countries. To provide answers to thousands of inquiries which resulted from the proclamation of the Neutrality Act provisions, the Bureau issued a guide to the Act, which included an interpretation of its provisions and maps and charts graphically supplying answers to common questions concerning it. This "Geolexigraph of the Neutrality Act of 1939," distributed as a publication of the Bureau, was also widely reprinted.

Particular attention was given to the effect of the war on foreign sources upon which we rely. In the case of wool and flax, for example, the Bureau was able to expedite the release of substantial supplies. On the other hand, assistance was extended to American exporters in specific instances where new restrictions imposed by the belligerents threatened to close access to foreign markets. An example in point was the Bureau's assistance in securing the admission of a large shipment of corn sirup to the United Kingdom.

The Department's participation, through the Bureau, in the trade-agreements program was continued during the year along the lines reported on in detail in previous annual reports.

Under the national defense program, the Bureau furnished data on strategic and critical raw materials and manufactures. It provided information, vital to defense procurement, on sources of supply, extent of requirements, availability of substitute materials, names of business executives in key posts. A function of especial significance was the preparation of reports covering the economic and business situation in the belligerent countries, with special attention to British industrial reorganization and the adaptation of British industry and trade to war purposes.

Hemisphere cooperation.—The Bureau gave especial attention to economic and commercial, and to a considerable degree even cul-

tural, relations between this country and the other American Republics. Particularly significant was its participation in the furtherance of improved and extended transportation and communication facilities linking the United States with the nations to the south. Assisting the Export-Import Bank in its efforts to cushion the shock of wartime disruptions of trade to Latin America, the Bureau supplied data necessary in the negotiation of loans. Special analyses of leading export and import commodities of the Latin American countries were prepared, and American firms interested in these markets were furnished with extensive data on tariff classifications, import duties, license restrictions, customs requirements, and trade regulations, essential to the development of new business.

Data on the handicraft industries of Latin America were collected in an effort to widen this channel of commerce and culture, and, on the export side of cultural relations, the Bureau participated in the preparation of plans for distributing cultural films through our diplomatic missions.

Domestic commerce.—The most noteworthy activities of the Bureau in the domestic field lay in the development of new surveys and statistical reporting. A new industry survey which each month reports a cross-section of orders, sales, and inventories is one of these. The statistical reporting on business and industry was made more comprehensive, and measures of monthly changes in consumer credit were developed. Such series are important for the analysis of the economic outlook generally, as well as for the guidance of business management.

In the wholesale field, studies were made of distribution cost accounting, the functions and processes of the wholesaler in the present distribution system, wholesale dry-goods trading areas, and other related subjects. The topic of "business mortality"—the entrances, growth, mergers, and disappearances of business organizations—was made the subject of a special study, as were the accounting problems of the small store.

The Bureau issued a report presenting the results of all available "vacancy surveys" for the period 1928–40—providing (for builders, material suppliers, and financial agencies) a valuable guide to building operations and to general market conditions, as well as to the type of construction for which the greatest demand is likely to exist. A study of the relationship of labor productivity to low-cost housing was also completed during the year.

The work of the Bureau in the field of national income reporting and analysis was further expanded under a separate National Income Division established early in the year. In addition to constant improvement of the component series on national income, a principal undertaking during the year was the beginning of a broad-gaged analysis of the "final product of the American economy."

The Bureau continued its active cooperation with other agencies both public and private. Studies undertaken for the Temporary National Economic Committee are discussed above. Through the Interdepartmental Committee on Interstate Trade Barriers, chairmanship of which is located in the Bureau, the work launched in the previous fiscal year to remove such barriers was continued and expanded.

During the year, development of a plan for coordinating the research activities of the Bureau with those of the business schools of the country was begun. The plan includes a clearing-house for data; a cooperative arrangement for mutual exchange of research facilities; the reduction or elimination of duplication of effort; the encouragement of decentralization of research; emphasis upon the needs of small business, which is usually unable to afford a research program of its own; and the prospective establishment (at universities) of a number of Bureau-university cooperative business-research stations.

BUREAU OF THE CENSUS

The Decennial Census of the United States is one of the most important instruments of democracy. Originally provided for in the Constitution as a means of apportioning representatives and direct taxation among the States, the decennial census is now the Nation's most important institution for the measurement of social and economic facts. Indeed, the Census of Population, which was the sole subject of our first national inventory in 1790, has come to be but a part of that great national inventory known as the Decennial Census of the United States. During the past year Nation-wide inquiries have been conducted on the subjects of agriculture, manufactures, business (including retail and wholesale trade, service establishments, and construction), mineral industries, housing, irrigation and drainage.

No past census has come at so appropriate a time for immediate emergency use in national defense. Every country faced by a war emergency must take stock of its assets and liabilities, of its manpower and its capacity to produce food, clothing, ships, guns, airplanes, explosives, and all the other necessities of national defense. Fortunately, America need not guess about its production and manpower. The comprehensive nature of the 1940 decennial census provides nearly all the basic facts for national defense. The Census of Population gives an accurate picture of manpower, its characteristics and employment, recent enough to be used without elaborate estimates. The Census of Agriculture gives a very detailed account of our farms, their acreage, crops, and inventories of livestock. The Census of Manufactures reveals the industrial production of the Nation, the number of units of nearly every manufactured product, their value, the cost of materials, and industrial employment. Priority was given to the reports for some 75 of the most important industries from a national-defense point of view for use by the National Defense Commission. A list of 72 materials considered indispensable for adequate defense, of which 33 are minerals, was compiled by the War Department. Because of this basic importance of minerals for national defense, work on the reports of the Census of Mines and Quarries, from which a picture of our mineral resources is obtained, was being specially expedited at the close of the year.

The Census of Business, with its reports on retail and wholesale trade, service establishments, and construction, also provides important data, which can be used to judge the relationship of national defense preparations to the distribution of goods and services needed for internal consumption.

The Decennial Census is truly a national cooperative undertaking. The questionnaires which provides business, industry, and agriculture as well as the Government with basic data upon which to plan intelligently their programs result from many conferences of Census officials with men and women representative of all phases of national life. The 1940 Decennial Census is not the Government looking at its people but actually the people, all interest groups, looking at themselves.

Beginning on January 2, 1940, with the enumeration of the Censuses of Business, Manufactures, Mines and Quarries, and Irrigation and Drainage, and continuing through the balance of the fiscal year, the Bureau of the Census was engaged in the largest field collection job ever undertaken by any agency. The Censuses of Population, Agriculture, and Housing were started on April 2 and were substantially complete by June 30, 1940. An army of nearly 110,000 persons was required to secure completed reports for the more than 131,000,000 individuals, 36,000,000 dwelling units, 6,000,000 farms, 3,000,000 places of business, 180,000 factories, and 30,000 mines, quarries, and oil wells in the United States.

Plans for the rapid compilation and publication of the decennial census were completed and the work of compiling reports proceeded as rapidly as schedules were returned from the field. At the end of the fiscal year the Bureau was well ahead of any previous census in its program of compilation of census returns.

A Census of Housing to provide a comprehensive inventory of dwelling structures and housing facilities was added to the subjects of the decennial census by an act approved August 11, 1939. This is the first Nation-wide census of dwelling units and housing facilities ever taken in the United States. Among the more important facts to be presented by this census are: the number and type of structures, the number of rooms, rental value, and facilities (such as water, sanitation, heat, light, and refrigeration) of dwelling units, and financial and mortgage data for owner-occupied nonfarm units.

Although the task of preparing for and conducting the enumeration of the decennial census overshadowed other work during the past year, the continuing services of the Bureau were expanded and improved.

Great demands have been made on the Bureau for information as to the age and citizenship of individuals as recorded in past censuses. Until recently the principal demand for such information was for proof of age, and arose from the operation of the various Social Security programs. Although this source of request continues to increase rapidly, the national defense program has resulted in the influx of even more urgent requests for proof of age and citizenship needed to obtain or renew marine and radio licenses, and to obtain employment in airplane, munitions, and other factories engaged in national-defense work. A total of 185,000 requests for personal information were answered during the past fiscal year and 63,000 requests remained to be answered at the end of the year.

During the year the collection of vital statistics data has been expanded in the field of accident, judicial, criminal, institutional, and marriage and divorce statistics. Authority was given for the collection of marriage and divorce data during the decennial census

period. Since the annual report on marriage and divorce was discontinued in 1932, the United States has been without national figures on this subject. Data are being collected for individual cases from a marriage and divorce registration area comprised of selected States.

In the field of State and local government statistics, the Bureau continues to compile the receipts and expenditures of States and of cities of 100,000 population or more, and since January 1940, has prepared a quarterly report on the employment and pay rolls of State and local governments.

Forty-one reports are issued monthly on retail and wholesale trade activity, and a quarterly report shows trends in canners' and distributors' stocks of selected vegetables, fruits, and fish. Current reports on 66 industries (or commodities) provide a valuable source of data showing the monthly (or quarterly) production, inventory, or sales of important commodities.

NATIONAL BUREAU OF STANDARDS

New and more precise standards are constantly needed to keep pace with industrial developments. One of the problems of the National Bureau of Standards is to anticipate these requirements by providing the necessary laboratory facilities and techniques. Two important steps in this direction were taken during the period covered by this report. The new high-voltage and X-ray laboratory was completed, and the low-temperature laboratory was rebuilt. Equipment being installed in the former building will permit measurements at the highest potentials used in electrical and X-ray work. The capacity of the liquid-air plant was doubled and needed floor-space was made available for new equipment.

The Bureau was called on for advice on many problems connected with the preparedness program, including the properties of materials, the quality of supplies, and the performance of instruments and equipment.

The standard frequency transmission service was modernized and improved. Announcements are now made by voice only and are given every 5 instead of every 10 minutes. The maximum deviation of any oscillator from the mean value of the 7 oscillators which constitute the national standard is now 3 parts in 100,000,000.

An Interdepartmental Screw Thread Commission was organized with representatives from the Departments of War, Navy, and Commerce, to continue the work formerly carried on by the National Screw Thread Commission. The first report of the committee was in such demand that the sales stock was exhausted in less than 4 months.

The annual conference of State Utility Commission Engineers and the Thirtieth National Conference on Weights and Measures were held at the Bureau of Standards during the year, and were highly successful. Subjects of special interest discussed by the weights and measures group included the metering of bottled gas, the sale of packaged commodities, and the best methods for instructing inspectors and for interesting the public in weights and measures matters. Members of the Bureau's staff took leading parts in a symposium on thermometry organized by the American Institute of Phys-

ics and also in the Section of Physical Sciences of the Eighth American Scientific Congress.

Various studies were made of the characteristics of carbon dioxide gas for the extinguishment of fires in buildings. Carbon dioxide displaces the air required for combustion and thus extinguishes the fire with no water damage. It provides a valuable adjunct to present methods of fighting fire, particularly in office buildings. In cooperation with the Civil Aeronautics Authority, extended tests were in progress looking to the utilization of similar methods in extinguishing fires in the engine compartments of airplanes in flight.

A practicable method for the commericial production of ribose, a rare sugar of potential biological importance, was developed at the Bureau. For some time investigators had sought for a method of preparing this sugar at a price that would not be prohibitive.

Information obtained on the two new synthetic textile materials, nylon and vinyon, will serve as a guide to the military services and other Government Departments in the way these synthetics may be used to replace natural textile fibers advantageously. A study, including moisture pickup, tensile strength, elongation, recovery, and permanent set, of the materials, was completed.

A cooperative project supported by the Textile Foundation, concerned with scientific and economic research for the benefit and development of the textile industry, was well under way at the close of the year and several fundamental papers had been published in the Bureau's Journal of Research.

The testing of materials suitable for low-cost house construction was continued, and over 50 reports in the Building Materials and Structures series were issued. Special interest was shown by the public in the reports on typical wood frame construction, floor coverings, and roofing materials.

In the Commercial Standardization field, the reduction of waste was continued through the elimination of needless variety of sizes and styles of commodities. New commercial standards were developed through the cooperation of manufacturers, distributors, and consumers. Safety was promoted through the revision, still in progress at the close of the year, of the National Electrical Safety Code in cooperation with the American Standards Association.

PATENT OFFICE

Nation-wide interest in the patent system was stirred by the observance of its sesquicentennial on April 10, 1940. The President, by proclamation, designated that date as "Inventors and patent day" and invited the people to commemorate the enactment of the first patent law as an event which, he declared, "had proved so important and salutary to this Nation."

By joint resolution the Congress authorized a commission to mark the anniversary by appropriate exercises. Members of this commission were Hon. Harry L. Hopkins, Secretary of Commerce; Hon. Charles Edison, Secretary of the Navy; Hon. Homer T. Bone, United States Senator from Washington; Hon. Charles Kramer, Representative from California; Hon. Wallace White, Jr., United States Senator from Maine; Hon. Fred A. Hartley, Representative from New Jersey; Hon. Finis J. Garrett, presiding judge of the United States Court of Cus-

toms and Patent Appeals; Dr. Charles F. Kettering, director of research of General Motors Corporation; and the Hon. Conway P. Coe, the Commissioner of Patents.

Five of the group of seven bills submitted to Congress by the Secretary of Commerce in 1939 were enacted during fiscal year 1940. These bills were introduced following the hearings before the Temporary National Economic Committee at which the Commissioner of Patents presented testimony for the information of the committee.

Public Act No. 286, approved August 5, 1939, made a fundamental change in the patent law by reducing from two years to one the period of publication and public use before a patent need be applied for.

Public Act No. 287, approved August 5, 1939, simplifies and shortens interference practice in the Patent Office. By virtue of this act an interference, to decide the question of priority between two or more rival applicants, is determined in the first instance by a board of three interference examiners in the Patent Office. From their decision the defeated party may appeal to the United States Court of Customs and Patent Appeals or file a suit under section 4915 of the Revised Statute.

Public Act No. 288, approved August 5, 1939, enacts a statutory period of 1 year, beyond which an applicant is barred from copying claims from a patent for the purpose of contesting an interference with the patent.

Public Act. No. 341, approved August 7, 1939, gives the Commissioner of Patents authority to shorten the time within which an applicant for patent must reply to Patent Office actions.

Public Act No. 358, approved August 9, 1939, simplifies the procedure in respect to the payment of final fees on allowed applications for patent. By this act renewal applications are abolished. In place of renewals the act provides simply that the fee may be accepted late, and the patent issued, merely on request to the Commissioner, upon the payment of a small additional fee and after a showing that the delay is justifiable.

An act of Congress approved July 11, 1939 (Public Act No. 244), transferred from the Patent Office to the Register of Copyrights, jurisdiction over the registration of copyrights for prints and labels, effective June 30, 1940.

Nine months of war in Europe, overthrowing Governments, creating economic dislocations, and hampering communication and exchange, had its reflex in the Patent Office during the fiscal year covered by this report. The number of applications from European countries declined below the total of recent years and there was a corresponding decrease in the fees from those sources. There was received in fiscal year 1940 an aggregate of 61,425 applications from all countries as against 66,166 in the preceding 12 months. The number of patents granted, including those covering reissues, designs, and plants, was 47,924, and exceeded by 451 those issued in 1939.

The number of applications for patent which were pending on June 30, 1940, was 110,743, less by 2,534 than the total of those awaiting final disposition on the corresponding date of the previous fiscal year. The number of cases disposed of in 1940 was 64,571. This was 4,672 fewer than in 1939. Cases awaiting action by the examiners at the end of the latest fiscal year were 44,902, as against 42,215 in 1939.

The Patent Office Advisory Committee continued its monthly meetings during 1939-40, the seventh year of its activities. It cooperated most helpfully in studying and furthering the legislative changes in the patent laws described in a foregoing paragraph of this report, and assisted the Commissioner in revising the Rules of Practice.

In the last fiscal year a new Manual of Classification was issued, the first since 1929. Preparation of the copy included compilation of a new subject matter index. The manual was delivered for distribution to the examiners and general public on June 25, 1940.

Reclassification of patents progressed with little turnover in the examining force. Three new classes (131, 204, and 252) including 19,204 original patents and 27,500 cross references, were completed; and a reclassification of abrasive compositions, comprising 29 subclasses which contain 915 originals and 1,034 cross references, was made and added to class 51. Class 87 was abolished in connection with the formation of class 252.

BUREAU OF MARINE INSPECTION AND NAVIGATION

The volume of work performed by the Bureau during the year showed a definite increase over previous years. This is a natural result of the fact that the shipbuilding and shipping industries, for the fourth consecutive year, were near an all-time peak of activity. Although 92 ships were affected by the Neutrality Act at the outbreak of the war in Europe, most of these ships were transferred by the close of the fiscal year to other services. The American bulk freighter fleet on the Great Lakes was nearing 100 percent operation for the second time in a decade, and ship construction work in progress in the United States was the largest in two decades. During the fiscal year there were 398 vessels of 690,215 gross tons, representing new additions to the American merchant marine, which received their initial certificate of inspection from the Bureau.

Several months prior to the outbreak of hostilities, the Bureau, working in cooperation with the State Department, provided an arrangement by which the Secretary of Commerce authorized the State Department through its consular offices abroad to permit, in the event of an emergency, American vessels, both passenger and cargo, to transport a number of passengers in excess of the number regularly allowed by the vessels' certificate. By this prior accord, when the emergency arose no new arrangements had to be made and thousands of American citizens were promptly brought back from Europe in excess of the number which might ordinarily have been carried in the vessels concerned. This transportation was accomplished with no loss of life and no serious injuries.

The unsatisfactory conditions which had existed concerning the regulation of motorboats and motor vessels were in part remedied by the act approved April 25, 1940. Although this legislation provides some additional safety requirements with respect to the equipment of uninspected motorboats and motor vessels, it fails to provide additional safety requirements for, or to clarify, the confused provisions of law which pertain to inspected motor vessels, particularly those carrying passengers for hire. The Department proposed legislation which, if enacted, will correct these conditions. The proposed legislation provides, among other things, that all motor vessels car-

rying more than 16 passengers on domestic voyages, or carrying more than 12 passengers on foreign voyages, shall be subject to the provisions of Title LII of the Revised Statutes to such an extent and upon such conditions as may be required by the Board of Supervising Inspectors, with the approval of the Secretary of Commerce. The enactment of this legislation is vitally essential if adequate protection of life and property is to be afforded the patrons of motor vessels.

The Bureau extended every possible aid to the Navy and War Departments in the field of national defense. The facilities of its inspection service were utilized to a considerable degree to help commission former passenger vessels as Army and Navy transports.

It is highly satisfactory again to report for the third consecutive year that during the fiscal year no passenger life was lost on any inspected vessel of the United States as a result of casualty, defective equipment, or culpable fault on the part of the licensed officers or certified personnel comprising the crews of our merchant vessels. During the past 5 years 1,270,849,762 passengers were carried on inspected merchant vessels of the United States with the loss of but one passenger attributable to the causes mentioned.

This record continues to be made possible by a number of factors, notable among which are the officers and men manning our merchant vessels, who have become "safety conscious" and who realize that eternal vigilance is the price of safety; the cooperation of steamship owners and operators; the efforts of Bureau employees; and the effectiveness of rules and regulations that have been promulgated for the protection of life and property at sea.

The European war affected to a very great degree the foreign commerce of the United States. In order to safeguard the neutrality of this country, certain restrictions were placed by regulation of the Department on the clearance of vessels to foreign countries. Shortly thereafter, greater restrictions were placed on foreign shipping and upon the exportation of merchandise and the movement of American citizens by the Neutrality Act of 1939. In order to provide effective policing of that act and to prevent, as far as possible, its violation, regulations were issued by the Department, prohibiting the clearance of any vessel, which, together with its cargo and passengers, if any, was not in full compliance with the act.

In many instances, cargoes laden on foreign flag vessels in the United States were later discharged in the United States, as owners and operators of the vessels did not deem it expedient to continue the voyages commenced because of fear of capture or destruction of the vessels. Although the laws provide for forfeiture of merchandise so transported, the Department remitted the penalty in all cases where it was satisfied of the bona fides of the transaction.

COAST AND GEODETIC SURVEY

Excellent progress was made in all branches of work carried on by the Coast and Geodetic Survey for the construction of nautical and aeronautical charts and the accumulation of geodetic, tide, magnetic, and seismological data. Accomplishments with respect to coastal surveys during the year are especially notable, 83,000 square miles of water

area having been surveyed as compared with 49,000 square miles in 1939.

This increased production resulted in large measure from the appropriation of additional funds which enabled the Bureau to operate its survey vessels for a period of approximately 10 months instead of 6 months, the average period in previous years. Considerable expense is involved in the maintenance of these vessels between field seasons and consequently the additional amount required for this longer operating period is relatively small in comparison with the total annual expenditures for this activity.

Contributing also to this progress was the availability, during the last half of the year, of two new survey vessels, constructed with Public Works funds, which replaced smaller and less efficient craft. Designed especially for operations in the remote regions of western Alaska, these vessels were commissioned in the spring of 1940 and assigned to duty in the Aleutian Islands, where they are proving to be remarkably effective in the advancement of surveys in this difficult area.

The Bureau's service in supplying geodetic control data, required for charting, mapping, and many other engineering and industrial projects, was greatly improved during the year by the output of two processing offices, maintained in cooperation with the Work Projects Administration at New York and Philadelphia. The expansion of geodetic field work as a relief measure from 1932 to 1935 resulted in a large accumulation of data which could not be computed and adjusted expeditiously by the small force available for this work in the Bureau's Washington Office. Through the efforts of the processing offices a considerable part of this work has been accomplished and the results made available for use.

The New York office and one in the Puerto Rico also completed extensive work on the results of magnetic surveys. In the latter activity a new and more satisfactory method was devised for disseminating reports on magnetic conditions for use in radio communication and other purposes. A new magnetic observatory at Sitka, Alaska, made necessary by construction work near the old observatory, was well on the way to completion at the end of the year.

The work of the Coast and Geodetic Survey is closely related to the national defense on account of the essential need for its charts and other navigational publications for naval and military operations and the necessity for control surveys as a basis for topographic mapping of strategic areas and for other military purposes. Consequently the expansion of defense activities during the latter part of the year brought an immediate and heavy demand upon the Bureau for the acceleration of field surveys in various areas; for a material increase in the production of nautical and aeronautical charts, Coast Pilots and tide tables; and for the accomplishment of much special work.

The issuance of nautical charts provides a good illustration of these conditions. For some time there has been a gradual increase from year to year in the demand for these charts. For the first part of the year sales of nautical charts showed an increase of about 14 percent over a corresponding period in the preceding year. During the first month after the national defense program was inaugurated orders for

these charts jumped from an average monthly issue of 35,800 copies to nearly 51,000 copies, an increase of over 40 percent.

This extra work overtaxed the facilities of the Bureau and, near the end of the year, supplemental appropriations were provided for additional vessels, office personnel, and chart printing equipment, to enable the Bureau to accomplish in a more adequate manner the services required of it in connection with national defense. Funds provided by the War Department for the execution of several special control survey projects also advanced the progress of this class of work.

INLAND WATERWAYS CORPORATION

The Inland Waterways Corporation was created by act of Congress (Public 185—68th Cong., approved June 30, 1924) for the purpose of carrying out the mandate and purpose of Congress as expressed in sections 201 and 500 of the Transportation Act, 1920, as amended, and for the purpose of carrying on the operations of the Government-owned inland, canal, and coastwise waterways system until such time as the system can be transferred to private operation to the best advantage of the Government.

The functions vested in the Corporation by the organic act, and amendments thereto, were governed and directed by the Secretary of War until July 1, 1939, when, in accordance with Reorganization Plan No. II, the Inland Waterways Corporation and all its functions and obligations were transferred from the War Department to the Department of Commerce.

While the functions of the Corporation have legally been under the supervision of this Department since the beginning of fiscal year 1940, only a partial reorganization was effected before the end of the calendar year 1939. After an inspection of the far-flung activities of the Corporation and a study of its organic set-up, new bylaws were promulgated on November 15, 1939, and as a result of changes in various phases of the Corporation's administrative and operative procedures, reductions in expenses amounting to approximately $115,000 per year were accomplished.

The Corporation closed the year in a sound financial position. It has no bonded debt or other obligations except of a current nature. The following condensed balance sheet displays the assets, liabilities, and net worth of the Corporation as of June 30, 1940.

ASSETS

Permanent and long-term investments:		
Real property and equipment	$26,453,755.10	
Reserve for accrued depreciation-Cr	7,018,603.35	
		$19,435,151.75
Loans receivable		445,812.27
Working assets:		
Cash	$678,869.31	
Marketable securities (Treasury bonds)	4,057,001.59	
Accounts receivable	473,433.60	
Materials and supplies	195,766.29	
		5,405,070.79
Deferred debits: Prepaid expenses and other deferred debits		239,893.36
Total		25,525,928.17

LIABILITIES

Working liabilities: Accounts payable			686,632.87
Deferred credits:			
Operating reserves		$320,941.43	
Other deferred credits		23,817.48	
			344,758.91
Total			1,031,391.78

NET WORTH

Stock:			
Capital stock	$12,000,000.00		
Premiums on capital stock	10,362,616.45		
		$22,362,616.45	
Corporate surplus:			
Appropriated	97,913.34		
Unappropriated	2,034,006.60		
		2,131,919.94	
Total			24,494,536.39
Grand total			25,525,928.17

Congressional appropriations aggregating $12,000,000 received by the Corporation in payment for capital stock subscribed for by the Government were used in the acquisition of new facilities to meet the expansion of its service. The operation of transportation facilities by the Corporation was conducted without additional appropriations. All expenses in connection with such operations were paid from revenues.

The amount invested by the Corporation in Treasury bonds was accumulated from its operation, a substantial part of it being depreciation money, to be held in reserve for the replacement of facilities and the acquisition of new equipment as the occasion demands.

The Corporation operates as a common carrier subject to the provisions of the Interstate Commerce Act, as amended, and to the provisions of the Shipping Act, 1916, as amended, in the same manner and to the same extent as if its facilities were privately owned and operated. Its fiscal year, under regulations of the Interstate Commerce Commission, is the calendar year, and its detailed annual reports to the Governor of the Corporation, the Secretary of Commerce, are prepared on that basis.[1]

APPROPRIATIONS AND EMERGENCY FUNDS

Detailed information as to direct and transferred appropriations and as to emergency funds available for expenditure by the Department during the year will be found in the report of the Chief Clerk and Superintendent.

The reports of the several bureaus of the Department covering their activities during the year are attached.

Very sincerely,

JESSE H. JONES,
Secretary of Commerce.

[1] Copies may be obtained by addressing the Inland Waterways Corporation, Boatmen's Bank Building, St. Louis, Mo.

REPORT BY BUREAUS

CHIEF CLERK AND SUPERINTENDENT

Notwithstanding heavy demands upon all divisions of the Office of the Secretary during the fiscal year 1940, through the willing cooperation of the employees and the performance of considerable overtime the work was kept practically current.

The space situation continued acute during the year, making it necessary to utilize hallways to the extent of 2,500 square feet for working files of the Bureau of Marine Inspection and Navigation. Outside agencies occupy 94,409 square feet of office space in the Commerce Building. This space, if returned to the Department, would enable us to provide more adequate and comfortable quarters for its employees. So long as the Department is deprived of this space, makeshift arrangements, which do not conform to good administration, will have to be continued.

DEPARTMENT LIBRARY

The following statistical summary reflects the activities of the Library for the fiscal year 1940:

Library staff	13
Number of books and pamphlets in library	208,650
Number of periodicals and newspapers currently received	2,066
Number of books cataloged	6,264
Cards filed in catalog	15,027
Books prepared for shelf	5,919
Number of books circulated	42,713
Books bound	1,069
Books borrowed from Library of Congress and other libraries	1,335
Books loaned to other libraries	696
N. R. A. hearings circulated	2,025
Telephone requests requiring research	5,264

DIVISION OF PURCHASES AND SALES

During the fiscal year 1940 there were placed 8,343 purchase orders, which, including freight, rent, and miscellaneous accounts, involved the expenditure of $1,098,163.73. These amounts show a decrease in orders of 4,237 over the fiscal year 1939 and a decrease in expenditures over the fiscal year 1939 by the amount of $472,198.81. This decrease was due principally to the transfer of the Bureaus of Fisheries and Lighthouses from the Department of Commerce to the Department of the Interior and the Treasury Department.

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There were 39 contracts approximating $226,147.54 submitted to this office for examination by the various field offices of the Department. In addition, there were 7 formal contracts amounting to $66,036.71 prepared by this Division, making a total of 46 contracts examined and prepared, involving a total expenditure approximating $292,184.25. There were 3 leases prepared by this office. There were 17 leases submitted by field offices for examination, as well as 334 leases for temporary quarters for the Bureau of the Census.

There was obtained, through the cooperation of the Procurement Division of the Treasury Department, by transfer, without exchange of funds, surplus and forfeited property valued at approximately $12,394, and transfer involving exchange of funds amounting to approximately $1,730. There was transferred, without exchange of funds, from this Department to other branches of the Government, or disposed of as directed by the Procurement Division, surplus material valued at approximately $193,347.

DIVISION OF ACCOUNTS

The following table shows the amounts appropriated by Congress for the bureaus and offices of the Department for the fiscal year ended June 30, 1940, the amounts transferred to this Department from other Government departments and agencies, and the amounts transferred from this Department to other Government departments and agencies, exclusive of funds appropriated under the several emergency appropriation acts:

Bureau or office	Annual appropriation acts	Deficiencies and supplements	Transfers from other Departments	Transfers to other Departments	Prior year appropriations available for 1940	Balance of 1940 funds available for 1941	Net available for 1940
Office of the Secretary	$1,481,400			−$311,695			$1,169,705
Bureau of Foreign and Domestic Commerce	3,129,000		$59,780	−940,256	$18,496		2,267,020
Bureau of the Census	22,000,000	$5,000,000		−3,450	43,750	−$2,000,000	25,040,300
Bureau of Marine Inspection and Navigation	2,670,000	12,000					2,682,000
National Bureau of Standards	2,266,000	69,000	343,952	−4,200	99,412	−258,700	2,515,464
Bureau of Lighthouses	11,628,000			−11,628,000			
Coast and Geodetic Survey	2,765,000	360,000					3,125,000
Bureau of Fisheries	2,144,100			−2,144,100			
Patent Office	4,667,500						4,667,500
Total	52,751,000	5,441,000	403,732	−15,031,701	161,658	−2,258,700	41,466,989

EMERGENCY FUNDS

In addition to its regular functions, the Department has for the past several years participated in various emergency projects designed for the relief of unemployment and improvement of economic conditions generally. The following table shows the allocations or allotments made from emergency appropriations to the Department during the fiscal years 1934 to 1940, inclusive, and the obligations incurred against these funds:

	1934 to 1937, inclusive	1938	1939	1940	Total
Office of the Secretary:					
N. I. R. A.:					
Allotments	$947,000			$55,000	$1,002,000
Obligations	945,805			48,501	994,306
W. P. A.:					
Allotments	70,000	$20,620			90,620
Obligations	69,991	20,268			90,259
P. W. A.:					
Allotments				10,000	10,000
Obligations				3,742	3,742
Total:					
Allotments	1,017,000	20,620		65,000	1,102,620
Obligations	1,015,796	20,268		52,243	1,088,307
Civil Aeronautics Administration:[1]					
N. I. R. A.:					
Allotments	2,083,303		$2,000,000	749,600	4,832,903
Obligations	2,075,748		1,437,587	824,545	4,337,880
P. W. A.:					
Allotments	987,775		2,535,000	839,900	4,362,675
Obligations	978,964		1,080,000	2,100,031	4,158,995
C. W. A.:					
Allotments	199,603				199,603
Obligations	198,285				198,285
W. P. A.:					
Allotments	587,380	260,600			847,980
Obligations	549,973	259,927			809,900
Total:					
Allotments	3,858,061	260,600	4,535,000	1,589,500	10,243,161
Obligations	3,802,970	259,927	2,517,587	2,924,576	9,505,060
Bureau of Foreign and Domestic Commerce:					
C. W. A.:					
Allotments	372,275				372,275
Obligations	349,639	8,247			357,886
W. P. A.:					
Allotments	100,000				100,000
Obligations	99,968				99,938
Total:					
Allotments	472,275				472,275
Obligations	449,607	8,247			457,854
Bureau of the Census:					
C. W. A.:					
Allotments	2,524,736				2,524,736
Obligations	2,302,596				2,302,596
F. E. R. A.:					
Allotments	1,005,000				1,005,000
Obligations	844,961	48,427			893,388
W. P. A.:					
Allotments	11,017,448	83,000	9,200		11,109,648
Obligations	10,746,381	77,000	9,180		10,832,561
Drought relief in agricultural areas:					
Allotments	1,000,000				1,000,000
Obligations	999,570				999,570
Census of partial employment, unemployment, and occupations:					
Allotments		850,000	10,000		860,000
Obligations		815,692	9,933		825,625
Total:					
Allotments	15,547,184	933,000	19,200		16,499,384
Obligations	14,893,508	941,119	19,113		15,853,740
Bureau of Marine Inspection and Navigation:					
N. I. R. A.:					
Allotments	93,043				93,043
Obligations	92,039				92,039
National Bureau of Standards:					
N. I. R. A.:					
Allotments	100,000				100,000
Obligations	99,601				99,601

[1] The allotments and obligations for fiscal years 1934 to 1938 inclusive were made by the Bureau of Air Commerce under the Department of Commerce, and for the fiscal years 1939 and 1940 by the Civil Aeronautics Authority, an independent agency. The organization was transferred to the Department of Commerce on June 30, 1940.

	1934 to 1937, inclusive	1938	1939	1940	Total
National Bureau of Standards—Con.					
P. W. A.:					
Allotments	$70,000				$70,000
Obligations	69,997				69,997
W. P. A.:					
Allotments	75,000				75,000
Obligations	74,998	$2			75,000
Total:					
Allotments	245,000				245,000
Obligations	244,596	2			244,598
Bureau of Lighthouses:					
N. I. R. A.:					
Allotments	5,620,334				5,620,334
Obligations	5,607,495				5,607,495
W. P. A.:					
Allotments	20,000				20,000
Obligations	19,029				19,029
P. W. A.:					
Allotments		2,098,750	$1,620,900		3,719,650
Obligations			3,265,700		3,265,700
Total:					
Allotments	5,640,334	2,098,750	1,620,900		9,359,984
Obligations	5,626,524		3,265,700		8,892,224
Coast and Geodetic Survey:					
N. I. R. A.:					
Allotments	8,293,220				8,293,220
Obligations	8,286,209				8,286,209
P. W. A.:					
Allotments			2,050,502		2,050,502
Obligations			1,900,054	$149,819	2,049,873
Total:					
Allotments	8,293,220		2,050,502		10,343,722
Obligations	8,286,209		1,900,054	149,819	10,336,082
Bureau of Fisheries:					
N. I. R. A.:					
Allotments	670,455		328,000		998,455
Obligations	670,075				670,075
C. W. A.:					
Allotments	38,391				38,391
Obligations	38,056				38,056
W. P. A.:					
Allotments	151,372		661,606		812,978
Obligations	151,372		586,071		737,443
P. W. A.:					
Allotments			1,142,550		1,142,550
Obligations			911,565		911,565
Total:					
Allotments	860,218		2,132,156		2,992,374
Obligations	859,503		1,497,636		2,357,139
Total, Department of Commerce:					
N. I. R. A.:					
Allotments	17,807,355		2,328,000	804,600	20,939,955
Obligations	17,776,972		1,437,587	873,046	20,087,605
P. W. A.:					
Allotments	1,057,775	2,098,750	7,348,952	849,900	11,355,377
Obligations	1,048,961		7,157,319	2,253,592	10,459,872
W. P. A.:					
Allotments	12,021,200	364,220	670,806		13,056,226
Obligations	11,711,712	357,197	595,251		12,664,160
C. W. A.:					
Allotments	3,135,005				3,135,005
Obligations	2,888,576	8,247			2,896,823
F. E. R. A.:					
Allotments	1,005,000				1,005,000
Obligations	844,961	48,427			893,388
Drought relief in agricultural areas:					
Allotments	1,000,000				1,000,000
Obligations	999,570				999,570
Census of partial employment, unemployment, and occupations:					
Allotments		850,000	10,000		860,000
Obligations		815,692	9,933		825,625
Grand total:					
Allotments	36,026,335	3,312,970	10,357,758	1,654,500	51,351,563
Obligations	35,270,752	1,229,563	9,200,090	3,126,638	48,827,043

Disbursements during the year ended June 30, 1940, from appropriations and from funds transferred from other departments, exclusive of emergency funds, were as follows:

Bureau or office	Appropriation for—			Total
	1938	1939	1940	
Office of the Secretary	$15,672.86	$397,010.47	$911,223.38	$1,323,906.71
Bureau of Foreign and Domestic Commerce	135.24	75,089.04	2,208,895.80	2,284,120.08
Bureau of the Census	5,904.82	56,019.84	20,229,998.42	20,291,923.08
Bureau of Marine Inspection and Navigation	8.50	11,200.22	2,568,416.08	2,579,624.80
National Bureau of Standards	541.47	149,793.70	2,551,449.69	2,701,784.86
Coast and Geodetic Survey	725.15	413,520.96	2,555,527.61	2,969,773.72
Patent Office	5,687.27	125,006.11	4,458,152.92	4,588,846.30
Total	28,675.31	1,227,640.34	35,483,663.90	36,739,979.55

MISCELLANEOUS RECEIPTS

Office of the Secretary:	
Sale of Government property	$742.04
Other	399.50
Bureau of Foreign and Domestic Commerce:	
Fees under China Trade Act	1,350.00
Sale of publications	34,860.68
Sale of Government property	149.67
Other	48.36
Bureau of the Census:	
Statistical services	2,465.78
Other	54.78
Bureau of Marine Inspection and Navigation:	
Tonnage tax, United States	1,504,272.86
Navigation fines	59,843.62
Navigation fees	191,916.65
Overtime service	59,701.33
Reimbursement for loss on continuous discharge books	3,140.75
Sale of Government property	155.58
Other	41.81
National Bureau of Standards:	
Testing fees	82,958.01
Sale of Government property	275.50
Other	100.58
Bureau of Lighthouses: Reimbursement, Government property lost or damage, etc	52.65
Coast and Geodetic Survey:	
Sale of charts	63,545.41
Sale of maps	14,553.56
Sale of publications	10,535.79
Sale of Government property	3,122.61
Other	421.52
Bureau of Fisheries:	
Sale of sealskins	246.79
Sale of Government property	23.83
Paten Office: Fees	4,344,967.08
Miscellaneous: Refund, State and local taxes	5.44
Total, Department of Commerce	6,379,952.18

DIVISION OF PUBLICATIONS

The following statement shows, by appropriation title, the amounts expended or obligated from appropriations available for printing and binding during the fiscal year 1940:

Title of appropriation	Available	Expended [1]	Balance [1]
Printing and binding, Department of Commerce	[2] $380,000	$379,431.93	$568.07
Printing and binding, Patent Office	865,000	864,154.06	845.94
Customs statistics, Bureau of Foreign and Domestic Commerce	[3]	13,038.50	
Investigation of building materials, National Bureau of Standards	[3]	8,508.48	
Expenses of the Sixteenth Census, Bureau of the Census	[3]	1,042,653.00	
Salaries and expenses, Social Security Act, Bureau of the Census	[3]	6,055.00	

[1] Estimated. Exact figures cannot be given until all work ordered is completed and billed.
[2] Includes $16,250 for Bureau of Fisheries, which was transferred to the Department of the Interior; $39,000 for the Bureau of Lighthouses and Lighthouse Service, which was transferred to the Treasury Department; and $500 for Foreign Commerce Service, which was transferred to the State Department.
[3] Amount available for printing not stated in the appropriation item.

Receipts from sales of publications, other printed material, and processed statements issued by the Department of Commerce during the fiscal year 1940 were $761,687.20, as compared with $726,514.73 for 1939. The following table presents a comparison for the 2 years by selling agencies:

Sales by—	Receipts	
	1939	1940
Superintendent of Documents: Miscellaneous sales and subscriptions	$171,414.76	$186,024.69
Coast and Geodetic Survey: Coast pilots, inside route pilots, tide tables, current tables, charts, and airway maps	104,643.36	129,984.98
Patent Office: Specifications of patents, reissues, etc., trade-mark section and decision leaflet of Official Gazette, and classification bulletins and definitions	404,349.50	396,279.55
Bureau of Foreign and Domestic Commerce: Processed statements	46,107.11	49,397.98
Total	726,514.73	761,687.20

DIVISION OF PERSONNEL SUPERVISION AND MANAGEMENT

The Division of Personnel Supervision and Management was established on May 10, 1939, in accordance with the provisions of Executive Order No. 7916 of June 24, 1938, and replaced at that time the former Division of Personnel of the Department.

In addition to carrying on and extending the personnel program in effect when the Division was established, including the Division's work in connection with the classification of positions in the Department, the selection of new employees, the transfer and reinstatement of former employees, maintenance of employee records and files, keeping current retirement records, etc., the Division has extended its program in several significant respects.

The staff of the Division, in cooperation with officials of the Patent Office and the Civil Service Commission, have completed a classification survey of the technical positions in the Patent Office and have practically completed a survey of the clerical positions in that office.

The efficiency-rating system has been extended to the field service of the Department.

A Welfare and Recreational Council, made up of one representative from the recreational associations of each of the several bureaus of the Department, has been organized, and is effective in fostering and encouraging recreational activities in the several bureaus, in developing inter-bureau competition, and conducting departmental activities.

A Departmental Consulting and Advisory Council on Training has been appointed and has had considerable to do with the development of training programs in the several bureaus and the training program of the Department. Most significant of the training programs on a departmental level were the 6-week course in Better Government Correspondence, and the 10-week course on Supervisory Training. These two courses were conducted by the Division of Personnel Supervision and Management and attended by representatives of all the bureaus of the Department.

The Division has inaugurated an induction and orientation program for the purpose of acquainting new employees with the Department's regulations and activities and orienting new employees to their positions. This activity is under the direction of a placement officer who also has the responsibility of follow-up of new employees, particularly during the probationary period.

During the year, a Department-wide machinery for adjusting employee grievances has been worked out and several instances have arisen as evidences of its equitable operation. The plan followed by the Department complies with standards fixed by the Civil Service Commission in accordance with the Executive order of June 24, 1938.

The Director of Personnel for the Department has served, as provided in the Executive order of June 24, 1938, as a member of the Council of Personnel Administration and, in addition to participating in the round-table discussions of matters affecting personnel departments on a government-wide basis, he is acting as chairman of the following council committees and member of the following additional committees: Chairman, Terminology Committee, Recruitment Committee, and Personnel Technician Examination Committee; member, Training Committee, and Promotional Examinations Committee.

There follows a statement showing the personnel of the various bureaus of the Department as of June 30, 1940:

	Permanent	Temporary	Emergency
Office of the Secretary	193	9	14
Bureau of the Census	5,771	6,768	----
Bureau of Foreign and Domestic Commerce	849	14	----
National Bureau of Standards	948	40	----
Coast and Geodetic Survey	1,112	197	20
Bureau of Marine Inspection and Navigation	920	4	----
Patent Office	1,339	2	----
Inland Waterways Corporation	1,226	1,986	----
Total	12,358	9,020	34

During the past fiscal year, the following number of personnel actions were completed:

Appointments	886
Transfers	182
Changes in grade	758
Administrative promotions	879
Separations	599
Retirements	35

CONFERENCES AND EXPOSITIONS SECTION

During the past fiscal year the Department was actively interested in 13 international conferences held within the United States and in 34 in other countries. Agenda for these conferences included the fields of commerce, education, finance, industry, law, and the sciences.

One of the most important of the conferences which took place in this country was the Eighth American Scientific Congress, Washington, D. C., May 10 to 18, 1940, for which this Department assisted in the development of the technical program. Dr. Lyman J. Briggs, Director of the National Bureau of Standards, served as chairman of the section on physical and chemical sciences; Eugene C. Crittenden, Assistant Director of the National Bureau of Standards, served as secretary of this section; and Dr. Halbert L. Dunn, of the Bureau of the Census, served as secretary of the section on statistics.

The Seventh World's Poultry Congress, Cleveland, Ohio, July 28 to August 7, 1939, was attended by representatives of the Bureau of the Census and the Bureau of Foreign and Domestic Commerce. These organizations contributed also to the poultry exposition held simultaneously, which was reported as the largest of its type ever assembled. Representatives of the Department served on the Federal committee and various working committees for a year in preparation for this Congress. Other conferences of special significance to the Department were the Seventh Assembly of the International Union of Geodesy and Geophysics, the Tenth General Congress of the International Chamber of Commerce, Tenth International Conference on High Tension and Electric Systems, Annual Meeting of the Permanent International Association of Road Congresses, Seventeenth International Congress for Housing and Town Planning, Sixth International Technical and Chemical Congress, Fifth International Conference on Timber Utilization, Second International Safety Congress, Ninth General Conference on Weights and Measures, and Second Pan-American Congress of Commercial Agents. The bureaus of the Department were also represented at a large number of national and regional meetings in specific fields, and numerous annual gatherings such as the National Foreign Trade Council, the Annual Meeting of the United States Chamber of Commerce, the Annual Meeting of the American Roadbuilders, and the 1940 Convention for the Revision of Pharmacopoeia.

Continued Government participation in the Golden Gate International Exposition and the New York World's Fair made necessary the renovation of, and some modification in, the thematic displays in the Federal buildings in which various bureaus of the Department are

represented. As new features in the New York World's Fair the Bureau of Marine Inspection and Navigation installed an exhibit in the Communications Building and the Department assisted with the new housing unit sponsored by the Central Housing Committee, of which the Under Secretary is a member.

The Secretary of Commerce was designated a member of the Coronado Cuarto Centennial Celebration and this Department actively assisted in preparations for this celebration.

The Department, through its several bureaus, presented exhibits varying in size and scope at about 20 smaller events within the United States during the fiscal year. It participated also in one or two expositions in Latin America.

OFFICE OF THE SOLICITOR

During the fiscal year ended June 30, 1940, there were 593 opinions rendered; the law and facts were reviewed in 49 cases of appeals to the Secretary of Commerce by officers and seamen of vessels from decisions involving the revocation or suspension of their licenses or certificates; the law and facts were reviewed in 108 cases involving petitions to the Secretary of Commerce for remission or mitigation of penalties for violation of the navigation and inspection laws; there were reviewed 233 cases submitted to the Attorney General; there were reviewed 78 cases for submission to the Comptroller General; and 115 contracts, 355 leases, and 196 bonds were examined. Legislative matters handled numbered 165. This was exclusive of the many discussions and conferences held approximately twice a week since the beginning of the year at the legislative committee meetings. In addition, 832 miscellaneous matters were handled.

All regulations issued by the Department and the Bureaus during the year were examined and approved. The office also reviewed the Federal Register work for the Department. Many other questions not requiring written opinions, involving statutes, contracts, treaties, regulations, and administrative law and procedure were disposed of in conferences with officials of the Bureaus and representatives of other Departments.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

The force most potent in shaping the activities of the Bureau of Foreign and Domestic Commerce during the fiscal year just ended has of course been the cataclysm of the European war. With the progress of hostilities in the continents of the Old World, there has arisen an array of exigent, perplexing problems in every conceivable field of commerce, finance, and industry. The Bureau, like every businessman, has felt the impact of the shattering of traditional molds, the transmutation of commercial concepts, the drastic readjustment of ends and of means, the choking of grooved channels, the wrenching and twisting of accustomed forms, and the emergence of new methods.

All of these things, inevitably, have affected most directly the endeavors of this Bureau to advance the fundamental interests of American business, both in the wide world theater and within the domestic sphere.

MARKED ALTERATION IN CHARACTER OF BUREAU'S SERVICE

The transformations that have taken place in world economy in recent years have altered very appreciably the character of much of the service that this Bureau has been called upon to render in the field of foreign trade, and this change has proceeded rapidly in 1939–40.

In earlier years, when the transactions of international commerce were relatively free—and when, therefore, success in foreign trade depended largely upon individual initiative, alertness, keen enterprise, and vigor in seizing upon and developing specific openings—the work of the Bureau was concerned mainly with helping American businessmen actually to sell goods, to get orders, or, on the other hand, to obtain needed shipments of particular supplies. But with the tremendous rise of State power and State control throughout the world, with the countless attendant restrictions and rigidities, and the imposition of arbitrary decrees from above, that special type of Bureau helpfulness has been made increasingly difficult. Such individual aid is still extended by the Bureau in a great number of instances, but in 1939–40 it has not been quite so frequent as it formerly was.

The course of international business, to an unprecedented degree, has been strictly controlled by governments—and the Bureau's problem has been chiefly one of providing really basic information as to what is currently happening, and of striving to help most effectively in the solution of the problems through the instrumentality of broad-gaged governmental action.

MAJOR REORGANIZATION EFFECTED

Such changes in world conditions made it desirable for the Bureau to effect, during 1939–40, a thoroughgoing reorganization in the

structure and operation of its Washington headquarters. The objects were to dispel uncertainties and overlapping—to reinvigorate the general approach to major problems—to integrate and align the Bureau's functions in a more logical manner—and thus to shape all activities in accordance with basic concepts and the fundamental requirements of economists and businessmen.

A comprehensive reorganization has therefore been carried out, whereby the Bureau's various divisions have been brought together mainly in three great groups—constituting, respectively, the "Industrial Service" (concerned with specific products and classes of commodities), the "International Service" (studying broad as well as highly specialized developments in the field of world economy), and the "Basic-Problems Service" (devoting its attention chiefly to salient economic forces as they affect American business and the American way of life).

INDUSTRIAL SERVICE

The "Industrial Service" of this Bureau comprises 13 divisions whose task it is to bring together, analyze, and effectively disseminate vital data designed to aid the business activities of specific branches of American industry. The experts on the staffs of these divisions, particularly the chief, have in nearly every instance been chosen after consultation with industry. Most of these experts have had practical experience with the lines of merchandise which come within their purview here. They are of necessity familiar with the evolution and traditions, the technical methods, the dominant motives, the operating problems, the factual bases, and the broad aims and aspirations of their several industries. Enjoying wide acquaintance among the executive personnel of American enterprises, they have maintained at all times during 1939–40 a close and comprehensive contact with their respective industries—based on common understanding and an acknowledgment of mutual needs.

Quick responsiveness to the needs of industry is the keynote of the Bureau's Industrial Service—while concentrated, carefully directed specialization gives the primary force and impetus to the functions of this group of divisions.

FACILITATING ADJUSTMENT TO CONSEQUENCES OF WAR

One of the most significant types of service performed by these Industrial Divisions during the fiscal year just past has consisted in facilitating the adjustment of their industries to the repercussions of world developments. Such repercussions, it need hardly be said, have been extremely frequent and of highly varied character. Psychologically, there have been reactions of uncertainty, anxiety, and (especially during the early weeks of the war) of intense perturbation, in the minds of the executives of many American industries concerned with international trade. In certain places in the world, a tendency toward speculation became manifest. Numerous American industries found their customary foreign operations severely dislocated. Embarrassing shortages arose. Drastic restrictions of every sort were put into effect abroad. Imports of certain commodities were prohibited or very sharply curtailed in many countries affected by the hostilities.

Shipping routes, long followed, had suddenly to be abandoned. The procedures that were involved in the enforcement of blockades occasionally resulted in troublesome delays or in the frustration of the purpose of the American exporter or importer. American industries having a vital interest in foreign commerce have very often been harassed by these and similar factors in the great world picture, and in thousands of cases they have come to the Industrial Divisions of the Bureau of Foreign and Domestic Commerce for indispensable information and dependable guidance.

Such assistance by the Industrial Divisions has frequently taken the form of direct and practical help whose worth is readily expressible in dollars and cents. One may mention, for example, the case of the British orders for fire hose, which were cleared to American manufacturers through the Bureau's Leather and Rubber Division just before the outbreak of the war and which resulted in hose shipments to the United Kingdom valued at $2,179,106 in 11 months of the fiscal year, against the relatively trifling amount of $165,394 during the corresponding period of the preceding year, this increase alone being equivalent to the total normal American production of fire hose for half a year.

In the important field of foodstuffs, a shipment of $750,000 worth of American corn sirup was refused a license by the British Government because of its being shipped from American interior points subsequent to the date of the official British embargo. The Foodstuffs Division of this Bureau was appealed to—and, through its cooperation with the Foreign Tariffs Division and the American commercial attaché in London, success was achieved in getting this three-quarters of a million dollars' worth of American goods released for export across the seas. To a large American manufacturer of prepared foods a similar service was rendered.

Numerous indeed have been the instances in which the Industrial Divisions have been called upon by their industries, or have voluntarily undertaken, to make broad factual appraisals of the sharply altered situations resulting from the war. The Bureau's Motion Picture Division, for example, has been ceaselessly active in helping American producers to cope, so far as possible, with the troubles engendered by the war conditions abroad—the foreign government restrictions, the depressed economies, the radically altered competitive position. The Transportation Division has been prompt with its authentic information on problems that have arisen with respect to packing, ship space, ocean freight rates, shipping documents, and overland transportation facilities in foreign countries, consequent upon the widespread disruption of the war. In the fall of 1939 the Bureau was quick to make analyses of anticipated effects of the war on United States trade in leather and rubber products, directing special attention to heightened export possibilities; also, it obtained, for the Tanners' Council of America, special reports concerning the continued availability of hides and skins from 22 different foreign regions.

In many industrial fields, the Bureau has arranged or participated in conferences designed to frame practical measures for dealing with the facts and contingencies of the war. The Chemical Division, for example, was instrumental in alleviating much keen apprehension,

through its sponsoring of conferences with producers, consumers, and other interested elements. Subjects dealt with by such conferences have included, among others, the situation with regard to what are called "match chemicals"—the endeavor to assure our self-sufficiency in potash—the inspiring of interest in the expansion of process research and facilities for coal-tar light oil—and the stimulation of new sources for exotic products.

Many of the divisions have furnished to their respective industries quick data on all the pertinent day-to-day developments arising from the war. Such a service (illustrative of that provided by every other industrial division) has been that of the Forest Products Division in issuing a series of special circulars describing the rapidly appearing orders of the British Timber Controller with respect to new British trading methods and restrictions necessitated by the exigencies of the European hostilities. The facts regarding controls exercised over the paper trade by the several belligerents have likewise been communicated, at the earliest possible moment, to the American industries whose interests were thereby affected.

It has proved imperative for the Bureau's Industrial Divisions to give very special attention to the war's effect on foreign sources of the many materials that are vitally essential to the functioning of our economy. The American wool market, for example, was keenly disturbed following the action of the British Government in taking control of the wool supplies of the entire British Empire. Therefore, an interdepartmental committee, on which the Department of Commerce was represented, immediately canvassed the world situation (and particularly the domestic situation) to evaluate the probable demand for wool of various types, and this committee at once made known to the British Government the probable requirements of our industry. As a result, the allocation to us of an adequate supply was assured. Acting upon the recommendation of this Bureau's Textile Division, a joint meeting of representatives of the Government, manufacturers, dealers, and growers was arranged. These prompt actions with respect to wool helped to maintain confidence and avoid severe market disturbances that might well have been expensive and damaging. Somewhat similar was the case of flax. Limited available flax supplies and their control by countries requiring them for military purposes threatened idleness for the American cordage, thread, and linen industry. Cooperating with American manufacturers in sizing up their potential requirements and the supplies on order, and acting through diplomatic channels in conformity with Bureau practice, the Textile Division was helpful in bringing about the release of substantial supplies.

Naturally, the interests of the American pulp and paper industry have been most significantly affected by Scandinavian developments such as the disruption and uncertainty resulting from the invasion of Finland and later of Norway and the consequent cutting off of normal movements of pulp and paper from northern Europe to the United States and to Latin America. During the periods of doubt and anxiety with respect to this Scandinavian trade in pulp and paper, the Bureau's Forest Products Division has been alert and active in providing American industry with highly essential up-to-the-minute information.

Comparable service has been provided by practically all of the Industrial Divisions. Often, a considerable degree of foresight has had to be exercised. Just before the outbreak of the war, for example, the Bureau's Tobacco Division, anticipating a troublesome condition as regards imported material, in consequence of the prospective closing of the Mediterranean Sea, made surveys of the situation with regard to cigar-wrapper tobacco, aromatic tobacco, and licorice, and reported the findings to the American industry. On August 24, 1939, a conference of importers was called, and its deliberations resulted in the removal of all material (a year's supply) from the Mediterranean before the end of 1939—4 months ahead of normal.

Under the conditions of the war emergency, the Industrial Divisions of this Bureau have been zealous in facilitating the continuance—and where possible the expansion—of the export of American merchandise. The Machinery Division, for example, found purchasers in neutral countries eagerly seeking new sources of supply for equipment that they had previously obtained from European suppliers, and the fresh opportunities thus opened to American manufacturers have been persistently publicized by the staff of the Division. The Automotive-Aeronautics Trade Division, solicitous for the maintenance of exports by the great industries that come within its purview, has furnished a wealth of information on all of the many new measures that have a bearing on the operation or sale of motor vehicles abroad. It has made summaries of gasoline restrictions and rationing, the use of gasoline substitutes for motor-vehicle operation, and the conversion of vehicles for the use of such substitutes. It has supplied data on motor-vehicle production in the belligerent countries. Also carried out by this Division was a special study of Japan's dependence on United States automotive products and raw materials for motor-vehicle production.

Substantial orders for American exporters followed the action of the Bureau in supplying the British authorities with requested technical data on Southern short-leaf pine. Furnished to Britain, also, were data on the use of modern metal timber connectors for use in the construction of airplane hangars and towers, as well as suitable plans for camps to take care of the many thousands of persons evacuated from the British cities—valuable orders for American products being thus effectively stimulated.

The Foodstuffs Division has issued prompt analyses (in press releases) of every major change in the international situation affecting foodstuffs. In its processed periodical, Foodstuffs Round the World, the Division arranged to include last-minute "insert pages" announcing the food-control and rationing measures that were being instituted abroad.

CULTIVATION OF COMMERCIAL RELATIONS WITH LATIN AMERICA

One of the outstanding consequences of the outbreak and course of hostilities in Europe has been the intensification of our interest in the countries to the south of us—the heightened realization of the need for the development of more intimate, more vital, more mutually beneficial commercial and cultural relations between the United States and the Latin American Republics. As is only natural, the

Bureau of Foreign and Domestic Commerce has been taking an active part in the furtherance of the wholesome objectives envisaged by the statesmanship of the Pan American nations.

The Industrial Divisions of the Bureau have been studying the implications of long-term Pan American economic relationships in their respective commodity fields, with the purpose of making it easier to adjust such relations judiciously in the light of probable trends.

Radio communication is acknowledged today to be one of the most powerful factors in enhancing the factors of harmony and understanding between nations. Significant, for that reason, is the cooperation afforded by the Bureau's Electrical Division as a member of the Subcommittee on Radio of the Interdepartmental Committee on Cooperation With the American Republics. Motion pictures, too, play a great role in developing a "community of interest" between different peoples, instilling through entertainment a better comprehension of basic habits of thought, national attitudes, and ways of life; consequently, helpful results may confidently be expected from the work of the Motion Picture Division during the past fiscal year in surveying the potentialities of expanded Latin American markets for our pictures, and in aiding also in the formulation of plans for distributing cultural films through our embassies and legations in the Latin American countries.

The Bureau, during the year, has been helping to lay the groundwork for a sounder two-way trade with Latin America—which involves the importing by us of greater quantities of Latin-American products which we can take without injury or prejudice to our own industries. The Specialties Division, for instance, has been making a comprehensive collection of information on handicraft industries in the Latin-American countries, in the thought that our people should be able readily to buy from the southern countries many decorative articles, curios, novelties, souvenirs, toys, distinctive furnishings, products designed for personal adornment or apparel, and other "craft" merchandise of a special character, which may well take the place of our previous purchases from other regions, or may make a particular appeal calculated to increase our buying, without affecting adversely the interests of our own enterprises.

In numerous ways the Bureau has interested itself in movements for the development of transportation and communication facilities linking us with the Latin Americas. It has been helping, too, to foster cultural ties, including scientific interchange. Various Industrial Divisions cooperated with the Eighth American Scientific Congress, held recently in Washington and attended by many delegates from the countries to the south. The Bureau sponsored an exhibit, in the lobby of the Department of Commerce Building, on medical and hospital supplies, designed for Latin-American doctors and health officers. At this Congress a division chief made an address on "The Importance of Rubber to the New World," and other divisions had a share in the proceedings and results of the Congress.

One of the Industrial Divisions has supplied much pertinent data in connection with loans made by the Export-Import Bank to certain Latin-American countries, part of which loans are earmarked for the Pan American Highway, whose eventual importance will in-

dubitably be very great. The Division also furnished data to the Pan American Highway Confederation for use in the preparation of the first authentic "condition maps" of the far-flung Pan American Highway System.

The Industrial Divisions have been scrutinizing the potentialities and requirements of the Latin-American markets—the outlook for the merchandise that we produce. For example, the Foodstuffs Division has published in Commerce Reports, the Bureau's weekly foreign-trade magazine, a series of special articles on Latin-American markets for all kinds of our confectionery. The Automotive Division has assisted American sales officials to prepare themselves wisely and adequately for selling trips to Latin America. The Tobacco Division provided its industry with a comprehensive study of our tobacco trade with Latin America over the long period comprehended between the years 1821 and 1939. A survey of the Latin-American markets for brushes has also been made.

ASSISTANCE IN SOLVING PROBLEMS OF NATIONAL DEFENSE

To a mounting degree the problems of our national defense have been engaging the attention, and enlisting the active service, of this Bureau's Industrial Divisions. In many varied ways these Divisions have been aiding the National Defense Advisory Commission and other governmental agencies concerned with defense efforts. It was inevitable, of course, that the Bureau should be called upon for much of its accumulated data on the economics of essential strategic raw materials and of "critical" manufactures. In the field of defense procurement, the Chemical Division, for instance, has prepared factual presentations, pertinent to such products as sulphur, soda ash, phosphate rock, and potash. Through its "commodity synopses," the Bureau satisfied the interest of the Joint Army and Navy Munitions Board on the "availability factors" of no fewer than 70 strategic and critical products in the chemical field. The Machinery Division helped in the work of getting from abroad certain specialized equipment not made in the United States but highly necessary in speeding up production of articles required for our national defense.

The Bureau held conferences with the Munitions Board on preliminary plans for handling the rubber obtained under our Cotton-Rubber Exchange Agreement with the Government of the United Kingdom—as well as with the State, War, and Navy Departments on the prevention of unusual rubber reexports from this country before the licensing system was initiated in the fall of 1939. The Leather and Rubber Division's regular annual survey on United States consumption and year-end stocks of crude, reclaimed, and synthetic rubber provided information that has been constantly in use by Government and industry in connection with national defense plans.

Foreseeing the effects of the war on the wood-pulp price structure, the Bureau began last September a detailed wood-pulp price study which is already proving its worth by quickly providing the Defense Commission with needed data on prices and trends.

The Bureau's Metals and Minerals Division has within its purview a great many of the materials most essential to national defense. The

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outbreak and spread of the war created pressing problems with respect to the supply of many of these materials, and the Division has been able, from its store of information on sources of supply, national requirements, substitute materials, and related matters, to facilitate the industrial operations of many of its "contacts" when these were threatened with interrupted production if not actual stoppage through failure of facilities for raw-material supplies.

The Specialties Division inaugurated a monthly survey of imports, use, and stocks of unmanufactured cork in the United States, which is reported regularly to the Army and Navy Munitions Board.

The Machinery Division exerted influence to initiate the manufacture in this country of equipment to facilitate the rapid fabrication of airplanes, equipment that had in the past been imported. A successful search was made for existing, installed machines for special operations in the manufacture of aircraft, to obviate the delay involved in having new equipment made for these specialized purposes. This Division has furnished to the War and Navy Departments data and estimates of production, present and potential, of equipment vitally necessary in building up our defense forces. Advice was given on machine-tool equipment. Supply officers of other agencies were informed where to obtain highly technical articles made by only a few manufacturers.

VARIED CONTRIBUTIONS TO PROMOTION OF FOREIGN TRADE

Besides their services that have been related to the war and to national defense, the Industrial Divisions have made numerous contributions to the promotion of American foreign trade. In the first place, they have furnished general guidance to exporters and importers. Illustrative of the efforts of the divisions along this line one may cite the procedural guide, in chart form, brought out by the Chemical Division under the title "Are You Planning to Export?"

As always, there have been surveys of foreign markets for specific lines of American merchandise. The Foodstuffs Division, for example, conducted surveys of the Latin American markets for canned pimientos, eggs in the shell, and dried milk, as well as the broad confectionery survey already mentioned. Often requested by industry, and now provided by the Bureau, is a new reference handbook on World Paper Consumption, by countries and types of paper—containing much vital information that had not been previously available. World markets for dental and surgical goods were surveyed by the Specialties Division, and the data thus compiled (the first and only survey of its kind) proved most welcome to the manufacturers of such articles. A detailed study of world trade in glass was made available to that industry. World cotton consumption, production, exports, and prices were analyzed by the Bureau for use in the consideration of the domestic cotton problem.

In cases of varying character the Industrial Divisions have facilitated actual sales by American interests. The Transportation Division participated directly and potently in enabling American manufacturers to obtain from Brazil orders for about $4,000,000 worth of railway equipment. Noteworthy was the assistance rendered to the projects by which, for the first time in history, American railway-equipment manufacturers obtained orders for rolling stock for the

remote countries of Thailand (Siam) and French Indochina, as well as for locomotives in Mozambique. The Transportation Division also cooperated with American manufacturers in a locomotive transaction for Iran (Persia) which is still pending and which, if consummated, will result in the sale of nearly $2,000,000 worth of equipment.

The Bureau's Industrial Service has given substantial assistance to a number of individual foreign buyers or agents. Typical of this service is the case of a motion-picture film importer from Calcutta, India, who was visiting the United States; he was assisted by the Bureau to make arrangements with one of the large American producers of raw film to distribute this product in Bengal. This business will total thousands of dollars yearly.

During 1939–40 the American short-wave radio broadcasting companies have been developing the possibilities of commercializing their short-wave services. This Bureau has had the opportunity of rendering direct assistance in these studies. Several programs are now being carried regularly on a commercial basis.

The Chief of the Transportation Division has continued his work as executive secretary of the Foreign-Trade-Zones Board, which is authorized to grant to corporations (public or private) the privilege of establishing and operating foreign-trade zones in ports of entry—the purpose of such zones being to minimize the customs administration and surveillance over foreign merchandise pending its reexportation or entry into the United States.

SERVICES TO DOMESTIC BUSINESS BY INDUSTRIAL DIVISIONS

In their services to domestic business, strictly within the United States, the Industrial Divisions have likewise been active throughout the past year. The Bureau has developed a new monthly "Industry Survey" which periodically records a cross section of the country's orders, sales, and inventory. All of the Industrial Divisions have contributed to this survey.

The planning of a commodity reporting program for the lumber and allied-products industries has engaged the energies of the Forest Products Division. Careful analyses of available current statistics have been made, the aid of trade-association groups has been enlisted, and initial efforts have been concentrated on the retail lumber trade, where desired current data are now lacking. This forest-products program encompasses primary and secondary manufacture, wholesale and retail channels, and the wood-consuming industries; it may involve several years of effort; it aims to enable the industry better to regularize itself and eventually to increase employment, wages, and profits through better-informed decisions in production, selling, inventories, and related factors.

Encouraging progress has been made by the Textile Division in its long-term program of developing more effective statistical studies, so related as to provide the basis for a clearer picture of current developments, and calculated to furnish a more rational foundation on which to shape commercial and governmental policy. Many textile firms are voluntarily lending their active support and are providing statistical data for the Nation-wide Inventory Report.

The Specialties Division, like the others, has been developing a broad-gage program of encouraging and assisting industries to collect adequate trade statistics, or improve existing ones, and gratifying results have already been achieved. This activity will be extended as facilities and personnel permit. In various industrial and trade groups there is a keenly felt need for analytical studies and for economic and distribution surveys. In the specialties field, two major projects of this kind—for hand-made glassware and for bicycles—have been under consideration for execution soon.

The Foodstuffs Division, during this past year, collected information for a survey on rates of operation and plant capacities in all important American food industries. That Division has instituted new services which include published monthly market reports on canned foods, fats and oils, and confectionery.

A general study of a distinctive character is the survey of the motion-picture equipment facilities of educational institutions throughout the United States, now being conducted by the Bureau.

The Bureau's Industrial Service has been alert to concern itself with all the vital aspects of new American industries that promise to develop in a substantial and rewarding way. The Chemical Division, for example, has devoted intensive effort to varied phases of the swiftly developing synthetic-plastics industry. High lights of this program during the past year have been a publication, Plastics Progress; a 6-week educational exhibit of plastic samples in the lobby of the Department of Commerce Building; and a survey of Latin-American markets for plastics.

The Bureau has cooperated with the General Land Office in endeavors bearing upon the establishment of a wood-pulp industry in the richly wooded but sparsely peopled Territory of Alaska.

Automobile manufacturers have been assisted by the Bureau in their study of small automobiles, our Automotive Division supplying such material as specifications of low-horsepowered European cars and figures as to gasoline consumption and tire sizes.

During the past year a number of the industrial divisions have contributed factual material, comments, and analyses to the consideration of the proposed Great Lakes-St. Lawrence Waterway.

PUBLICATIONS—STATISTICS AS TO SERVICES AND CONTACTS

In each Industrial Division, considerable time has been devoted during the year to the preparation of material for publication. The special monographs and bulletins, on specific subjects dealt with by the industrial divisions, that have been published or prepared during the past fiscal year, have been of varied character but uniformly high value. They have included, for example, such a publication as Modern Export Packing, a 530-page handbook covering every phase of the packing of goods for export shipment, both to prevent damage and to achieve maximum economies in transportation and customs duties. Transport Control Abroad is a valuable monograph. The study of Wartime Control of Ocean Freight Rates in Foreign Trade possesses a lively timeliness. A comprehensive bulletin covering a virtually untouched commercial field is World Markets for Dental and Surgical Goods. Manuscript has been practically completed for

books on the subjects of International Trade in Citrus Fruits and Foodstuffs Trade With Latin America. A Bureau expert has finished writing a study of World Refrigerator Markets. Forest-products studies typified by such booklets as those on Folding Paper Boxes, American Hickory Handles, and American Hardwood—Dimension, Solid Wall Paneling, and Interior Trim have been printed and released. This list is by no means complete, but it serves to illustrate the nature of the Bureau's special publications.

Besides the formal publications, the Industrial Divisions have issued a large number of current trade studies not intended for any degree of permanence. Taking just one of these divisions, to illustrate such service, it is found that in 1939–40 the division issued 97 foreign-market bulletins dealing with as many specific foreign markets for particular export products, as well as 37 special circulars on various subjects relating to international commerce, the trade of the United States in specific products, foreign industries, arresting new developments, and similar matters.

INTERNATIONAL SERVICE

The Bureau's International Service, comprising six divisions or units, concerns itself actively not only with the broad questions of conditions abroad, and the course of international commerce, but also, in a specialized manner, with the technical details of such matters as foreign tariffs and trade regulations, foreign commercial laws, the complex problems of international finance, the trade-agreements program, and the relations of the Bureau with the American Foreign Service. More than ever before in the history of the Bureau, the services of these International Divisions have been urgently in demand throughout 1939–40.

REGIONAL INFORMATION

As has been the case with numerous other units of the Bureau, the main task of the Division of Regional Information has been to adapt its work to the new demands growing out of the international political situation.

The fundamental shifts in the economy of the various European countries, even prior to the outbreak of the war, resulted in a falling off in the demand for economic data pertinent to trade promotion under normal conditions. The activities of the Division have, therefore, been shifted to supplying more fundamental information about the economic structure of the various countries involved in the international complications—information designed to throw light on the new trends and economic policies and the capacity of the various countries to meet the strain resulting from the political and military developments. These shifts in trends spread from the European countries to those in other parts of the world whose economies are closely tied up with Europe. The outbreak of the war produced a sudden shift in sources of supply and markets, particularly to Latin America and the Far East, and the Division has attempted to supply the basic economic information essential for an intelligent appreciation of the new conditions. As examples of the new line of work, one may mention a comprehensive survey of the diversion of Latin

American orders from belligerent countries to the United States; 23 detailed statistical analyses of the trade of foreign countries or areas, showing the effects of the changing character of international trade; 36 economic press memorandums covering foreign countries or areas coming within the sphere of world political disturbances; and 11 economic surveys for 1939 on some of the more important foreign countries.

With the development of the war and the change in the political status of a considerable part of the European Continent, it became necessary to begin to plan for the probable postwar economic situation and to draw certain conclusions as to the part of the United States in the coming new international alinement. The possibility of the emergence of economic blocs as a result of the German victories has been fully taken into consideration, and a number of studies have been initiated for the purpose of determining the economic structures of the new blocs, their strength and weakness, and their capacity for achieving a relative self-sufficiency under certain conditions.

Particular attention has been paid to the possibility of greater Western Hemisphere economic cooperation, and the Division has published analyses of the Twenty Leading Export Commodities from the Latin American Republics, and of Imports Into the Twenty Latin Republics of Leading Commodities by Trade Regions, to serve as basic data in the consideration of this subject. Also under preparation is an analysis of the principal imports and exports of European countries, a similar analysis covering Africa, and a study of the production and trade in the primary commodities of Europe. In connection with the proposed United States participation in the marketing of Latin American surplus commodities, studies have been initiated with a view to determining the form of organization necessary to carry out that policy.

With the establishment of the Advisory Commission to the Council of National Defense, the Division has been asked to provide information in regard to the industrial policies of the various belligerent countries. Among the material furnished have been data on the German economic situation prior to and as influenced by the war, the rationing of industrial raw materials, and the economic position of France. There is also under preparation, for the use of the Commission, a study of the adaptation of British industry and trade to war purposes.

A report on Recent Trends in British Industrial Reorganization was completed for the Temporary National Economic Committee, to be published as a part of their program.

The regular work of the Division involved a continuation of its usual publications, including the 1939 Foreign Commerce Yearbook and the Economic Review of Foreign Countries, 1939, annual publications of the Bureau. Its special circulars have included studies on living and office-operating costs in some of the Latin-American Countries, Japan's Trade with Latin America, China's Trade Under Wartime Conditions, 20 Years of Soviet Trade, and a Commercial and Industrial Survey of Finland. Part III of the Commercial Travelers' Guide to Latin America was completed, this last volume covering Mexico, Central America, and the Caribbean Area. With

the intensified interest in increasing trade with Latin America, the Guide, including Parts I and II on the West and East Coasts of South America, has been of utmost usefulness to American business organizations sending representatives to those areas.

PROBLEMS OF INTERNATIONAL FINANCE

Among many other activities in 1939–40, the Finance Division has (1) expanded the distribution of information on current exchange developments in certain important areas; (2) published a 95-page bulletin, Oversea Travel and Travel Expenditures in the Balance of International Payments of the United States, 1919–38; (3) issued a series of special reports relating to the international investment position of the United States; and (4) rendered numerous special services to both private and public agencies, after the outbreak of the European war, on current regulations arising from wartime exigencies affecting international financial and commodity markets.

The outbreak of the war brought special requests for information and guidance from exporters who were suddenly cut off from their foreign customers. The invasion and occupation of country after country and the subsequent "freezing" by the United States Government of the dollar assets owned by the governments and nationals of such countries created special payment and transfer problems for our exporting industries. This situation led to innumerable inquiries relating to the status of foreign importers' dollar accounts, while constant changes in the regulations of certain belligerent governments pertaining to the liquidation of securities and the employment or transfer of foreign-owned funds produced a series of inquiries which, because of their great urgency, required expeditious handling. A growing interest in, and concern over, Germany's system of barter trade contributed materially to an increase in inquiries relative to exchange developments in certain areas, especially in Latin America.

The disruption of shipping and ocean passenger service gave rise to special inquiries on foreign-travel statistics from steamship companies, advertising agencies, and travel agencies. In view of the latter developments, the Finance Division's special study on oversea travel and travel expenditures proved to be especially timely.

Of equal importance in dealing with a special type of wartime inquiry was the Division's series of studies relating to our international investment position inaugurated in 1937 with the publication of the bulletin, Foreign Investments in the United States. With the imminence of war in Europe considerable public interest developed in the volume of dollar balances and investment holdings of the probable belligerents. This interest developed largely from the special application of the Johnson Act to such countries as England and France, so that with the actual outbreak of war and the passage of the Neutrality Act of 1939 the nature and volume of investments in this country by the nationals of belligerent and potentially belligerent powers became matters of daily concern in the formulation of public policy. By keeping its compilations on international investments as up to date as essential statistical procedure permitted, the Bureau's Finance Division became an important source of current

information for those Government departments and agencies which were directly concerned with the execution of the neutrality laws, the President's "freezing" order of April 10, and other measures.

In addition to services performed for the State and Treasury Departments, the Securities and Exchange Commission, and the Tariff Commission, special aid was rendered the Civil Aeronautics Authority in connection with certain of its functions concerned with travel in particular areas, while the Maritime Commission called on the Division for cooperation in its study of the war's effect on foreign travel, as well as its study on indirect subsidies obtained by foreign shipyards. An extension of the Division's earlier studies on foreign investments in United States industrial concerns became the basis of testimony before the Temporary National Economic Committee by two members of the Division. On the basis of the Bureau's accumulated international investment data, certain requests from the Advisory Committee on National Defense have been adequately met.

The Finance Division is at present engaged in a study of personal and institutional remittances to foreign countries during the post-World War period and in special research relating to the country's "invisible" foreign trade, particularly freight and shipping transactions. As an important part of its continuous examination of the country's international investment position, a report is in preparation on foreign holdings of United States corporate bonds. In connection with the annual compilation of the balance of international payments, special compilations, prompted by recent international developments, have been undertaken with a view to showing the country's total transactions with particular world areas.

FOREIGN TARIFFS

As a result of the adoption by many foreign countries of special trade-control measures arising out of the war situation in Europe, the Division of Foreign Tariffs carried during the year an unusually heavy responsibility. Since such controls have as a rule been applied without advance notice, and communication with many foreign areas has been difficult, it has been doubly necessary to provide American business with prompt notification of the operation of such measures. Accordingly, special attention has been directed to the swift obtaining of dependable official information on these wartime measures and their dissemination through press releases and by teletype and air-mail advices of field offices of the Bureau. Through these channels, it has been possible to save American traders from heavy losses that might otherwise have resulted.

The number of news items published on developments in the field of foreign tariffs and trade regulations affords an index of the increased volume of activity of the Division. These totaled 2,686 during the year, an increase of approximatedy 25 percent over the fiscal year 1938–39. During the quarter October–December 1939, the volume of such announcements was 65 percent above the similar period of the preceding year. In this connection, special mention should also be made of the increased service to American firms that sought to avail themselves of the enlarged market opportunities in Latin America in consequence of war conditions. Such firms have

been supplied with the basic data on tariff classifications, import duties, license restrictions, customs requirements, and trade regulations essential to the successful handling of this new business.

The Division has also been the channel through which valuable aid has been extended, generally in collaboration with the industrial divisions, to American trade interests, who have required assistance in consequence of difficulties arising out of war trade controls and customs laws or regulations. After analysis and study of the technical problems involved, such cases have been taken up through the Department of State with foreign governments by the appropriate American Foreign Service officers and substantial results have often been achieved. The following accomplishments of this character during the past year may be cited: Increased supplies of flax needed by American industry were made available from Great Britain, and supplies of tungsten ore were secured from Burma; British import licenses were granted for the following American products: 32 carloads of breakfast cereals valued at $96,000, more than 2,000 tons of corn sirup and glucose totaling $250,000, radios worth $3,700, and substantial shipments of canned shrimp; while other suitable governmental endeavors, in which this Bureau had a share, eventuated in modifications of the Brazilian wood-pulp perforation regulations, favorable reclassification of American wallboards in several Latin American markets, remittance of fines on American hosiery and shirts in Honduras, the establishment of uniform rates of customs duties on glass blocks in Brazil, the reclassification of shaving lotions in the Straits Settlements.

The following problems which were the bases of technical service extended to various American trade interests may be cited as illustrations of other phases of the Division's activities: Foreign customs classification of nylon yarn and hosiery; Portuguese flag differentials in import duties; Egyptian sanitary restrictions on American fruit; world import duties on grain and grain products; Cuban explosive regulations; Swiss regulations on imports of beef and sausage casings; duties and import restrictions on radios and office equipment in British Empire areas; French export restrictions on hides and skins; Canadian import duties on heavy machinery; documentary parcel-post regulations in important world markets; and trade diversion under import-control regimes in various British colonial areas. The long-range value of the Division's activities is well illustrated by a report from an exporter of fertilizer, in which it was stated that as a result of the assistance extended to this industry in the previous year in the establishment of the dutiable value of its product, and the elimination of the possibility of the application of antidumping duties to the product, sales in the current year had reached a total of $180,000 in a single foreign market.

In addition, the Division has carried on its usual schedule of publications. The Special Research Section completed during the year a new publication, Foreign Marks of Origin Requirements, a revised edition of Preparing Shipments to British Countries, a revision of the Fresh Fruits and Vegetables Tariff Handbook, and a supplement to the Shipment of Samples and Advertising Matter Abroad. The annual review, Foreign Tariffs and Commercial Policies during 1939, written by the Chief of the Division, was accorded wide secondary distribution and quotation, here and abroad, while there was considerable

demand for circulars on preparing shipments to the countries of Latin America.

Close cooperation with the Department of State, the Department of Agriculture, the United States Tariff Commission, the Maritime Commission, and the Post Office Department continued to be maintained. During the year, the Division contributed to the trade agreements program by supplying basic data on the foreign-tariff systems of 14 countries for use in the study of new, revised, or prospective reciprocal trade agreements.

FOREIGN COMMERCIAL LAWS

As the number of commercially important countries entering upon a war footing increased, the Division of Commercial Laws, whose primary function is to follow the development of foreign laws effecting American commerce, was obliged to turn a large part of its energies into the problem of dealing with war measures, many of which affected American cargoes already at sea and American business interests and property in belligerent countries. Upon the approval of the Neutrality Act of 1939, export methods and practices of years had to be abandoned, and for some weeks much difficulty existed in the readjustment of business to the new conditions. As most of the trouble arose out of lack of information about the act and its interpretation, the first objective of the Division was to disseminate information as quickly as possible. In addition to replying directly to the great number of letters of inquiry, the Division published a guide to the act and its interpretation, with maps and charts supplying graphically answers to common questions. The publication was widely reprinted, and thousands of copies of a reprint of the map showing the "combat areas" and restricted zones, reissued with current changes five times, were distributed to inquirers. It is credited with a material part in the dissipation of the critical confusion that existed.

Following the pressure of inquiries, the Bureau advanced its intensive studies in the commercial laws of Latin America and the countries still accessible to trade, including the compilation of taxation data and the investigation of the effect of economic policy upon settled principles of law. In its work designed to assist the American insurance industry abroad, the Division of Commercial Laws participated actively in the efforts of the industry to protect its interests against the growing tendencies toward nationalization in many countries.

The Division continued its interest in foreign and international measures to regulate industrial property, particularly in the fields of trade-marks and design patents. The service whereby the Bureau warns American trade-mark owners of applications made abroad for possibly infringing marks has been improved during the year. New studies relating to the means of better protecting American design patterns were given impetus by the awakening American leadership in styling, especially in women's apparel.

One of the oldest activities of the Division is the trade-adjustment service, by means of which complaints filed with the Bureau by American merchants, and those filed with American Foreign Service offices by merchants abroad, are reciprocally adjusted. The

number of complaints handled increased rapidly in consequence of unsettled conditions abroad, and the ratio of satisfactory adjustments has been high. When adjustments are effected, the consequences exceed the circumstances of the particular cases, since the parties generally resume friendly commercial relations.

FOREIGN SERVICE LIAISON

In July 1939 the Bureau organized a Foreign Service Liaison Division, which took over part of the personnel and records of the former Foreign Service Division, after the Bureau's Foreign Service had been transferred to the Department of State. The new Division facilitates the prompt transmission of information, received directly from Foreign Service officers or indirectly through the Department of State, to the appropriate officers and divisions of the Bureau; reviews and transmits requests originating in the Bureau, or with business interests in the United States, to the Department of State for forwarding to Foreign Service establishments; and carries on essential administrative activities relating to the Foreign Service.

The Chief of the Division is also the Liaison Officer for the Department of Commerce in the Department of State. In this capacity he has a separate office in the Department of State and devotes a large part of his time to conferring with State Department officials in connection with the commercial work of the Foreign Service and related questions of policy and personnel.

During 1939–40 the Division collaborated with the Department of State in revising the commercial sections of the new Foreign Service Regulations. New reporting schedules were drafted. A training period of 8 days in Commerce work for members of two different classes of the Foreign Service Officers Training School was planned and carried out during the year; this included lectures, interviews, and visits to the bureaus and technical units of the Department of Commerce. Arrangements were made for trade-conference itineraries, to the principal American industrial and commercial centers, on the part of various returning Foreign Service officers during the course of the year.

Records kept during the present calendar year, up to June 30, show that outgoing requests to the Foreign Service for information included, on an average, 311 letters per week and 12 cablegrams per week; while the weekly average for material received from the Foreign Service and the Department of State has been: Reports, 747; cablegrams, radiograms, and telegrams, 59; letters and form reports, 91; original trade letters for review and forwarding, 328; Trade Opportunities, 47.

TRADE AGREEMENTS UNIT

A consistent and important share in the achievements of the interdepartmental trade-agreements organization has been attributable to the Bureau's Trade Agreements Unit during 1939–40. This contribution by the Unit consisted primarily in the cooperative work of investigation, recommendation, and negotiation, in connection with: (*a*) the Venezuelan Agreement, concluded November 6, 1939, and the Supplementary Agreements with Cuba and Canada, concluded, respectively, on December 18 and December 30, 1939; (*b*) the persistent

and painstaking, though unsuccessful, effort at Buenos Aires and Montevideo late in 1939 to conclude agreements with Argentina and Uruguay; (*c*) the interrupted discussions with Belgium regarding a new agreement, and the continuing negotiations with Chile.

A second important activity consisted in the preparation of numerous statistical analyses and factual foreign-trade studies to determine whether there existed the basis for new, revised, or supplementary agreements, or to ascertain the effect of the war on the trade of countries with which agreements had been or might be concluded. As hostilities spread and became more intense, the field for new agreements became more limited, and the need for the exploratory studies grew less.

The Unit continued its preparation of statistical surveys of the import trade of "agreement countries" to determine the results of concessions obtained as indicated by relative and absolute import trends. Several of these studies had been started prior to July 1, 1939, but not until 1940 did they begin to appear. Studies for the following countries have already been released in 1940: Cuba, Belgium, Sweden, Brazil (January); Finland, France (February); Canada, Netherlands (March); Switzerland (April); Haiti and Colombia (June).

The Unit also issued on December 31, 1939, a detailed compilation of concessions obtained for United States exports, classified by commodity groups, in agreements concluded through 1939, except those with Canada and the United Kingdom, which were considered in a separate study prepared by the Department of State and this Unit. During the year numerous brief general surveys of agreement results were published as circulars or in Commerce Reports. Moreover, the Unit continued its policy of compiling cumulative tables of United States export trade with "agreement countries."

The Unit maintained its practice of keeping American businessmen informed regarding the program—directly and through the industrial divisions, the district offices, trade associations, and media established or approved by the interdepartmental trade-agreements organization. The preparation and distribution of educational material on the aims, operation, and results of the program involved a particularly heavy burden before and during the hearings before Congress on the Joint Resolution to extend for 3 years the Trade Agreements Act, which was approved by Congress and signed by the President on April 12, 1940.

For the present the regular work of the Unit is largely confined to what is known as "policing" existing agreements—that is, checking operation of agreements, studying the desirability and feasibility of making adjustments or revisions in them, and in general contributing this Department's share to the interdepartmental plan of maintenance.

BASIC-PROBLEMS SERVICE

Responding to the many demands that have arisen recently, the Bureau of Foreign and Domestic Commerce, through its Basic-Problems Service, has both deepened and expanded its surveys and appraisals.

STUDIES OF THE NATION'S INCOME

More widespread recognition of the fundamental importance of the studies of the Nation's income, and of the need for the broadening of the Bureau's work in this field, led to the establishment of a separate National Income Division during the fiscal year. Past studies of the Bureau had provided historical data and current estimates of the volume of the national income, the industrial source from which it was derived, and the distribution of types of payments, as well as data on income payments by geographic regions. Current monthly statistics on income payments supplemented these yearly reports.

To round out these studies and to give a more concrete meaning to national income, an analysis of the final product of the economy has been undertaken. The output of hundreds of commodities will be summarized and classified into 70 or 80 commodity groups, to provide businessmen with a behavior pattern useful for appraising results of operations. Expenditures on services as well as on commodities will be covered. Data will be broken down to show separately the changes in business inventories and the amounts that consumers spend for commodities and services. Special attention will be given to the output of items, such as machinery and new factory buildings, which are eventually added to the sum total of the national wealth and the production of which may be classified as capital formation. This part of the study will add considerably to our knowledge of output of the durable-goods industries.

MEASURES OF CHANGES IN CONSUMER CREDIT

The National Bureau of Economic Research and the Russell Sage Foundation completed and published a study of the volume of consumer installment credit and its characteristics over the period 1929 through 1938, and had urged upon the Bureau the importance of the extension of these data currently. Since this was in accord with its policy of providing more adequate current business data, the Bureau undertook to develop measures of monthly changes in consumer credit. These series are important for the analysis of cyclical fluctuations in business, as well as for the guidance of business management. This step was a natural extension of the work of the Marketing Research Division, which for a number of years has been conducting annual credit surveys and, more recently, has analyzed and reported annually upon the bad-debt experience of business concerns. Toward the close of the year, the first phase of this project was completed with the inauguration of current reporting on consumer-loan operations of industrial banking companies.

NEW AND UNFILLED ORDERS, SHIPMENTS, INVENTORIES

An outstanding contribution made during the year to the body of current economic data was the development of monthly series of manufacturers' new and unfilled orders, shipments, and inventories. This monthly industry survey was undertaken with the advice and approval of the Business Advisory Council. Prior to the launching of the industry survey, by the Division of Business

Review, comprehensive monthly data covering the value of inventories for manufacturing as a whole or its major segments were not available, nor had comprehensive current figures on the value of orders and shipments been compiled. Absence of such vital information constituted a handicap to the formulation of business policies which were dependent upon a correct appraisal of business trends.

To secure the required information a brief and simple schedule was devised, limited to four items readily available from the records ordinarily maintained by manufacturing concerns. At the end of the fiscal year the companies cooperating in the survey accounted for almost 40 percent of domestic manufacturing output.

TABULATIONS AND ANALYSES OF EXPORTS AND IMPORTS

Immediately upon the start of the European conflict and at the request of the State Department, arrangements were made to furnish to interested Government departments, through the Division of Foreign Trade Statistics, a daily tabulation of exports. Later this was changed to a 10-day summary. This permitted the issuance of a preliminary report to the press and the business public on the month's exports of leading commodities and principal countries by the 15th of the following month. These statistics provided valuable guidance during a period when the export trade—though expanding in total—was characterized by very marked shifts in both product composition and market destination. A number of special analyses of the export-import trade were completed, including one on Latin America and several on the areas which come directly under the cloud of war.

STUDIES FOR TEMPORARY NATIONAL ECONOMIC COMMITTEE

The studies undertaken for the Temporary National Economic Committee were either completed or in draft form by the end of the year. This body of information will make an important contribution to the factual and analytical material being made available to the public through the TNEC. The studies are too numerous for listing here, but several studies on the subject of concentration in the manufacturing industries, prepared by the Bureau's Special Research and Analysis Section, have assumed added importance by reason of the close study of our manufacturing set-up necessitated by the advancement of the national defense program.

One study, entitled "The Integration of Manufacturing Operations," is concerned with the analysis of the extent and significance of central-office operations, as measured by the number of establishments, wage earners, value of products, etc. The functional relations of establishments within central offices were classified and analyzed. In a second study, The Concentration of Production in Manufacturing, 1,807 census products were analyzed, and the concentration in the manufacture of these products was measured in terms of the proportion of the total value of each product accounted for by the largest four producers. The products were selected to give a cross-section picture of product concentration as it existed in 1937, and their economic characteristics were examined to determine the factors with which concentration was associated. A third study is entitled

"The Product Structures of Large Corporations." Production statistics for the 50 largest manufacturing corporations (selected on the basis of their value of products) were analyzed to determine the number of products manufactured, the proportion of the total United States value of each product accounted for by each company, and the contribution of each product to the total value of products of the individual companies.

FACTUAL AID FOR WHOLESALERS

The Bureau in past years published a number of case studies analyzing wholesalers' costs, and, while in each of these studies the procedure was carefully described, there was in no one place a consolidated statement of the various techniques with an appraisal of their value and practical use. Accordingly, Distribution Cost Accounting for Wholesaling was prepared and published. The study was based on methods that have a history of actual use, and it provides an analysis of distribution-cost-accounting technique and procedure useful to both accountants and business managers.

With the emphasis in recent years on chain-store operations, supermarkets, voluntary and cooperative chains, a study of the functions and processes of the wholesaler in the present distributive system was designed to aid in adjusting an existing organization set-up to changed conditions. Manuscripts of two reports were in an advanced stage at the end of the year. One study, Atlas of Wholesale Dry-Goods Trading Areas, follows the general pattern of the Atlas of Wholesale Grocery Trading Areas, published in 1938, and is designed to show graphically and statistically the various primary and secondary wholesale dry-goods trading areas. It will help the manufacturer or distributor who markets through wholesale dry-goods houses to appraise existing and alternative selling plans and territory coverage. The Dry Goods Atlas is considered representative of the wholesaling of shopping-goods lines, whereas the Grocery Atlas is representative of convenience goods. The other report in the wholesale field, Efficiencies in Grocery Wholesaling, is designed to be of immediate and practical use for all wholesalers of groceries, and of indirect use to wholesalers of other convenience-goods lines. The study, embracing field observations in about 100 wholesale grocery houses over the country, portrays the best methods found for performing certain of the regular functions of the wholesaler. It presents the experience of known successes in the various jobs for which the wholesaler is responsible.

BUSINESS MORTALITY

Still another report that promises to be substantially helpful is that completed for the TNEC on business mortality. This constitutes a study of the entrances, growth, mergers, and disappearances of business organizations. It draws on facts presented in all authoritative existing studies of this problem. Since many of the business failures of record might have been avoided under more favorable or more enlightened conditions at the time of entrance into the field, it is reasonable to assume that the facts underlying unsuccessful

enterprise should be stated and analyzed in order that they may contribute to the reduction of business mortality, with its regrettable and frequently avoidable cost to individuals and society.

HOUSING DATA

In the housing field, the Bureau issued a report presenting the results of all available vacancy surveys for the period 1928–40. Information of this type is of use primarily to local builders, material suppliers, and financing agencies, in assisting them to plan their activities to meet more closely the needs of the residential market. Information on vacancies provides a valuable guide to building operations and to general market conditions, as well as to the type of construction, in terms of price, location, and size, for which the greatest demand is likely to exist. This information has become of particular importance at the present time when the national defense program and its concomitant industrial expansion are resulting in immediate or potential pressure upon housing facilities in some areas.

A study of the relationship of labor productivity to low-cost housing was also completed for the TNEC during the year, with the purpose of drawing attention to one of the principal factors in the high price of current housing. By removal of the barriers to increased productivity, housing costs could be sharply reduced and the volume of construction much enlarged.

IMPROVEMENT IN ANALYTICAL CONTENT OF STUDIES

Diversion of additional Bureau resources to the study of current economic fluctuations has resulted in the preparation of more comprehensive and authoritative analyses for the guidance of Government officials and the business public. As the year was characterized by a major cyclical fluctuation, with new forces playing an important part in the swings that did occur, analysis of the underlying factors contributing to current business fluctuations has facilitated understanding of the character of such movements. One of the results of the Bureau's greater effort in this direction was the marked improvement in the analytical content of the monthly Survey of Current Business.

REPORT ON VOLUME OF DEBT

In the preliminary report on the volume of debt outstanding at the end of 1939, the results of a thoroughgoing revision and clarification of the fundamental concepts of the measurement of debt were presented by the Bureau. The new estimates are more comprehensive than those previously compiled, covering short-term as well as long-term obligations and including the debts of several classes of debtors not formerly covered. In addition, the new study differentiates consistently between gross debt and net debt.

EFFORTS TO REMOVE IMPEDIMENTS TO FLOW OF INTERSTATE COMMERCE

The Bureau has long taken an active interest in the removal of impediments to the free flow of commerce over State lines within the United States. An Interdepartmental Committee on Interstate

Trade Barriers has been established to (*a*) serve as a clearing house for information on research and new developments in the trade-barrier field; (*b*) promote, implement, and coordinate present and future research; (*c*) act as liaison between the various agencies of the Federal Government and the State governments through the Council of State Governments; (*d*) undertake any further activities in this field deemed practical; and (*e*) in general, work against unsound trade practices. The chairman of the committee is devoting his full time in the Bureau to the fostering of cooperative efforts among the States to remove these troublesome and damaging obstructions to commerce. A report on the general problem of interstate trade barriers has been prepared for submission to the TNEC.

COMMERCIAL INTELLIGENCE

The Bureau's clinical analysis of "what happens to official 'trade leads' from abroad" was continued during the past fiscal year and led to further constructive suggestions and improvement.

There was an increase of exactly 1,000 so-called Trade Opportunities over the 6,760 received in the previous fiscal year. The actual results of publicizing these Trade Opportunities showed considerably less than the 14 percent effectiveness established from the review conducted in the previous year—with even more numerous causes for the failure of negotiations, chiefly causes arising from adverse economic conditions and increased complications resulting from the world situation. Accordingly, steps were taken to improve the Trade Opportunity service, to provide better quality and faster dissemination so that American foreign traders may have more specific information than heretofore.

Depreciation of Trade List values resulting from mechanical routine and trading complications led to the reduction in the number of titles which the Bureau purposes to maintain on a more accurate and timely basis. The number of titles on January 1, 1940, was 8,854; this number has been reduced by some 3,000, and those for which there is only intermittent demand are made specially to fit the needs of energetic exporters and importers; 1,299 regular Trade Lists were revised, and these current lists have been added to the stock of those now more than 1 year old, forming a reservoir from which American foreign traders may obtain, promptly, pertinent information on foreign buyers and sellers.

The demand for World Trade Directory Reports has continued with slight abatement, but as a result of procedural changes, determined after careful study, these reports are now furnished on a much more prompt basis. The Foreign Service Regulations were redrafted for the purpose of eliminating automatic revision in the field of reports previously submitted, leaving Foreign Service officers free to improve the quality of called-for reports. During the year, 43,172 of these reports were requested, with the number of requests declining progressively in line with the spread of the war throughout Europe.

The new Foreign Service Regulations also provide for personal canvass of prospective buyers or distributors by the American Foreign Service officer. They require that officer to recommend to the Bureau

of Foreign and Domestic Commerce the names of responsible firms which express an active interest in handling American commodities.

Despite the fact that 207,710 reserved-information slips on Trade Opportunities were distributed by the Bureau, the continued analysis showed that the service rendered to foreign traders was not commensurate with the time and expense involved. This Trade Opportunity service has been subject to considerable abuse, and the new procedures have made it possible for bona fide foreign traders to receive carefully selected information on which they could act more promptly and obtain a larger return for the amount of time and money spent in "following through."

Five hundred and five foreign businessmen coming to this country were provided with introductions to our district offices, whose executives introduced them to American traders and facilitated their business negotiations.

The Bureau has continued to expand its policy of rendering service to the smaller business units that are not in a position to carry on extensive research of their own. Results of studies, both governmental and nongovernmental, have been digested in the Bureau and made available for reference purposes in more than 700 files throughout the United States, in chambers of commerce, trade associations, public and university libraries. Additional assistance has been rendered directly through the answering of more than 10,279 individual inquiries upon specific business problems and the expansion of requested features in the trimonthly publication, Domestic Commerce. Another vehicle for acquainting businessmen, both large and small, with the availability of recent reports is the Domestic Commerce News Letter, issued by each of the Bureau's field offices for the benefit of the contacts within their territories.

DISTRICT-OFFICE SERVICE

The Bureau has opened two new District Offices—in San Juan, P. R., and Honolulu, T. H.—to provide territorial citizens with Bureau services and to acquaint the Bureau with economic problems in the territories.

Immediately after the outbreak of the war in Europe the Bureau inaugurated a nightly airmail service to all its District Offices, to provide businessmen with up-to-the-minute data on commercial developments resulting from the hostilities. This service proved invaluable. At the close of each day every Bureau Division sent to the District Office Division a résumé of the day's developments, and these résumés were dispatched immediately to District Offices, which in turn notified the business interests in their respective districts. This service is known to have lessened very greatly the shock experienced by our foreign trade in consequence of the conflict.

Last fall there was an immediate attempt on the part of hundreds of established exporters, as well as relatively inexperienced firms, to take advantage of the opening up of certain important foreign markets as a result of the withdrawal of European trade connections. The Bureau, through its District Offices, was in a position to supply much vital information and at the same time to caution new foreign

traders against entering foreign markets before acquainting themselves thoroughly with the many restrictions and pitfalls that were likely to be encountered.

The Bureau undertook a careful study and analysis of its entire field set-up, to determine how it can provide maximum service to business under rapidly changing world conditions. Plans were formulated to strengthen those offices located in the 12 Federal Reserve cities where reporting on domestic commerce may be effected most readily. With the constant dislocations and reduction in foreign markets, it was immediately apparent that the Bureau could advantageously direct a greater proportion of its efforts to the fostering of domestic business without impairing in any respect the essential services to exporters.

In relation to the industrial-mobilization program and the other defense preparations of the Nation, the Bureau's District Offices have been called upon in a great number of cases to furnish information and data at their command.

COORDINATING RESEARCH ACTIVITIES OF BUREAU AND UNIVERSITIES

The Bureau of Foreign and Domestic Commerce now has under way a closely integrated plan for coordinating its own research activities with those of the business schools of the Nation. During the year just ended, this program has crystallized into more nearly definite form. Between November and May, a Bureau official visited 72 universities and colleges in 47 different States. Conferences were held with university presidents, deans of schools of business administration, directors of business-research bureaus where such existed, faculty members, graduate students, and business leaders of the community. Numerous talks at each university enabled more than 5,000 persons to learn at first hand about the program which, as now being drafted, includes these points:

1. A clearing house that collects reports on business research in progress at the various universities and by Government agencies and issues releases showing just what studies are being conducted throughout the Nation, so that the Government and the universities will be thoroughly informed about what is being done and who is doing it.

2. The provision of cooperative arrangements whereby the research facilities of the Department of Commerce are made available to the universities and vice versa. Several specific cooperative projects on State income have been initiated, and other similar projects are under consideration. Particularly important are contemplated studies of new industrial possibilities that will reduce unemployment.

3. The reduction or elimination of duplication of effort, to permit greater economic efficiency in business research.

4. The encouragement of decentralization of research, so that regional and local research may be done more effectively by local men or women familiar with local conditions and enjoying the confidence of the local community.

5. Emphasis upon the needs of small business, which is usually unable to afford a research program of its own. Specific studies of the problems of independent retailers, leading to more efficient business methods, are typical of the help that can be afforded to small businessmen. By calling on or writing to the various university research stations, or the field offices of the Bureau, the small businessman will be able to present his problem and discuss it with an expert who is familiar with up-to-date business practices.

The Bureau has in mind the establishment of a limited number of Bureau-University cooperative business-research stations to be located at universities in or near Federal Reserve cities where the Department of Commerce has field offices.

APPROPRIATIONS

Salaries and expenses, Washington Commerce Service	$555,000
Domestic Commerce, Department of Commerce	330,000
Export industries, Department of Commerce	540,000
Salaries and expenses, Foreign Commerce Service	19,200
District and Cooperative Office Service, Department of Commerce	350,000
Customs statistics, Department of Commerce	403,000
Total	2,197,200

PERSONNEL

Type of employment	Employees on roll June 30, 1940		
	District of Columbia	Field	Total
Permanent	584	276	860
Temporary	5	2	7
Total	589	278	867

BUREAU OF THE CENSUS

INTRODUCTION

More than ever before the 1940 census has been a cooperative enterprise on a Nation-wide scale. In a very real sense the decennial census of the United States is a national undertaking, the Bureau of the Census being but the instrumentality for the census. Conferences, voluminous correspondence, and in some cases public trial, determined the questions to be asked and the tabulations to be made. Through the cooperation of newspapers, radio stations, motion pictures, trade associations, local citizens' committees, and other groups too numerous to mention, the Nation was informed about its census. And the Nation responded with a good will to give reports for more than 131,000,000 individuals, 36,000,000 dwelling units, 6,000,000 farms, 3,000,000 places of business, 180,000 factories, and 30,000 mines and oil wells.

Every census has four distinct phases: (1) Planning and preparation, (2) enumeration, (3) compilation of the data, and (4) analysis of the data and preparation of final reports. For most of the decennial census subjects only the first two phases have been completed during the past fiscal year, the first of the 3 years of the decennial census period. The planning and preparation for censuses of all types is a continuous function of the Bureau. Preparations for the 1940 census were commenced in a small way as soon as the 1930 census was completed. A lack of staff and funds during the intercensal period resulted in a heavy burden of preparatory work during the 9 months just before enumeration began. However, scheduled dates were met and on January 2, 1940, the enumeration of the censuses of business, manufactures, and mines was under way. On April 2 the enumeration of the censuses of population, agriculture, and housing began. Details of the preparatory work and enumeration of each of these censuses are given below.

Although the Bureau's activities during the past year were mainly concerned with the decennial census, its continuing activities were not slighted. Particular attention was given to means of increasing the usefulness of census published reports both as to content and timeliness without sacrificing completeness and accuracy. During previous decennial censuses the Bureau found it necessary to stop entirely certain phases of its regular work. By better planning and by recruiting and training an adequate staff it has been possible to maintain currently every regular service of the Bureau during the past year.

Space adequate for the 9,000 employees required for the decennial census and other Bureau work at the peak during 1940 and 1941 was a pressing problem. In March 1940, the three largest divisions

of the Bureau concerned with the decennial census, population, agriculture, and mechanical tabulation, were moved into the new Census Building just completed. Although this modern building provides 396,000 square feet of space, the Bureau has had to rent additional space outside the Commerce Building for certain of its functions, and will utilize the new building for a double shift during the peak of the decennial census work.

CENSUS ADVISORY COMMITTEE

To keep abreast with recent advances and changes in the social and economic fields of its inquiries, the Bureau requires the advice of nongovernmental statistical experts. For this purpose a general advisory committee is appointed by the American Statistical Association to advise the Director of the Census. The Committee held four meetings during the past year at which time plans for the 1940 census were carefully reviewed and various suggestions were presented to the Director.

The membership of the General Census Advisory Committee is as follows:

ROBERT E. CHADDOCK, Columbia University, New York City, chairman.
MURRAY R. BENEDICT, College of Agriculture, University of California, Berkeley, Calif.
PAUL T. CHERINGTON, New York City.
J. FREDERIC DEWHURST, Twentieth Century Fund, New York City.
WILLIAM F. OGBURN, University of Chicago, Chicago, Ill.
WILLARD L. THORP, Dun & Bradstreet, Inc., New York City.

In addition to the Census Advisory Committee, several special advisory committees have been appointed by the Secretary of Commerce and the Director of the Census. These committees are composed of experts in specific fields and advise the various divisions of the Bureau on their problems and subject matter. The recommendations of the special committees are considered by the Census Advisory Committee. The members of these various committees are listed in the sections of this report relating to their specific subjects.

SIXTEENTH DECENNIAL CENSUS WORK

The preparatory work for the Sixteenth Decennial Census required the preparation of schedules and instructions, the planning of a complete field lay-out and procedures, the recruitment of an army of field and office workers, many of them with special technical qualifications, the training of these workers, and a complete program of public education.

PREPARATION OF SCHEDULES AND INSTRUCTIONS

The preparation of schedules for the various censuses which together comprise the Sixteenth Decennial Census, was a distinctly cooperative procedure. Experts from the Bureau met in numerous conferences with groups representing the governmental, business, and specialized interest groups as well as with individual experts and special advisory committees in drafting schedules and instructions.

It is estimated that more than a thousand persons were consulted directly, and several thousand contributed their ideas to group representatives who came to Washington to present their recommendations. Major departments and agencies of the Federal Government appointed liaison officials for clearance of their interests. Schedules went through numerous widely discussed drafts before going to the Central Statistical Board, to the Census Advisory Committee, to the Director of the Census, and finally to the Secretary of Commerce for approval.

Field enumeration plans.—The complete canvass of all the population, farms, factories, stores, and mines of the United States (and for most of these subjects, also the Territories and possessions) requires extremely detailed planning for every city, county, and State.

The United States was divided into approximately 154,000 enumeration districts each of which was a civil division, or part of such a unit, for instance a rural township, an unincorporated village, a ward, etc. Some of these units comprised special population concentrations such as army posts, institutions, large apartment buildings, etc. Each of these was described in detail, and mapped with the latest boundaries. Approximately 175,000 maps were prepared for the enumeration.

The names and addresses of all business establishments, mines, and factories listed in business directories, or reported in a recent census, were transcribed on cards and sorted by location to insure complete coverage in the business and industrial censuses.

To administer the census field activities, the United States, including its Territories and possessions, was divided into 3 regions. Each region was administered by an Assistant to the Chief of the Field Division with headquarters in Washington. The 3 regions were divided into 105 areas, each area in charge of an area manager who had been trained in Washington.

The areas in turn were divided into districts, each district in charge of a supervisor. There were 532 of these districts in the United States. Each supervisor's district was divided into enumeration districts, the smallest field unit for census administration and the territory normally canvassed by 1 enumerator.

This field organization whereby the United States was divided into regions, areas, and districts was an innovation of the 1940 census and provided a better control and quicker action on field problems than was possible under the field organization of previous censuses.

Squad leaders were appointed in cities of 50,000 or more population in the ratio of about 1 to every 10 or 20 enumerators. At the peak of field activity there were 2,464 squad leaders and 101,916 enumerators employed on the enumeration of the censuses of population, housing, and agriculture.

Area offices were opened about November 20, 1939, and district offices about December 4. For the censuses of business, manufactures, mines, and irrigation 6,396 enumerators, 127 squad leaders, and 1,628 clerks were appointed beginning in December, and in most areas began their canvass on January 2, 1940.

Employee recruiting and training.—Nearly 130,000 persons will work in the field or in the Bureau's Washington office on some phase

of the Sixteenth Decennial Census. Emphasis has been given both to the recruitment and the training of this army of temporary employees.

During September, October, and November 1939, 180 candidates for the position of area manager were given an 8 weeks' training course in Washington. These classes were taught by census experts in their specific fields, and included instruction in administrative and personnel procedures, as well as in schedule forms and instructions. Objective tests on each census subject were given and the grades on these tests were correlated with the grades made on general intelligence tests, and together these grades formed part of the basis for the hiring and placement of these workers.

During December each area manager held a 1 week training program for his district supervisors using detailed training instructions prepared in the Washington office. The district supervisors in turn held from 1- to 4-day training classes for the census enumerators just prior to the beginning of their work. Again, objective tests were prepared for the selection and placement of enumerators.

Periodic correspondence instruction was given to the area and district supervisors from January through March. Regional training classes were held in nine cities for special instructions on population, agriculture, and housing during February and March.

Sound motion pictures were made in Washington and distributed to district supervisors to assist them in training enumerators. This visual method of training was an innovation of the Sixteenth Decennial Census and was perhaps the largest visual training program ever given in so short a period. Instruction manuals, illustrative examples of completed schedules, and objective tests were prepared to assist the district supervisor in the training of enumerators.

An intensive program is being conducted for temporary office employees to train them in editing, coding, and machine tabulation.

CENSUS PUBLICITY

A Division of Public Relations was organized in August 1939 under specific authority of Congress to plan and execute an educational campaign for enlisting Nation-wide cooperation in the decennial census.

Operating through various media of public expression—newspapers and periodicals, radio, motion pictures, local committee organizations, public officials, and the Bureau's field force—an intensive campaign was conducted in advance of and during the enumeration. More than 2,000 cooperating local committees sponsored by chambers of commerce and State, county, and municipal officials assisted this program in their localities.

School officials, church leaders, civic groups, and fraternal organizations throughout the country also gave their assistance toward insuring the completeness of the census. Valuable contributions in services were received from county farm agents, home demonstration agents, and other leaders in the rural sections of the country. Other agencies of the Federal Government also cooperated in passing the word along through their local offices everywhere. The 40,000 postmasters throughout the Nation gave space on lobby bulletin boards to posters and other expressions of census information.

Editors of more than 10,000 daily and weekly newspapers, and of more than 1,600 general magazines, business and professional periodicals, agricultural publications, and organs of trade associations and commercial organizations also cooperated in giving space to explanatory articles about the census as well as editorials urging the fullest cooperation on the part of their readers.

The Office of Education contributed much to the success of the radio program as did, of course, the various radio broadcasting chains, commercial program sponsors, and hundreds of individual radio stations. Similarly, the cooperation given by national news-reel companies and by several thousand individual motion picture theater operators is to be credited as a contribution of major importance.

Other agencies and groups, too numerous to detail in consideration of space limitations, contributed also—as, for instance, news services and press associations, Washington newspaper representatives, free-lance writers, volunteer speakers, library officials, heads of individual business organizations, and so on. The Bureau also had the benefit of consultative service by technical experts on the various media of publicity.

CENSUS OF POPULATION

The population schedule for the 1940 census was designed to provide factual information on important national problems. The inquiries, in addition to calling for the standard information such as age, color, marital status, and other personal characteristics of the population, embodied a comprehensive series of questions on employment, unemployment, internal migration, income, and formal education attainment.

The population schedule for the first time included a series of questions asked of a representative cross section of the population. These questions, obtained from a sample of the population, were aimed at obtaining data which would supplement the complete enumeration for purposes of broad national policy and administration or for the continuation of earlier census statistical series which are no longer required on a small area basis. Through the introduction into census procedure of this representative cross section method of collecting data, information was obtained relating to social security coverage, veterans and their dependents, differential fertility, occupational shifts, nativity of parents, and mother tongue of the population. Through the introduction of this sampling procedure much pertinent data can be secured at a saving of money, time, and effort.

Special provision was made for the enumeration of transients throughout the country. As the census enumeration is carried on over a period of several weeks, transients may be missed by the enumerator if they move during the enumeration period. In order to avoid this contingency, April 8 was set aside as the day when the usual places of residence of transients in all cities would be visited by enumerators. Special blanks were used to improve the enumeration of W. P. A., C. C. C., and N. Y. A. workers. Absent family schedules and nonresident schedules were used more extensively than in previous censuses, and were mailed directly to Washington for allocation to the proper enumeration districts. A card for new occupants was left in all vacant dwelling units to insure the enu-

meration of persons moving during the census period. The use of these supplemental forms was aimed directly at securing a more complete count of transient population than in previous censuses. It has been necessary to check these various forms against the names on the population schedules to avoid duplicate enumeration. It is evident that a good enumeration of transients has been secured.

To assist in the preparation of the schedules and plans for tabulation of the population data a technical standing committee was appointed to serve in an advisory capacity. The members of this committee were:

FREDERICK F. STEPHAN, American Statistical Association, chairman.
O. E. BAKER, United States Department of Agriculture.
FRANK LORIMER, American University.
P. K. WHELPTON, Central Statistical Board.
HOWARD B. MYERS, Work Projects Administration.

The Committee on Occupational Classification, composed of statisticians on occupations and special representatives of several other Government agencies, who had been engaged during the year on the preparation of a standard classification of occupations, has completed its task. This classification system, adopted by other major Federal agencies, was also adopted for the population census in order to promote uniform national and local occupational statistics.

At the close of the year work was in progress on the various operations incidental to the preparation of the population schedules for punch cards.

Trial census.—A special census of St. Joseph and Marshall Counties, Ind., was authorized by the Secretary of Commerce to be taken as of August 14, 1939. This census, a preview of the decennial census of population, proved to be very helpful in providing a testing ground for the schedules, auxiliary forms, instructions, and procedures planned for the decennial census and indicated some necessary changes in the schedules and procedures. Two innovations of the trial census were the use of objective tests as a means of testing and selecting the enumerators after a period of census training and the employment of squad leaders as supervisors of from 10 to 20 enumerators. Both of these innovations were adopted for the Sixteenth Decennial Census.

This trial census also provided real data for training office employees before the population schedules from the regular census were received. Preliminary editing and coding instructions, card forms, tabulations, and even table forms for the final census reports for 1940 were developed well in advance of any previous census on the basis of this substantial "census prevue."

CENSUS OF HOUSING

A census of housing was added to the subjects to be taken in the decennial census by an act approved August 11, 1939. This act provided that the census of housing should give information concerning the number, characteristics (including utilities and equipment), and geographical distribution of dwelling structures and dwelling units in the United States, Hawaii, Puerto Rico, the Virgin Islands, and Alaska, and gave the Director of the Census authority to collect such supplemental statistics as might be necessary for the compilation thereof. The act authorized the expenditure of not to exceed $8,000,000 to cover the cost of such a census.

The housing census was the first comprehensive census of dwelling units and housing facilities ever taken for the country as a whole. The decennial census of population has usually included a count of the number of occupied dwelling units of families tenure, and in 1930 they reported the value or monthly rental of each unit.

The housing data were collected on an occupied and a vacant dwelling schedule containing inquiries relating to characteristics of the structure, housing facilities, and financial and mortgage data for each owner-occupied nonfarm dwelling unit. For this purpose multiunit, precoded, check-block schedules were used.

Because the housing census was a new field for the Bureau, more planning of the schedules was required than for the other censuses. For this purpose a special housing committee was appointed composed of the following members:

WARREN J. VINTON, United States Housing Authority, chairman.
Miss SHIRLEY K. HART, Federal Housing Administration.
CORWIN A. FERGUS, Federal Home Loan Bank Board.
P. J. WOOFTER, Farm Security Administration.
Miss ARYNESS JOY, Department of Labor.
SAMUEL J. DENNIS, Bureau of Foreign and Domestic Commerce.
CALVERT L. DEDRICK, Bureau of the Census.
LEON E. TRUESDELL, Bureau of the Census.

The additional work of taking the housing census appreciably delayed the enumerators who were also engaged in the censuses of population and agriculture. The enumeration districts laid out for population and agriculture were found to be too large to be canvassed by one enumerator when housing schedules were also enumerated. This problem was met in part by splitting enumeration districts in the field and in part by unavoidably extending the period for completion of a district.

CENSUS OF AGRICULTURE

The final schedule for the census of agriculture followed closely the pattern of the schedule developed for the trial census of agriculture which was made in selected counties in 1938. The results of the trial census indicated which new questions were practicable. An important improvement as compared with the census of 1930 was the adoption of regionalized schedules which were first used in the trial census. Nine agricultural regions were used. The master schedule for the United States consisted of 232 major questions which were reduced to about 180 actually required for any specific region. This regionalization of schedules, however, affected only the reverse, or crop portion of the schedule, the front, or general farm data portion was the same for all regions.

A special advisory committee for agriculture passed upon all aspects of the schedule, thoroughly reviewing hundreds of requests for additions to the schedule, and the results of the trial census. This committee comprised the following members:

S. H. DEVALUT, American Farm Economic Association, chairman.
W. F. CALLANDER, Department of Agriculture.
N. R. OGG, American Farm Bureau Federation.
FRED BRENCHMAN, The National Grange.
HAROLD F. E. JENNET, Agricultural Publishers Association.
H. G. KEENEY, Farmers Educational and Cooperative Union of America.
OLE A. NEGAARD, Central Statistical Board.

Important innovations are being made in the mechanical tabulations of this census. An 80-column card is being used instead of a 45-column card, thus making possible a much greater number of cross tabulations, eliminating numerous count sheets and saving nearly 100,000,000 cards. By the use of a collator machine 18 of the principal sources of errors in the compilation of agricultural statistics are automatically checked in one run. These mechanical improvements are expected to improve the accuracy of results and effect a major saving in clerk hire.

By June 30, 598,000 schedules were edited and sent to the tabulating division, a record well ahead of that for 1930.

CENSUS OF MANUFACTURES, 1939

Manufacturing activities in this country have been charted by censuses for the past 130 years, the first census covering the year 1809. Since 1921 this census has been taken biennially. The 1939 census of manufactures was taken in conjunction with the census of business and the census of mines, with enumeration beginning on January 2, 1940. Unlike the usual biennial census which is taken largely by a mail canvass, the 1939 census involved a complete canvass by enumerators.

One general schedule, one administrative office schedule, and 147 special industry schedules were used in the collection of data. The special schedules differ from the general schedule primarily in the detail required as to products made and work done during the year. All of the schedules were developed through extensive conferences with representatives of the industry concerned, and with governmental and private users of these data.

For the first time an effort was made to cover all persons connected with the establishment who receive pay during normal pay-roll period. This complete employment report will indicate the number of proprietors or firm members, the number of salaried officials of the corporation, the number of employees engaged in manufacturing, those engaged in distribution or construction activities, and those employees doing other types of work. Inquiries concerning the legal forms of organization and the power equipment used by the plant are also included. An inquiry on inventories at the beginning and end of 1939 showing finished products separate from materials, supplies, and work in progress was included.

The reports for 75 industries which are of special interest for national defense have been given special attention. The schedules for these industries are posted as rapidly as they are received so that an immediate report can be given at any time.

CENSUS OF MINES

The 1930 census of mines marks 100 years of Census effort to gather data in the field of mining.

The present schedules contain all the essential features of past census schedules and also new inquiries to secure information on production as well as value of products, fixed capital outlays, details of employment, loading machines, and more detailed data on the value of

services performed by service corporations either under contract or on a fee basis.

In order that the results of this census might adequately interpret the developments in the major branches of mining, special schedules were developed for canvassing each of these branches. These schedules were drafted with the assistance and cooperation of business interests and governmental agencies.

The method of collecting information was adapted to the characteristics of the individual mining industries, that is, some industries were enumerated by regular census enumerators while others were conducted by a mail canvass. The census of the bituminous coal industry was conducted through a cooperative agreement between the Bituminous Coal Division of the Interior Department and the Bureau of the Census to promote economy and efficiency in collecting statistics.

The actual task of conducting the census was begun on January 2, and by the end of the fiscal year the work of collection was approximately 75 percent complete. Special attention is being given to the early preparation of preliminary reports of minerals defined as strategic and essential by the Army and Navy Munitions Board, and such preliminary compilations were under way at the end of the fiscal year.

CENSUS OF BUSINESS

The census of business for 1939 is the fourth national inquiry of this character. Decennially, its antecedent was the Census of Distribution for 1929, which was the first national census of retail and wholesale trade, contract construction, and hotels. Because of rapidly changing business conditions during the decade, emergency funds were provided for similar censuses in 1933 and 1935. These special censuses were of very great value to industry, business, and Government in charting the effects of depression and recovery during the decade.

The 1939 Census of Business includes the following major subjects: Retail trade, wholesale trade, service businesses, places of amusement, hotels, contract construction, and sales finance companies. Schedules for power laundries and dry cleaning previously collected with the census of manufactures were also included with the business census.

The 14 schedules used in the census of business were developed in conference with many businessmen and representative trade associations, research groups, and governmental agencies. Copies of the proposed schedule forms were circulated and the Bureau received many valuable suggestions and a widespread voluntary response pledging cooperation in giving detailed data.

Data on sales finance companies were gathered for the first time. New emphasis was given to questions concerning employment and pay roll by classes of employees, to data on accounts and notes receivable at the beginning as well as at the end of the year (for retail trade), stocks of merchandise on hand as of the beginning and end of the year, and the separate reporting of sales taxes collected by wholesalers and retailers and paid direct to taxing agencies.

By June 30, 1940, 2,902,505 schedules had been received, of which 2,735,446 were edited and coded. The compilation of this census is proceeding more rapidly than in previous inquiries of this character.

CENSUS OF TERRITORIES AND INSULAR POSSESSIONS

The Sixteenth Decennial Census includes a canvass of the population of all Territories and outlying possessions of the United States. A census of agriculture was taken for all areas except the Panama Canal Zone, in which the census was restricted to population. Schedules for manufactures and business were canvassed in Alaska, Hawaii, and Puerto Rico, and inquiries on housing were included for Hawaii, Puerto Rico, and the Virgin Islands. The schedules used in the enumeration of the Territories and possessions were adapted to the special conditions of each area, but were based on the schedules used in continental United States. In most instances the schedules included fewer items, particularly the specialized censuses of agriculture, manufactures, and business, but an attempt was made to maintain comparability with data secured for the United States. The schedules and instructions for Puerto Rico were printed in Spanish to assure the more accurate collection of data by local enumerators.

Field work in Territories and outlying possessions which started with the enumeration of Alaska in October 1939, was almost completed at the close of the fiscal year and four preliminary reports were issued.

INFANT ENUMERATION

An infant card was included as one of the schedules of the Sixteenth Decennial Census. The purpose of this special enumeration was to test the completeness of birth registration and infant enumeration. An infant card had been included in the trial census in St. Joseph and Marshall Counties, Ind. This census had demonstrated that infant enumeration was a practical approach to this problem. This enumeration entailed the filling out by the census enumerator of the special infant card for each infant born in December 1939, January, February, and March, 1940. Transcripts of the birth certificates for infants born during these same months are available in the Bureau from birth records previously collected throughout the United States. By matching the infant card and the birth certificate, data will be obtained for a study of the completeness of birth registration and of infant enumeration. The unmatched records become a problem to be solved by field investigation to ascertain the causes for underenumeration or nonregistration.

DECENNIAL CENSUS TABULATION

The preparatory work for machine tabulation of the decennial census during the fiscal year consisted of checking all schedule forms from which statistics will be compiled by the punch card system, participating in the preparation of tabulation outlines and result slips, and preparing punch cards and procedures for processing the various operations of machine tabulation.

It is estimated that 1,221,250 tabulation sheets in 191 different forms and approximately 500,000,000 punch cards in 151 different forms will be required for the decennial census.

Actual production on decennial census work began on March 22, with the census of business. Before the end of the fiscal year ma-

chine tabulation was also in progress on the censuses of population, manufactures, agriculture, and territorial and insular possessions.

It is estimated that the following machines will be used for decennial census work; 907 manual key punch machines, 503 duplicating key punch machines, 12 alphabetic printing punch machines, 1 automatic multiplying punch machine, 11 alphabetic gang punch summary punch machines, 900 verifying machines, 92 sorting machines, 23 automatic comparing reproducers, 69 accounting machines, and 46 unit tabulating machines.

NONDECENNIAL CENSUS WORK

POPULATION

Special studies.—The analysis of data on the population of Canadian origin has not been entirely completed due to the decennial census work. The material on population of Canadian origin in the United States is to form part of a report which is being prepared as a joint project with the Dominion Bureau of Statistics.

The special report giving "Comparative Occupation Statistics, 1870 to 1930" has been completed with the exception of a small amount of textual revision.

The "Index of Data Tabulated from the 1930 Census of Population" was completed and distributed to a selected mailing list.

Population estimate.—Considerable work was done on the preparation or revision of intercensal population estimates for July 1 of each year from 1900–1939. New material for making these estimates was collected, and experimental computations were made.

In order to provide a better base for making post-censal estimates for States and cities in the following decade, data on immigration and emigration are being assembled for the years 1900 to 1930 and negotiations are now in progress with the Office of Education with regard to suggested changes in the schedule of data on school enrollment and school censuses collected in the Biennial Survey of Education.

At the request of the Interdepartmental Committee on Puerto Rico, estimates were prepared on the future trend of the size and age composition of the population of Puerto Rico.

Institutional population.—The collection of data on mental patients has been materially extended. The 1939 schedules were amplified by the insertion of special tabulations calling for age distributions, resident-patient population counts, clinical diagnoses, and individual data of patients who died in these institutions.

The work in criminal and judicial statistics has been progressing along three general lines of effort. The first of these involving the establishment of a prisoner register to serve as a current inventory of the prison population is an important step and a major advance in prison statistics. Secondly, the continuation of collection and publication of judicial and criminal statistics, and thirdly, a special sampling study for prisoners in the jails of the District of Columbia, Baltimore, and Philadelphia County.

Metropolitan districts.—The special committee on Metropolitan Districts completed its work during the year and made a report to

the Bureau. These recommendations are now being studied and will be compared with the 1940 census data before the metropolitan districts are finally determined. The members of this committee are as follows:

PAUL T. CHERRINGTON, chairman, representing market and advertising interests.
F. W. HOWARD, representing manufacturers and chambers of commerce.
GLENN E. MCLAUGHLIN, representing other statistical groups.

VITAL STATISTICS

The collection of vital statistics data has been expanded during the year in the field of accident, criminal and judicial, institutional, and marriage and divorce statistics. The integration of this new work with the birth and death statistics will permit a more complete analysis of the influence and trends in the makeup of the population and also provide social agencies with better statistical guidance.

Special advisory committee.—The Advisory Committee on Vital Statistics held one meeting during the year in February. The committee was particularly concerned with the reestablishment of annual marriage and divorce statistics, and urged the creation of marriage and divorce registration areas of the same general type as the birth and death registration areas. The membership of this committee is as follows:

LOWELL J. REED, Johns Hopkins University, Baltimore, Md., chairman.
HAVEN EMERSON, Columbia University, New York City.
LOUIS I. DUBLIN, Metropolitan Life Insurance Co., New York City.
ROBERT E. CHADDOCK, Columbia University, New York City.
ROBERT OLESON, United States Public Health Service, Washington, D. C.
W. A. DAVIS, State Registrar of Vital Statistics, Austin, Tex.
J. V. DEPORTE, director, Division of Vital Statistics, Albany, N. Y.
A. J. CHESLEY, State Department of Health, St. Paul, Minn.
ISADORE FALK, Social Security Board, Washington, D. C.

Uniform vital statistics law.—The vital statistics model law was presented to the Commission on Uniform State Laws at their annual convention in July 1939. Committee work on this law has proceeded throughout the year and at the present time has been approved by the committee preparatory to action by the Commission in the fall of 1940.

Standard certificates.—Standard certificates of birth, death, and stillbirth which were recommended to the States during 1939 and 1940 have been adopted with minor modifications by most States. At the end of the fiscal year, 41 States had adopted the standard death certificate, 35 States the standard birth certificate, and 17 States the standard stillbirth certificate. In addition, 36 States have agreed to include on the birth certificate the special questions requested by the Children's Bureau of the Department of Labor.

Revision of the International List of Causes of Death.—The editing of the manual containing the fifth revision has taken a consider-

able amount of time and effort throughout the year. The fourth revision of the Joint Cause of Death Manual and the fifth revision of the International List of Causes of Death have been incorporated into a single volume which is now in the hands of the printer.

Hospital and institutional statistics.—More than 18,000 institutions were queried to obtain special data on deaths in institutions. For this purpose detailed questionnaires were sent to hospitals, convalescent homes, nursing homes, orphanages, old-age homes, almshouses, and penal institutions. The preliminary returns of this questionnaire indicate that an unusually complete coverage has been achieved.

This study will not only reveal in statistical tabulations the hospitals and medical facilities available in communities throughout the country, but will also result in the compilation of an active address file of these institutions.

Marriage and divorce statistics.—Plans for the creation of marriage and divorce registration areas for the collection of marriage and divorce data during the decennial census period were drafted and announced during the year. Much basic work has been done to obtain information so as to ascertain the accuracy and completeness of the marriage and divorce data now existing in the country. Hitherto, reports issued by the Bureau have been concerned primarily with the number of marriages by county of marriage, and thus much valuable information relating to population and fertility has never before been available.

The marriage registration area has been started with about half of the States participating. However, it will not be possible to include in the divorce registration area more than three or four States because of the inadequateness of the records which have been collected by local official agencies. It is anticipated that for the first time marriage and divorce statistics, tabulated from individual schedules of marriage and divorce, will be available at least for certain States.

Accident statistics.—A special report series was inaugurated during the year, one of which, the "Motor Vehicle Accident Fatalities" will release accident data by States for the year 1939. Special tabulations have been made to secure all of the facts on accidents from the death certificates at an earlier date than has hitherto been possible and in addition considerable experimental effort has been directed toward the collection of supplementary schedules on fatal accidents.

Field activities.—A number of field projects in vital statistics were conducted during the year. Birth registration compaigns were carried out in South Carolina, New Mexico, and Arizona which were directed primarily at informing the public about the importance and methods of birth registration.

Two conferences of State registrars were held under the sponsorship of the Bureau during the fiscal year. The first was a regional conference held in July 1939 in Oakland, Calif.; the second a national conference held on April 9–12, 1940, in Washington. Approximately 80 persons attended this last conference at which time all phases of the 1940 vital statistics plans were discussed and correlated with State activities. The results of this conference have been prepared in a report which will be released at an early date.

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Field agents visited the registrars in each State to assist them in inaugurating the use of the new transcript forms of birth, death, and stillbirth.

STATE AND LOCAL GOVERNMENT

Advisory committee.—The special Advisory Committee on Statistics of States and local government held two meetings during the year at which time a study of the current work was made. Recommendations thereon were referred to the Census Advisory Committee. The members of this special committee are as follows:

CHARLES J. FOX, city auditor, Boston, Mass., chairman.
FREDERICK L. BIRD, Dun & Bradstreet, Inc., New York City.
DAN O. HOZE, city controller, Los Angeles, Calif.
WELLES A. GRAY, Chamber of Commerce of the United States, Washington, D. C.
CARL H. CHATTERS, Municipal Finance Officers' Association, Chicago, Ill.
L. MCCARTHY DOWNS, auditor of public accounts, Commonwealth of Virginia, Richmond, Va.
WALTER R. DARBY, commissioner of local government, State of New Jersey, Trenton, N. J.

Statistics of States.—The annual report which was discontinued with the publication of the 1931 volume was compiled and a summary bulletin issued for 1937. A final volume presenting these statistics according to a revised classification and including interpretations of the data was sent to the printer. A series of 21 reports on the summary of finances of States for 1937 was published during the year.

Both the text and the tabular material for the 1938 individual reports were greatly expanded and the format revised to enhance its appearance. Four of the 1938 individual State reports were published during the year and schedules compiled for the other 44 States. The field work for the 1939 report is already well under way.

Statistics of cities.—The annual report for 1939 covering cities having over 100,000 population was published in the form of a Summary Bulletin during the year, and material for a modernized final report was sent to the printer.

The individual 1938 reports for 4 cities were published and the field work for the remaining 90 cities was completed during the year.

Quarterly employment survey.—Beginning with January 1940, a quarterly employment and pay-roll survey of State and local governments was inaugurated. This survey is a consolidation of the efforts of four agencies which had been compiling independent series of data on State and local government employment and pay rolls. The survey covers all 48 States, all counties with populations over 50,000, all cities with populations over 5,000, and a sample coverage of smaller units such as cities and villages of less than 5,000 population, counties less than 50,000 population, New England towns, and other towns and townships.

Data for each type of governmental unit were published separately for the first quarter of 1940, and all field work has been completed and some of the data have been published for the second quarter. National estimates of State and local government employees and pay rolls and preliminary employee data classified by governmental functions were also published based on the first quarterly reports of 1940.

Current special-subject studies.—Nonfinancial current studies were made on proposals voted upon in the State and city elections of 1939. A new series of annual studies was inaugurated on current State tax collections. This series will provide information on a subject of vital concern to the tax system of the Federal Government.

Digest of State Tax Laws.—A 1939 supplement to the Digest of State Laws relating to income taxes, 1938, and a 1939 Supplement to the Digest of State Laws relating to inheritance and estate taxes, 1938, were published during the fiscal year.

Municipal reference service.—The collection of documentary material relating to municipal government was expanded to cover all States and some counties; in addition, material for all the remaining cities of less than 50,000 population have been added to the reference service. The collection was kept up to date and the scope of the service expanded. As usual much information was made available to Federal agencies, State and local officials, and private organizations and individuals through correspondence.

MANUFACTURES

Cooperative agreements.—For the calendar year 1939, a cooperative agreement was arranged for the first time between the Agricultural Marketing Service of the Department of Agriculture and the Bureau of the Census for compiling statistics for the Dairy Products Industries in the State of Wisconsin. The collection and editing of these reports was done in the Madison, Wis., office of the Department of Agriculture, following which the reports were sent to the Bureau of the Census for tabulation. One of the primary purposes of this agreement was to avoid duplication of activities between the two agencies.

As in previous years, a cooperative agreement was arranged between the United States Forest Service and the Bureau of the Census for collecting data on forest products for 1939. This agreement covered the canvassing of logging establishments, sawmills, veneer mills, and planing mills operated in conjunction with sawmills, in the 12 Western States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, Wyoming, and in Alaska.

In the Eastern States of Florida, Georgia, Mississippi, Michigan, Minnesota, Wisconsin, North Carolina, and South Carolina, a modified cooperative arrangement with the Forest Service provided that they edit the production data for lumber, lath, shingles, cooperage stock, and veneer.

Special studies.—A study of the location and migration of industry is being conducted in cooperation with the Bureau of Agricultural Economics. This study may be divided into two phases. The first phase is devoted to a historical sketch showing the migration of industry on a county basis from 1889 to 1937. The second phase of the study describes the location of individual industries in 1929, 1937, and 1939; the new plants coming into the industry, plants going out of the industry, and idle plants in the industry between 1929 and 1939. These data are on a county and size of city basis. The second phase of the study also shows the regions toward which industry is tending to migrate at the present time.

CURRENT STATISTICAL SERVICE

Improvements have been made during the past fiscal year in a number of the current statistical reports issued by the Bureau on 66 industries (or commodities). Fifty-two of these reports are published monthly, 9 quarterly, and 5 annually. Beginning with January 1940, the reports for the air-conditioning industry were divided into three separate groups. A monthly report on air-conditioning systems and accessory equipment for summer and year-round use; quarterly reports on blowers, fans, unit heaters, and accessory equipment; and also warm-air furnaces, winter air-conditioning systems, and accessory equipment .

Additional items were added to the schedules on men's, youths', and boys' clothing, and underwear and allied products. Due to the limited field which it served, the monthly report on imported dates was discontinued with the December 1939 issue.

Forty-one reports are issued monthly on retail and wholesale trade activity, and one report on canned-foods stocks is issued quarterly. The canned-foods report shows trends in canners' and distributors' stocks of selected vegetables, fruits, and fish. These surveys, conducted on a voluntary basis, have over 40,000 participating merchants.

The preliminary report on the Manufacture and Sale of Farm Equipment and related products for 1939 was issued 2 weeks earlier than it had ever previously been released. The Bureau is striving to reduce the period between collection and publication of these reports in order to increase their value to the general public.

COTTON AND OILS

The cotton and oil reports released by the Bureau are based on individual reports received from approximately 13,000 cotton ginneries, 500 cottonseed-oil mills, 300 cotton-oil refineries and consumers, 3,000 warehouses and compressers, 2,000 cotton-consuming establishments, and 4,000 plants producing, consuming, and storing fats and oils.

During the fiscal year reports were issued showing cotton ginned to 12 specified dates; cotton consumed and held at consuming establishments and in storage monthly; cottonseed crushed and products manufactured and stocks monthly; the factory products manufactured and stocks monthly; the factory production, factory consumption, and the stocks of animal fats and vegetable oils quarterly.

The prompt release of these reports has made available up-to-date statistics on cotton and cotton products. The cotton-ginning report is published on the morning of the 8th day following the report date; cottonseed and products on the 19th day; cotton consumed, imported, exported, and on hand on the 14th day; activity in the cotton-spinning industry on the 20th day; and fats and oils during the month following the end of the quarter.

In addition, reports were published of cotton ginned by counties of growth; the production of mill run, first and second cut linters; and the factory consumption of primary animal and vegetable fats and oils by class of products. There were also issued during the year three annual reports in pamphlet form associating and revising the published preliminary reports.

CENSUS OF RELIGIOUS BODIES

The Decennial Census of Religious Bodies which was taken as of 1936 is nearing completion. Thirty-two bulletins which included data on membership, financial, and other statistics, and a summary of the history, doctrine, organization, and work for 88 denominations were released during the year. The remaining 46 bulletins for 168 denominations are in the hands of the printer as is a summary for the United States containing the number of churches and members of each denomination for the year 1936, with comparable statistics for 1926.

RESEARCH

The Bureau realizes that it is only through a constant research program that new methods and techniques may be appraised for eventual inclusion in census procedure. Thus research work is constantly in progress to improve the census schedules, presentation of census data, and means and procedures of collecting data. Considerable research has been done during the last year on sampling techniques. The sampling procedure whereby 5 percent of the population was asked specified questions in the population enumeration was an outgrowth of the Bureau's research, and was adopted only after a period of careful study. Sampling studies are now in progress on the data collected for the Current Statistical Service and State and Local Government Statistics.

MACHINE TABULATION

The machine tabulation work during the year is equivalent to passing 224,352,190 punch cards once through one machine and all the operations required of the punch card system.

Approximately 90 percent of the tabulations were for the Bureau of the Census; vital statistics accounted for over 47 percent of the cards handled and the decennial census work for slightly over 7 percent. Almost 9 percent of the work involved assignments for other governmental agencies while the remaining 1 percent represents work done for nongovernmental organizations on a cost basis.

SEARCHING OF POPULATION RECORDS

During the last few years the number of requests for age certification has far exceeded expectations. This increased demand for age data is evidenced by the fact that 185,301 requests were answered during the past fiscal year as compared with 4,166 a decade ago.

Although the Social Security Act is responsible for most of this increase, the national defense program is rapidly becoming an important cause for the influx of requests for proof of age and citizenship for the purpose of obtaining or renewing marine and radio licenses, and for employment in airplane, automobile, and munition factories. In addition, requests for proof of age and citizenship are regularly received from individuals for passports, insurance, and other purposes and from the Civil Service Commission, Veterans' Administration, and other governmental agencies.

To search for an individual in the large bound census volumes often involves much time and labor. Approximately 92,000 requests had to be properly allocated by the Geography Division before a search could be made.

The indexes which have been compiled to assist in age searches have proved very efficient. The index for the 1920 census was completed in June; it consists of 51,000,000 cards, representing approximately 107,000,000 names and is the largest index of its kind in the world. A similar index is being compiled from the 1880 census records in New York City with funds appropriated by the Works Progress Administration. At the completion of this index, three population censuses will be on index records, namely 1880, 1900, 1920.

In addition to the written requests for age data, 6,197 visitors called personally for genealogical purposes to examine those census records which are open to public inspection. Only census data recorded prior to 1880 are open to public inspection, all subsequent records being strictly confidential. Of the 161,976 requests for information received during the past year, 62,622 were yet to be answered at the end of the year.

PHOTOSTAT AND MICROFILMING LABORATORY

In order to preserve the original census records from the wear resulting from constant searching, the earlier records have been photostated or placed on film. The census records through the year 1830 have been photostated and the schedules for the years 1840 through 1880, comprising 3,645 volumes, have been placed on 35-millimeter film. To reduce the space required for its storage, the index of 1900 has also been reproduced on 16-millimeter film.

In addition to photostating and microfilming census records, the Bureau has furnished numerous universities and historical societies with copies of the earlier census data. The Bureau has also been able to furnish microfilm and photostat service at cost to a number of other governmental agencies. During the fiscal year, a total of 230,303 photostatic prints were made.

GEOGRAPHY

The area measurement project, financed in part by the Work Projects Administration, has been in progress during the past 2 years. This project is concerned with remeasuring the United States, the States and counties, and initially measuring the square-mile area of all minor civil divisions. These data are to be published as a part of the 1940 census report.

FOREIGN STATISTICS

The work of collecting, classifying, and indexing foreign statistical material was continued. The exchange of foreign statistical material was carried on in accordance with arrangements made early in 1939. As the Bureau has no extra copies of these foreign publications, it is necessary to assemble and copy the data when requests are received for statistical information contained in these reports.

SPECIAL SERVICES

The Bureau often cooperates with other governmental agencies by loaning its experts to assist them in specific tasks. The Bureau gave considerable assistance to the statistical section of the Eighth American Scientific Congress which met in Washington during May 1940. The Scientific Congress has in part been responsible for the development of the Inter-American Statistical Institute. It is anticipated that the Institute will integrate the official statutes in the 21 American Republics in much the same manner as the International Statistical Institute has accomplished this task for European countries.

A member of the Bureau was absent during the last half of the fiscal year assisting the Government of Uruguay in modernizing its system of vital statistics.

The Bureau has been active in assisting the National Defense Program whenever its services have been called upon. For this purpose the Bureau loaned the services of one of its senior staff to the Justice Department to assist in organizing and developing the plans for alien registration. Another senior staff member was detailed to the Bureau of Research and Statistics of the Advisory Commission to the Council of National Defense. For the past 3 years a Bureau employee has been loaned to the Philippine Government as director of its census and to organize a unified system of statistics for the islands.

The Bureau also assisted the President's Committee on Civil Service Improvement through the services of one of its staff. A 228-page report "The Scholarship of Junior Professional Appointees in the Government Service" was prepared for the Committee.

WORK FOR OTHER AGENCIES

Because the Bureau has in its possession a wealth of statistical facts which have been gathered in past censuses, it is frequently called upon to provide information relating to these censuses. Although much of this service is often in the form of correspondence or requests which can be answered with a relatively small expenditure of time, more extensive investigation or tabulation is performed on a reimbursement basis. In addition to its service of making special compilations of census data, the Bureau also provides mechanical tabulation service on a cost basis for other governmental agencies and outside organizations.

Since the Civilian Conservation Corps has become a part of the Federal Security Agency, the card-punching and tabulating work previously done by the Bureau of the Census has been taken over by the Federal Security Agency. Accordingly, on October 16, 1939, all equipment, supplies, and records of the Civilian Conservation Corps were transferred to the Social Security Board.

During the past year, special tabulations were made for the following governmental agencies: Temporary National Economic Committee, Department of Labor, Bureau of Foreign and Domestic Commerce, Bureau of Marine Inspection and Navigation, Civilian Conservation Corps, Department of Agriculture, Federal Bureau of

Investigation, and the Federal Power Commission. In addition, special tabulations were made for the following outside organizations: General Foods Sales, Inc., Russell-Miller Milling Co., University of Pennsylvania, St. Lawrence Waterways, Underwear Institute, General Electric Co., University of Pittsburgh, University of Alabama, Devoe & Raynolds Co., Chicago Bridge & Iron Co., Blackett-Sample-Humbert, Inc., Columbia University, University of Chicago, and several other private groups and individuals.

PUBLICATIONS

During the fiscal year, 405,705 copies of publications were distributed, 327,245 of which represent releases relating to various subjects.

Preparations were in progress during the year for the publication of the 1940 census data. Tentative lists of publications have been drawn up and plans are being made for their distribution.

Statistical Abstract of the United States.—The 1939 edition of the Statistical Abstract, a volume of 916 pages, was completed and published during the year, and preparations for the 1940 edition were well under way at the close of the fiscal year.

The Statistical Abstract is a compilation of authoritative figures derived from reports of the Bureau of the Census and other agencies, Federal, State, and nongovernmental, relating to the social and economic conditions of the population and to the industrial, commercial, and governmental activities of the Nation. The Abstract has a wide distribution among businessmen, economists, statisticians, students, and others who have need for a convenient reference work of this character.

Final industry reports for the 1937 Census of Manufactures were released during the early part of the fiscal year. These reports were followed by the two printed volumes which constitute the final publications of the Census of Manufactures for 1937. Part I, consisting of 1,674 pages of text and tabular material, was issued in January 1940, and is primarily an assembly of the detailed reports for manufacturing, printing, and publishing industries. Part II, consisting of 135 pages, was issued in September 1939 and is an assembly of detailed reports for cities having 25,000 inhabitants or more and of inventories in the hands of manufacturers at the beginning and end of 1937, by industries and States.

The following publications of the Census of Electrical Industries, 1937, were also released during the year: Telephones and Telegraphs, Street Railways and Trolley-bus and Motor-bus Operations, and Electric Light and Power Industry.

Annual reports.—The two annual vital statistics volumes published by the Bureau for many years, namely, mortality statistics, and birth, stillbirth, and infant mortality statistics, have been replaced by corresponding annual volumes for the year 1937, entitled "Vital Statistics of the United States, Part I and Part II." In part I are published mortality and birth statistics which have been tabulated by place of occurrence; in part II are included the materials classified by place of residence.

Other annual reports include: Lumber, Lath, and Shingles, 1938; Lumber Cut by 1,112 Identical Mills, 1939; Manufacture and Sale of Farm Equipment and Related Products, 1939; Clay Products—Nonclay Refractories, and Sand-Lime Brick, 1938; Paper Production, 1938; Pulpwood and Woodpulp, 1938; Convention Dates of Negro Organizations; and Negro newspapers and periodicals in the United States.

Special reports and releases.—The Bureau regularly issues preliminary releases which are later included in published reports. These releases are very numerous and are not all included in the following list:

Manufactures:
- Industry Classification for Census of Manufactures, 1939.
- Alphabetical List of Products, Census of Manufactures, 1939.
- Man-Hour Statistics for 105 Selected Industries, issued in cooperation with the Bureau of Labor Statistics.

Vital statistics:
- Judicial Criminal Statistics, individual State releases for 1937.
- Patients in Hospitals for Mental Diseases, 1937.
- Mental Defectives and Epileptics in Institutions, 1937.
- Special Report Series—State Summaries.
- Special Report Series—Motor Vehicle Accident Fatalities.
- Weekly Accident Bulletin.
- The Registrar, monthly.
- Monthly Vital Statistics Bulletin.
- Weekly Health Index.

Population:
- Index of Data Tabulated From 1930 Census of Population.
- Urban Population in the United States From 1790 to 1930 on the Basis of the 1930 Definitions by States.
- Families in the United States by Type and Size, 1930.
- Four Press Releases on St. Joseph and Marshall Counties, Ind., as follows:
  - Results of the Special Census of St. Joseph and Marshall Counties, Ind., 1939.
  - Employment and Unemployment in South Bend.
  - Employment and Unemployment in the Cities and Rural Areas of St. Joseph and Marshall Counties.
  - Marital Status of the Population 15 Years Old and Over.

State and local government:
- State and Local Government Summary Bulletin of Financial Statistics of States, 1937.
- A series of 21 Reports on the Summary of Finance by States, 1937.
- Individual Reports of 4 State Financial Statistics, 1938.
- Supplement to the Digest of State Laws Relating to Inheritance and Estate Taxes, 1938.

Current reports:

Cotton and oils:
- Cotton ginned (12 reports).
- Cotton consumed and held at consuming establishments and at storages (monthly).
- Cottonseed crushed and products manufactured and stocks (monthly).
- Factory production, factory consumption, and stocks of animal fats and vegetable oils (quarterly).

Current industrial reports:

Quarterly reports:

- Edible gelatin.
- Electric (mining and industrial) locomotives.
- Electrical goods.
- Fans, blowers, unit heaters, and accessory equipment.
- Lacquers.
- Warm-air furnaces, winter air-conditioning systems, and accessory equipment.
- Wheat and wheat-flour stocks.
- Wheat ground and wheat-milling products (merchant and other mills).
- Wool stocks.

Monthly reports:

Air conditioning systems and accessory equipment for summer and year-round use.
Automobiles.
Automobile financing.
Bathroom accessories.
Boots, shoes, and slippers (other than rubber).
Cellulose plastic products.
Commercial steel castings.
Confectionery and competitive chocolate products.
Convection-type radiators.
Cotton, leather, and allied garments.
Distillate oil burners.
Domestic pumps and water systems and windmills.
Domestic water-softening apparatus.
Electric industrial trucks and tractors.
Fabricated steel plate.
Fire-extinguishing equipment.
Floor and wall tile.
Galvanized range boilers and tanks for hot water heaters.
Hosiery.
Knit fabric gloves.
Knit wool gloves and mittens.
Leather gloves and mittens.
Malleable iron castings.
Manufacturers' sales and collections on accounts receivable.
Measuring and dispensing pumps (gasoline, oil, etc.).
Mechanical stokers.
Men's, youths', and boys' clothing, cut.
Methanol.
Oil burners.
Paint, varnish, lacquer, and fillers.
Paperboard.
Plastic paints, cold water paints, and calcimines.
Plumbing brass.
Porcelain enameled products.
Asphalt prepared roofing.
Public merchandise warehousing.
Pulverizers.
Pyroxylin-coated woven cotton fabrics.
Railroad locomotives.
Red-cedar shingles.
Steel barrels and drums.
Steel boilers.
Steel office furniture, shelving, and lockers, and fire-resistive, safe industry products.
Structural-clay products.
Sulphuric acid.
Superphosphates.
Terra cotta.
Underwear and allied products.
White-base antifriction bearing metals.
Wheat ground and wheat-milling products by States and capacity groups.
Wool consumption.
Wool machinery activity.

Current business reports:

Canned food stocks (quarterly).
Wholesalers sales, inventories, stocks, collections, and accounts receivable (monthly).
Retail sales of independent stores, one report for each of 34 States and 6 cities (monthly).

PERSONNEL

The following table shows the number of employees of the Bureau at the end of the fiscal year, and the number of appointments and separations.

	Bureau total	Washington office	Field
Total employees on roll, June 30, 1940	12,687	5,127	7,560
Permanent	1,643	849	[1] 794
Temporary	11,044	4,278	6,766
Total appointments, fiscal year	13,180	5,328	7,852
Permanent	183	103	80
Temporary	12,997	5,225	7,772
Total separations, fiscal year	2,221	1,104	1,117
Terminations	692	171	521
Expirations of appointments	218	168	50
Transferals	539	539	
Resignations	735	204	531
Retirements	18	18	
Deaths	19	4	15

[1] Includes special agents for cotton and for vital statistics.

The personnel of the Bureau increased from 1,728 to 12,687 during the past year. This large increase in personnel made the recruiting and assimilation of the new workers an important task of the Bureau.

In addition to the number of employees shown in the above table, there were on the rolls June 30, 4 supervisors without compensation and 3,389 temporary agents (475 in the Washington office, and 2,918 outside of Washington) appointed for limited periods at $1 per annum, or without compensation. Of this number, 257 special agents without compensation were employed on the four W. P. A. projects in the Washington office, and 1,888 on the project in New York City. There were 556 appointments of special agents made during the fiscal year in the Washington office and 4,234 outside of Washington. The separations were 691 and 4,433, respectively.

There were 849 permanent employees in the Bureau on June 30. During the fiscal year 103 permanent employees entered on duty and 55 were separated from the rolls, a net increase of 48. Of the 55 who were separated, 10 resigned, 26 transferred, 1 died, and 18 retired.

The task of building up the professional and scientific personnel in the Bureau has continued during the year. The increase of professional and scientific employees has occurred through the reallocation of certain officials and employees from the clerical, administrative, and fiscal group, and by the appointment of new employees. On June 30, 1940, there were 61 employees under this classification compared to 50 in 1939, 41 in 1938, and 29 in 1937.

The work of reclassification of employees has also been continued. There were 257 reclassifications during the year which makes a total of 589 employees whose grades have been adjusted since July 1, 1933.

Sixteenth Decennial Census personnel.—The above table regarding census employees at the end of the fiscal year does not give a complete statement of employees who were appointed in the field in connection with the Sixteenth Decennial Census. Much of the field census work had been completed before June 30 and the final reports as to the number of enumerators appointed by area and district offices had not been made. However, the following number of employees is approximately correct for the peak of field operations on the decennial census: total employees in field administrative offices (including supervisors, clerks, squad leaders, and interpreters), 7,361; enumerators for population, agriculture, and housing, 101,916; enumerators for business and manufactures, 6,396; and enumerators for irrigation and drainage, 261. Of the 115,934 employees who served in administrative offices or as enumerators for the decennial census only 6,657 are included in the above table as temporary field employees on June 30, 1940.

APPROPRIATIONS

A total of $27,000,000 was appropriated during the fiscal year for the regular work of the census. Of this sum $26,900,000 was for the expenses of the Sixteenth Decennial Census and $100,000 for

searching census records and supplying information to carry out the provisions of the Social Security Act.

For the fiscal year ending June 30, 1941, $17,850,000 was appropriated for expenses of the Sixteenth Decennial Census, $110,000 for salaries and expenses of the Social Security Act, and $10,000 for special statistical work and trust fund.

The following table presents the appropriations by source for the fiscal year ended June 30, 1940:

Appropriations and other funds made available to the Bureau of the Census, by source, fiscal year ended June 30, 1940

Purpose	Total	Source of funds		
		Bureau appropriations	Allotted or transferred from other Federal agencies	Nongovernmental
All Bureau work	$27,033,530	$27,000,000	$28,342	$5,188
Regular salaries and expenses	27,000,000	27,000,000		
Expenses of the Sixteenth Decennial Census	26,900,000	26,900,000		
Salaries and expenses, Social Security Act	100,000	100,000		
Work for other Federal agencies	28,342		28,342	
Work for outside organizations or individuals	5,188			5,188

NATIONAL BUREAU OF STANDARDS

GENERAL ACTIVITIES

Finances and Personnel.—The Bureau's appropriation for 1940 was $2,266,000 which included $100,000 for purchase of additional land and $198,000 for the special investigation of building materials and structures suitable for low-cost housing. In addition, deficiency items of $44,000 for substation equipment and $25,000 for land were provided. Thus, $125,000 is available for purchase of land necessary to increase the Bureau's site by 12.5 acres. The sum of $24,000 was allotted for travel and $48,000 for printing and binding from the consolidated funds of the Department of Commerce.

The regular staff at the close of the year (including temporary employees) numbered 982, an increase of 32 as compared with the preceding year. The number of research associates—82—stationed at the Bureau by national engineering societies and trade associations, again shows a large increase. This cooperative approach to problems of national importance is mutually helpful to the Government and American industry and insures the prompt translation of research results into commercial practice.

Testing.—The Bureau acts as the principal testing laboratory for supplies (other than food and drugs) purchased by the Government. It does not test materials for the public if suitable facilities are available elsewhere, and public tests are in general limited to the calibration of instruments and working standards in terms of the national standards. This important service shows a 6 percent total increase over the preceding year.

Publications.—The results of the year's work have been made available through 276 printed publications and articles. In addition, 44 mimeographed letter circulars on subjects about which many inquiries are received were prepared and distributed on request.

Visiting committee.—The members of this committee are: Gano Dunn, chairman of the J. G. White Engineering Corporation; Dr. Frank B. Jewett, president of the Bell Telephone Laboratories; Dr. Karl T. Compton, president of the Massachusetts Institute of Technology; Dr. William D. Coolidge, director of the research laboratories of the General Electric Co.; and Morris E. Leeds, president of the Leeds & Northrup Co. The committee met at the Bureau on May 22.

International action on units.—As was forecast in the report for 1939, delays in the international program of measurements prevented the introduction of the new units of electricity and of light on January 1, 1940, the date set by the International Committee on Weights and Measures. The meeting of the International Committee sched-

uled for October 1, 1939, was canceled, and no date can be set for introduction of the new units until the Committee meets again.

The Bureau was represented at the first meeting of an Advisory Committee on Thermometry organized by the International Committee on Weights and Measures. At this meeting, held in Paris July 11 and 12, 1939, the Advisory Committee prepared recommendations including a revision of the text defining the international temperature scale. These recommendations, however, must be approved by the International Committee before becoming effective.

Thirtieth National Conference on Weights and Measures.—The thirtieth meeting of this conference was held on June 4 to 7, inclusive, and was attended by officials from 26 States and the District of Columbia, as well as representatives of business firms, railroads, and the Federal Government. Technical papers were presented on a variety of weights and measures subjects, and reports were received from the standing committees. The conference endorsed the principles of certain pending Federal legislation and adopted additions and amendments to the codes of specifications, tolerances, and regulations for commercial weighing and measuring devices, amendments to the Model State Law on Weights and Measures, and recommendations relative to methods of sale for packaged commodities. A comprehensive program of weights and measures education, to be carried on under the guidance of a conference committee, received approval, and a new committee was created for interim studies of methods of sale of commodities.

Conference of public-utility engineers.—Fifty-nine commission engineers from 28 States and the District of Columbia met at the Bureau in their eighteenth annual conference on May 14 to 16. Eleven formal papers were presented and discussed. The attendance exceeded any previous conference of this group.

Interdepartmental Screw Thread Committee.—This committee, of which the Director of the National Bureau of Standards is chairman, has been established by the Departments of War, Navy, and Commerce to promote uniformity in screw-thread standards, thus continuing and extending the work formerly done by the National Screw Thread Commission.

This committee is charged with: (1) The development of standards for screw threads; (2) the standardization of gages, dies and taps; and (3) the standardization of dimensions of nuts, bolt heads, wrenches, and other items associated with the manufacture and use of interchangeable threaded parts. These standards, when approved by the Departments concerned, are to be published, together with a joint order making their use mandatory in the Departments of War, Navy, and Commerce, except where a need for deviation is shown.

To meet the immediate needs of the Federal services, the committee has adopted and republished the screw-thread standards as established by the National Screw Thread Commission (H25),[1] which are now in full force and effect.

[1] Elements in parentheses identify the serial number of the paper and the Bureau publication in which it appeared. RP refers to a Research Paper from the Journal of Research of the National Bureau of Standards; BMS, Building Materials and Structures; R, Simplified Practice Recommendation; CS, Commercial Standard; H, Handbook; LC, a mimeographed Letter Circular.

American Gage Design Committee.—The Bureau has participated in the continued activities of this committee in standardizing the design of limit gages. A revised and enlarged edition of its publication Gage Blanks (replacing CS8–33), containing basic designs for several additional types of limit gages, and also standard designs for dial indicator gages, is being prepared.

American Standards Association.—The Bureau is sponsor (or co-sponsor) of 26 projects carried out under the procedure of this association. It holds representation on 160 A. S. A. technical committees, having chairmanship of 15, vice chairmanship of 2, and secretaryship of 7. It is represented on the following coordinating agencies of the association: Board of Directors; Standards Council; Electrical Standards Committee; Mechanical Standards Committee; Advisory Committee on Ultimate Consumer Goods; Safety Code Correlating Committee; and Building Code Correlating Committee. All of the safety code, building code, and plumbing code requirements thus far formulated under the auspices of the Bureau have been accepted as a basis for the development of safety, building, and plumbing codes under the American Standards Association procedure. Two members of the staff of the association are located at the Bureau to facilitate the cooperative work of the two organizations.

Federal specifications.—The Bureau makes many investigations and tests in connection with the development and use of purchase specifications. The Director serves as chairman of the Federal Specifications Executive Committee, under the auspices of which 1,294 specifications have been prepared for the use of executive departments and establishments of the Government. In the preparation of these specifications the Bureau cooperates with 70 other agencies of the Federal Government. It has representation on 62 of the 70 technical committees of the Federal Specifications Executive Committee. It holds chairmanship of 34 of these technical committees; vice chairmanship of 8; and secretaryship of 4.

The staff of the Bureau takes part in the activities of 127 technical and trade organizations representing various fields of endeavor, including science, technical research, and trade, both national and international. It has representation on 910 technical committees of these organizations, many of which depend upon the Bureau's cooperation in carrying forward their scientific and technical activities. The Bureau has representation on 300 technical committees and subcommittees of the American Society for Testing Materials, a national technical society devoted to the promotion of the knowledge of engineering and the standardization of specifications and methods of testing. Through this representation the Bureau holds chairmanship of 30 of the A. S. T. M. committees, vice chairmanship of 4, and secretaryship of 6.

ELECTRICITY

High-voltage laboratory.—The new building, specially designed for research and standardization work on high voltages and X-rays, was substantially completed and was accepted by the Bureau on April 6, 1940, subject to correction of some minor mechanical defects. The larger part of the building is a single room 136 feet long, 65 feet

wide, and 60 feet high, in which the high-voltage equipment will be placed. In front of this is a series of smaller laboratories occupying five stories. The walls of the large room are lined with sheet copper; the exterior walls are thermally insulated with 3 inches of cork. The ceiling is metal, and steel armor cast in the concrete floor completes a metallic enclosure (Faraday cage) which gives definite electrical conditions for measurements in the building and at the same time prevents a high-voltage discharge from interfering with radio reception or other electrical measurements outside the building.

Of the new equipment to be provided for high-voltage research and testing, the two largest items are a 2,000,000-volt impulse generator and a set of three transformers which, connected in cascade, will give 1,050,000 volts. These have been ordered and are to be delivered in December 1940. One new 250,000-volt standard transformer has been installed in the building. It will be supplemented and checked by two 100,000-volt transformers and the Bureau's absolute electrometer which are to be moved from the old laboratory. Reference to the X-ray equipment will be found under "Optics."

While some acceptance tests will be made on materials and equipment purchased by Government agencies, the principal functions of the laboratory will be precise testing of measuring apparatus and standards, and research on methods of measurement and on special problems such as the development of new apparatus.

Basic electrical units and standards.—The comparisons of standards of several countries made by the International Bureau of Weights and Measures in 1939 showed that in the last 5 years the volt as maintained by the Bureau had changed by only one part in a million in relation to the average of all countries taking part. The apparent change in the ohm was three parts in a million. Since the war has made it impossible to carry through at the present time the projected adjustment of units to get rid of the existing discrepancies between systems of units and between the different countries, the Bureau will continue to use its own units, but for the maintenance of the ohm it has adopted during the year a group of 10 resistors of the improved double-walled type developed some years ago. During the last 5 years no one of these has changed by as much as a part in a million in relation to the average of the 10.

Radio.—The primary standard of frequency, consisting of seven independent oscillators, was improved to the point where the maximum deviation of any oscillator from the curve of average values was three parts in a hundred million. Highly accurate standard frequencies were broadcast regularly. The standard of musical pitch, 440 cycles per second, was broadcast continuously, day and night, on a radio carrier frequency of 5000 kilocycles per second. Because of the availability of this service at all times it was extensively used, both for frequency measurement and musical purposes.

The equipment for studying radio wave transmission and the ionosphere was extended by the construction of a portable recorder mounted in an automobile trailer. This was taken to Texas for radio observations of the solar eclipse of April 7, 1940. Continuous recording of radio transmission conditions led to new understanding of the processes of long-distance radio wave propagation by multiple reflec-

tions from the upper atmosphere. To aid radio stations in selecting frequencies, predictions of maximum usable frequencies were made and published monthly; subsequent observations gave gratifying verification of the predictions. Diminution of solar activity in the 11-year cycle caused a steady decrease of optimum radio frequencies and of radio disturbances. Knowledge of the characteristics of several types of disturbances was extended. Cooperation with observers in Argentina led to the explanation of markedly better radio transmission between North and South America than between North America and Europe.

The radio sonde, previously developed by the Bureau and now in general use for routine observations of upper-air temperature, pressure, and humidity, was improved through perfection of an electric hygrometer. This has several times the speed of response of the hair hygrometer, universally used hitherto. This electric hygrometer has also been adapted to many other uses (RP1265).

A method and equipment were developed for automatic radio transmission of weather data from isolated locations, such as islands or mountainous regions. In the device constructed, the weather elements included were temperature, pressure, humidity, wind direction, wind velocity, and rainfall. Each element operates, through electrical resistance, to vary a keying frequency of a radio transmitter. The rate of keying is counted at the remote radio receiver. In service tests of completely unattended apparatus the equipment functioned satisfactorily (RP1318).

Lamps and lighting.—The inspection and testing of lamps purchased by the Government increased greatly. Over 5,000,000 lamps were inspected at factories, and 7,838 were life tested at the Bureau, being 71 percent and 49 percent, respectively, more than the numbers for the preceding year. Many more calls for advice on lighting in Government buildings were received, especially in connection with use of the new fluorescent lamps. A large number of tests were made for the Civil Aeronautics Authority on aircraft position lights, parachute flares, airport approach lights, boundary lights, airway beacons of various types, and ceiling projectors. Life tests were made on neon approach lights, and nearly 2,500 large units (lenses, course lights, beacons, and reflectors) were inspected at factories. For the Weather Bureau, 200 ceiling projectors were inspected, and a device for measuring ceiling heights in daylight was developed. This is capable of measuring the height of clouds up to several thousand feet, under almost any conditions of background brightness and cloud formation.

Pipe-line corrosion studies.—Continuing the investigation of pipeline corrosion begun in 1922, the Bureau took up buried specimens of a large variety of metals and of several protective coatings for pipe lines from 19 test sites representing different soil types. Additional specimens of brass, stainless steel, cast iron, cement-asbestos pipe, and a nonbituminous coating were buried at 15 of these sites. A report on corrosion-resistant materials buried in 1932 was published (RP1250). Laboratory methods previously developed at the Bureau for determining the corrosivity of soils were improved, and results obtained by eight proposed methods were compared with observations of actual corrosion on a 25-mile section of pipe line. In co-

operation with the American Gas Association a study was made of the conditions under which pipe lines can be protected from corrosion by causing electric current to flow onto them. Final inspection of protective coatings applied by the American Petroleum Institute in 1930 to short lengths of pipe and to mile-long sections of working lines was begun in March 1940, and at the close of the fiscal year these inspections had been completed at 12 of the 15 test sites, most of them in Western States.

WEIGHTS AND MEASURES

Scope of weights and measures work.—The service rendered by the Weights and Measures Division has had a direct bearing on scientific research, industrial production, and Government activities, because in each of these fields reliable information on standards of measurement is essential. Thus, analytical weights were tested and certified for laboratory workers; weights of all denominations were tested for local, State, and Federal agencies having supervision over commercial weighing apparatus; test weight cars and railway track scales were inspected for all important railway systems (freight charges and in many cases the sale value of the product depend upon the accuracy of these scales); motortruck and wagon scales were tested with special equipment (which demonstrates to local and State officials the condition of the scales within their jurisdictions, and the need for regular inspection); loaded motortrucks were weighed on the Bureau's new motortruck scale at the request of the police and traffic officers to check possible overloading of bridges; measuring tapes were tested for civil engineers, educational institutions, and agencies of State and Federal Governments; linear scales and precision circles were graduated and tested for manufacturers and for State and Federal agencies; chemical glassware and hydrometers were tested for manufacturers, educational institutions, commercial and Government laboratories, and State departments of weights and measures; dilution pipettes, blood-counting chambers, and cover glasses were tested for physicians and hospitals; cement-testing sieves were tested for sieve manufacturers, cement manufacturers, and cement testing laboratories; precision gage blocks, limit gages, dial indicator gages, and screw threads were tested for tool manufacturers and for a wide range of users in many industries, ordnance laboratories, and arsenals; tests were made of gas meters and meter provers used in scientific investigations, and in checking apparatus for commercial measurement of large volumes of gas; time-measuring instruments, such as watches, clocks, chronometers, time stamps, and parking meters, were also tested; apparatus and specimens used in determining coefficients of thermal expansion of metals, alloys, stone, glass, and other solids were examined; density and thermal expansion of liquids of importance to science and industry were determined. These examples by no means cover all of the activities of the Weights and Measures Division, but they illustrate the variety of the work, the scope of which is not generally appreciated.

Graduation of precision circles.—The graduation of precision theodolite circles for the United States Coast and Geodetic Survey

has been continued, and a program has been started under which precision circles and line standards will be graduated for industry if apparatus of the required accuracy is not obtainable elsewhere. Two such circles already furnished an American manufacturer have been incorporated in theodolites bought by a State for precise surveying. These instruments are reported as being the most accurate theodolites ever built.

Test of watch movements.—On request of the Bureau of Customs, Treasury Department, performance tests were made on about 3,000 imported watch movements. Under the Tariff Act of 1930, as amended January 1, 1939, the duty assessed on imported watches and watch movements of 17 jewels, or less, is 50 cents for each "adjustment." One of the purposes of the test was to determine, if possible, whether the watches were "adjusted" or "unadjusted," and, if "adjusted," the number of "adjustments" to which they had been subjected. The Tariff Act contains no definition of "adjustment," and no adequate criteria for judging whether or not a watch is "adjusted." As a result of the tests such criteria have been set up on a basis that should be just to the importer and to the Government, and which is not in conflict with the Tariff Act now in force.

Dental research.—In cooperation with the American Dental Association, the Bureau has helped to protect the dental profession and the public against defective materials. Dentists have been assisted in their selection of the few satisfactory types of natural color denture base resins. The lists of tested and certified brands of dental filling materials represent a practical example of the Bureau's standardization service for commercial materials.

Identification.—The Bureau has continued to serve the Government on technical phases of scientific crime detection. Instruction and laboratory training have been arranged for selected agents of the Government who wish to become proficient in this field. Expert assistance has been given in the solution of several important and difficult cases, in which the Federal Government was a party at interest.

Weighing laboratory.—The new weighing laboratory was completed during the year. It houses a 60,000-pound motortruck scale, a 10,000-pound scale, a 400-pound scale, and a 50-pound balance, together with standard weights in denominations of 10,000, 2,500, and 50 pounds, to an amount in excess of 60,000 pounds. Facilities are thus provided for the precise determination of masses from 50 pounds to 60,000 pounds, for referee weighings throughout this range, and for studies of problems related to commercial weighing operations and scale design.

Testing of vehicle scales.—Continuing the program begun in 1936, the Bureau's vehicle-scale testing unit completed scheduled tests of wagon and motortruck scales in the States of Wisconsin, Minnesota, North Dakota, Nebraska, Kansas, Oklahoma, and Texas, and partially completed a program in New Mexico and Arizona. This work is conducted in cooperation with the weights and measures officials of the States and their local subdivisions, and serves to demonstrate the value of suitable vehicle-scale testing equipment. State and local officers are instructed in proper testing methods, and data are secured on the performance of commercial scales.

Since the beginning of this Nation-wide program, approximately 2,200 commercial vehicle scales have been tested. Three out of four of these have been found in error in excess of acceptable tolerances, the mean of the maximum percentage errors being almost six times the basic tolerance of 0.20 percent. Very large numbers of scales have been found poorly installed and improperly maintained. Overloading of wagon scales, the weighing of loads of less than 1,000 pounds on vehicle scales, and the "two-draft" weighing of vehicles or vehicle combinations too long to be accommodated properly on the scale platforms, have been found to be common abuses.

As a direct result of the Bureau's activities many States not previously provided with adequate equipment for testing vehicle scales have now procured it and have set up definite testing programs.

Railway track scales.—The year's work in the field of railway track scales and associated activities comprises the calibration of 18 master track scales, the testing, on the lines of 103 railroads, of 1,004 commercial railway track scales, of which 587 were railroad owned and 417 were industry owned, the field weighing of 30 railway track scale test weight cars, the standardization on the Bureau's master scale of 58 test weight cars, and the calibration of one special locomotive-scale installation and two special track scales.

The performance of 13 of the master railway track scales was found to be within the adjustment tolerances of approximately 0.01 percent, and the 5 remaining scales were found to be weighing well within the maintenance tolerances, which approximate 0.02 percent. All scales were left weighing within the adjustment tolerances. In the case of commercial railway track scales, 82 percent were found within the applicable tolerances.

HEAT AND POWER

Temperature symposium.—The Bureau cooperated in a symposium on temperature held under the auspices of the American Institute of Physics on November 2, 3, and 4. Of the 125 papers on temperature soon to be published in book form, members of this Bureau have contributed 13.

Stability of base-metal thermocouples.—The accuracy attainable in temperature measurements with chromel-alumel and iron-constantan thermocouples, widely used in industrial plants for measurement and control of high temperatures, is limited by the changes which take place in the thermocouples during use at elevated temperatures. These changes have been determined experimentally for various heating periods up to 1,000 hours in air at temperatures from 800° to 2,000° F., and the results have been published (RP1278).

Low-temperature laboratory.—The low-temperature laboratory has been supplied with a new and larger compressor for the liquid-air plant, and the inside of the building has been remodeled so as nearly to double the available laboratory space. During the remodeling, tables of thermodynamic data on hydrogen were completed for use of the chemical industry. These tables are particularly important in view of the rapidly growing use of hydrogen in chemical processes, such as the hydrogenation of fuels.

Fire-extinguishing tests with CO_2.—Continuing the work done at the Bureau in 1936, fire-extinguishing tests with carbon dioxide were made in rooms of floor area from 200 to 5,000 square feet, representing the larger spaces in Government buildings in Washington. Up to 5,500 pounds of gas were used in a single test. One object of the work was to prove the feasibility of extinguishing a fire with carbon dioxide applied by a fire brigade responding to an alarm. It is apparent that the damage inevitably caused by water would be thus largely avoided. This is very important where records and other valuable contents are involved.

Fire resistance of ship construction.—Tests were made of materials and equipment used in ship construction, such as fire screen and stateroom bulkheads, insulating materials, deck coverings, fire- and smoke-actuated detecting equipments, and door releases. Departmental regulations pertaining to ship construction and the transportation of explosives and other dangerous articles were revised. In some cases, tests of the materials were necessary to determine the degree of hazard.

Precision of knock ratings.—Accurate control of the knock ratings of commercial gasoline is of great importance. Since 1936, owners of CFR knock-testing units have been invited to rate three test fuel samples twice a year, reporting their results to the Bureau. An analysis of over 1,600 ratings reported in the first eight semiannual cooperative tests shows that continued participation in these tests has resulted in steadily decreasing error. The average standard deviation for laboratories which participated only once is 1.05 octane units, while the average standard deviation of all tests made by those laboratories which participated in the eight sets of tests is 0.58 octane unit.

Motor survey.—The Bureau again participated in tests to ascertain the octane-number and vapor-pressure requirements of automobiles in service. The results of tests by 14 cooperating laboratories on 32 different car models were analyzed and reported at the annual meeting of the Society of Automotive Engineers. A study of the change in octane-number requirements of 1938 and 1939 test cars with car mileage was made and reported.

Flow characteristics of aircraft fuel lines.—When an airplane is climbing rapidly or flying at high altitudes it is difficult to secure a correct distribution of fuel to the engines, because of the formation of vapor in the fuel lines at either high temperatures or high altitudes. The fuel gets warm when an airplane stands in the sun and the reduction in air pressure during a climb makes it tend to boil. Under such conditions it is imperative that no gas pockets should form in the fuel line. Under the auspices of the Cooperative Fuel Research Committee, representing the aircraft industry, the petroleum industry, and the Government, the Bureau has nearly completed an experimental study of the pressure drop across component parts of aircraft fuel systems as a function of size, design, rate of fuel flow, and vapor liquid ratio. The data are being analyzed and presented to the aircraft industry in the form of engineering tables.

Automotive oil filters.—The cooperative research on test methods to determine the efficiencies of oil filters has been continued. The

service data are furnished by the industry, while the experimental work is done at the Bureau. Tentative specifications based on this research work are being used for the purchase of oil filters by the Government and have greatly influenced their general use.

Journal bearings.—The operation of journal bearings under the severe conditions met with in such units as dive-bombing airplanes calls for entirely new criteria of bearing performance. The Bureau developed a testing machine and the necessary technique for a study of this problem. Based on experimental observations, criteria have been established for evaluating safe operating conditions for such journal bearings in terms of oil viscosity, bearing temperatures, and heat dissipation from the bearings.

OPTICS

X-ray standardization.—The X-ray equipment in the new high voltage laboratory includes a 1,400,000 volt direct-current generator capable of delivering an X-ray excitation current of 25 milliamperes—the most powerful thus far built. Two X-ray tubes have been provided for use with this generator, one of which is for standardization of dosage meters and related testing, and the second, for exploratory work and cooperative studies witth the National Cancer Institute. The new generator possesses the unusual feature of reversible polarity so that it can be used for producing neutrons. In addition, the large pressure ionization chamber, developed earlier for moderate voltage X-ray and gamma ray measurements, has been modified for measuring X-rays at 1,500,000 volt excitation potentials.

Atomic physics.—The general relation between the intensity of ionization in a cesium discharge and the number of spectrum lines in a series has been determined, so that from the appearance of the spectrum the electrical conditions in a discharge can be evaluated. An important application is in the determination of conditions existing momentarily in the spark from a condenser discharge.

Radioactivity.—Improvements have been made in Geiger-Muller tube counters and accompanying alternating current circuits, so that they may be used for routine quantitative measurements of gamma radiation; 2,419 preparations, containing approximately 18,570 milligrams of radium, were tested. Seventeen specimens of radium luminous material were tested for brightness.

Spectroscopy.—Accurate measurements of atomic emission spectra and analyses of their structures are prerequisite to their practical use for spectrochemical testing. New analyses have been made of the arc spectrum of tin, the spark spectrum of vanadium, the arc and spark spectra of thulium, and portions of the spectra of chromium, molybdenum, and germanium. The Zeeman effect was studied for ytterbium, thulium, columbium, chromium, and molybdenum spectra. Analysis of spectral structure was extended in each case, and completed for tin and vanadium. The chemical composition of about 1,000 samples of miscellaneous materials was determined from their atomic emission spectra.

Photoelectric reflectometry and colorimetry.—An instrument has been developed for the rapid and precise measurement of reflectance, gloss, and color of materials relative to standards. The response of

a barrier-layer cell is converted by one light filter to give gloss and reflectance results in agreement with visual measurements in daylight illumination; and the use of two other filters enables small color differences to be accurately evaluated in terms of the standard observer. The instrument is especially useful in testing samples to determine conformity with specifications.

Photographic standardization.—The American Standards Association is cooperating in the establishment of a standard technique for measuring the speeds of roll films and film packs; purchase specifications for films and plates, covering more than 200 items, were prepared and used by the Procurement Division of the Treasury Department in awarding contracts for the General Supply Schedule; and for the first time, sensitometric equipment has been adapted to measuring the light sensitive characteristics of commercial blueprint and diazo papers.

Motion-picture projectors.—The performance of motion-picture projectors is being studied in cooperation with the Committee on Scientific Aids to Learning of the National Research Council. As a result, the selection of suitable motion-picture equipment will be made easier for the schools, the preparation of Federal specifications will be simplified, and ideas for improving the design of projectors will be made available.

Standard of ultraviolet radiation.—Supplementing this Bureau's standards of thermal radiation (carbon filament lamps; RP578) issued for calibrating nonselective radiometers (thermopiles) in absolute energy units, a standard of ultraviolet radiation was established consisting of a high potential arc through mercury vapor in a quartz tube, in which about 98 percent of the germicidal energy is in the resonance emission line at 2537A. Ultraviolet meters will be calibrated against this standard source. These meters are used in measuring the output of ultraviolet germicidal lamps for killing air-borne bacteria in hospitals, in air-conditioning apparatus, and in accelerated tenderizing of meat.

Equipment for ruling line scales.—The machine which employs light waves for stepping off the length of the meter was completed, and a similar ruling machine for making decimeter scales was also perfected. With this machine, scales such as decimeters subdivided into millimeters, millimeters subdivided into hundredths, inches subdivided into 40 or 100 equal intervals, and scales having intervals of 1,000 to 100,000 lines per inch, have been ruled without measurable error. These shorter scales are used, without correction charts, as standards in industry, for calibrating micrometer microscopes, for determining the magnification of microphotographic systems, etc.

Decolorizing media.—A large industry for the production of bone chars, vegetable carbons, and substances with analogous properties has been developed in this country. The effectiveness of decolorizing media varies greatly with the type of raw material used in their preparation. Improvement has been retarded by the lack of fundamental data on the functioning of decolorizing media when applied to solutions. In cooperation with a representative group of industries, a study has been started of the fundamental principles involved in the removal of color by bone chars, vegetable carbons,

and analogous substances. A comprehensive bibliography of existing scientific literature on the carbons has been obtained, and a technique developed for determining the total surface area of a given decolorizing material, irrespective of the degree to which that area may be ascribed to the porosity of the material. This has been accomplished by measuring the adsorption of pure nitrogen on a char at liquid oxygen temperature (−183° C.).

CHEMISTRY

Density of gases.—Density is directly involved in the measurement of gases by orifice meters, on which the sale of great quantities of gas is based, particularly in the natural-gas industry. For this reason, a study has been made of the available methods of determining gas density. This included an investigation of the operation and sources of error in 11 commercial instruments of widely different types.

Measurement of liquefied petroleum gas fuel.—Volumetric methods at present used for measuring "liquefied petroleum" gas fuel are inaccurate. A more satisfactory method has been found, based on the relations between vapor pressure and heating value of this class of materials.

Comparative tests of chemical glassware.—Tests have been made to determine the relative resistance to aqueous solutions and other reagents of the four brands of laboratory glassware available in the United States. Determinations of thermal expansion were made by the Weights and Measures Division, and tests of quality of annealing, uniformity of glass distribution, and resistance to thermal and mechanical shocks by the Clay and Silicate Products Division. The results will shortly be published for the guidance of governmental agencies and the public in selecting laboratory glassware.

Methods of analysis.—New improved methods of analysis were published on: Colorimetric determination of arsenic in ferrous and nonferrous alloys (RP1267); the separation and colorimetric determination of rhenium and molybdenum (RP1248); and the handling of hygroscopic substances in microchemical determinations of carbon and hydrogen.

One of the troublesome problems of the platinum metal analyst is to get the materials into solution. Progress was made in developing a method for doing this by the use of hydrochloric-nitric acid mixture in sealed glass vessels at high temperatures. Rhodium, ruthenium, and osmium can be dissolved rather readily, at about 200° C. Iridium is the most refractory in this respect, but substantially complete solution of crystalline iridium can be accomplished at 300° in several days' time. Preliminary studies have been made of the pressures developed during this treatment, using a new device which will be generally applicable to the measurement of high vapor pressures of corrosive liquids. At 250° C. the pressure is of the order of 1,500 pounds per square inch.

Cooperative analyses have been made by approximately 40 industrial, educational, and commercial testing laboratories of a single gas mixture, typical of manufactured fuel gas. The study of the results, in comparison with analyses and tests of various kinds made

by the Bureau, is expected to give a much better picture than exists at present of the accuracy obtainable by various methods of analysis and different operators.

An investigation of the accuracy of various methods of determining mercury in air has resulted in an examination of all Bureau laboratories in which a hazard from this source might exist, and in the improvement of conditions wherever an appreciable amount of mercury was found. An investigation to determine whether the health of employees has been affected is being made by the Public Health Service.

In cooperation with the Chemo-Medical Research Institute, Georgetown University, the cystine content of insulin was determined by the polarographic method and compared with values obtained by other methods. The results are of value for medical and biological purposes. (J. Biol. Chem. 130, 741 (1939).)

Standard samples.—Six renewal samples were prepared, comprising two open-hearth steels, a ferromanganese, a magnetite ore, a cast bronze, and sodium oxalate. Stocks now on hand represent standard samples of 118 different kinds. These are used as standards for physical measurements and for checking analytical processes in industrial, commercial, and scientific laboratories. Approximately 10,300 individual samples were sold, an increase of 20 percent over the previous year.

Physical constants of pure substances.—Accurately determined constants are the best criteria of the identity and purity of many crystalline organic compounds. The preparation of pure organic compounds for optical crystallographic study was continued, and the optical constants of some of them were determined.

Two years ago the technique of measuring the freezing range of benzoic acid was developed to the point where concentrations of impurities of the order of 0.01-mole percent could be determined. This technique has since been greatly refined, and it is now possible to determine the relative purity of benzoic acid in the neighborhood of 99.999 percent. Three samples prepared at the Bureau were found to have this order of purity. The procedure will be tried with several other substances to determine its general applicability.

Relations between boiling point and vapor pressure for n-heptane and 2,2,4-trimethylpentane were obtained over the range 100 to 1,500 millimenters pressure (RP1280).

Thermochemistry.—Measurements were completed of the heats of combustion of 3-methylpentane, 2,2-dimethylbutane, 2,3-dimethylbutane, normal heptane, and 2-methylheptane, and of the difference in the heats of vaporization of ordinary water and deuterium oxide ("heavy" water).

Values were calculated for the following thermodynamic properties: Heat and free energy of formation of deuterium oxide; heats of formation of 8 paraffin hydrocarbons (through the pentanes), 16 olefin hydrocarbons (through the pentenes), and 3 acetylene hydrocarbons; heats and free energies of isomerization of the five isomeric hexanes. The latter data are needed by the petroleum industry in determining the optimum temperatures for obtaining maximum amounts of the more highly branched paraffin hydro-

carbons. These have a high degree of freedom from knock when used as fuel in automotive engines.

Constitution of petroleum.—Work in cooperation with the American Petroleum Institute on the separation of petroleum into its constituent hydrocarbons led to the following results: The separation of five new hydrocarbons, 1-methyl, 3-ethylbenzene, 1-methyl, 4-ethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, and 1,2,3,4-tetramethylbenzene; the assembly of three new distillation columns of high efficiency, of two 56-foot extraction columns for separating naphthenes from paraffins in the kerosene fraction, of a boiling-point apparatus, and of an apparatus for extracting lubricating oil.

Electroplating.—The results of exposure tests of electroplated metals have been published (RP1293), and specifications for such coatings have been submitted to technical societies for adoption.

During electrodeposition, the film of solution adjacent to the cathode has a different composition than the body of solution. It has been shown that its composition may be determined by rapidly freezing it during electrolysis, and analyzing successive layers of the frozen film. Further work is in progress. Studies have also been continued on current distribution during electrodeposition.

MECHANICS AND SOUND

Acoustics.—The control of acoustic properties and the reduction of noise are now recognized as factors which should be considered at an early stage in the design of many types of structures, including auditoriums, courtrooms, offices, and apartment houses, as well as manufacturing plants, buildings for testing airplane engines, and similar special occupancies. Last year the Bureau made examinations, analyses, or tests in some 35 structures occupied or built by the Federal Government. Sound absorption measurements were made on 106 large samples and 49 small samples of sound-absorbing materials, and transmission measurements were made on 9 panels. Data on the properties of sound-absorbing materials were issued to architects and others interested (LC573). A paper was published on the effect of painting on the sound absorption of many of these materials (RP1298).

A report was issued on all the measurements made at the Bureau on the sound insulation of partitions and floors (BMS17).

A report prepared by the Bureau on the principles, practice, and progress of noise reduction in airplanes was issued by the National Advisory Committee for Aeronautics (Technical Note 748).

Other acoustic work included the study of audiometers and hearing aids, the testing of sound-on-film projectors, preparation of specifications for acoustic materials, calibration of microphones and sound meters, and the development and intercomparison of methods for absolute sound measurements.

Fire extinguishing devices.—In addition to the usual examination and testing of equipment for the Bureau of Marine Inspection and Navigation, a special investigation of fire-detecting and -extinguishing equipment for airplane power plants was undertaken in cooperation with the Civil Aeronautics Authority. An engine nacelle with stub

wings was constructed, in which was mounted an operating airplane engine. The equipment was set up in front of the Bureau's 10-foot tunnel, the wind stream being reversed to blow toward the assembly. Over 400 test fires have so far been made in this equipment. Carbon dioxide, carbon tetrachloride, methyl bromide, and sodium bicarbonate powder have been used as extinguishing media. The results have been quite satisfactory, indicating that extinguishing systems of reasonable weight and of considerable effectiveness can be designed for engine nacelles.

Engineering instruments and appliances.—Approximately 1,500 instruments were calibrated, principally for the various engineering and inspectional bureaus of the Government. Tests or investigations were made of some 200 appliances, including mail metering devices for the Post Office Department, and safety devices, heating, office, and miscellaneous appliances for the various Federal bureaus.

Aircraft instruments.—An investigation of the performance of sphygmomanometers as pressure gages is in progress in cooperation with the American Heart Association. A circular on mercury barometer standards for testing altimeters and aneroid barometers is in preparation.

The studies of lubricants for timepieces and instruments and of methods of controlling and measuring humidity at low temperatures, which the Bureau has been making for the Bureau of Aeronautics, Navy Department, have been continued. Specifications were prepared on electrical engine-gage units and synchronous electrical instruments.

In cooperation with the National Advisory Committee for Aeronautics, an investigation of the performance of corrugated diaphragms, useful in pressure elements, and an investigation of dashpot damping devices have been in progress.

Aerodynamic investigations.—In cooperation with the National Advisory Committee for Aeronautics, methods were developed for greatly reducing the turbulence in wind tunnels and for measuring small values of turbulence.

Rigid frames.—Strength and stress distribution studies, in cooperation with the American Institute of Steel Construction, of three steel rigid frames have been completed (RP1130, RP1161, and RP1224). As engineers now have a definite basis for the design of steel rigid frames, they have confidence in their safety. The extensive use of rigid frames since these results have been available has resulted in large cost savings for the country.

Airplane vibration.—An increasing number of vibration problems have arisen with higher speeds of airplanes and the decrease in weight of airplane engines. The Bureau has been active in this field, beginning with an experimental and theoretical study of propeller vibration (RP678, RP764, and RP1148). The conditions for failure by vibration are being investigated for wing beams by axial fatigue tests of complete wing beams using the resonance method described in NACA Technical Note 660. Devices for measuring dynamic strains, accelerations, and displacements in airplanes in flight have been calibrated, particularly for the Navy Department, by means of specially constructed equipment. A number of improvements have been suggested in the design of these devices, the most important being compensation for inertia effects (RP1005).

Friction losses in dredge lines.—Many millions of dollars are spent annually in the United States for dredging rivers and harbors. Often, the dredged material must be pumped through long pipe lines in order to dispose of it, and although the pressure loss in these pipes because of friction accounts for the major portion of the power consumed, very little is known about it. The Bureau is, therefore, investigating the resistance to flow of sand-water mixtures through pipes. As a result of this work, which is being conducted in cooperation with the Corps of Engineers of the United States Army, it is hoped to place the design of dredge lines on a more scientific basis.

Theory of flood waves.—When severe floods occur, the protection of life and property depends to a large extent on ability to predict the progress and height of the floods as they move downstream. At the suggestion of the United States Weather Bureau, the Bureau is preparing a series of papers on the subject of translation waves in channels, including flood waves. The first of these papers, on the mathematical theory of irrotational translation waves, has been published (RP1272). Other papers dealing, respectively, with the effect of turbulence and of channel shape and slope on the travel of translation waves, and with the quasi-steady regime of rivers and the prediction of floods, are in preparation.

ORGANIC AND FIBROUS MATERIALS

Automobile brake linings.—The effectiveness of an automobile brake is determined primarily by the friction between the brake lining and the drum. This friction depends on the force applied to the pedal, on the design of the braking equipment, and, to a considerable extent, on the characteristics of the lining. The coefficient of friction between the lining and the drum is not a constant quantity. It varies with linings of different makes and even with the same lining. The coefficient may change with wear and depends upon whether the lining is wet or dry. If the coefficient gets too high, the brake may "seize" and stop the car too suddenly; if too low, control of the car is lost. A machine has been designed and constructed at the Bureau for making service tests of brake linings (RP1207) with which measurements of the coefficient of friction can be made when the lining is hot or cold, wet or dry, new or worn. After a considerable period of trial, the machine is now being used to test Government purchases of brake linings, and it is hoped that the work will lead to standards of quality for brake linings for the benefit of the general public (LC556).

Drying of textiles.—Dyeing, bleaching, and finishing are all "wet processes," so that before a fabric is ready for market it has been wetted and dried several times. Not only does this make the cost of drying a considerable item, but the effect of the repeated drying on the quality of the fabric may be of even greater significance. Commercial driers were formerly designed with the belief that a high rate of drying could best be achieved by using the highest temperature the fabric would stand. The textile industry was not satisfied with the results obtained, and the United States Institute for Textile Research accordingly sponsored a fellowship at the Bureau to obtain

the information needed to develop correct drying procedures. The first step was to determine the laws relating the 4 drying variables to the moisture content of 16 kinds of fibers. These variables are time, temperature, humidity, and speed of air flow. Then it was necessary to relate the moisture content with those physical properties of the fibers (such as tensile strength) upon which their value depends. The work has been completed, and will be embodied in a series of 5 reports, 2 of which have already been published (RP1303 and RP1304). High temperatures have been found to have deleterious effects on the fibers, especially when accompanied by high humidity, as is likely to be the case in the usual type of drier. By increasing the air flow to several times that ordinarily used, textiles can be dried more quickly without raising the temperature to the danger point. This discovery should permit the drying of textiles without damage, and at a faster rate and therefore at a lower cost.

Building boards and papers.—Last year the Bureau reported on the qualities of 11 kinds of building boards and 21 kinds of papers, all of which were tested when new. This year an accelerated aging test was developed which has made it possible to predict how the boards will react to the usual conditions of service, such as wetting and drying and attack by molds (BMS50). Two new types of boards have been examined, when new and after aging: Sheathing board, which is 25/32 inch thick and waterproofed, designed to be used in place of wood sheathing; and wall tile—a thin, dense board with an enamelled surface—designed to be used in place of ceramic tile for the walls and ceilings of kitchens. The sheathing boards seem to compare favorably with the ordinary wood sheathing. They are quite resistant to molds, are well waterproofed, and have ample strength for the purpose. Most of the wall tile are equally satisfactory, though some makes showed a tendency to warp or fade. They are all remarkably resistant to scrubbing with the usual cleansing compounds.

Floor coverings.—The test chamber for floor coverings houses a circular track, on which 40 samples of coverings are laid, and over which a heavy, steel-tired truck is run. The truck is driven by a walking wheel, which is shod with leather for the first 24,000 cycles, and with abrasive cloth for the second 24,000 cycles. The samples are then examined and the depth of the grooves worn by the tires and the walking wheel is measured. The 3 runs of 40 samples each, included 53 varieties of floor coverings, such as linoleum, rubber, asphalt, magnesite, and wood. The other samples were used to determine the relative effects of a concrete or wood subfloor, of different kinds of adhesives, and whether or not a felt liner is advantageous (BMS34, BMS43). Separate tests were made on 34 varieties of commercial adhesives, and the report on these tests will be issued shortly. In general, it can be said that both floor coverings and adhesives stood up remarkably well under this unusually severe test.

METALLURGY

Aircraft metals.—The study of aircraft metals was continued as a major project, in close cooperation with various Federal agencies.

Basic investigations of the pseudo-elastic properties of stainless steel and other structural cold-worked wrought alloys were summarized in two technical reports of the National Advisory Committee for Aeronautics. These were supplemented by similar studies at low temperatures. The effect of a temperature of −80° C. on the impact strength and fatigue resistance of welded steel joints was investigated. In order to discover any indications of deterioration, the tensile-impact properties of specimens previously fatigue-stressed, were determined. Minute cracks which were almost invariably found by microscopic and magnetic methods, accounted for a marked decrease in impact resistance, and gave evidence of early fatigue damage. Methods are being studied for removing the damaged surface layer and thus restoring the metal to its initial condition. Interrupted fatigue tests show the beneficial effect of intermittent rest periods, but this is too small to be of practical importance.

Space permits only the briefest mention of other investigations. Protective chromium coatings on steel propeller blades have been shown to lower the fatigue limit in certain cases. The study of methods for finishing magnesium was expanded to include cooperative tests with industry and other Government laboratories. The usefulness of solution potential measurements as a nondestructive means for predicting the character of the corrosive attack in aluminum alloys was demonstrated, but the method cannot be recommended as yet for the inspector in the factory. Extended studies have been made of parts of airplanes which failed in service. Tests were made of aircraft steel tubing from all commercial sources, looking toward a revision of specifications.

Silver in industry.—Since 1937 the American Silver Producers have supported an investigation of industrial uses for silver. This has been conducted under the Research Associate plan, with headquarters at the Bureau. The aim has not been to work out methods of plant operation, but rather to acquaint the interested industries with the developments and to help them in overcoming initial difficulties. The work has now been concluded, and a comprehensive book, "Silver in Industry," summarizing the results, is being printed by the sponsors. New developments meriting special mention are silver coatings on shipping containers, silver-containing (tin-free) solders, improvement of many engineering alloys by small silver additions, silver electrical contacts, and silver fungicidal agents.

Corrosion.—The life of aircraft metals in sheet form under prolonged exposure to seemingly mild conditions has continued to receive attention. Aluminum alloys, magnesium alloys, and stainless steels were the materials used, the exposure being in a marine atmosphere (Hampton Roads, Va.), with intermittent wetting by the tide in one series. The tensile properties of the weathered sheet metal were used as the criterion, except in the case of the stainless steel, for which fatigue tests were found to be most informative. The corrosion of metals joined by riveting and spot welding has been specially studied. A paper on the chemical treatment of water to inhibit corrosion of steel, a subject of special interest in air conditioning, was published (RP1305), as well as a general account of the effect of combined fatigue and corrosion in fresh water (RP1307).

Corrosion products from ferrous pipe subjected to long-time "flow" tests in Washington domestic water have been removed and studied at 6-month intervals. These experiments are being supplemented by special service tests in the Bureau's own lines.

Ferrous metals.—Detailed metallographic surveys and other tests of welded assemblies of ship plate have been made for the Navy Department as part of their extensive welding research. The development of a suitable domestic steel for engraving plates is under way for the Bureau of Engraving and Printing. The hardenability of steel with special reference to influence of austenitic grain size has been studied, using high-purity alloys of iron and carbon (RP1225, RP1308). An account was published summarizing the preparation and properties of high-purity iron, less than 0.010 percent impurity (RP1226). However, it is hoped that eventually a metal still closer to elemental iron can be produced. Extreme precautions are necessary, such as analysis of distilled water used for washing. Most characteristic properties of the high-purity iron have been determined, as the basis for a report on this subject. The development of refractory crucibles of unusual composition and purity has been required in this work (RP1236). Bricks and special shapes have been made and utilized in constructing a high-temperature gas furnace.

A study of the rate of surface oxidation of steels is summarized in a recent report (RP1221). The unusual behavior of stainless steel received special attention. This material oxidizes readily to a bright blue on heating in an enclosed space evacuated to a degree sufficient to prevent oxidation of ordinary steels. The study of gases in metals has continued, with emphasis on the determination of hydrogen in steel. A publication on the elastic properties of high-strength cast iron will soon be ready.

Nonferrous metals.—The report on the durability of soldered joints in copper plumbing lines (a cooperative project with the Copper and Brass Research Association and the American Standards Association) is in press. Incidental to this investigation, a study has been made of the tendency of certain solders to deteriorate upon prolonged service at elevated temperature by alloying action with the second metal member of the joint. Continued study of the plastic flow of copper by the cold working of single-crystal specimens has served to explain many points left obscure in the earlier work. In the study of copper-base ingot metals, "85–5–5–5" alloy, emphasis has been placed on the effects of combined impurities. "Hot shortness," claimed to result from certain specific impurities, has been shown to be associated with faulty foundry technique. Results of the study of this important alloy have been summarized for the handbook of the American Ingot Metals Association. The theoretical aspects of the creep of metals at elevated temperatures are being studied, using copper and Monel metal.

CLAY AND SILICATE PRODUCTS

Optical glass, glazes, and enamels.—The production of high-quality optical glass for the Navy and for reserve purposes has been continued. A study of available data on the composition and optical properties of glass led to the conclusion that the contributions of

the glass-forming oxides to the optical properties are simple functions of the periodicity of the chemical elements. This is of decided interest and importance in optical glass manufacture.

Cooperating with scientific and technical groups, an improved test was developed for determining the amount of alkali dissolved from the inside surface of bottles by water and dilute acids. Results showed that (1) phenol red, chlorphenol red, bromthymol blue, methyl red, or paranitro-phenol are very satisfactory for titrating the acid extracts, and that (2) accuracy can best be obtained by acidifying and boiling the water extracts before titration, using one of the indicators mentioned above.

The determination of fundamental glaze reactions is being continued by an investigation of phase relations in the lead-alumina-silica system. A report on the lead-boron-silica system was published during the year (RP1231).

Vitreous enameled architectural panels for exterior use were installed at St. Louis, Mo., Lakeland, Fla., and Washington, D. C., for long-term weathering tests to select the most durable types. Parallel accelerated laboratory tests include exposure to ultraviolet radiation and autoclave treatment with superheated steam. A method was worked out for determining the thickness of the acid-resistant portion of porcelain enamel coatings on formed-metal sanitary ware and other enameled articles purchased on specification. Standard quality tests for porcelain enamels were developed in cooperation with a committee of the industry (RP1237).

The laboratory work on low-cost glaze for structural clay products is nearly completed and the report is being prepared for publication.

Ceramic whiteware and refractories.—An investigation of the shrinkage of white-burning clayware during heating in the kilns was conducted, using 13 clays and 3 bodies. Shrinkage of individual clays ranged from 8 to 16 percent. The measurements were made with a dilatometer specially designed for the purpose. The results of this investigation (RP1311) will help manufacturers to obtain a better and more uniform product.

Four refractory bonding materials—ground-fire clay, air-setting wet, air-setting dry, and hot-setting types of mortars—are marketed for laying firebrick. Federal specifications cover ground-fire clay and the air-setting wet type of mortar. Sixteen air-setting dry mortars and 12 hot-setting mortars have been studied in order to prepare specifications for them also. The 4 bonding materials will thus be definitely classified, and confusion regarding them should be eliminated. The study has shown that air-setting mortars of the dry type deteriorate rapidly when stored in burlap sacks having a so-called moisture-proof lining.

Cement, concrete, lime, and gypsum.—A vibrator was designed for fabricating mortar test cubes, so as to reduce the variation in strengths obtained in hand fabricated specimens (RP1273). Both this vibrator and a commercial (barrel packer) vibrator produced more uniform specimens than could be made by hand. The vibrator could also be used to measure the consistency of mortars as dry as required for fabrication by vibration.

A portable apparatus was developed (RP1252) for determining the relative wear resistance of concrete and mortar floors (RP1252).

The relative wear resistance of various mixtures was determined, as well as the effect of variations in the cement-water ratio, curing, grading, and the time interval between placing and troweling and curing.

Apparatus utilizing air permeability has proved to be rapid and precise in the measurement of fineness of cement and other finely ground powders and in connection with the determination of the modulus of elasticity of concrete.

The quality of finishes of cement-water paints was found to depend more upon the method of use than upon composition. In particular, the appearance, durability, and resistance to rain penetration depend largely upon the nature of the backing, its moisture content at time of painting, the type of brushes used in applying the paint, and the method of curing.

Measurements of distribution of stress in reinforcement bars imbedded in concrete pull-out specimens indicated that the bond stress with four types of bars commonly used in construction, was greatest at the loaded end of the bar and least in the interior of the specimen or at the free end of the bar. With smooth cold-rolled steel the bond stress was greatest at the free end and with plain hot-rolled steel it was symmetrically distributed, being least near the middle of the specimen.

Continued study of the glassy phase in portland cement clinker, in cooperation with the Portland Cement Association, has shown that the sulfate resistance of these cements is improved by the quick cooling of the clinker, particularly when the composition shows a relatively high ratio of alumina to iron oxide. This quick cooling results in higher glass content and a lower content of crystalline tricalcium aluminate. Further studies have revealed definite relations between composition or heat treatment of clinker and the bleeding and plasticity of pastes prepared from the corresponding cements.

Inspection of Government-owned and private buildings in the interior of the country has shown that failures of white-coat plaster are as prevalent as in the Washington, D. C., area where the first survey was made. The Bureau, in cooperation with various lime companies, has demonstrated that commercial production of a completely hydrated dolomitic lime is practical, and such lime is now being produced by several manufacturers. Some Government agencies are now specifying these improved hydrates in lieu of those formerly used.

Cement Reference Laboratory.—The Cement Reference Laboratory, a cooperative project of the Bureau and the American Society for Testing Materials, has nearly completed its sixth inspection tour, during which about 300 cement testing laboratories were visited. The scope of the service was enlarged to include additional apparatus.

More than 200 laboratories participated in the tests of a sample of cement for comparison purposes. The results were summarized and the report distributed to the participants. Two additional comparison samples, for chemical determinations only, were prepared for distribution.

Branch laboratories.—More than 8,000,000 barrels of cement were tested for the Federal Government by the Bureau and its branch

laboratories at Seattle, Wash.; San Francisco, Permanente, and Riverside, Calif.; Denver, Colo.; and Allentown, Pa. This represents an increase of 1,000,000 barrels over the testing of the previous year. The branch at Permanente, Calif., was established primarily for testing cement for Shasta Dam.

Masonry.—Observations of masonry specimens exposed to the action of weather have shown rather large volume changes on panels built from some mortars containing chemically active ingredients. Measurements show that the masonry expanded, but the cracks were similar in appearance to those caused by shrinkage.

The resistance of masonry walls to rain penetration was found to be governed more by the method of laying the joints than by any other factor. Most walls with solidly filled vertical joints (however obtained), or with a continuous parging of mortar in the interior, were highly resistant. The likelihood of obtaining a complete bond of mortar to brick and watertight joints was greatest when the bricks were as wet as they could be made without excessive floating and the joints were completely filled with a water-retentive mortar. Facings of stucco, when properly applied, were found to be highly resistant. Exposure of masonry walls to the weather did not increase their water permeability if they were composed of materials resistant to frost action.

Measurements have been made on an experimental masonry structure to determine the nature of the deformations and deflections which have resulted in cracks in many buildings composed of masonry bearing walls and reinforced concrete floor and roof slabs. The central portion of the roof slab was found to have deflected downward and to have curled upward at the corners. These movements and the shortening of the slab, both of which result largely from the shrinkage of the concrete during drying, and the elastic and plastic deformation of the concrete under the dead loads, are believed to be responsible for the cracking of masonry walls at the corners of buildings.

Studies of plastic calking compounds (BMS33) have led to a quality specification which is now being used by the Government.

SIMPLIFIED PRACTICE

New, revised, and reaffirmed recommendations.—New Simplified Practice Recommendations for cast-iron radiators and paper containers for foods and beverages were promulgated. Surveys of 22 existing recommendations resulted in the reaffirmation of 11, and complete revision of 11. Three of the latter had been in use for more than 10 years, during which period each had been reaffirmed repeatedly. The sales records of 5 others, obviously not in need of changes, indicated reprinted editions to meet a continuing demand by the public.

Softwood lumber.—The review of American Lumber Standards for Softwoods, commenced in 1937, resulted in a new revised edition, "R16–39," hundreds of copies of which have been purchased by the public and tax-supported agencies, because of the prevailing interest in matters pertaining to building construction. This recommendation will be recognized by the Federal Specifications Executive Com-

mittee, and it will be closely observed by such Government establishments as the Federal Housing Administration, particularly in regard to size standards. Lumber importers in Central and South America and other foreign countries will find this recommendation informative and useful.

Uses of Simplified Practice Recommendations.—Engineering handbooks, school textbooks, and business circulars are, to an increasing extent, drawing attention to the advantages of simplified practice as an element of industrial management. Thirty specific recommendations will be used as the nucleus for a new Manual of Standards for Hospital Equipment and Supplies. A recently published Wrapping Supply Manual, composed entirely of one new and four existing recommendations, is intended to make substantial savings possible for the department and specialty stores that use these supplies, as well as the manufactures of them.

TRADE STANDARDS

Commercial standards printed and promulgated.—Twelve commercial standards were promulgated in mimeographed form and nine were issued in printed form for book cloths, buckrams, woven dress fabrics, oil burners, builders' hardware, pipe nipples, sanitary cast iron enameled ware, fuel oils, Stoddard solvent, sunglass lenses (two kinds), solid hardwood wall paneling, hardwood interior trim, Douglas fir standard stock doors, and boys' button-on waists. These standards are made a part of sales contracts (and enforcible as such) by voluntary guaranties on invoices, labels, or marks on the goods themselves. They aid the buyer in his choice and provide a basis for fair competition.

Mechanical draft oil burners.—Commercial Standard CS75–39 (Automatic Mechanical Draft Oil Burners Designed for Domestic Installations), promulgated August 18, 1939, represents one of the most difficult and ambitious undertakings in this direction in any industry. The standard covers general requirements, manufacturing, and production tests, laboratory requirements and test procedure, performance tests on each burner after installation, and a certificate to be placed with each burner. This certificate records the manufacturer's warranty of compliance with the Commercial Standard, the installer's record of the heating load supplied by the boiler and the results of tests after installation, such as the percentage of carbon dioxide in the flue gas, the stack temperature, draft, and the firing rate. By means of the certificate, definite legal responsibility is voluntarily assumed by the manufacturer and by the installing contractor. The burners will also bear an inspection label issued by the Underwriters' Laboratories, which has been selected as the central inspection agency for this industry.

Conferences.—Fifty-six conferences, including four general or public conferences, were held with representative groups of consumers, distributors, producers, and testing laboratories in the development and establishment of a wide range of commercial standards. Written acceptances of commercial standards as the standard practice in buy-

ing and selling these products were filed by responsible officers of 4,240 companies and organizations.

Standards for exports.—Upon authority from the Congress the work was extended to the establishment of standards for exports as a basis for voluntary inspection or tests prior to shipment and voluntary certification of quality to facilitate acceptance, improve the reputation of, and expand foreign markets for quality goods of American manufacture in the face of intensified European price competition or barter.

With the cooperation of the respective industries and after careful technical study, drafts of standards for exports were developed for builders' hardware; power shovels, cranes, and dragline excavators; oak flooring; hardwood dimension lumber; and gold-filled articles. The last four of these, together with specifications for ground-glass joints, stopcocks, and stoppers (CS21–39) were forwarded to the Bureau of Foreign and Domestic Commerce for translation into Spanish and Portuguese.

CODES AND SPECIFICATIONS

Building codes.—A study of current building regulations fails to confirm the common belief that in most cases the matter of new materials and methods of construction has been ignored or inadequately covered. The trouble lies rather with the cumbersome methods set up for dealing with new situations as they arise than with the regulations themselves.

Sizes of building units.—In order to reduce construction costs, an effort is being made to coordinate the sizes of different types of building materials. Similar work is in progress on structural clay, concrete and cast-stone masonry units; wood doors and windows; metal windows; and natural stone.

Safety codes.—The fifth edition of the National Electrical Safety Code is being published as six separate documents in the Bureau's Handbook series, as follows: H31, Safety rules for the installation and maintenance of electric supply stations; H32, Safety rules for the installation and maintenance of electric supply and communication lines; H33, Safety rules for the installation and maintenance of electric utilization equipment; H34, Safety rules for the operation of electric equipment and lines; H35, Safety rules for radio installations; H36, Safety rules for electric fences. Manuscript of all of these parts was prepared during the past year, except H34, which was issued in October 1938.

Facilitating the use of specifications.—The total number of lists of sources of supply of commodities guaranteed to comply with the requirements of Federal specifications and commercial standards was increased to 742, with signed requests for about 25,000 separate listings from 13,632 firms. Information concerning the certification plan and the lists of willing-to-certify sources of supply, and copies of Federal specifications were sent in compliance with 1,680 specific requests from interested purchasing agents, other consumers, and manufacturers.

Services to tax-supported agencies and consumers.—The year has witnessed a steady increase in the requests for assistance from Federal,

State, county, and municipal tax-supported agencies. Many of these agencies are taking advantage of the services available at the Bureau, including aid in preparing building, plumbing, and safety codes and in solving purchasing problems. In order to learn how to render the most efficient aid to county officials, a survey was made of the purchasing methods used by the counties throughout the country. The specification method of buying is used in about 70 percent of the 747 counties which supplied information. The specifications utilized include those of the Federal, State, and local governments, various technical societies, and trade associations. An article devoted to this survey was published in the National Municipal Review, June 1940.

As part of the national defense program, first-hand, up-to-date information was obtained concerning the standardization and simplification activities of national technical societies and trade associations. All of the nongovernmental, as well as the governmental standardizing and specifications-using agencies cooperated willingly by supplying copies of their standards, specifications, codes, and similar documents which are being used in revising the "National Directory of Commodity Specifications." The publication, "Services of the National Bureau of Standards to the Consumer" has been sent to press five times, and more than 14,000 copies have been distributed.

BUILDING MATERIALS AND STRUCTURES

Structural properties of building constructions.—The structural properties of 23 constructions intended for low-cost housing were determined. Five of these were earth wall constructions in which the United States Indian Service, National Youth Administration, and the Department of Agriculture were interested. One of the published reports (BMS25) describes tests of conventional wood-frame constructions performed at the Forest Products Laboratory. Data from the tests on 88 constructions made during the 3-year program are being correlated with a view to the publication of tentative performance standards.

Roofing materials.—Two reports have been prepared dealing with specific classes of roofing materials in common use; metallic roofing (BMS49) and asphalt-prepared roofing (in press). These publications describe the various types of conventional and commercially available materials suitable for low-cost house construction.

In cooperation with other Government agencies additional information has been obtained on roofing materials used in different sections of the country, and their relative merits as determined from service records. A report on the status of roofing throughout the country has been prepared with the help of the Home Owners' Loan Corporation and the Federal Housing Administration.

Protection of steel against corrosion.—A report (BMS44) was published which summarized the results of tests by different methods on treated and painted steel and galvanized steel samples. Pretreatments of the clean metal by the phosphate type of treatment for both plain and galvanized surfaces showed outstanding merit in improving the protective value of paints under widely varying laboratory corrosive

conditions. Particularly effective protection was obtained when such pretreatments were used in combination with a primer containing an inhibitor such as zinc chromate. It is believed that sufficient information has been acquired by tests of this character, so the laboratory tests are being terminated. The supplementary outdoor exposure tests, however, which are required to complete the survey, will be continued and may require several years.

Exterior masonry paint.—The scope of this investigation has been broadened to include all types of paint finishes suitable as decorative, protective, and waterproof coatings for exterior masonry wall surfaces. Outdoor exposure tests of 325 coated test panels and 113 coated wall specimens of cinder block, concrete block, cast-in-place concrete, common brick, and used brick are in progress. The tests include observations as to durability, the effects of excessive moisture, and resistance to staining, soluble alkaline salts, and efflorescence.

Plumbing.—With the cooperation of the Central Housing Committee on research, design, and construction, a recommended plumbing manual for Federal use is in preparation. Part I, the introduction, and part II, general requirements and specific requirements applicable to all types and sizes of buildings, are complete in manuscript form. Part III, applicable current standards and specifications, tabular data relating to plumbing design and construction, and illustrated interpretations of the requirements of part II, is nearly finished. Experiments on the more scientific design of plumbing systems were continued.

Radiator and convector tests.—The apparatus for radiator and convector testing has been in continuous use, and 24 convectors and 1 radiator have been tested. Of these, 2 were tested for the Veterans' Administration, 2 for the Department of Agriculture, 1 for the Housing Authority of the city of Omaha, and 1 for the United States Housing Authority. Four were tested in connection with a cooperative program of the University of Illinois. A supplemental report was published in June, and makes available to governmental agencies the test data obtained up to April 20, 1940.

Heat transfer tests of wall sections.—The hot-box test apparatus was completed, and has been in use since March 1. Twenty-eight wall sections or modifications have been tested, 26 of which were of frame or sheet-metal construction, while 2 were of monolithic rammed earth.

Heating plants and appliances.—A series of tests was made on a typical oil-fired cast-iron boiler to determine the applicability of Code C of the Institute of Boiler and Radiator Manufacturers to rating boilers for the use of the Federal housing agencies. These tests led to an investigation of the effect of soot on the heating surfaces of an oil-fired cast-iron boiler (BMS54).

Heat distribution and temperature gradients.—A four-room, one-story, frame dwelling was erected on the Bureau grounds to serve as a laboratory for studying heating plants and heating methods from the standpoint of comfort and economy. Measuring instruments were installed to show the temperature distribution throughout the structure.

During the 4-month period from January 1 to April 30, the house was calibrated by the use of an electric heater. Subsequently, five floor furnaces, two space heaters, one hot-air furnace, and an air circulating device were installed in succession and observations taken on the resulting temperature distribution. Reports are being prepared covering these hot-air heating systems.

Roof insulation.—Using a test structure with separate ceiling panels insulated in various ways, ceiling temperatures were measured under the panels, as a means of comparing the effectiveness of the insulation in excluding heat from the room below it. While but little difference could be found in the efficiency of the different materials, the advisability of using insulation, particularly in houses with no attic, was apparent (BMS52).

Fire-resistance ratings.—A compilation of fire-resistance ratings of building materials and constructions was begun, based on all available test data. The work on load-bearing masonry walls, columns, and roofing materials is completed. As an aid in applying such ratings, information based on actual tests was obtained, showing the severity of fires in given amounts of combustible contents and trim. Fires which completely consumed the contents of a residential occupancy aggregating 5½ to 12 pounds per square foot of floor area, had a severity equivalent to that of the first ½ to 1 hour exposure to the standard furnace test.

Combustible contents of buildings.—Surveys of combustible contents of warehouses, schools, and residential buildings were made in cooperation with other Government agencies. Those in the main rooms of residential buildings were found to be in the range 6 to 14 pounds per square foot, the highest single average for an area occupied by one family being 10 pounds per square foot. This indicated the possibility of safely reducing structural protection for fully fire-resistive dwellings, which are now generally required to have 2- to 4-hour fire ratings.

Simplified Practice Recommendations.—In addition to completing the revision of Simplified Practice Recommendation R16–29, Lumber, generally known as American Lumber Standards, several other recommendations for building materials were revised and made current with industrial practice. A new recommendation for large tube cast-iron radiators was completed. Data for revising the recommendation on hollow building tile are now being collected, and similar work in connection with the revision of the recommendation for metal windows has been completed.

Commercial standards.—Proposed commercial standards for factory fitted Douglas fir entrance doors, hardwood stair treads and risers, and prefabricated mineral wool were drafted and submitted to the respective industries. Two commercial standards, solid hardwood wall paneling, CS74–39, and hardwood interior trim and molding, CS76–39, were issued in printed form. An amendment of old growth Douglas fir standard stock doors, CS73–38, was issued. A revision of Douglas fir plywood, CS45–38, was circulated for written acceptance and over 90 percent of the production volume has filed acceptance. Preliminary studies were made on a revision of oak flooring, CS56–36.

GENERAL FINANCIAL STATEMENT

The amounts and objects of each appropriation for the past fiscal year, together with disbursements, liabilities, and balance for each appropriation, are shown in the following table:

Disbursements, liabilities, etc., 1940, 1939, and 1938 appropriations

Appropriations	Total appropriations [1]	Disbursements	Liabilities	Balance
Operation and administration [2]	$319,006.21	$305,488.75	$13,215.71	$301.75
Testing, inspection, and information [3]	1,155,883.26	1,077,029.08	77,382.19	1,471.99
Research and development [4]	737,589.65	729,271.16	7,841.28	477.21
Standards for commerce [5]	123,033.25	121,434.17	1,358.60	240.48
Investigation of building materials, 1940–41 [6]	198,398.78	158,117.31	2,484.65	[7] 37,796.82
Electrical building and equipment	99,412.53	17,683.93	74,086.36	[7] 7,642.24
Land	125,000.00			[7] 125,000.00
Appropriations transferred from other departments:				
Salaries and expenses, Weather Bureau	6,000.00	5,804.07	100.88	95.05
Aviation, Navy	168,819.10	163,334.93	4,733.70	750.47
Salaries and expenses, Bureau of Engraving and Printing	11,300.00	11,139.56	19.92	140.52
Distinctive paper for United States securities	2,000.00	1,997.50		2.50
Construction and repair, Bureau of Construction and Repair	10,000.00	9,437.45	503.15	59.40
Advisory Committee for Aeronautics	70,000.00	69,223.32	647.58	129.10
Incidental expenses of Army	10,000.00	9,903.98	35.22	60.80
Establishment of air navigation facilities, C. A. A	8,600.00	8,467.85	22.34	109.81
Salaries and expenses, C. A. A	20,600.00	18,173.73	2,015.88	410.39
Air Corps, Army	16,333.00	15,577.86	623.75	131.39
Maintenance, National Cancer Institute	3,000.00	2,973.41		26.59
Engineering, Bureau of Engineering	11,300.00	10,838.11	450.00	11.89
Ordnance and ordnance stores, Navy	3,000.00	2,723.35	221.55	55.10
Ordnance service and supplies, Army	3,000.00	1,535.32	1,400.69	63.99
Appropriations transferred from other departments under the provision of the Legislative Act approved June 30, 1932:				
Working fund, 1940:				
Navy—Ordnance	24,000.00	23,961.43		38.57
Yards and Docks	15,000.00	13,977.98	883.80	138.22
Treasury—Internal Revenue	6,000.00	5,907.34	52.45	40.21
Navy, Aviation	1,200.00	1,086.38	35.03	78.59
Working fund, no year:				
Maritime Commission	5,000.00	4,471.15		528.85
Navy, A. A. A	30,000.00	12,492.45	46.05	17,461.50
Treasury, Procurement Division	36,000.00	14,512.37	83.78	21,403.85
Treasury, Procurement Division	37,800.00	10,333.87	2,036.15	25,429.98
Treasury, Procurement Division	5,000.00			5,000.00
Total, 1940	3,262,275.78	2,826,897.81	190,280.71	245,097.26
Total, 1939	[8] 2,929,956.87	2,771,912.90	130,279.32	27,764.65
Total, 1938	2,774,402.98	2,687,948.57		[9] 86,454.41

[1] Includes transfers from other Departments, reimbursements received and pending, and appropriation adjustments as shown under the following footnotes:
[2] $6.21.
[3] $300,883.26.
[4] $22,589.65.
[5] $33.25.
[6] $398.78.
[7] Available in 1941.
[8] Does not include $359,600 transferred to Treasury Department, Procurement Division, Public Buildings.
[9] Includes administrative reserve of $73,640.

PATENT OFFICE

Nation-wide interest in the patent system was stirred by the observance of its sesquicentennial on April 10, 1940. The President, by proclamation, designated that date as "Inventors and patent day" and invited the people to commemorate the enactment of the first patent law as an event which, he declared, "had proved so important and salutary to this Nation."

By joint resolution the Senate and the House of Representatives authorized a commission to mark the anniversary by appropriate exercises. Members of this commission were Hon. Harry L. Hopkins, Secretary of Commerce; Hon. Charles Edison, Secretary of the Navy; Hon. Homer T. Bone, United States Senator from Washington; Hon. Charles Kramer, Representative from California; Hon. Wallace White, jr., United States Senator from Maine; Hon. Fred A. Hartley, Representative from New Jersey; Hon. Finis J. Garrett, presiding judge of the United States Court of Customs and Patent Appeals; Dr. Charles F. Kettering, director of research of General Motors Corporation, and the Commissioner of Patents. Each branch of Congress made provision for addresses recounting the history and accomplishments of the patent system during the 150 years of its operation. They were delivered by Senator Bone, Representative Kramer, and Representative Hartley.

Notable in the series of events by which the sesquicentennial was celebrated was the "Parade of inventions," an impressive exhibition of old and new patented mechanisms lent for the purpose by various industrial corporations. These products of American inventive genius were kept on display in the Department of Commerce building from April 8 to April 14. More than 40,000 persons were attracted to this "parade."

A banquet was given on the evening of April 10. This concluded the commemorative exercises having official sponsorship. Attending this dinner were officials of the executive departments, Members of Congress, and judges of the Federal courts. The addresses of the several speakers and the musical and dramatic features of the program were broadcast by radio.

Both the "Parade of inventions" and the banquet and entertainment were planned by the Patent Law Sesquicentennial Committee, appointed by the commission created by Congress.

Organizations representing industry and the patent law profession gave valuable cooperation in devising and realizing a worthy celebration. The National Association of Manufacturers sponsored recognition of living inventors. In all, 572 of these were honored as "Modern pioneers" and received special awards. Anticipating the actual date of "Inventors and patent day" (April 10), the association and local groups collaborating with it arranged for "Modern pioneer"

dinners and special exercises during February in Cleveland, Minneapolis, San Francisco, Detroit, Philadelphia, Hartford, Los Angeles, St. Louis, Baltimore, Rochester, Chicago, Boston, Cincinnati, and New York.

The American Patent Law Association offered a prize for the best essay on the benefits of the patent system submitted by a college undergraduate. A large number of students participated. The association also gave a dinner in Washington, on January 22. Among the numerous guests were Members of Congress, judges of the Federal courts in the national capital, officials of the Patent Office, and representatives of the Department of Commerce.

A booklet, "The Story of the American Patent System, 1790–1940," was published by the Department of Commerce and widely distributed.

The Patent Office Society, whose members are employes of the Patent Office, gave a dinner and dance on April 6, and published a booklet dealing with the proceedings of Congress relating to the passage of the first patent law.

On April 7, the Smithsonian Institution, in cooperation with the United States Office of Education, presented a radio program having for its subject the American inventor.

NEW LEGISLATION

Five of the group of seven bills submitted to Congress by the Secretary of Commerce in 1939 were enacted during the latest fiscal year. These bills were introduced following the hearings before the Temporary National Economic Committee at which the Commissioner of Patents presented testimony for the information of the committee, made various recommendations for improvements in the patent laws, and also arranged for the introduction of evidence by inventors, engineers, manufacturers, and others having pertinent knowledge and experience.

The five laws which have been enacted expedite the filing, the prosecution, and the issuance of applications for patents; they simplify the procedure in many respects, and correct abuses which the earlier statutes had failed to prevent or remedy.

Public Act No. 286, approved August 5, 1939, made a fundamental change in the patent law by reducing to 1 year the 2-year period of publication and public use before a patent need be applied for. The period of 2 years was adopted in 1839, when communication and transportation were far slower than at present, and by virtue of this longer allowance of time an invention could be fully and completely known to the public for 2 years prior to the filing of an application for patent by the inventor. Reduction of the period to 1 year is more in consonance with modern conditions, and yet gives the inventor sufficient time to file his application.

Public Act No. 287, approved August 5, 1939, simplifies and shortens interference practice in the Patent Office. By virtue of this act an interference, to decide the question of priority between two or more rival applicants, is determined in the first instance by a board of three interference examiners in the Patent Office. From their decision the defeated party may appeal to the United States Court

of Customs and Patent Appeals or file a suit under section 4915 of the Revised Statutes.

Public Act No. 288, approved August 5, 1939, enacts a statutory period of 1 year, beyond which an applicant is barred from copying claims from a patent for the purpose of contesting an interference with the patent.

Public Act No. 341, approved August 7, 1939, gives the Commissioner of Patents authority to shorten the time within which an applicant for patent must reply to Patent Office actions. Previous to this act, a fixed period of 6 months was allowed by law, regardless of the nature of the action or the condition of the application. Under the new law the Commissioner of Patents may reduce this time to not less than 30 days in cases warranting such a curtailment.

Public Act No. 358, approved August 9, 1939, simplifies the procedure in respect to the payment of final fees on allowed applications for patent. By this act renewal applications are abolished. These renewals were a circuitous and cumbersome means of enabling the final fee to be paid after it became due. They were introduced shortly after the Civil War and had since been the cause of considerable delay and abuse. In place of renewals the act provides simply that the fee may be accepted late, and the patent issued, merely on request to the Commissioner, upon the payment of a small additional fee and after a showing that the delay is justifiable.

On September 28, 1939, the Commissioner of Patents promulgated, with the approval of the Secretary of Commerce, a number of amendments to the Rules of Practice of the United States Patent Office. These amendments placed into the Rules the various statutory changes summarized above and made provisions for carrying them into effect. Amendments effecting additional simplifications in the practice were also included.

PRINTS AND LABELS

An act of Congress approved July 11, 1939 (Public Act No. 244, 76th Cong., 1st sess.), transferred from the Patent Office to the Register of Copyrights, jurisdiction over the registration of copyrights for prints and labels, effective June 30, 1940. The anomalous situation of registering in the Patent Office copyrights for prints and labels while all other copyrights were registered in the Library of Congress, had existed since 1874 when copyright registration for prints and labels for articles of manufacture was enacted. Since that date the Patent Office has registered a total of 73,145 print and label copyrights. With the present act all connection of the Patent Office with copyrights is terminated. It may be remarked that the Patent Office was the depository of all copyright materials and records from 1859 to 1870, anteceding the Library of Congress in this function.

RECEIPTS AND EXPENDITURES

Nine months of war in Europe, overthrowing governments, creating economic dislocations, and hampering communication and exchange, had its reflex in the Patent Office during the fiscal year covered by this report. The number of applications from European countries declined below the total of recent years and there was a corresponding decrease in the fees from those sources. There were received in 1940 an aggregate of 61,425 applications from all countries as against 66,166 in the preceding 12 months. The number of patents granted, including those covering reissues, designs, and plants, was 47,924, and exceeded by 451 those issued in 1939. Registrations of trade-marks, including petitions for renewals, in 1940 were 14,843, an increase of 524 compared with 1939. There continued to be a larger recourse by manufacturers and dealers to the protection afforded to their products by design patents. The number of these issued in 1939 was 5,779, exceeding by 625 the number granted in the previous fiscal period.

Earnings derived from initial fees paid by applicants were $1,838,730 in 1940. This was $141,840 less than the total for 1939. Final fees paid by applicants in 1940 were $1,244,820, or $25,481 below their amount in the preceding fiscal period.

Receipts from all sources in 1940 were $4,563,916.32, or $99,623.10 less than expenditures. This deficit was the second incurred in the last 7 years. The surpluses for that period, however, averaged $102,100.70.

CONDITION OF THE WORK

The number of applications for patent pending on June 30, 1940, was 110,743, less by 2,534 than the total of those awaiting final disposition on the corresponding date of the previous fiscal year. The number of cases disposed of in 1940 was 64,571. This was 4,672 fewer than in 1939. Cases awaiting action by the examiners at the end of the latest fiscal year were 44,902, as against 42,215 in 1939.

On June 30, 1940, the work of 8 examining divisions was within 3 months of current. Of the remaining divisions 11 were between 3 and 4 months in arrears; 19 were between 4 and 5 months; 14 between 5 and 6 months; 5 between 6 and 7 months; and 8 between 7 and 8 months.

CLASSIFICATION OF PATENTS AND RELATED WORK

In the last fiscal year a new Manual of Classification was issued, the first since 1929. Preparation of the copy included compilation of a new subjects-matter index. The manual was delivered for distribution to the examiners and general public on June 25, 1940.

Reclassification of patents progressed with little turn-over in the examining force. Three new classes (131, 204, 252) including 19,204 original patents and 27,500 cross references, were completed and a reclassification of abrasive compositions comprising 29 subclasses containing 915 originals and 1,034 cross references was made and added to class 51. Class 87 was abolished in connection with the formation of class 252. In addition, 86 subclasses containing 4,066 original pat-

ents and 2,213 cross references were added to existing classes; 40 subclasses containing 4,152 original patents and 1,790 cross references were abolished and the patents transferred to existing classes; 3,010 miscellaneous patents were transferred; and 3,440 miscellaneous cross references were made to facilitate searching.

In connection with the weekly issue, 42,137 patents were checked as to classification and 36,159 cross references were made.

Work now in process includes 22 classes, of which 5 (34, 53, 106, 134, 156) will be completed within a few months.

In addition to these activities, the Classification Division wrote decisions in 1,003 controversies as to assignment of applications for examination, and in 3,427 applications gave written decisions as to the propriety of requirements concerning joinder of inventions under rules 41 and 42. Informal decisions and information as to assignment, joinder, fields of search, procedure, etc., were given in 8,630 interviews with examiners and 5,356 interviews with attorneys, inventors, and others not connected with the Office.

PATENT OFFICE ADVISORY COMMITTEE

This committee continued its monthly meetings during 1939–40, the seventh year of its activities. It cooperated most helpfully in studying and furthering the legislative changes in the patent laws described in a foregoing paragraph of this report, and assisted the Commissioner in revising the Rules of Practice.

The present members of the Advisory Committee, all of whom serve without compensation and bear the expenses incident to their attendance at frequent meetings in Washington, are: George Ramsey, of New York, N. Y., chairman; John J. Darby, Washington, D. C.; John A. Dienner, Chicago, Ill.; Franklin E. Hardy, Pittsburgh, Pa.; Delos G. Haynes, St. Louis, Mo.; Herman Lind, Cleveland, Ohio; Robert Lund, St. Louis, Mo.; John D. Myers, Philadelphia, Pa.; Fin Sparre, Wilmington, Del.; Milton Tibbetts, Detroit, Mich.; Charles E. Townsend, San Francisco, Calif.; and W. W. Wheeler, Hartford, Conn.

SPECIAL CASES

During the last fiscal year there were received 298 petitions from applicants seeking to have their applications examined out of turn in keeping with the practice of according such special status when there is a prospect that the issuance of a patent would result in investment of capital and the employment of labor in the manufacture of the inventions covered, or would otherwise be of public benefit.

The total of such petitions was 63 less than that received in 1939. Of the petitions filed in 1940 there were granted 151, of which 65 received such favorable consideration in the interest of prospective manufacture necessitating original or additional use of capital and labor.

STATISTICS

Following is presented the usual statistical information regarding the activities of the Patent Office.

Applications received during the fiscal year ended June 30, 1940 [1]

With fees:		
Applications for patents for inventions	61,425	
Applications for patents for designs	7,579	
Applications for reissue of patents	383	
		69,387
Applications for registration of trade-marks	[2] 14,843	
Applications for registration of labels and prints	2,829	
		17,672
Total, with fees		87,059
Without fees:		
Applications for inventions (act of Mar. 3, 1883)	384	
Applications for reissue (act of Mar. 3, 1883)	2	
Total, without fees		386
Grand total		87,445

[1] Including applications in which fees were refunded and transferred.
[2] Includes 2,408 applications for renewal of trade-mark registrations.

Applications for patents for inventions with fees

Year ended June 30—		Year ended June 30—	
1931	84,097	1936	59,809
1932	73,465	1937	63,772
1933	59,408	1938	66,050
1934	56,095	1939	66,166
1935	56,832	1940	61,425

Applications for patents, including reissues, designs, trade-marks, labels, and prints, with fees

Year ended June 30—		Year ended June 30—	
1931	106,717	1936	85,102
1932	93,859	1937	89,980
1933	79,469	1938	92,018
1934	79,367	1939	91,163
1935	81,000	1940	87,059

Patent applications awaiting action

June 30—		June 30—	
1931	92,203	1936	33,540
1932	76,723	1937	38,121
1933	49,050	1938	45,723
1934	39,226	1939	42,215
1935	31,920	1940	44,902

Patents withheld and patents expired

	1939	1940
Letters patent withheld for nonpayment of final fees	5,158	4,241
Applications allowed awaiting payment of final fees	16,736	15,361
Patents expired	39,004	38,973
Applications in which issue of patent has been deferred under sec. 4885 R. S	618	781
Applications in process of issue	3,455	3,936

Patents granted and trade-marks, labels, and prints registered

	1936	1937	1938	1939	1940
Letters patent	39,978	39,412	36,672	41,908	41,708
Plant patents	61	65	28	52	73
Design patents	4,174	4,939	5,142	5,154	5,779
Reissue patents	400	405	343	359	364
Trade-marks	10,777	11,329	10,529	10,591	10,254
Labels	1,787	1,955	1,806	1,770	1,856
Prints	519	551	609	545	614
Total	57,696	58,656	55,129	60,379	60,648

Statement of receipts and earnings for the fiscal year ended June 30, 1940

Unearned balance at close of business June 30, 1939		$215,325.10	
Collections during fiscal year ended June 30, 1940		4,373,894.35	
Total		4,589,219.45	
Refundments		25,303.13	
Net collections			$4,563,916.32
Earnings:			
Inventions, first fees	$1,838,730.00		
Extra claims	29,360.00		
Reissues	11,430.00		
Designs	78,415.00		
Design extensions	35,150.00		
Trade-marks	221,685.00		
Labels and prints	14,874.00		
Oppositions	10,670.00		
Recording articles of incorporation	766.00		
Recording international trade-marks	50.00		
Total		2,241,130.00	
Final fees	1,244,820.00		
Extra claims	15,987.00		
Disclaimers	2,290.00		
Total		1,263,097.00	
Appeals	63,505.00		
Revivals	3,370.00		
Total		66,875.00	
Printed copies, etc	403,514.05		
Photoprints	9,928.10		
Photostats	62,515.30		
Manuscript	117,239.35		
Certified printed copies	6,831.90		
Total		600,028.70	
Registration of attorneys		870.00	
Court costs refundments		885.21	
Drawings		19,360.85	
Assignments		152,720.32	
Total earnings			4,344,967.08
Unearned balance June 30, 1940			218,949.24
Net receipts			4,563,916 32

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Expenditures, fiscal year ended June 30, 1940

Salaries		$3,557,189.83
Photolithographing:		
Current issue, black and white	$40,012.83	
Current issue, color	14,000.00	
Reproduction, black and white	76,794.75	
Reproduction, color	840.00	
Photographic printing	14,199.16	
Photostat supplies	33,928.94	
Total		179,775.68
Miscellaneous expenses		62,008.20
Printing and binding:		
Specifications	$689,986.34	
Official Gazette	103,747.37	
Indexes	11,257.45	
Total		804,991.16
Miscellaneous		59,162.90
Travel expenses:		
Public use, etc	$388.35	
Commissioner	23.30	
		411.65
Total		4,663,539.42

Receipts and expenditures

Receipts from all sources	$4,563,916.32
Expenditures	4,663,539.42
Deficit	99,623.10
Receipts from sale of Official Gazette and other publications (Superintendent of Documents)	74,276.27

Comparative statement

June 30—	Receipts	Expenditures	Deficit	Surplus
1931	$4,565,377.08	$4,832,277.96	$266,900.88	
1932	[1] 4,487,508.78	5,314,851.59	827,342.81	
1933	[1] 4,423,563.18	4,588,585.02	165,021.84	
1934	[1] 4,383,468.11	3,876,785.01		$506,683.10
1935	[1] 4,264,874.67	4,153,591.21		111,283.46
1936	[1] 4,368,099.17	4,446,463.69	78,364.52	
1937	[1] 4,565,501.69	4,492,273.47		73,228.22
1938	[1] 4,551,298.87	4,476,913.25		74,385.62
1939	[1] 4,742,617.26	4,615,505.11		127,112.15
1940	[1] 4,563,916.32	4,663,539.42	99,623.10	

[1] This does not include the amount received by the Superintendent of Documents for the Official Gazette and other publications.

Comparative statement of expenditures under separate appropriations

Appropriation	1939	1940
Salaries	$3,534,851.65	$3,557,189.83
Photolithographing	171,665.86	179,775.68
Printing and binding	802,320.71	804,991.16
Miscellaneous printing and binding	52,033.80	59,162.90
Miscellaneous expenses	53,976.24	62,008.20
Travel expenses	656.85	411.65
Total	4,615,505.11	4,663,539.42

Litigated cases

Patent:			
Interferences declared			1,190
Interferences disposed of before final hearing			1,039
Interferences disposed of after final hearing			222
Interferences heard			244
Interferences awaiting decision			48
Trade-mark:			
Interferences declared			95
Oppositions instituted			1,027
Cancellations instituted			198
Interferences disposed of before final hearing			990
Interferences disposed of after final hearing			392
Interferences heard			395
Interferences awaiting decision			18
Before the Board of Appeals:			
Appeals in ex parte cases		3,677	
Appeals in interference cases:			
Priorities	130		
Motions	144		
		274	
			3,951
Ex parte appeals decided		3,846	
Appeals in interference cases decided:			
Priorities	156		
Motions	160		
		316	
			4,162
Ex parte cases awaiting action		2,672	
Interference cases awaiting action:			
Priorities	66		
Motions	93		
		159	
			2,831
Oldest ex parte case awaiting action			June 6, 1940
Oldest interference case awaiting action			Apr. 26, 1940
To the Commissioner:			
Appeals in trade-mark interferences	5		
Appeals in trade-mark oppositions	83		
Appeals in trade-mark cancellations	19		
Appeals in ex parte trade-mark cases	32		
Interlocutory appeals	6		
		145	
Petitions to Commissioner:			
Ex parte	946		
Inter partes	188		
To make special	298		
To revive	468		
Under Rule 78	6,746		
		8,646	
			8,791
Cases disposed of by Commissioner:			
Appeals in trade-mark interferences	4		
Appeals in trade-mark oppositions	76		
Appeals in trade-mark cancellations	21		
Appeals in ex parte trade-marks	45		
Interlocutory appeals	6		
		152	
Petitions disposed of:			
Ex parte	946		
Inter partes	188		
To make special	298		
To revive	468		
Under Rule 78	6,746		
		8,646	
			8,798

Notices of appeals to United States Court of Customs and Patent Appeals:		
In ex parte cases (including 9 trade-marks)	127	
In inter partes cases (patents)	51	
Ex parte design application	1	
In trade-mark oppositions	15	
In trade-mark cancellations	2	
Trade-mark interferences	2	
		198
To the District Court of the United States for the District of Columbia (suits)		106

OTHER DETAILS OF BUSINESS FOR THE FISCAL YEAR

As to the volume of business, the Office received during the year 69,387 applications for patents, reissues, and designs; 12,435 trade-mark applications, and 2,408 applications for renewal of trade-mark registrations; 2,829 label and print applications; 165,899 amendments to patent applications, 12,370 amendments to design applications, and 16,348 amendments to trade-mark, label, and print applications.

The number of letters constituting the miscellaneous correspondence received and indexed was 475,041. In addition, 43,988 letters were returned with information.

The number of printed copies of patents sold was 3,961,541; 1,287,918 copies of patents were shipped to foreign governments, and 839,863 copies furnished public libraries. The total number of copies of patents furnished was 6,660,198, including those for Office use and other departments.

The Office received for record 45,317 deeds of assignment.

The Drafting Division made 719 drawings for inventors, and corrected 12,400 drawings on request of inventors; in addition, 7,096 drawings were corrected for which no charge was made; 123,099 sheets of drawings were inspected, and 14,917 letters answered.

Typewritten copies of 3,200,500 words were furnished at 10 cents per hundred words. The Office certified to 16,314 manuscript copies, and furnished 5,799 miscellaneous certified copies. The Office also furnished 503,862 photostat copies of manuscript pages, 36,689 photographic copies, and 312,767 photostat copies of publications and foreign patents, for sale; 17,071 photostat-manuscript pages, 86 certified manuscript copies, and 14,302 photostat copies for Government departments, without charge; 35,472 photostat and 18,432 photograhic copies for use of the Patent Office; 13,018 photostat copies for sale through photo-print section, and 141 photostats for Office use; also 81,013 photostats for assignments, grants, and disclaimers for official use; in all, 977,696 photostat and 55,121 photographic copies.

BUREAU OF MARINE INSPECTION AND NAVIGATION

The organization of the Bureau of Marine Inspection and Navigation remained substantially unchanged during the year, the exception being the transfer of the Licensed Officers Examination Section from the Ship Personnel Division to the Vessel Inspection Division. The Washington office is composed of the Vessel Inspection Division, Law Enforcement and Review Division, Technical Division, Ship Personnel Division, and Administrative Division. The field service is composed of 7 supervising inspection districts, 48 boards of local inspectors, and 14 offices of shipping commissioners. In addition, the Bureau operates a small fleet of patrol vessels for the enforcement of the navigation laws, particularly the Motor Boat Act.

VESSEL INSPECTION DIVISION

This division is responsible for the safety and seaworthiness of all merchant vessels of the United States with few exceptions. The inspection, administration, and enforcement of the inspection laws and regulations promulgated thereunder which govern the construction, equipment, operation, and manning of such vessels is carried out by 48 boards of local inspectors situated in various ports within the continental limits of the United States and in the Territories of Puerto Rico, Hawaii, and Alaska. Assisting the 96 local inspectors, comprising the 48 boards, were 310 assistant inspectors, as of June 30, 1940. For administrative purposes, the United States is further divided geographically into 7 supervising inspection districts, each district being presided over by a supervising inspector, who has general supervision over the local boards within his district.

Attached to the administrative staff in Washington, are 10 principal and 4 traveling inspectors who make frequent visits to the field in the interest of securing uniformity and efficiency.

BOARD OF SUPERVISING INSPECTORS

In addition to presiding over their districts, the supervising inspectors are authorized by statute to meet as a board once each year, and at such other times as the Secretary of Commerce shall prescribe, to promulgate, with the approval of the Secretary of Commerce, all necessary rules and regulations for the promotion of safety of life at sea. During the fiscal year there were two executive committee meetings of the Board of Supervising Inspectors as well as the required annual meeting of the full board.

The most important action of an executive committee meeting held from August 4 to August 8, 1939, was the adoption of new regulations necessary under the act approved July 17, 1939 (Public, No. 188, 76th

Cong.), concerning the issuance of licenses for officers on uninspected vessels. The principal effect of the act was to require licensed officers on vessels of over 200 gross tons which are not inspected by this Bureau.

In the other executive committee meeting held on October 10 and 11, 1939, the principal item of interest was the approval of lifeboats for use on the S. S. *America*. These lifeboats are the largest ever constructed in the United States.

The annual meeting of the full board held January 17 to January 29, 1940, was concerned primarily with matters of uniform and efficient administration. Recommendations were made as to a revision of local and supervising inspection district boundaries for the purpose of providing more efficient distribution of work, savings in travel expense, and less inconvenience to vessel owners and operators.

The policy of advising the marine industry in advance of proposed changes in rules and regulations was followed in the case of all amendments passed by the board during the year. In addition, a proposed complete revision of the Ocean and Coastwise General Rules and Regulations was submitted to the industry for comment on October 1, 1939. The volume and constructive nature of the comments received make it now apparent that a revised draft should be issued to include changes suggested.

ADMINISTRATION

Because of the rapid progress made in the art of welding, both machine and hand, and the many welding processes used in the construction of boilers, pressure vessels, and hulls of vessels, conferences were held during December 1939 and June 1940, which were attended by some inspectors from all districts for the purpose of acquiring the latest information on this subject. The field force as a whole will benefit by the dissemination of the information.

Inspections for other Government agencies, due in part to the national defense program, have increased to such proportions that maximum efficiency is necessary in their handling. For an example, the Bureau's records indicate that some 2,100 boilers located at fortifications, hospitals, and other Government establishments, are inspected annually by the Bureau's field force. In addition, hundreds of requests are received for the inspection of Government-owned floating equipment, of which the more important work is concerned with troop transports. A new simplified procedure developed this year which is now in effect will permit disposal of these inspections in a most efficient, expeditious, and economical manner.

The Board of Supervising Inspectors at its annual 1939 session recommended that the obsolete and restricted provisions of the law with respect to lifeboat disengaging apparatus and fire pumps be amended so as to allow a greater flexibility in the law with regard to such devices. The law was accordingly amended by legislation sponsored by the Bureau (Public, Nos. 371 and 376, 76th Cong., approved August 10, 1939), and will enable vessels to be equipped with fire pumps and disengaging apparatus which will in all respects be suitable for use on such vessels.

MOTORBOATS AND MOTOR VESSELS

In an attempt to reduce the hazards incident to careless and improper operation of pleasure motorboats, the Bureau prepared and distributed a self-inspection blank with safety instructions on the reverse and a perforated, detachable safe-operation certificate. Over 120,000 were delivered to collectors of customs, local and assistant inspectors, shipping commissioners, and the United States Coast Guard for distribution to motorboat owners. The filling out of this form is not compulsory but it is being widely used for the purpose intended.

Subsequent to the preparation and distribution of the safe operation certificates, Congress passed a new motorboat act (Public, No. 484, 76th Cong., approved April 25, 1940), which had been sponsored by the Bureau for the primary purpose of correcting unsatisfactory conditions existing in the regulation of motorboats and motor vessels of the pleasure type.

In order to insure adequate protection to the public traveling on board these vessels, the Board of Supervising Inspectors in a unanimous report in its 1939 annual session recommended that legislation be submitted to Congress with a view to clarifying the law and raising the low safety requirements applicable to these vessels, fixed by the existing statute. As a result of the board's recommendation, this Bureau, through the Department, has submitted drafts of companion bills which were introduced in the House and the Senate and are known as H. R. 9477 and S. 3864, the terms of which provide that all motor vessels carrying more than 16 passengers on domestic voyages or carrying more than 12 passengers on international voyages shall be subject to the provisions of title LII of the Revised Statutes to such extent and upon such conditions as may be required by the Board of Supervising Inspectors with the approval of the Secretary of Commerce. Neither of these bills had been enacted into law by the end of the fiscal year.

LICENSED OFFICERS

In furtherance of the project for standardization and centralization of the Bureau's method of conducting examinations for licensed officers, the Division continued to enlarge the scope of the material available for use in the examinations.

Many thousands of approved examination questions and answers have been assembled. These have all been selected, checked, graded, and arranged for the various grades of licenses, "Deck" and "Engineer." In the meantime, additional examination papers were prepared for future use.

During the fiscal year, 12,786 deck officers' licenses, 10,266 engineer officers' licenses, and 11,176 licenses to motorboat operators were issued.

TRAVELING AND PRINCIPAL TRAVELING INSPECTORS

During the fiscal year the traveling and principal traveling inspectors inspected 565 passenger ships, 96 of which were inspected while under way at sea to observe operating conditions. Special attention was paid to the conduct of drills and instructing officers and crew in their emergency stations and duties. They also inspected 110

freight ships, 57 tank ships, and 163 tank barges, made 143 miscellaneous examinations of ships and examined 16 ships in drydock. The principal traveling inspectors served as members of "B" Marine Investigation Boards on 22 occasions, involving investigations of serious marine casualties, resulting in trials of 13 licensed officers and certificated personnel.

The traveling and principal traveling inspectors traveled a total of 208,054 miles in the transaction of their official duties during the year, 95,861 miles of which were traveled while inspecting ships en route at sea.

LOCAL INSPECTORS

A brief summary of the work performed by the offices of the local inspectors is given below. The work in general falls into four major categories as follows: Inspection and examination of vessels and their equipment throughout; inspection (at the factory) of material which enters into the construction and equipment of vessels; examination, certification, and licensing of personnel; and investigation of marine casualties.

	Total number completed
Vessel inspections:	
Annual inspections (13,869,910 gross tons)	6,514
Reinspections (9,744,476 gross tons)	2,970
Drydock examinations (12,654,938 gross tons)	5,469
Tailshaft examinations	1,099
Cargo vessels examined; permission given to carry persons in addition to the crew	1,630
Sanitary inspections	5,447
Special surveys completed	172
Steam motorboat letters of approval	26
Government hulls	130
Government boilers afloat	537
Miscellaneous examinations	26,321
Factory inspections:	
Lifeboats	589
Life rafts	72
Buoyant apparatus	269
Davits	334
Life preservers	175,537
Life buoys	25,574
Life-throwing guns	564
Signal pistol cartridges	28,773
Boilers	370
Unfired pressure vessels	1,380
Steel plates	7,320
Steel bars and shapes	1,760
Corrugated furnaces	131
Miscellaneous steel items	347
Other miscellaneous inspections	1,785
Personnel examinations, casualty investigations, miscellaneous:	
Certificates issued to unlicensed personnel, etc	81,196
Deck officers' licenses issued	12,786
Engineer officers' licenses issued	10,266
Motorboat operators' licenses issued	11,176
Investigations and trials concluded	2,563
Government land boilers inspected	1,323

Included in the number of annual inspections are 398 vessels of 690,215 gross tons receiving their initial certificate of inspection. These vessels represent new additions to the American merchant marine. Also included in the number of annual inspections are 353 Government vessels. In addition, the local offices inspected Government hulls, Government hulls afloat, and Government land boilers.

Certificates of inspection were withdrawn from 365 vessels for noncompliance with requirements, transference to foreign registry, etc., or as a result of casualties.

LAW ENFORCEMENT AND REVIEW DIVISION

During the past fiscal year, 7,976 applications and petitions in connection with violations of the navigation laws dealing with division of crews into watches, hours of labor, certification of personnel, manning and citizenship requirements, inspection of vessels, documentation of vessels, application of the coastwise laws to foreign vessels, motorboats, etc., were reviewed by this Division and appropriate recommendations made to the Secretary of Commerce with regard to the requests contained therein for mitigation or remission of fines and penalties incurred. In addition, 1,040 cases were closed upon recommendations of United States attorneys.

In the first part of the year, the war between Germany, France, and England, which later spread to other European countries, affected to a very great degree, the foreign commerce of the United States. Because of the conditions which arose, it was deemed necessary in September to require that shippers' export declarations covering all cargoes destined for foreign countries be filed with the appropriate collectors of customs before clearance was granted to the vessels transporting those cargoes. Shortly thereafter, and as a further safeguard, it was considered necessary to require that complete vessel manifests also be filed with the appropriate collectors before clearance was granted to vessels bound to foreign ports. As vessels had in the past been permitted to depart on foreign voyages without filing these documents prior to clearance, some readjustment on the part of both shippers and vessel operators was necessary. This was effected with little or no disturbance of the usual flow of water-borne foreign commerce.

The Neutrality Act of 1939, which was approved by the President on November 4, 1939, prohibited, among other things, the exportation of merchandise from the United States to the belligerent nations except under conditions prescribed in the act, and restricted the operation of American vessels and the movement of American citizens. Immediately upon approval of that act, regulations were prepared and issued by the Secretary of Commerce, directing collectors of customs not to grant clearance to any vessel in the foreign trade unless the vessel, together with its cargo and passengers, if any, was found to be in compliance with the act. Many questions dealing with interpretation and administration naturally arose. The Departments of State, Treasury, and Justice, as well as the Department of Commerce, were all concerned in the enforcement of the act, and very close cooperation between those Departments was essential.

In a great number of cases, cargoes laden on foreign-flag vessels in ports of the United States were later discharged from those vessels in other ports of the United States, establishing prima facie violations of the coastwise laws. These cargoes were either laden prior to the outbreak of the war or just before the extension of the war to new belligerents. Because of the changed conditions which

arose after lading and departure of the vessels from the United States, the operators did not deem it expedient to continue the voyages because of fear of capture or destruction of the vessels, and ordered the return of their vessels to the United States. As a consequence, a great number of petitions for relief from the penalties of forfeiture incurred for violation of the coastwise laws were received, and after review, recommendations were made to and accepted by the Department for remission of the penalties incurred because of the peculiar circumstances. In a number of cases where cargoes of perishable products were involved, it was necessary that action be taken immediately.

Since shortly after the beginning of the war, all requests for the admission of belligerent flag vessels to American registry (of which a number have been received) have been refused as a matter of public policy, in order that this Government might not become involved with any of the belligerent nations who might not recognize such a transfer of flag.

The "A" marine investigation boards were not once called into session to investigate any passenger loss of life resulting from casualties to inspected vessels coming within the jurisdiction of the Bureau. These boards, however, were called into session a number of times to investigate loss of life resulting from accidents to members of the crew, at least 90 percent of which accidents were due to special hazards connected with seafaring life.

There were 11 casualties recorded in each of which monetary damage amounted to $50,000 or over. There were several total losses reported in casualties to seagoing vessels, to vessels engaged in coastwise service, and to those in service on the rivers and the Great Lakes.

None of the above losses was found to be due to neglect on the part of the Government officials connected with the inspection of vessels nor was there any case of gross negligence on the part of the licensed or certificated personnel. However, there were cases of negligence on the part of certain licensed personnel concerned with casualties and appropriate action in each case was taken by the Director.

There were only two outstanding cases during the year of insubordination among the certificated personnel and these were dealt with promptly.

The total number of cases reported to the Bureau as having been investigated during the fiscal year 1940 is as follows:

Major "A" [1]	21
Minor "A" [2]	469
"B" cases	17
Complaint [3]	189
"C" cases	1,343
Total	2,039

[1] Loss of life to crew members due to casualty on inspected vessels.
[2] Single loss of life to crew members not due to casualty on inspected vessels and also loss of life on uninspected vessels.
[3] Any complaint with reference to misconduct, misbehavior, inattention to duty, or violation of the navigation laws by licensed or certificated personnel.

PASSENGER ACT

The Law Enforcement and Review Division is also responsible for administration of the Passenger Act of 1882, which contains certain provisions for the accommodations for steerage passengers. Ves-

sels entering ports of the United States from foreign countries, having on board steerage passengers, are supervised by customs inspectors acting as representatives of this Department who see that these provisions are complied with. The purpose of the act is to look after the welfare, health conditions, food, separation of the sexes, and care in case of illness of passengers. There were 483 voyages made, involving 102,801 steerage passengers during the fiscal year 1940, as compared with 661 voyages involving 121,828 steerage passengers during the fiscal year 1939.

SHIP MORTGAGE ACT

The Ship Mortgage Act provides for the recording of all mortgages on vessels of the United States and the endorsement on the vessels' documents of all preferred mortgages.

APPROVAL OF HOME PORTS

It is necessary that the owner of every vessel, prior to its documentation under the laws of the United States, and upon every change in ownership or change in home port, designate a home port for the vessel which must be approved by this Bureau before such designation may become effective. During the fiscal year 1940, there were approved 9,987 such home-port designations as compared with 9,214 approvals during the preceding year.

COLLECTION OF FEES AND DUTIES

This division, through the collectors of customs, supervises the collection of tonnage taxes and other navigation fees. It also considers petitions of ship owners and operators for refunds of tonnage taxes and navigation fees when they have allegedly been illegally or erroneously assessed. During the fiscal year the sums of $1,558,412.76 in tonnage duties and $191,694.06 in navigation fees were collected.

NUMBERING OF MOTORBOATS

On June 30, 1940, there were numbered 298,243 motorboats. This is an increase of 35,780 during the year. During the year, 1,285 motorboats were removed from the records, having been reported lost, abandoned, etc.

PATROL FLEET

The patrol fleet maintained by the Bureau consists of three vessels—*Siwash*, *Navigation*, and *Tyrer*—and two 18-foot launches. The three patrol vessels are operated throughout the year on the Atlantic and Gulf coasts. One of the two launches is assigned the district comprising the entire Mississippi River Basin. The other is working in Pacific coast ports. The personnel of the vessels is engaged in the enforcement of the navigation laws, particularly the Motorboat Act, the Numbering Act, and the Tanker Act. These boats have been of material assistance to the local inspectors in enabling them and their assistants to reach a larger number of the vessels under their jurisdiction. Examination of tank vessels having on board inflammable or combustible liquids in bulk continues to occupy much of the time of the fleet. Out of a total of 13,654 inspections made by the patrol fleet, 7,091 violations were reported, and in addition, other enforcement officers reported 6,936 violations.

LEGISLATION

Several bills affecting the navigation laws were enacted during the year. The Motorboat Act of June 9, 1910, was superseded by a new law requiring certain equipment on motorboats in accordance with the recommendations heretofore made by the Bureau. Statutes requiring that manifests be filed and permits be obtained by American vessels engaged entirely in the domestic commerce of the United States were repealed. The inspection laws were amended by the deletion of unnecessary requirements with regard to lifeboats and fire pumps. The various rules of the road were amended to permit small craft to anchor in certain areas to be set aside by the Secretary of War, without exhibiting anchor lights at night. The laws dealing with the operation of tugs and towboats and with regard to salvage operations in the United States were amended in such a manner as to exclude foreign vessels from those operations.

A new act makes it a misdemeanor to stow away on vessels, while another enactment provides for the regulation of civilian nautical schools, and vessels and other floating equipment used by or in connection with such schools. Authority was given to the Secretary of Commerce to rearrange, by consolidation or otherwise, the location of the several boards of local inspectors, to discontinue boards by abolishing them and to establish others in their stead, provided that the whole number of boards of local inspectors may at no time exceed 48, the number now authorized.

The provisions of the navigation laws with respect to the transportation of dangerous, combustible, or inflammable cargo are conflicting and very unsatisfactory. Proposed legislation to correct this situation was transmitted to Congress by the Department, and at the end of the fiscal year, was still receiving consideration by it. In view of the fact that the present laws regulating motor vessels engaged in the transportation of passengers do not completely and properly cover the subject, legislation was prepared and was transmitted to Congress to safeguard adequately the lives of passengers on such vessels.

Bills are now before Congress to provide for citizen ownership of American vessels; to require the manning of those vessels by citizens of the United States; and to provide the means for enforcement by this Bureau of the laws relating to manning of vessels. The Bureau has studied this proposed legislation very carefully and is of the opinion that its enactment is desirable and has been made imperative because of unsettled conditions arising as a result of the disturbances overseas.

Forty-seven bills and resolutions were reviewed, and individual reports on them were submitted to the Department at its request.

TECHNICAL DIVISION

The primary function of this Division is to examine and pass on all contract plans and specifications for the construction of new or major alterations to existing passenger vessels of the United States of 100 gross tons and over, propelled by machinery. If the plans and specifications are approved by the Director, the construction or alteration of the vessel may begin.

The Technical Division also passes on plans and specifications for the construction of new vessels and alterations to existing types of vessels, regardless of whether they are engaged in passenger or other

services. Since these vessels must comply with the Bureau's safety requirements before a certificate of inspection will be issued, it is also necessary that their plans and specifications be approved to insure a uniform standard of safety and to avoid additional construction costs and unnecessary delays in sailings.

The Division is comprised of the naval architecture subdivision (hull and admeasurement sections); the marine engineering subdivision; the electrical engineering subdivision; and the load line subdivision.

NAVAL ARCHITECTURE SUBDIVISION

Hull section.—During the fiscal year 1940, plans and specifications for 75 new designs, representing 220 new vessels, were examined and appropriate action was taken.

In addition to the designs enumerated above, plans for 134 new barge designs covering approximately 172 barges, as compared with 160 barges in 1939, were checked to establish their strength and compliance with Bureau rules. Plans for the alteration or conversion of 372 vessels, as compared with 340 in 1939, were also reviewed and appropriate action taken.

Subdivision and stability requirements that would insure ferry vessels remaining afloat with positive stability, in the event that any one compartment was accidentally flooded, were, on January 1, 1940, extended to include ferry vessels on runs of less than 10 minutes. Pursuant to the imposition of this requirement upon vessels of this class, flooding and stability calculations were made for 260 vessels operating in this service. Where vessels were found to be deficient, corrective measures, usually the installation of additional watertight bulkheads, were required. The necessary calculations and other details incident thereto were made by this section and transmitted to the owners via the local inspectors. Necessary follow-up was maintained with the local inspectors until compliance with specified requirements was reported.

Inclining tests on 76 vessels were conducted at various ports in the United States by members of the section and calculations were made in each case to determine their stability. For 19 of these vessels no plans were available and it was necessary for the Bureau's representative to have the vessel drydocked in order that offsets could be measured, and plans prepared upon which to base the stability calculations. In instances of insufficient stability, installation of ballast or other corrective measures were required. In a number of cases, calculations were made to determine the effect of alterations on stability of existing vessels, and appropriate action was taken to insure the proper margin of safety.

Special inspections were held by members of the Hull Section on 18 vessels to determine the practicability of applying specific requirements. These inspections covered construction surveys, lifeboat-lowering-device arrangements, fire-detecting and fire-extinguishing systems, and the operating characteristics of vessels at sea. In addition to the above, 11 excursion vessels were inspected while under way and experimental data were collected for use in analyzing the stability characteristics of this type of vessel when carrying large numbers of passengers.

Admeasurement section.—This section is responsible for the interpretation and administration of the admeasurement laws and main-

tenance of uniformity in the admeasurement of vessels throughout the United States. It is also responsible for the checking of blueprints and admeasurement figures to determine that the law and regulations are properly applied and that the computed gross and net tonnages of merchant vessels are correct.

One of the outstanding accomplishments of this section during the fiscal year 1940 was the revision and distribution of new regulations for the measurement of vessels. These regulations had not been revised since 1925; consequently, due to new types of construction and the need for clarification of the various phases of admeasurement, naval architects and admeasurers of vessels were experiencing considerable difficulty in carrying out the requirements of law.

The admeasurement procedure consists of the application of numerous formulas as required by law and regulation for finding, in tons of 100 cubic feet, the internal capacity of the space under the tonnage deck, all between-deck space, and every superstructure on or above the upper deck of merchant vessels of the United States. The tonnage of a vessel as thus determined forms the basis upon which canal tolls, pilotage, wharfage, and other fees are determined.

During the fiscal year 1,366 new vessels, aggregating 544,171 gross tons, were admeasured throughout the United States. The plans of 152 of these vessels, totaling 302,956 gross tons, as compared with 218 new craft, aggregating 205,304 gross tons in 1939, were reviewed by the Washington office to insure correct interpretation of the law by field admeasurers; uniformity of procedure; accuracy of measurements; and proper treatment of spaces, etc. Appropriate instructions were issued therefor.

When the tonnage of a documented vessel of the United States has been determined and approved it may not be changed except by permission of the Director. Therefore, when structural alterations or changes in usage of spaces are made, applications for tonnage changes must be filed with the Director of the Bureau. These applications, accompanied by appropriate blueprints and admeasurement figures, are carefully analyzed and approved prior to the issuance of authority for the change in tonnage. In checking these figures against the dimensions scaled on the blueprints, it is frequently noted that incorrect measurements have been taken; that improper deductions from the gross tonnage figures have been allowed; that skylights, stairways, elevators, propelling machinery, and other spaces have been improperly treated. When these and other irregularities were noted, corrective measures were taken and appropriate instructions issued to the admeasurers concerned. During the fiscal year 441 such applications, aggregating 486,911 gross tons, were checked.

MARINE ENGINEERING SUBDIVISION

The Engineering Subdivision during the fiscal year 1940 initiated a system of intensive study in welding for the purpose of training boiler inspectors. In December 1939, and January 1940, courses of instruction were held in Cleveland, Ohio, which were attended by some 20 boiler and hull inspectors, respectively. Another outstanding achievement was the development and submission to the Board of Supervising Inspectors of a complete set of welded piping rules to govern the installation of welded high-pressure piping on modern vessels. In this connection procedures necessary to govern the ac-

tions of the field inspectors were developed and put into effect.

This subdivision was represented at various meetings of important technical committees of the A. S. M. E. Boiler Code Committee, the American Welding Society, and the American Standards Association, etc., for the study and development of standards applicable to use in the marine industry. A new specification for boiler steel was developed and adopted by an Executive Committee of the Board of Supervising Inspectors on August 4, 1939. This specification is working successfully and will do much toward eliminating some of the defects encountered in marine boiler steel.

This subdivision has given much time and thought to the development of new rules to meet conditions in connection with high-pressure and high-temperature steam installations which are now under construction for the United States Maritime Commission. Among these are new types of boilers, superheaters, and the so-called reheating cycles, which in installations now under construction will return the steam to the boiler after it has been used in a high-pressure turbine, there to be superheated at the reduced pressure before entering the succeeding turbine. By this means a high degree of economy is obtained without resorting to extreme temperatures.

During the year this subdivision prepared rules to govern the use of the submerged melt electric welding process, which is being used quite extensively in the marine field for pressure vessels and for hull construction; also developed were specified conditions to govern the approval of the various welding procedures, and formulated procedures to govern production. With the trend to ever increasing high pressures and temperatures it has become necessary to change or modify much of the equipment and materials used heretofore, and this subdivision has given considerable time and study to the approval and improvement of such equipment and materials.

The routine duties of this subdivision included examination of plans submitted by shipowners and builders for approval, suggestions, or comments, covering machinery arrangements and equipment, piping systems, diesel installations, refrigerating, steaming-out and steam-smothering systems, fire mains, sounding tubes, vents, overflows, sea chests, pressure vessels, etc., for installations on passenger and freight vessels, barges, oil tankers, and towboats. Such plans were submitted for new vessels and for alterations, conversions, and repairs covering approximately 335 vessels.

In addition to this, fuel oil installations were examined and approved for 53 vessels; 441 plate welders and 150 pipe welders were tested and qualified; radiographs of 181 new welded boilers examined; and plans and specifications covering approximately 25 boiler and piping installations for other Government agencies examined and passed upon.

ELECTRICAL ENGINEERING SUBDIVISION

The duties of this subdivision include the examination of plans and specifications submitted to the Director for approval in connection with lighting and power, both ship's service and emergency, and interior communication distribution circuits. The plans also include the type, construction, and method of installation of generators and motors, control equipment for generators and motors, switchboards, distribution panels, circuit protective devices, electric

cables, electrical fittings and fixtures, and interior communication apparatus.

Many types of electrical equipment, such as fire-detecting systems, emergency lighting and power control systems, searchlights, lighting fixtures, wiring appliances, etc., were examined and tested during the year. Such equipment as was found to be satisfactory for marine service was given approval for use on inspected vessels.

The preparation of specifications and instructions for use by local and assistant inspectors in inspecting electrical systems and apparatus aboard ship was continued. The description of three additional fire-detecting and alarm systems was completed for inclusion in a booklet covering the inspection, operation, and maintenance of approved fire-detecting systems.

Electrical plans and specifications for 70 new vessel designs, representing 180 new vessels, and plans for the alteration or conversion of 102 existing vessels were examined.

This subdivision took an active part in meetings of the American Institute of Electrical Engineers' Committee on Applications to Marine Work in the revision of the 1938 edition of A. I. E. E. Standard No. 45: "Recommended Practice for Electrical Installations on Shipboard." This standard has been accepted as the Bureau's general requirement for electrical installations on shipboard.

Plans and specifications for extensive alterations to the electrical installations on the Bureau's patrol vessels, U. S. M. V. *Tyrer* and U. S. M. V. *Navigation*, including specifications for the purchase of new material and the supervision of all work aboard the vessels, were prepared by this subdivision.

The preparation of specifications and minimum standards for many items of marine electrical equipment has been continued. This work is being done in cooperation with the National Bureau of Standards, the American Institute of Electrical Engineers, and manufacturers of such equipment.

LOAD LINE SUBDIVISION

During the fiscal year load line certificates were issued to 134 vessels, and 101 certificates were voided for various reasons. Revalidations of existing load line certificates for American vessels numbered 482, and for foreign vessels, 23. Annual load line inspections were accomplished for 2,349 vessels. Reports of sailings of 22,480 vessels were received and checked for compliance with the regulations. There were 38 violations of the load line acts reported and appropriate action was taken.

Applications for special service load lines, as provided by section B of the regulations, were approved for 40 vessels, and load lines for 8 special type vessels were approved.

The American Committee of Lloyd's Register of Shipping was approved as the assigning authority for 13 vessels.

Two additional steam colliers were permitted to have specially designed slot-type freeing ports, as a continuation of the experiment conducted to determine the efficacy of opened or closed bulwarks on steam colliers.

A special investigation of derrick barges on the Great Lakes was conducted, as a result of which special instructions to the classification societies were prepared and approved, outlining the conditions

of load line assignment for such vessels. The Canadian Department of Transport was informed of the Bureau's action and similar instructions were issued for Canadian vessels in order that uniform treatment of Canadian and United States vessels may be maintained.

The Board of Trade, London, England, accepted the Bureau's interpretation of Rules LXV and CV of the International Load Line Convention of 1930, so that vessels crossing the North Atlantic whose course passes into the winter North Atlantic zone during its period of applicability and whose ports of departure or arrival are south of latitude 36° North may be loaded to the winter load line.

Reciprocal recognition of Great Lakes subdivision load line regulations for passenger vessels was effected between the United States and Canada.

The practice was continued of personally instructing collectors of customs, their deputies, and the Coast Guard at various ports in details of load line enforcement in the field. Hydrometers and the necessary attachments needed by the enforcement officers were purchased and sent to each port. A draft of proposed instructions for the use of load line inspectors in the field has been prepared and will be issued in pamphlet form.

SHIP-PERSONNEL DIVISION

This Division supervises the field activities of 14 shipping commissioners located in as many ports throughout the United States. Shipping commissioners are required by law to witness shipment and discharge of crews on shipping articles of agreement for all vessels in the foreign trade and vessels of 75 tons and up in intercoastal trade. They act as arbitrators for masters and seamen in settling controversial matters, such as wages, working conditions, overtime, etc. As enforcement officers they are required to report any violation of the navigation laws coming to their attention. They also maintain registers of seamen seeking employment on American vessels. This register is available to the masters of vessels in the selection of their crews.

This Division also directs and supervises the activities of the Central Records Section in Washington. This section maintains sea service records for some 300,000 seamen to whom certificates have been issued. Individual file jackets are maintained for each seaman, which contain a description, including photographs, fingerprints, and other identification, of every person who holds American seaman's papers.

Under section 13 of the act of March 4, 1915, as amended (46 U. S. C. 672) and section 4551 R. S., as amended (46 U. S. C. 673), the following seamen's documents have been issued by appropriate field officers during the fiscal year and the records forwarded to the Central Records Section: 19,543 continuous discharge books; 17,074 permanent certificates of identification; 3,509 able seamen's certificates; 3,793 lifeboatmen's certificates; 3,808 qualified member of the engine department certificates; 40,351 certificates of service; and 737 tankerman certificates, making a total issue of 88,815 certificates of all classes, including continuous discharge books, as compared with a total issue of 112,303 certificates during the fiscal year 1939. This figure in comparison with previous years indicates that the peak

load has passed and the issuance of certificates has now reached a point where it reflects a normal turn-over of seamen and progress through the grades. There were 9,701 duplicate continuous discharge books and certificates of various kinds prepared by this Division for issuance to seamen who lost their original papers.

The maintenance of individual seamen's jackets, the recording of certificates and other papers required by law is current; however, that phase of the work which requires the posting of records of shipment and discharge of seamen is in arrears because of insufficient personnel. In October 1939, a group of W. P. A. workers was assigned the project of bringing these records up-to-date with the result that approximately one-fourth of this work has been completed.

AMERICAN SHIPPING ON JUNE 30, 1940

On June 30, 1940, the merchant marine of the United States, including all kinds of documented craft, comprised 27,212 vessels of 14,018,188 gross tons, as compared with 27,470 vessels of 14,631,991 gross tons on June 30, 1939. Of this total, 1,504 vessels of 3,658,083 gross tons were engaged in the foreign trade, as compared with 1,513 vessels of 3,332,661 gross tons on June 30, 1939; and 25,708 vessels of 10,360,105 gross tons were engaged in the coasting trade.

Geographically, there were 16,704 vessels of 10,016,814 gross tons operating on the Atlantic and Gulf coasts; 6,759 vessels of 2,046,698 gross tons on the Pacific coast; 2,059 vessels of 1,669,389 gross tons on northern lakes; and 1,690 vessels of 285,287 gross tons on western rivers.

The five principal services, from the standpoint of number of vessels engaged therein, were: Freight, 9,367 vessels of 8,267,118 gross tons; fishing, 6,910 vessels of 225,158 gross tons; passenger, 3,646 vessels of 1,545,930 gross tons; towing, 3,517 vessels of 345,403 gross tons; and tank, 1,108 vessels of 3,028,154 gross tons.

The following is an analysis of the ownership of documented tonnage (5 net tons and over): Private ownership, 27,083 vessels of 13,217,615 gross tons; Maritime Commission, 129 vessels of 800,573 gross tons.

LAID-UP VESSELS

On June 30, 1940, the laid-up tonnage of the United States aggregated 1,281 vessels of 1,050,656 gross tons, as against 1,604 vessels of 2,252,396 gross tons on June 30, 1939.

APPROPRIATIONS

The following appropriations were made available to this Bureau for the fiscal year 1940:

Departmental salaries	$350,000
Salaries and general expenses	2,332,000
Total	2,682,000

The amount appropriated for the Bureau's activities is offset in great measure, by the tonnage taxes, fees, fines, and penalties collected during the same period. These amounted to $1,819,072.60.

COAST AND GEODETIC SURVEY

The Coast and Geodetic Survey carries on a number of activities which are vital to the promotion of commerce and to the national defense. Its duties include the surveying and charting of all coastal waters under the jurisdiction of the United States; the production of aeronautical charts for air navigation; and the procurement of tidal, magnetic, geodetic, and other data required for water and air navigation as well as for a wide variety of engineering and scientific purposes.

During the past year services great in volume and variety have been rendered to the public and to numerous Government agencies; the normal increase in the demand for the Bureau's products, which has prevailed for several years, being further augmented by the additional requirements of the Army, Navy, and other services in connection with preparations for the national defense. The issue of 463,917 aeronautical charts and 407,186 nautical charts, an increase of 21.6 percent over 1939, again exceeded the distribution during any previous year in the history of the Bureau.

NATIONAL DEFENSE

The work of this Bureau is as necessary for national defense as it is for other purposes. The project of original basic surveys of the Alaskan Peninsula and Aleutian Islands, on which the Coast and Geodetic Survey has been engaged since 1934, is of paramount importance in this respect. The magnitude of this undertaking may be visualized when one realizes the Aleutian Islands extend westward over 1,000 miles from the western end of the Alaskan Peninsula and approach to within 250 miles of the islands off the Siberian coast.

Geodetic surveys are essential for the control of military and other mapping projects and for the establishment of artillery fire control systems and other purposes.

Tide tables, current tables, and tidal current charts are needed for navigation, the launching of ships, and for speed trials, and tidal datums are required in connection with harbor fortifications and for the construction of Army and Naval bases. Reprints of tide and current tables are necessary during the year to meet the increased demands of our expanding Navy. A study was also begun of methods of reproducing predictions prepared by foreign countries, to make this country independent of predictions supplied by other governments under exchange agreements. Correct magnetic information is necessary for both water and air navigation. Some European countries have made more adequate magnetic surveys a part of their military program. In naval and other communications, the new broadcasting of three-hourly intensity numbers, made possible chiefly

through observatory work, shows whether transmission difficulties at a given time are due to instrumental conditions or to the medium carrying the message. The same knowledge of magnetic conditions is useful in the transmission, during magnetically disturbed conditions, of transoceanic messages by indirect paths.

All seismologic data obtained by the Bureau have been applied to naval and other defense construction. An important addition to these data are the records of the Imperial Valley, Calif., earthquake of May 18, 1940. The experience of the Coast and Geodetic Survey in vibrating various kinds of buildings and building sites, and the development of instruments for this type of work, are proving useful. Both the Army and Navy have frequently called upon the Bureau for data or assistance in determining earth and building motions caused by earthquakes or other shocks.

While it is not yet possible to apply all the information gathered, continuity in obtaining information insures continued attention to application of our latest knowledge in design of structures. Defense structures should not be menaced by earthquake at the time of possible enemy action. Buildings at Mare Island Navy Yard were severely damaged by an earthquake during the Spanish American War.

Of the 407,186 nautical charts issued during the year, 154,165, or 38 percent, were issued to the Navy and Coast Guard. Large quantities were also issued the Army, Maritime Commission, and other organizations engaged directly or indirectly on national defense work. Further assistance was extended to the Navy through the accumulation of reserve stocks of charts and the accomplishment of a considerable amount of special work.

Of the 463,917 aeronautical charts issued during the year, 334,104, or 72 percent, were issued to the Army, Navy, Civil Aeronautics Authority, and Coast Guard. Other large quantities went to organizations such as the civil pilot training schools, engaged directly or indirectly on national defense.

The Army Air Corps and Civil Aeronautics Authority have requested that the regional and Alaska aeronautical charts be completed at the earliest practicable date. The Civil Aeronautics Authority has also requested that the program for airport charts be started as soon as possible. Numerous special investigations and experimental projects are now under way for these services.

Special Publication No. 197, "Practical Air Navigation and Use of the Aeronautical Charts of the Coast and Geodetic Survey," is now one of the Government's best sellers. On June 1 the Army Air Corps and Civil Aeronautics Authority, both of whom use this publication as a manual in the training of pilots, requested a special printing of 20,000 copies of the third edition. Eleven thousand copies of this manual on the shelves of the Superintendent of Documents were sold in a month and a half and a new printing ordered.

Aside from the vital importance of nautical and aeronautical charts to the national defense, a very large percentage of so-called miscellaneous work is directly or indirectly related thereto. Under this classification are the printing of special prints and maps for the Civil Aeronautics Authority and the Maritime Commission; and the printing of geodetic control data and of planimetric maps, over 50 percent of the issue of which goes to the military services.

COOPERATIVE ACTIVITIES

Four members of the Bureau were on temporary duty for two weeks or more each with the Field Artillery Observation Battalion at Fort Bragg, N. C. On special request of the War Department, two of these men were detailed for maneuvers in Georgia, Louisiana, and Texas. The use of survey methods such as are employed by the Coast and Geodetic Survey personnel during their routine operations was a valuable adjunct to this battalion.

Other cooperation with the War Department included a gravity determination at the Aberdeen, Md., Proving Grounds, at the request of the Ordnance Department; and the following work, all at the request of the Corps of Engineers: Extension of triangulation over a large part of the Shasta Dam project area on the Sacramento River; extension of horizontal and vertical control along the Arkansas River, from above Muskogee, Okla., to its confluence with the Mississippi River southeast of Pine Bluff, Ark.; level lines to bench marks referencing river gages established along the San Joaquin, Sacramento, and Mokelumne Rivers in California; and extension of control work over small areas in the vicinities of Norfolk, Va., New York, N. Y., and Boston, Mass.

Cooperation was extended the Army Air Corps in the determination of the following airplane speed trial courses: From Wright Field, Ohio, to Scott Field, Ill.; from Wright Field to the vicinity of Eaton, Ohio; 3-kilometer courses each at Fairfield, Ohio, and Denver, Colo.; from Denver to Castle Rock, Colo.; and from Denver, Colo., to Tucumcari, N. Mex. Much of this work was done during December and January, the most severe weather of the winter.

With the excellent cooperation of the Air Corps and the United States Coast Guard, which supplied pilots and planes, 11 sectional aeronautical charts were flight checked during the year and a considerable amount of airphotographic work was accomplished. This Bureau obtained the type of photographs needed for the most efficient prosecution of coastal topographic mapping, while personnel of the other services received valuable training and experience in airphotographic operations.

Cooperation was extended the United States Navy by running precise spirit levels and making horizontal observations of alignment in connection with the laying of the track for model basin towing equipment. This work was performed in the large enclosed building at Carderock, Md., under conditions of almost constant temperature and formed an ideal laboratory for work of this character.

Lines of levels in the alluvial valley of the Mississippi River necessary to compute and adjust that region's entire network were completed for the Mississippi River Commission.

Eleven topographic quadrangle maps, and four navigational charts of the lake created by the Guntersville Dam, were reproduced for the Tennessee Valley Authority.

A large amount of photolithographic printing was also done for the Civil Aeronautics Authority, the Maritime Commission, and other agencies and bureaus.

Forty-nine cadet officers of the United States Maritime Commission were given instruction aboard Survey vessels, to familiarize them with the many Bureau activities benefiting the merchant marine officer.

The larger ships had at various times from two to six cadets assigned during the field season on the Atlantic, Gulf, Pacific, and Alaskan coasts.

Gravity observations were obtained at a number of stations in Wyoming and Idaho for the Geological Survey, as a basis for investigations to correlate various forms of geophysical and geological data in mountainous regions.

Reciprocal agreements continued between the United States and England, France, Canada, India, and the Netherlands for the exchange of tide predictions.

Cooperation with various projects of the Work Projects Administration included a leveling project in the Santa Clara Valley, Calif., for the examination for the eighth consecutive time of a region of large settlement in the general vicinity of San Jose. The results of the last leveling in the fall of 1939 indicate that subsidence, in one place more than 5 feet, has not only ceased but that there has been a slight rise in elevation of the entire net during the past 2 years. Since there was a rise in the ground water level at the same time, geologists and others most capable of passing judgment on this matter, attribute the surface rise to the raised water level.

Cooperation was also extended to Work Projects Administration in the sponsorship of computing offices in New York, N. Y., and Philadelphia, Pa., at each of which there were employed an average of about 180 persons.

Various items of equipment have continued on loan to Work Projects Administration projects. These include steel towers to the Massachusetts and Connecticut geodetic surveys and the Minneapolis city survey; theodolites to the Massachusetts geodetic survey and the Cleveland city survey; precise levels to the Georgia and Arkansas geodetic surveys and the Cleveland and Minneapolis city surveys; and a repeating theodolite and base tapes to the Mercer County, Pa., project.

An administration fund was transferred to the Bureau to cover such expenses in connection with assistance given to Work Projects Administration projects. This fund was also available for costs of computing forms furnished to such projects and to defray express and freight shipments.

Science Service paid for the transmission of earthquake code messages from seismograph stations in the United States for the immediate determination of epicenters. These determinations are sent to all cooperative stations.

The Gulf Research and Development Corporation loaned the Bureau instruments used in the determination of differences of vertical magnetic intensity at various piers at the Cheltenham Observatory. Data on magnetic conditions were furnished the corporation throughout the year, and tests of their new type magnetometer started.

The Bureau of Reclamation transferred $25,000 to the Bureau for the establishment of three seismological stations in the vicinity of Boulder Dam as a cooperative project of the two Bureaus and the National Park Service. The stations are used to determine the epicenter of nearby earthquakes.

Close cooperation was maintained with the California Institute of Technology, especially the seismological laboratory, in seismological problems, including instrumental development.

At the request of the American Standards Association, a Bureau representative is serving on sectional committee A–58, Building Code Requirements for Minimum Design Loads in Buildings. The Bureau furnishes fundamental seismological data necessary for the design of earthquake resistant structures.

Seismographs were operated in cooperation with the University of South Carolina, University of Chicago, Montana School of Mines, Montana State College, University of Utah, Utah State Agricultural College, Nebraska Wesleyan University, University of Hawaii, University of Alaska, Woods Hole Oceanographic Institute, and the Bermuda Biological Station. The Jesuit Seismological Association operated a number of seismographs and close cooperation was maintained in the exchange of records and data.

Tilt meters for determining the earth's tilt, and its relation to seismology, were continued in cooperation with the University of California.

Reports on the effects of earthquakes were obtained with the assistance of the Weather Bureau, several universities, many commercial agencies, and individuals.

The following activities were continued with the cooperation of the department of terrestrial magnetism, Carnegie Institution of Washington: Operation of a cosmic ray meter at Cheltenham Observatory; maintenance at Cheltenham Observatory of international magnetic standards; atmospheric and earth electric currents at Tucson Observatory (the Mountain States Telephone & Telegraph Co. and Bell Telephone Laboratories also cooperating); daily and weekly radio broadcasts of magnetic conditions, in which the Navy Department and Science Service have also aided; and training personnel and furnishing instruments for the United States Antarctic Expedition.

Two scientific assemblies were held in Washington, D. C., during the year. The first was the Seventh Assembly of the International Union of Geodesy and Geophysics, in September 1939. Various members of the Bureau are officers of the organization and took prominent parts in preparations for the meetings, as well as arranging for the entertainment, excursions, programs, and other features. Others presented papers and took an active part in the scientific discussions.

The second was the Eighth American Scientific Congress, in May 1940. Members of the Bureau also took an active part in presenting papers and in the discussions.

While such conferences are an ideal medium for the promotion of international scientific cooperation and cordial contact between nations, recent world events have been disastrous to many such organizations.

NEW AND IMPROVED METHODS AND EQUIPMENT

Two new ships of the most modern type for duty in the Aleutian Islands were added to the Bureau's survey fleet in the spring of 1940. The *Explorer*, a 220-foot vessel powered by a 2,000 horsepower steam turbine, with a cruising radius of 8,000 miles, is designed especially

for long voyages in isolated areas. The *E. Lester Jones* is a sturdy 88-foot wooden tender built for work in more protected waters.

The thermostatic control of the pendulum apparatus used in gravity determinations, undertaken some 2 years ago, has now been perfected. The chief difficulty in the adoption of this equipment to field work has been to eliminate any magnetic or electrical effect on the period of the pendulum.

A small rotary offset press, similar to the larger presses now in use, has been installed in the Washington office, to relieve the larger presses from special work which does not require large printing plates.

The Dorsey Fathometer No. 3 has now been installed on the survey ships *Discoverer*, *Pioneer*, *Explorer*, and *E. Lester Jones*, and automatic depth recorders to supplement the Fathometer have been placed on the ships *Explorer*, *Oceanographer*, *Lydonia*, *E. Lester Jones*, *Gilbert*, and on several launches.

Improvements continue in sono-radio buoys, now successfully used to distances of 85 miles. A mechanism was also designed to permit release in deep water of the anchor of the sono-radio buoy, so as to salvage the expensive anchor cable.

Excellent results have been obtained with an experimental model of a newly designed portable tide gage. A radical departure from the older model, it is designed to eliminate nearly all lost motion and friction and is less expensive to manufacture. An improvement was also made in the standard tide gage, to reduce the weight and cost of manufacture.

The support used for base measuring tapes was redesigned for construction of cast duraluminum, thereby providing a much lighter and cheaper device.

Physical changes in high precision theodolites are constantly occurring during field use, by reason of handling, temperature changes, lack of proper adjustment, and other causes. A program has been adopted of instrument testing which it is believed will safeguard instruments from future serious faults of this kind.

Signal lamps were improved as to rigidity of mounting and ease of focusing, and theodolites were improved by design of a positive yet simple means of adjusting the microscopes.

Two dozen light tables, equipped with latest type fluorescent lamps, were constructed for use in negative cutting. These tables provide soft even illumination, with an almost total absence of objectionable heat as the new lamps consume very little current.

CHART PRODUCTION

With demands for nautical and aeronautical charts increasing rapidly from year-to-year under normal conditions, there was suddenly added near the end of the year in connection with the national defense an unprecedented additional demand for these charts. The increasing output is shown in the following tabulation of annual issues and percentage increases for the last 4 years. Only a small portion of the demand resulting from the national defense program is reflected in these figures, since that program was not inaugurated until near the end of the fiscal year.

Charts	1937	1938	1939	1940
Nautical	333,366	351,150	350,062	407,186
Aeronautical	277,878	299,094	366,353	463,917
Total	611,244	650,244	716,415	871,103
Annual increase:				
Number		39,000	66,171	154,688
Percent		6.4	10.1	21.6

The total number of individual nautical charts available at the end of the year was 801, of which 163 were compiled and printed in Manila. Of the charts published in Washington there were 684 printings of 638 charts as follows: 10 new charts, 71 new editions, 534 new prints, 65 reprints, and 1 advance print. At the end of the year the Bureau was compiling 8 new original charts and recompiling 2 new charts.

The 10 new charts published during the year are as follows:

825. Manasquan Inlet to Little Egg Harbor.
826. Little Egg Harbor to Longport.
827. Longport to Cape May.
849. Elliott Key to Florida Bay.
937. Frederiksted Road, Saint Croix, V. I.
1050. New Orleans to Calcasieu River (East section).
1051. New Orleans to Calcasieu River (West section).
1263. St. Joseph and St. Andrew Bays.
5020. San Diego to Monterey.
5118. San Clemente Island, northern part Wilson Cove.

Of the above, special mention should be made of charts 825, 826, and 827, prepared to meet the demand for large-scale charts of the inland waterway along the New Jersey coast. These three cancel chart 3243, on a smaller scale. With new chart 849, and others completed previously, there are provided a complete set of inland waterway charts on a large scale from northern New Jersey to Miami, Fla.

The principal data received during the year consisted of 103 topographic surveys, 124 hydrographic surveys, 1,368 surveys from other organizations, and 741 chart letters. There were 5,693 changes in aids to navigation during the year. Dangers for hand corrections and data covering chart and related information were supplied the United States Coast Guard for announcement in its weekly Notice to Mariners. Although charts went to the press on an average of one in 11 months, it was necessary to apply 1,603,186 hand changes to 313,419 charts to correct them to the date of issue.

The issue of aeronautical charts shows a 27 percent increase over the fiscal year 1939. This is a logical trend accompanying all other statistics of the aviation industry which show comparable increases.

The Bureau now publishes 106 aeronautical charts. Two new Direction Finding charts (23–DF and 26–DF), and four new Regional charts (1M, 11M, 13M, and 17M), were added. There remain seven Regional and five Alaska charts still to be published to complete the present program. To maintain their accuracy, 234 printings were necessary, of which 55 new editions were required because of extensive changes in air navigation data. The redesignation, for the Civil Aeronautics Authority, of civil airways effective in March 1940, has been an improvement over former designations and their addition to charts has progressed satisfactorily.

HYDROGRAPHIC AND TOPOGRAPHIC WORK

During the year increased appropriations made possible the more nearly continuous field operation of hydrographic units. To accelerate the necessary preliminary office work on the resulting increased volume of field records, processing offices were established at Norfolk, Va., Pensacola, Fla., Oakland, Calif., and Seattle, Wash.

A summary of activities in hydrography, topography, and coastal triangulation follows:

Locality	Hydrography			Topography		Coastal triangulation		
	Sounding lines	Area	Soundings	Shore line	Area	Length of scheme	Area	Geographic positions
	Miles	*Square miles*	*Number*	*Miles*	*Square miles*	*Miles*	*Square miles*	*Number*
Gulf of Maine	7,227	4,989	70,029					
Boston Harbor	706	36	31,908	398	125			
Nantucket Sound	4,805	142	185,469			7	21	
North coast of Long Island						54	134	182
Atlantic coast east of Fire Island	14,113	6,199	162,168	3				
Chesapeake Bay	136	9	5,453	601	212			
Atlantic coast south of Cape Fear	11,521	5,842	114,309					
St. Johns River, Fla				253	134			
Indian River, Fla						46	300	140
West coast of Florida				708	265			
Choctawatchee Bay, Fla	1,752	57	68,425	65	20			5
Gulf of Mexico	24,908	41,629	254,679	18	4			
San Francisco Bay	462	19	15,570	34	10		9	14
Coast of northern California	972	289	9,452					
Columbia River and coast of Washington	2,071	95	89,728	176	50	25	130	72
Grays Harbor, Wash	263	7	10,668	92	7	56	507	52
Northern Puget Sound	3,560	117	105,138	110	174	74	264	180
Southeastern Alaska	1,639	119	41,213	198	85			
Gulf of Alaska	7,300		7,750					
Central Alaskan coast	3,384	2,627	29,677	16				
Alaskan Peninsula	10,611	11,893	137,609	116	186	63	377	40
Aleutian Islands, Alaska	9,887	7,882	168,111	171	171	59	291	62
Puerto Rico	41	2	1,687			4		2
Philippine Islands	7,958	1,418	166,985	121	24	102	1,081	208
Total	113,316	83,371	1,676,028	3,080	1,467	490	3,114	957

On the Atlantic coast the survey vessel *Oceanographer* completed her part of the offshore hydrographic project extending from the New Jersey coast to Nantucket Lightship, and began new basic surveys in the Gulf of Maine. The *Lydonia* continued on the former project. During the winter months both vessels were engaged on offshore hydrographic surveys along the coasts of North and South Carolina.

Wire-drag investigations along the Atlantic coast in the vicinity of Sandy Hook were completed under the supervision of the commanding officer of the ship *Oceanographer*.

The *Gilbert* continued work on surveys along the south coast of Cape Cod and cooperated with the *Lydonia* in the survey of Nantucket Shoals. The launch *Elsie III* began operations as a mobile revision unit along the Intracoastal Waterways of the Atlantic coast.

The *Mikawe* during the summer of 1939 continued surveys along the south coast of Cape Cod. With the close of the season the vessel proceeded to Norfolk, Va., arriving October 23. This vessel was destroyed by fire on the morning of October 27 while taking on gaso-

line, resulting in the death of Clement A. Bennett, oiler, and the serious injury of Lt. Max G. Ricketts; Anon J. Small, boatswain; William D. Bennett, quartermaster; Elton E. Mooney, seaman A. B.; and Isaac R. Jones, ship's cook.

After the loss of the *Mikawe*, the personnel were assigned to the launches *Ogden* and *Mitchell* which took up combined operations in the Indian River, Fla., during the winter months. In the spring of 1940 this party began surveys in Chesapeake Bay in the vicinity of Chester River and Eastern Bay.

The scheme of second-order coordinating triangulation along the northern shore of Long Island from Oyster Bay to Gardiners Bay was completed.

Coast Pilot revision parties were engaged in the collection of data for new editions of sections A and B of the Coast Pilot, covering the coastal areas from the Canadian boundary to New York Harbor.

Compilations of line maps from air photographs taken with the Bureau's 9-lens camera were made of Boston Harbor, Chester River, and adjacent tributaries of Chesapeake Bay, and Apalachee Bay and St. Marks River on the Florida Gulf coast. Small air-photographic compilation units were in operation at Baltimore, Md., and Tampa, Fla. Air-photographic surveys in advance of inshore hydrography have proved so efficient and time saving that this procedure is being used whenever conditions permit.

In the Gulf of Mexico, the ship *Hydrographer*, with the tender *Faris* operating as a subparty, completed her assignment along the Texas coast and began operations in the central and eastern parts of the Gulf, with headquarters at Pensacola, Fla.

A shore party completed the survey of the eastern half of Choctawatchee Bay, Fla., and of the Intracoastal Waterway between Fort Washington and West Bay.

On the Pacific coast all vessels were employed on a program of winter surveys. The ship *Guide* operated off Cape Mendocino, Calif., in San Francisco Bay and off the Santa Barbara Islands, Calif.; the *Surveyor* and *Westdahl* completed winter assignments in the San Juan Islands, Wash.; and the *Discoverer* began a revision survey of Grays Harbor, Wash.

The old *Explorer* discontinued work in Puget Sound in the fall of 1939 and was transferred to the National Youth Administration at Seattle, Wash., after service in the Coast and Geodetic Survey for 35 years. The new *Explorer*, and the motor vessel *E. Lester Jones*, built under an allotment from Public Works Administration funds, were commissioned in the spring of 1940 and assigned to Aleutian Island surveys.

A wire-drag party completed its assignment on surveys along the California coast. An arc of second-order triangulation was completed along the Washington coast from the mouth of the Columbia River to Grays Harbor, Wash., and a revision survey was made of Willapa Bay.

In southeastern Alaska the new motor vessel *E. Lester Jones* accomplished a short project in the outer southern approaches to Sitka, Alaska, before joining the fleet in the Aleutian Islands. The motor

vessel *Westdahl* continued work on original hydrographic surveys of Glacier Bay.

The *Surveyor* was transferred from the Aleutian Islands where she had been engaged on surveys along the coasts of Unalaska and Umnak Islands, and began work on the eastern end of a project of original surveys of the Alaskan coast, between Cape Fairweather and Cape St. Elias.

In southwestern Alaska the new *Explorer* and the new *E. Lester Jones* extended surveys in the Aleutian Islands westward from Umnak Island. The *Pioneer*, working in cooperation with the *Explorer*, extended triangulation to Amukta Island and accomplished offshore hydrography south of the Islands of Four Mountains.

The *Discoverer*, assisted by the tender *Wildcat*, continued operations along the south coast of the Alaskan Peninsula eastward from the Sanak Islands. The *Guide* continued work on the Bering Sea side of the Peninsula on the project extending northeastward from Cape Saricheff.

In the Philippine Islands the *Pathfinder* continued surveys on the west coast of Palawan. The *Fathomer* was recommissioned early in the year and began survey operations in the area between Balabac and Cagayan Sulu.

The 13 United States Coast Pilot volumes, which are kept current by annual supplements, contain a wide variety of important information supplemental to that shown on the chart, such as detailed description of the coast and information concerning the waterways, as well as maritime data for the ports of the United States and possessions. New editions of Coast Pilots are published as often as warranted by the number of changes made and the amount of new information available. Three supplements to United States Coast Pilots and one to the Hawaiian Coast Pilot were published during the fiscal year. New editions of the West Indies Coast Pilot and volumes I and II of the Philippine Islands Coast Pilots were published. Manuscript was prepared for a new edition of United States Coast Pilot B, covering the Atlantic coast from Cape Cod to Sandy Hook.

The field stations of the Bureau in the United States, Honolulu, and Manila, continued to render valuable service in supplying information for the correction of charts in their vicinities and in disseminating navigational and engineering data in response to requests from local public and official sources.

GEODETIC WORK

The demand for goedetic data was greater than for any year in the history of the Bureau. In addition to furnishing data in response to a large and increasing variety of requests, there has been conducted a large amount of field work in cooperation with other organizations, for which the latter furnished the necessary funds.

A brief outline of work accomplished in connection with geodetic triangulation, base lines, reconnaissance, and leveling and astronomical and gravity observations follows:

Locality	Length of scheme	Area
First-order triangulation	*Miles*	*Square miles*
Bloomington to Clarks Hill, Ind	75	750
Albany to Glasgow Junction, Ky	55	495
Wilmington to Georgetown, Ohio	50	600
Oquawka to Watseka, Ill	135	1,485
Longmont to Steamboat Springs, Colo	100	2,000
Hagerstown to Parkton and Thurmont to Brunswick, Md	90	900
Hamburg to Cortland, N. Y	150	1,500
Hayward, Wis., to Calumet, Mich	190	2,850
Missoula to Trail Creek, Mont	115	1,610
Billings to Rothiemay, Mont	80	1,440
Sonoma to Redding, Calif	320	6,750
Vicinity of Petaluma, Calif	20	100
Arkansas River, Ark., and Okla	485	5,950
Vicinity of Placerville, Calif	20	700
Total	1,885	27,130
Second-order triangulation		
Cape Charles, Cape Henry, and Fort Monroe, Va	30	150
Vicinity of Fort Tilden, N. Y	15	45
Vicinity of Fort Hancock, N. J	5	20
Vicinity of Boston Harbor, Mass	10	20
Airplane Record Courses, Illinois, Colorado, New Mexico and Ohio	10	20
Total	70	255

Locality	Length of scheme	Area
First-order base lines	*Miles*	*Square miles*
Steamboat Springs, Colo	4.7	
Orland, Calif	5.1	
Total	9.8	
First-order reconnaissance		
Stillwater, N. J., to Herkimer, N. Y	140	1,400
Forty-first parallel, California, Nevada, and Utah	380	15,200
Francesville, Ind., to Watseka, Ill	55	550
Monroeville, Ind., to North Manchester, Ind	50	500
Greencastle to Clinton, Ind	35	350
Arkansas River, Ark., and Okla	625	7,660
Vicinity of Petaluma, Calif	20	100
Total	1,305	25,760
Second-order reconnaissance		
Monroe to Opelousas, La., and Winnfield to St. Joseph, La	180	1,800
Minden to Lake Charles, La	155	1,550
Willamette River Valley, Oreg	80	1,600
Total	415	4,950

State	First-order	Second-order
Leveling	*Miles*	*Miles*
Arkansas	3	436
California	550	118
Kansas	72	153
Louisiana	6	
Mississippi	37	
Missouri	32	61

State	First-order	Second-order
Leveling—Continued	*Miles*	*Miles*
Nebraska	32	
Nevada		140
Oklahoma		98
Total	732	1,006

State	Determinations		
	Latitude	Longitude	Azimuth
Astronomy			
Alaska			1
California			1
Colorado	1	1	1
Illinois	1	1	1
Indiana	1	1	
Michigan	1	1	1

State	Determinations		
	Latitude	Longitude	Azimuth
Astronomy			
Minnesota	1	1	1
Montana	1	1	1
Nevada	1	1	
New York			1
South Dakota	1	1	1
Total	8	8	9

State	Determinations		State	Determinations	
	New	Repeat		New	Repeat
Gravity			*Gravity*		
Colorado	3		Nebraska	1	
Idaho	3		Wyoming	14	
Illinois	1				
Maryland	1	1	Total	23	1

Evidence of the value of control surveys continues to increase as the work advances. This natural reaction is doubtless due in large measure to the final geodetic datums for triangulation and leveling adopted in 1927 and 1929, respectively. Strangely enough it took more than a century before the Federal control of this country, started by Hassler in 1817, had attained the scope of a nation-wide network, ready for adjustment into a rigid and final system of coordinates for geographic positions and of elevations. The importance of this work is more deeply appreciated when one realizes that the maximum value of control work can be obtained only where it is completely coordinated into a single system or datum as a means of obtaining uniformity in field and office procedure over the country. Once a point on the earth has been marked by a monument and its position fixed, through the horizontal control system of the United States, or an elevation has been definitely established, it is of value to citizens for all time to come. Points not so coordinated are less useful.

These data of geographic positions, azimuths, distances between stations, elevations, basic gravity values, etc., are of indispensable value in the extension of all kinds of public works projects, flood control, surveying, mapping, and other engineering and scientific activities where coordination is essential so adjoining projects may meet without gaps or overlaps.

Three triangulation, two leveling, one astronomical, and one gravity parties operated through most of the year in the accomplishment of control in various sections of the country. Much effort was directed to the completion of gaps in previous work, so as to consolidate the existing fundamental net, coordinate supplemental projects of other organizations, and make available the processed data as early as practicable.

Variation of latitude observatories at Ukiah, Calif., and Gaithersburg, Md., were continued in operation. This program was initiated many years ago under the joint auspices of the International Astronomical Union and the International Union of Geodesy and Geophysics.

The expanded geodetic program of 1932–35 left a large accumulation of field records. Since that time and particularly during the past year, this situation was relieved by the processing of material through the efforts of the Washington Office and personnel in the New York and Philadelphia processing offices. It is believed that another year will relieve the arrearage almost completely. Some of the principal projects which have been processed during the year include:

Triangulation.—The adjustment of cooperative projects of triangulation in the Sacramento River Valley, Calif., along the Arkansas

and Columbia Rivers; and in Puerto Rico. Further adjustments, smaller in scope, were begun in Norfolk, New York, and Boston Harbors. Adjustments of the triangulation along the Hudson River from New York City to above Troy, N. Y., and in northern Maryland and eastern Pennsylvania, were also completed.

This year witnessed the completion of the adjustment of the triangulation along the Mississippi River from the headwaters in Minnesota to the Gulf of Mexico, in cooperation with the United States Engineers over a period of some 10 years, beginning in 1929. This project coordinated the field surveys in that region by the Corps of Engineers with those of the Bureau.

Leveling.—The adjustment of the net in the general vicinity of Cleveland; a local net in Kentucky; and a special adjustment of the leveling in the Boulder Dam area.

TIDE AND CURRENT WORK

Eighty-five primary and secondary tide stations were in operation during the year: 41 on the Atlantic coast, 6 on the Gulf coast, and 38 on the Pacific coast. Of these, 38 were conducted in cooperation with other agencies, including the United States Engineers, the Navy Department, Territory of Hawaii, cities of New York, Santa Monica, and Los Angeles, Port of Willapa Harbor, Woods Hole Oceanographic Institution, Chesapeake Biological Laboratory, and University of Washington.

Shorter periods of observations at approximately 120 additional stations were obtained in connection with hydrographic surveys and other activities.

A tide survey of the Sacramento-San Joaquin Rivers was continued throughout the fiscal year with 12 standard gages in continuous operation. Also continued throughout the year was a tide survey of the Connecticut River, in cooperation with the office of the District Engineer at Providence. Six stations were in operation between Saybrook and Hartford.

No current surveys were conducted. Some current observations were secured however by hydrographic parties and in cooperation with other organizations. Through the cooperation of the United States Coast Guard, a 13-month series of hourly current observations was completed at Fire Island Lightship, approximately 6½ months of similar observations were secured at Overfalls Lightship and 1 month at Portland Lightship. At the end of the year observations were still in progress at Overfalls and Portland Lightships. In cooperation with the Department of Highways, Suffolk County, N. Y., current observations were obtained at nine stations in the vicinity of Shinnecock Bay, Long Island.

The need for comprehensive current surveys in important waterways was emphasized by numerous requests for current data which could not be adequately supplied because of the meagerness or total lack of observational material for the localities concerned.

MAGNETIC WORK

Continuous magnetic information was obtained at five observatories located at Cheltenham, Md.; Honolulu, T. H.; San Juan, P. R.; Sitka, Alaska; and Tuscon, Ariz. Magnetic observations were made either to improve the magnetic survey or to keep record of the

changes in the earth's magnetism. The resulting information is used by the navigators of sea or air, the land surveyor, and the explorer of oil and mineral resources, and has proved exceptionally valuable in connection with radio communication. New methods have made it possible to furnish this information in convenient form by radio broadcast or otherwise. Special effort was given to making accumulated data of the past available for use. Two Work Projects Administration undertakings—one in New York City and the other in Puerto Rico—have done considerable work on the Polar Year records. Magnetic data were supplied for 180 charts.

The need for a nonmagnetic ship with which to make magnetic observations at sea is becoming more acute. Observations cannot be made with the present steel ships, and since the destruction of the *Carnegie* in 1929 none has been obtained. Therefore, the value of the magnetic declination on the charts is becoming less and less reliable.

Changed magnetic conditions necessitated the construction of a new observatory at Sitka, Alaska. Many improvements were made to instruments and methods with the aim of reducing time spent in eventual processing of records as well as increasing the accuracy.

The distribution of magnetic observations during the year is shown in the following table:

State or Territory	Repeat stations			Other declination stations	Total
	New—complete	Old			
		Complete	Declination only		
Alabama			3		3
Alaska	3	24		73	100
California			1	3	4
Colorado				30	30
Florida		1		7	8
Georgia			4		4
Idaho			2	10	12
Illinois			[1] 4	43	47
Indiana			2	10	12
Iowa			1		1
Kansas			2		2
Kentucky				6	6
Louisiana		1	3		4
Maine				3	3
Maryland	1			12	13
Massachusetts				3	3
Michigan			[1] 2	15	17
Minnesota		1	5		6
Mississippi			2		2
Missouri				1	1
Montana			3	30	33
Nebraska			3		3
Nevada				8	8
New Hampshire				2	2
New York			3	62	65
North Carolina		1	4		5
North Dakota		2	1		3
Ohio				6	6
Oregon			1	10	11
Pennsylvania			2	5	7
South Dakota			3		3
Texas	1	1	9	9	20
Vermont			1	17	18
Virginia	1	1	3		5
Washington				[2] 87	87
Wisconsin			5	22	27

[1] Including H observations at 1 station.
[2] Including D test observations at 4 sites.

SEISMOLOGICAL WORK

The Bureau's seismological work consists in recording distant and local earthquakes; obtaining data by an elaborate system of questionnaires; exchanging information with many institutions; measuring the character and magnitude of natural periods of vibrations of structures and the ground; and cooperation with other Government agencies, scientists, and educational institutions in the study of effects of earthquakes, with a view to improving present means of safeguarding life and property.

Seismographs were operated at observatories in Tucson, Ariz.; Honolulu, T. H.; Sitka, Alaska; and San Juan, P. R. The Bureau cooperated in the maintenance of seismographs at nine colleges and an equal number of independent stations sent their records to the Bureau for study and interpretation.

Sixty strong-motion seismographs for the recording of strong local shocks were maintained at 52 stations, and 24 records were obtained for 6 earthquakes.

Twenty-three vibration tests were made in 5 buildings, 3 tests on 1 bridge, and 88 ground period tests at 17 locations. Approximately 100 records were obtained on shaking table tests of instrumental equipment. Recording of fault noises in two deep wells was carried on intermittently. Three tilt-meter stations were maintained.

Intensive questionnaire coverage was obtained for 14 earthquakes of semidestructive character and over 3,300 reports on approximately 400 earthquakes were received.

Many institutions requested photographic copies of the original records.

PERSONNEL AND FINANCES

The Bureau had a personnel of 1,430 on duty at the close of June 30, 1940—398 (18 commissioned and 380 civilian, including 20 civilians paid from emergency allotments) on duty in the Washington office, and 1,032 (146 commissioned and 886 civilian) in the field service. The field personnel included 51 civilian employees on duty at the Manila Field Station and 50 members of the crew of the ship *Fathomer* paid by the Philippine Insular Government but under the jurisdiction of this Bureau.

Acquisitions by the library and archives included 124 hydrographic and 103 topographic sheets, representing new Bureau surveys; 1,120 blueprints (mostly surveys by Army Engineers); 2,134 maps; 646 charts; 7,435 field, office, and observatory records; 302 negatives; 1,928 prints; 333 lantern slides; 1,111 books; and 3,957 periodicals.

Collections covering miscellaneous receipts, including nautical and aeronautical charts and publications, totaled $133,246.64, as compared with $109,950.44 during the preceding year.

The regular appropriations for the year totaled $3,125,000. These were supplemented by the following additional appropriations:

Working fund, 13-21-3000-(08) (War, Rivers, and Harbors)	$12,600.00
Working fund, 13X6908.001 (special fund) (Bureau of Reclamation)	25,000.00
Working fund, 13X5908 (War, flood control):	
Limitation .001	2,000.00
Limitation .002	61,200.00

Working fund, 265009.4–650999, administrative expenses (Emergency Relief, Work Projects Administration), 1940	$29,292.00
Working fund, 139/05908, Commerce, Coast and Geodetic Survey, 1939–40 (transfer from War Department):	
Limitation .001	8,000.00
Limitation .002	8,000.00
Limitation .003	8,714.31
Working fund, 1305908.001, Commerce (Coast and Geodetic Survey), 1940	1,285.69
Allotment from the Department of Commerce for travel	23,500.00

There were also allotted for nonconstruction projects in Puerto Rico the following:

202037–650999, Emergency Relief, Nonconstruction projects (transfer from W. P. A.), 1940	$29,769.00
202038–650999, Emergency Relief, Administrative Expenses (transfer from W. P. A.), 1940	1,048.00

Transfers and reimbursements from other departments were received to the credit of the following appropriations: Salaries, 1940, $2,931.74; aeronautical charts, 1940, $32,267.25; and office expenses, 1940, $1,126.87.