

# CENSUS OF MANUFACTURES: 1929

## CHAPTER I.—GENERAL EXPLANATIONS

This volume presents detailed statistics by subjects, by industries and by States, and gives figures for "industrial areas" and important counties and cities, assembled from data collected at the manufactures census for 1929.

1. **Legal provision for biennial census.**—The census of manufactures for 1929 was the fifth of a series taken at 2-year intervals beginning with 1921. For these censuses, somewhat restricted in scope as compared with prior censuses taken at 5-year intervals, legal authority is found in section 32 of the Fourteenth Census Act and in section 17 of the Fifteenth Census Act. Censuses of manufactures were taken decennially prior to 1899 and quinquennially from 1899 to 1919, inclusive.

2. **Area and period covered.**—The canvass covered the 48 States and the District of Columbia. The returns relate to the calendar year 1929, or, in the cases of some establishments, to business or fiscal years ending within the period from April 1, 1929, to March 31, 1930, and cover a year's operations, except for establishments which began or discontinued business within the year.

3. **Scope of the census.**—The census statistics are compiled primarily for the purpose of showing (1) the production of each important class or kind of manufactured commodities, and the increase or decrease therein; (2) the absolute and relative magnitude of the various manufacturing industries covered, and their growth or decline; and (3) the industrial importance of individual States and cities and their changes in rank. In addition, statistics are presented which throw light on certain matters of economic and sociological importance, such as size of establishments, character of ownership (corporate or other), hours of labor, monthly employment of wage earners, power equipment, and fuel consumption.

The general statistical items for which data were collected at the census for 1929 were as follows: Time in operation and hours of labor; numbers and sex of proprietors and firm members, salaried officers and employees, and wage earners; monthly employment of wage earners; amounts paid in salaries and wages; cost of materials and containers for products; value of products; number and power rating of prime movers, electric motors, and electric generators; quantities and costs of fuels consumed, and cost of purchased electric energy; distribution of sales according to channels through which products were marketed.

This information was obtained from all manufacturing establishments coming within the scope of the census. In addition, as explained under the head "Detailed statistics of products,

materials, and equipment" (p. 6), data in regard to the quantities and values of individual classes of products were collected from establishments in all important manufacturing industries; in many cases the consumption of materials was reported in detail, by quantity and cost; and for a considerable number of industries data in regard to machinery and other equipment in use were also collected.

4. **Expansion of schedules.**—Because the census for 1929 belonged to the decennial as well as to the biennial series, more data were obtained than for preceding biennial censuses.

The expansion of the schedules for 1929 was made at the recommendation of an advisory committee appointed by the Secretary of Commerce. The membership of this committee, 25 in number, represented some of the leading manufacturing industries, the Chamber of Commerce of the United States, Cornell University, The Rockefeller Foundation, the National Industrial Conference Board, the Associated Business Papers, the American Federation of Labor, Stanford University, the National Coal Association, the office of the Secretary of Commerce, and the Bureau of the Census. The number of inquiries common to all schedules was increased from 8 to 12; some of the individual inquiries were amplified, and others were modified. All changes of any importance were made at the recommendation of the advisory committee.

An inquiry in regard to the distribution of manufacturers' sales was carried for the first time on the manufactures schedules in order to obtain data needed for the purposes of the census of distribution. The results are published as one of the reports of that census.

Special forms of schedules used at the census for 1929 numbered 165 and covered 238 of the 326 industries. At the biennial census for 1927, 152 special forms were used to canvass 226 industries. (See "Detailed statistics of products, materials, and equipment," p. 6.)

5. **The canvass.**—The data were collected in part by mail and in part by canvassers. The schedules were mailed in January to all manufacturers who had reported at the census for 1927 and to others whose names were obtained from various sources, such as trade directories. Many of the returns were sent in by mail; and those manufacturers who failed to make their reports within a reasonable time were visited by members of the bureau's field force.

The field work in cities having 10,000 inhabitants or more was done by a large force of canvassers appointed exclusively for manufactures and distribution census work; and in smaller places the regular population enumerators canvassed those manufacturing and mercantile establishments which had not already submitted satisfactory returns by mail. The schedules sent to manufacturers in all places in which the field force had local headquarters were accompanied by return envelopes addressed to the local offices, whereas those mailed to manufacturers in

other places were accompanied by return envelopes addressed to the bureau at Washington.

The usual cooperative arrangements were made with local chambers of commerce; with the Bureau of Mines, of the Department of Commerce; with the Forest Service, of the Department of Agriculture; and with the Department of Labor and Industries of Massachusetts.

6. **Publication of the statistics.**—The more important figures of the census for 1929 were first given out in mimeographed press releases, preliminary and subject to revision. Final statistics for individual industries, for individual States, and for certain special subjects, such as power and fuel, were issued in quarto pamphlets. All final reports of the census of manufactures will ultimately be assembled into three quarto volumes.

Preliminary industry reports, subject to revision, each covering a single industry, were issued in mimeographed form during the period from June 26 to December 31, 1930. In all, 212 such reports, covering all the more important industries embraced in the census classification (see "Classification of industries," p. 3), were given out. A printed summary for the United States, by industries, was published on December 31, 1930.

A second series of preliminary reports, each giving summary statistics for a State, by counties and for cities of 10,000 or more inhabitants, and a United States summary, by States, were issued during the period from March 20 to May 27, 1931.

Two special final reports, one presenting detailed statistics by industries, States, and counties for the consumption of fuel and purchased electric energy, and the other bringing together the general statistics by industries and by States, were issued in pamphlet form.

Final reports (in pamphlet form) of the industry series, numbering 80, gave detailed statistics for single industries or small groups of related industries. The contents of these reports, together with some additional matter, have been assembled and published as Volume II.

Final general statistics for States and for "industrial areas," by industries, were first issued in mimeographed form. (Each industrial area has as its nucleus an important manufacturing city and comprises the county in which the city is located, and in most cases one or more adjoining counties in which there is great concentration of manufacturing industry.) Printed reports in the State series, each giving complete statistics for a State as a whole and general statistics, by industries, for industrial areas and for important industrial counties and cities, were published later and ultimately assembled as Volume III.

Volume I is a general report covering all industries and all States.

7. **Comparableness with preceding years—Adjustments in figures.**—It is sometimes necessary, for various reasons but chiefly because of changes in census classifications, to make adjustments in the figures for earlier census years.

When such adjustments are of considerable magnitude, they are explained in headnotes or footnotes; and when they are insignificant and do not materially affect the comparableness of the statistics, the change is indicated by the footnote "Revised."

8. **Comparableness with preceding years—Price changes.**—In comparing the figures for cost of mate-

rials, value of products, and value added by manufacture for different census years, price changes should be taken into account. To the extent to which this factor was influential, the figures fail to afford true indexes of the actual increase or decrease in manufacturing activities.

9. **Comparableness with preceding years—Years covered.**—For the purpose of general comparison of industrial activity from census year to census year, a summary covering the period from 1849 to 1929 and complete general statistics for the period from 1899 to 1929, in combination for all industries, are presented in Tables 1 and 3, respectively.

Although the manufacturing industries of the country were canvassed at the censuses of 1810, 1820, and 1840, the results were not comparable with those of the manufactures inquiries made in 1850 and subsequent census years. The returns made by each manufacturing establishment at each census from 1850 to 1890, inclusive, covered either the preceding calendar year or some other 12-month period which usually ended within the census year. The returns from the censuses taken in 1900 and subsequent years have related in the case of each establishment either to the preceding calendar year or to the business year which corresponded most nearly thereto. In both tables the statistics for all censuses are presented as relating to the year immediately preceding that in which the census was taken.

The manufactures data collected at the decennial censuses from 1850 to 1900, inclusive, covered the so-called neighborhood, hand, building, and household industries, as well as the factory industries, whereas the canvasses for 1904 and subsequent census years covered factory industries only. (See "Establishments covered—Type," p. 3.)

The statistics for 1899 (census of 1900) have been reduced to the factory basis by eliminating, so far as possible, the data for the neighborhood, hand, building, and household industries, but no such elimination is possible in the case of the earlier censuses. For this reason the statistics for years prior to 1899 are not comparable with those for 1904 and subsequent census years. Nevertheless, they indicate in a rough way the industrial progress of the country from census year to census year since 1849.

Two sets of figures are given in Table 1 (p. 17) for 1899, one including data for the neighborhood, hand, building, and household industries, to preserve comparableness between 1899 and earlier years, and the other excluding such data in order to make the figures for 1899 comparable with those for later years. The financial items for 1869, which were reported in inflated currency worth in gold about 80 per cent of its nominal value, have been reduced to a gold basis in this presentation in order to make the figures for that year comparable with those for preceding and following census years.

10. **Comparableness with preceding years—Schedule changes.**—The comparableness of the statistics for 1929 with those for preceding years is affected to some extent, but only slightly in the cases of most industries, by certain schedule changes in the items for cost of materials and value of products.

Of the changes which were made at the recommendation of the advisory committee, referred to in section 4, p. 1, the only ones which had any effect on the comparableness of the 1929 statistics with those for preceding years are the following:

*a. Mill or shop supplies.*—At former censuses the cost of mill or shop supplies (lubricating oil, minor replacements, parts of machines and equipment, etc.) had been included in the cost of materials as reported, but the schedules for 1929 directed manufacturers to omit it.

This change was made in order to render it more convenient for manufacturers to make their reports. The cost of supplies is carried in the accounts of some manufacturers together with other "overhead" items, so that it is difficult or impracticable either to report it separately or to include it with the cost of materials proper. As a result of this change, the indicated increases in the cost-of-materials items understate the true increases and the indicated decreases overstate the true decreases; but for most industries these understatements and overstatements are slight and unimportant. In the reports for the few industries in which the cost of supplies formerly constituted a considerable part of the cost-of-materials item, special attention is called to this fact.

The value added by manufacture is, of course, affected to the same extent as the cost of materials, but in the opposite direction. (See sec. 27, "Value added by manufacture.")

*b. Option in reporting materials.*—The 1929 schedules gave manufacturers the option of reporting either the cost of materials purchased or the cost of those actually used during the census year.

It was found that in many cases the cost of materials purchased was out of line with the cost of materials consumed, as reported by the same manufacturers for earlier years. In order that the statistics might be made comparable, such cases were taken up by correspondence and data were obtained for the cost of materials consumed. It is therefore unlikely that the comparableness of the statistics has been affected appreciably by the use of data for materials purchased.

*c. Substitution of sales for production.*—At the census for 1929 manufacturers in most industries were directed to report their "shipments or deliveries" instead of their production, which had been reported at former censuses.

This change was made because the records kept by manufacturers in practically all cases show their sales, but in many cases do not show their production, during a given period. For 76 industries, however, the data on production were called for, as at former censuses. These exceptions were made for special reasons, and in most cases at the request of the associations representing the industries in question, or of important manufacturers in the industries. It is believed that the change from the production to the sales basis for reporting value of products had very little effect on the comparableness of the statistics for 1929 with those for preceding census years, since it is likely that the excess of sales over production in some establishments and the excess of production over sales in others counterbalanced each other in large measure.

**11. Establishments covered—Definition.**—As a rule, the term "establishment" signifies a single plant or factory.

In some cases, however, it refers to two or more plants operated under a common ownership and located in the same city, or in the same county but in different municipalities or unincorporated places having fewer than 10,000 inhabitants. On the other hand, separate reports are occasionally obtained for different industries carried on in the same plant, in which event a single plant is counted as two or more establishments.

**12. Establishments covered—Type.**—The censuses for 1904 and subsequent years were confined, in general, to manufacturing establishments proper, exclusive of the so-called neighborhood, household, and hand industries.

The inquiries have covered a few industries, however, which are not engaged in manufacturing in the sense in which the term is generally understood, the most important example being printing and publishing. The censuses for 1899 and for prior years covered hand trades as well as industries operated on a factory basis. Beginning with the census for 1904, the following classes of establishments have been omitted:

*a.* Establishments which were idle throughout the year or reported products valued at less than \$500. (See sec. 13, below.)

*b.* Establishments engaged principally in the performance of work for individual customers, such as custom tailor shops, dressmaking and millinery shops, and repair shops. (This does not apply to large establishments manufacturing to fill special orders.)

*c.* Establishments engaged in the building industries, other than those manufacturing building materials for the general trade.

*d.* Establishments engaged in the so-called neighborhood industries and hand trades, in which little or no power machinery is used, such as carpentry, blacksmithing, harness making, tinsmithing, etc.

*e.* Cotton ginneries.

*f.* Small grain mills (gristmills) engaged exclusively in custom grinding.

*g.* Wholesale and retail stores which incidentally manufacture on a small scale, particularly where it is impossible to obtain separate data for the manufacturing and for the mercantile operations.

*h.* Educational, eleemosynary, and penal institutions engaged in manufacturing.

**13. Establishments covered—Size.**—At the biennial censuses, with certain exceptions explained in the following paragraph, data have been obtained only from establishments reporting products to the value of \$5,000 or more.

In order to reduce the cost of the work and to facilitate the preparation of the statistics, no data (except in regard to wage earners and products, for 1921, and in regard to products only for certain industries, for 1923 and 1925) were collected from establishments with products valued at less than \$5,000. At the quinquennial censuses, however, data on all subjects covered by the census were obtained from all establishments with products valued at \$500 or more. This change in the minimum value-of-products limit, which resulted in a 21.6 per cent reduction in the number of establishments in regard to which general and detailed statistics were compiled at the census for 1921, did not otherwise materially impair the comparableness of the biennial and quinquennial figures, since 99.4 per cent of the total wage earners and 99.7 per cent of the total value of products reported at that census were contributed by the establishments reporting products to the value of \$5,000 or more.

**14. Classification of industries.**—Although there are thousands of more or less distinct lines of manufacturing activity, manufacturing establishments for 1929 are classified for census purposes into 326 industries.

The production of each specific class of finished commodities, however small, might be looked upon as a separate industry; and in some cases certain of the distinct processes in the manufacture of a single commodity might be treated as distinct

industries, as, indeed, is sometimes actually done in the census reports. Manifestly, however, there must be some grouping of commodities and processes, not only in order to bring the number of industries within reasonable compass, but also in order to avoid the extensive overlapping which would result from an attempt to distinguish so large a number of industries. Each establishment must as a rule be treated as a unit and the data reported by it assigned in toto to some one industry. In many cases an establishment manufactures several related articles or commodities, or performs several related operations. The classification should, therefore, if practicable, be broad enough to cover the entire activities of such establishments.

The effort has been made to distinguish, so far as practicable, each well-defined or well-recognized industry. The classification has been based on prevailing conditions as to the actual organization of industry and the distribution of the various branches of production among individual establishments. It has been necessary, however, in some cases to combine the data for two or more industries which are usually considered fairly distinct from one another, because of the considerable amount of overlapping among them. Such cases arise where, although the majority of the establishments concerned confine their business to one or another of the industries, a few important establishments combine two or more industries in such a way that separate data can not be obtained, so that it becomes practicable to present statistics for the industries individually.

**15. Classification of establishments.**—Each establishment as a whole (a single plant being counted as two or more establishments in certain cases, as explained in sec. 11) is assigned, on the basis of its product or group of products of *chief value*, to some one industry classification.

The statistics as to cost of materials, value of products, and value added by manufacture for any particular industry relate not only to the primary products normally belonging to that industry, but also to certain secondary products which normally belong to other industries. For example: Some of the establishments classified in the motor-vehicle industry manufacture, as secondary products, tractors, which are normally products of the "Engines, turbines, tractors, and water wheels" industry, while a few motor vehicles are made as secondary products by establishments engaged primarily in other lines of manufacture.

The treatment of each establishment as a unit and its assignment to some one industry according to its product of chief value sometimes results in overrating the importance of certain industries and underrating that of others. For example: The industry classified as "Wire, drawn from purchased bars or rods" embraces, as its title signifies, only those establishments which draw wire from rolled bars or rods purchased from other establishments. Many rolling mills operate wire-drawing departments; and wire and wire products are also manufactured in considerable quantities by establishments classified under the designations "Nonferrous metal alloys and products, not including aluminum products" and "Electrical machinery, apparatus, and supplies." The total output of wire and wire products by the establishments in the "Wire, drawn from purchased bars or rods" industry in 1929 was valued at \$192,439,764, whereas the total value of wire and wire products manufactured by all establishments which drew wire in 1929 amounted to \$553,509,538. Thus the output of the wire industry represented only about one-third of the value of wire and wire products manufactured in all wire-drawing establishments. On the other hand, it should be noted that the \$553,509,538 reported as the total value of products of all establishments engaged in drawing wire does not represent the value of wire alone but includes a considerable value of manu-

factures of wire, such as wire fencing, wire nails and spikes, and wire rope and strand—products similar to those manufactured from purchased wire by establishments under other classifications.

**16. Classification by industry groups.**—To facilitate the comparison of one broad class of manufacturing industries with another, the industries as constituted for census purposes are distributed into 16 general groups, for which summary statistics are given in Table 8, p. 37.

This grouping is based in most cases on the character of the principal materials used, but several of the groups are constituted on the basis of the purpose or use of the chief products, and one, "Chemicals," on the character of the manufacturing processes employed. It is necessary, of course, in some cases to include in a particular group certain industries which use considerable quantities of materials or manufacture considerable quantities of products other than those treated as basic for the group. For example: The furniture industry, included in the "Forest products" group, embraces the manufacture of metal as well as of wooden furniture.

At the censuses for 1921 and prior years the classification comprised only 14 groups of industries. At the census for 1923 the industries were rearranged into 16 groups and the statistics for prior years were adjusted to make them comparable, so far as possible, with those for 1923. After the publication of the report for 1925 each of two of the former groups was divided into two, and two others were consolidated with the "Miscellaneous industries" group. The present grouping is as follows:

- Group 1.—Food and kindred products.
- Group 2.—Textiles and their products.
- Group 3.—Forest products.
- Group 4.—Paper and allied products.
- Group 5.—Printing, publishing, and allied industries.
- Group 6.—Chemicals and allied products.
- Group 7.—Products of petroleum and coal.
- Group 8.—Rubber products.
- Group 9.—Leather and its manufactures.
- Group 10.—Stone, clay, and glass products.
- Group 11.—Iron and steel and their products, not including machinery.
- Group 12.—Nonferrous metals and their products.
- Group 13.—Machinery, not including transportation equipment.
- Group 14.—Transportation equipment, air, land, and water.
- Group 15.—Railroad repair shops.
- Group 16.—Miscellaneous industries.

Group figures for prior years as far back as 1914 have been adjusted so as to make them comparable with the current figures. (See Table 8, p. 37.)

**17. Persons engaged—General classification.**—The distinction between salaried officers and employees, on the one hand, and wage earners, on the other, depends primarily on the character of work done. The first group includes, in general, supervisory and office employees, and the second group, manual workers.

In the salaried group are included principal officers of corporations; managers, superintendents, and other responsible administrative employees; foremen and overseers who devote all or the greater part of their time to supervisory duties; and clerks, stenographers, bookkeepers, and other clerical employees on

salary. Wage earners are defined as skilled and unskilled workers of all classes, including piece-workers employed at the plant, and foremen and overseers in minor positions who perform work similar to that done by the employees under their supervision.

In the case of employees other than wage earners, the number reported for December 14, or for the nearest representative day, is treated as equivalent to the average for the year, since, as a rule, there is little variation from month to month in the number of employees of this class. For wage earners, the number shown by the pay roll for the week which included the 15th day of each month, or for some other representative week, is reported, and the average for the year is calculated by dividing the sum of the numbers reported for the several months by 12.

The sex distribution of persons engaged, by industries and by States, will be found in Volume I, Chapter X.

**18. Persons engaged—Wage earners.**—The ideal measure of the importance of an industry as an employer of labor would be the average number of wage earners employed during the year, on a full-time basis. This ideal average can not, however, be determined exactly.

The average number of wage earners in any industry, as calculated from the returns made by manufacturers, is necessarily somewhat in excess of the number that would be required to perform the work in that industry if all were continuously employed during the year. The reason is that the pay roll for any week is likely to contain the names of employees who have been temporarily laid off and of persons whose services had terminated before the close of the week covered by the pay roll. Moreover, if a manufacturer operated his plant during only a part of a given month, he would select an active week as a representative week and would report the total number of wage earners whose names appeared on the rolls for that week; or, if he operated his plant during every work day of the month on a 4-hour basis, his employment would be equivalent to one-half that on an 8-hour basis, yet he would report the actual number working on a part-time basis rather than the equivalent number on a full-time basis. For example: Suppose a manufacturer operated his plant, employing 100 wage earners, during 13 days of a month which contained 26 working days, or during 26 days on a 4-hour basis. This manufacturer's average employment of wage earners for the month on a full-time basis would be 50, but in all probability he would report 100, since that would be the number on the pay roll for a representative week.

Thus the average number of wage earners is unavoidably overstated to some extent, but it is believed that the wage-earner statistics are fairly comparable as between one census year and another and as between different industries, except those of a seasonal character, for the same census year.

**19. Persons engaged—Central-administrative-office employees.**—No data for employees of central administrative offices are included in the industry reports, but the numbers of such employees, by sex, and the amounts of their compensation are given in the State reports. A "central administrative office," as the term is used by the Bureau of the Census, is an office which operates one or more manufacturing plants located in a city or cities other than that in which the administrative office is located.

At the censuses for 1909, 1914, 1919, 1921, and 1923, data in regard to employees in such offices were collected on a separate "administrative schedule" and were tabulated and included with those for salaried employees of the manufacturing plants. At the census for 1925 such data were collected and tabulated but were not included in the figures for salaried employees except in the table giving combined summary statistics for all manufacturing industries (p. 14 of the report for that year). The numbers of central-administrative-office employees and the amounts of their salaries were, however, stated in footnotes to the "General Statistics" tables for all industries for which such employees were reported and for which it was possible to publish separate figures without disclosing data for individual establishments. At the census for 1927 no data in regard to central-administrative-office employees were collected.

**20. Salaries and wages.**—These items represent, respectively, the total compensation of salaried officers and employees and the total compensation of wage earners (including those employed on a piece-price basis).

The figures representing the total compensation of salaried officers and employees and of wage earners do not include dividends on stocks owned by officers and employees, nor the income derived by proprietors and firm members from manufacturing operations.

The Census Bureau has not undertaken to calculate the average annual earnings of either salaried employees or wage earners. Such averages would possess little real value, since they would be based on the earnings of employees of both sexes, of all ages, and of widely varying degrees of skill. Furthermore, so far as wage earners are concerned, it would be impossible to calculate accurately even so simple an average as this, for the reason that the Census Bureau's figures for wage earners are somewhat in excess of the number that would be required to perform the work in any industry if all were continually employed during the year. (See "Persons engaged—Wage earners," above.)

**21. Cost of materials, etc.**—This item relates to cost of materials, containers for products, fuel, and purchased electric energy used during the census years.

For the 1929 census, the cost of materials and containers for products was reported as one item, the cost of fuel as another, and the cost of purchased electric energy as a third; for 1927, the cost of materials and containers was reported as one item and the combined cost of fuel and purchased electric energy as another; for 1925, 1923, and 1921, the combined cost of materials, containers, fuel, and electric energy was reported as a single item. For the quinquennial censuses (covering the period from 1899 to 1919), the cost of materials and containers was reported as one item and the combined cost of fuel and "rented power" as another. The cost of fuel covers coal, fuel oil, gasoline, gas, etc. (See "Duplication in cost of materials and value of products," p. 6.)

**22. Contract work.**—The term "contract work"—which does not necessarily imply the existence of a formal contract—is applied to work done outside the establishment reporting, on materials furnished by it. It may be done either by another manufacturing establishment or by persons working at home.

Payments made for such work appear under the head "Paid for contract work"; payments received are included in "Value of products." Contract work is most common in the clothing



industries, and in a few others, such as the manufacture of gloves, some contract work is done. In the great majority of manufacturing industries, however, the contract work is small in amount and in many cases is merely incidental; that is, it is not a normal or a necessary part of the industry's activity. A careful analysis of the figures for contract work for all industries, as reported for census years prior to 1927, led to the conclusion that, as the payments for such work were, except in a few cases, very small in comparison with the cost of materials, the contract-work statistics for most industries were of little or no value. It was therefore decided to omit the contract-work inquiry from all schedules except those for a few industries in which contract work is of considerable importance in connection with regular manufacturing operations. For all industries taken as a group, the amount paid for contract work in 1925 was equal to only 1 per cent of the total amount expended for wages, whereas for the industries for which contract-work statistics are given for 1929 in the present report this proportion ranges from eight-tenths of 1 per cent in the case of the "Cotton small wares" industry to 208 per cent for the "Printing and publishing, music" industry. (Many music publishers have their printing done on contract.)

**23. Value of products.**—The amounts under this heading for 1929 represent, for the majority of the industries, the selling value, *at the factory*, of all products *shipped or delivered*, but for 76 industries, including some of the most important ones, they represent products *manufactured*, whether sold or not. For prior census years the value figures for all industries represent products *manufactured*.

The value of products is not a satisfactory measure of the importance of a given industry, because only a part of this value is actually created within the industry. Another part, and often a much larger one, is contributed by the value of the materials used. The aggregates for cost of materials and value of products include large amounts of duplication due to the use of the products of some industries as materials by others. (See "Duplication in cost of materials and value of products," below.) In the case of establishments performing work under contract (see "Contract work," p. 5) the amounts received for such work are reported in lieu of value of products.

Some manufacturers sell their products at prices which include freight and other delivery charges, but these transportation charges are deducted wherever possible.

The repair shops of steam and electric railroads manufacture few if any products for sale, their work being done or their products manufactured solely or principally for the use and benefit of the railroads operating them. For these plants, therefore, the value reported usually represents the operating cost or the cost of production, as no market value can properly be assigned to the work or the products, since it is not customary for such establishments to make any allowance for profit.

Somewhat akin to the case of the railroad repair shops is that of establishments which make partly finished products, or containers and auxiliary articles, for the use of other manufacturing establishments under the same ownership. For example: A blast furnace produces pig iron, which is used in the production of steel in plants under the same ownership. In such cases the "transfer value" assigned by the manufacturer is accepted as the value of the pig iron. This transfer value is usually based on market prices or on the cost of manufacture, but sometimes it is purely arbitrary.

**Primary and secondary products.**—The products reported for a given industry, on the one hand, include minor products different from those covered by the industry designation, and, on the other hand, do not include the entire output of products normally belonging to the industry, because some of this class

of commodities may be made in establishments in which they are not the products of chief value. In the case of every industry the value of the secondary products not normally belonging to it, and that of commodities normally belonging to it but made as secondary products by establishments engaged primarily in other lines of manufacture, offset one another to a greater or less extent; and in most cases the total value of products as reported does not differ greatly from the value of the total output, in all industries, of the classes of products covered by the industry designation. (See "Classification of establishments," p. 4.)

In most of the product tables in this volume a separate item, entitled "Other products (not normally belonging to the industry)," represents the production of commodities which normally are primary products of other industries. It has been necessary in some cases to distinguish between these secondary products normally belonging to other industries and minor or miscellaneous products of the industry covered by the report.

**24. Detailed statistics of products, materials, and equipment.**—For the more important industries data as to the quantities and values—or where quantity figures would have no particular significance, for the values only—of the separate classes of products are collected and tabulated.

While it is generally impracticable for an establishment to assign the proper proportions of its wage earners, wages, etc., to the various lines of manufacturing industry carried on within it, most establishments are able to distinguish, exactly or approximately, the quantities and values of the several classes of products made. Special schedules calling for detailed information in regard to products were therefore sent to the establishments in 238 industries, and in some cases several different special schedules were filled out by a single establishment whose manufacturing activities were of a varied character. The general manufactures schedule, which was sent to the establishments in the remaining 89 industries, also contained spaces for listing the quantities and values of the leading products separately, but in some instances it was found impracticable to obtain such information. The data thus collected have been assembled, and, in connection with the statistics for the establishments assigned to a given industry, the quantities and values of similar commodities normally belonging to that industry but made as secondary products by establishments classified in other industries are shown, either in the body of the table or in a footnote, wherever practicable. (See "Value of products—Primary and secondary products," above.)

Detailed data as to materials used were collected from establishments in many industries, including "Bread and other bakery products," "Flour and other grain-mill products," "Gas, manufactured," "Confectionery," the rubber industries, and the textile industries. In addition, special statistics of equipment are given for a number of industries, such as "Glass," "Iron and steel: Blast furnaces," "Iron and steel: Steel works and rolling mills," "Wire, drawn from purchased bars or rods," and "Wood distillation and charcoal manufacture."

**25. Duplication in cost of materials and value of products.**—In making use of the statistics for cost of materials and value of products it must be remembered that they include a large amount of duplication due to the use of the products of certain establishments as materials by others. The net value of all manufactured products is estimated to have been approximately two-thirds of the gross value for 1929. (See Table 7, p. 37.)

This duplication occurs, as a rule, between different industries, and is not found to any great extent in individual industries. To illustrate: Copper ingots made in the copper smelting and refining industry are sold to copper-rolling mills, which roll them into rods. The rods are sold to copper-wire mills, which draw them into wire. Wire made by these mills is sold to establishments in the "Electrical machinery, apparatus, and supplies" industry, which use it in the manufacture of ignition apparatus for internal-combustion engines. These establishments sell the ignition apparatus to manufacturers of automobile engines. The engines in turn are sold to automobile manufacturers, who install them in complete automobiles. The value of the automobiles, as reported by the automobile manufacturers, includes, of course, the value of the engines; similarly, the value of the engines includes the value of the ignition apparatus; and so on. Thus in the aggregate of the values of products reported by the copper smelters and refiners, the rod mills, the wire mills, the manufacturers of ignition apparatus, the engine manufacturers, and the automobile manufacturers, the value of the copper ingots is included six times, of the rods five times, of the wire four times, of the ignition apparatus three times, and of the engines twice; and corresponding duplications occur in the aggregate cost of materials.

The occasional occurrence of duplication between different establishments in the same industry is exemplified in the meat-packing industry, where certain packing establishments purchase fresh meat from slaughter-houses for use as their material. The total value of products reported for the industry, therefore, includes the factory value of all finished products, and in addition includes the value of products which pass through further manufacturing processes in other establishments.

If all manufacturers consumed only raw materials and turned out only products ready for ultimate consumption, the figures for their combined activities would contain no duplication in the material and value-of-products items. Manufacture, under these hypothetical conditions, would consist simply in adding value to given raw materials within a single establishment, and the reports made for such establishments would cover only the values of products made for sale to ultimate consumers.

Determination of the net value of manufactured products from the data furnished by manufacturers must be in part a matter of estimating. There are several possible methods of arriving at the net-value figure. To add together the factory values of those products which are ready for consumption would give the desired result, but would be impracticable because of the lack of sufficient data. A more satisfactory method—the one followed in preparing Table 7, page 37—consists in breaking down the "Materials, containers for products, fuel, and electric energy" item into raw materials and semimanufactures and deducting from the gross value of products the values of the semimanufactures (including manufactured fuel consumed in manufacturing industries) produced in the United States.

Since imported semimanufactures have not been previously reported as products by domestic manufacturers, they are treated in the same manner as raw materials. Only the values of the semimanufactures which have been processed in this country are deducted from the gross value of products. The values of raw and semimanufactured imports for consumption, exclusive of duty and carriage charges, as reported for 1929 by the Bureau of Foreign and Domestic Commerce, were as follows: Crude materials (other than foodstuffs), \$1,558,620,000; crude foodstuffs, \$538,560,000; semimanufactures, \$885,051,000. In using these figures to estimate the value of imports used as materials in manufacturing establishments of the United States, small deductions were made from the values of such items as crude foodstuffs, coal, and certain fertilizer materials, which are imported for sale to consumers rather than for use in further manufacture. The cost of "Raw materials and imported semimanufactures," as given in Table 7, page 37,

includes \$283,566,000, the cost of scrap iron and steel used in the three industry groups: "Iron and steel and their products, not including machinery"; "Machinery, not including transportation equipment"; "Transportation equipment, air, land, and water."

The values of manufactured fuels consumed by manufacturing industries (such as gasoline and fuel oil) have also been deducted. Finally, deductions of costs of certain contract work, to the amounts specified in the footnotes of the table, have been made in those cases in which duplications occur, as, for example, in the printing and publishing industries, where receipts for work done by a printing establishment for a publisher are included in the values of products for both establishments. The three totals at the heads of columns 4, 5, and 7 of the table are the sums of the items in the respective columns below. These items, being estimates, are rounded to the nearest million dollars. Horizontal additions of the several items in columns 2 to 5, inclusive, for each group and for the total for all groups do not, therefore, give precisely the totals found in column 1.

**26. Relation of wages to cost of materials and value of products.**—In making comparisons between the wages paid in manufacturing industries and the cost of materials and value of products of these industries, it should be borne in mind that whereas the materials and products items contain large amounts of duplication, the wage figures are free from duplication.

Moreover, the cost of materials, excluding the duplication therein, is made up in considerable part of wages paid to wage earners in nonmanufacturing industries, such as agriculture, mining, fisheries, and transportation. For example: The iron ore used as a material in blast furnaces comes from iron mines and is transported to the furnaces by rail or water. The cost of the ore at the mines consists in part of the miners' wages, and the cost of the ore delivered at the furnace includes also the wages paid to the employees of the navigation or railroad company which transported it. The pig iron produced by the blast furnaces is used as a material by steel mills. Thus the cost of this material is made up in part of the miners' wages, in part of the wages paid to the transportation employees, in part of the wages of the blast-furnace employees, and in part of other items. The wages paid the blast-furnace employees are included in the total wages shown by the manufacturer's reports, but the miners' wages and the wages of the transportation employees are not included. Moreover, the cost of the pig iron used as a material by the steel mills includes the cost of the iron ore, fuel, and supplies used by the blast furnaces. If the steel mill and the blast furnace were treated as a single establishment, this duplication would be eliminated and the cost of materials would be that of the iron ore, etc., used by the blast furnace, and the corresponding duplication in value of products would also disappear. If the mine, the transportation company, the blast furnace, and the steel mill were operated under a single ownership and treated as a single establishment, the cost of materials would be reduced to the value of the ore in the ground and the cost of fuel and supplies; the value of products would be a net amount representing the output of the steel mill alone instead of being made up of the value of the steel-mill products plus the value of the blast-furnace products; and the wage item would cover all wages instead of being limited to the wages paid in the blast furnace and the steel mill.

Thus, if the aggregate amount of wages paid both in manufacturing industries and in those industries which supply the raw materials used by manufacturers were compared with the net cost of materials or the net value of manufactured products in the form in which they reach the ultimate consumer, the ratio of the first amount to the second or the third would be

much larger than that of the wages paid in manufacturing industries alone to the gross cost of materials or the gross value of manufactured products.

**27. Value added by manufacture.**—For some purposes, the most satisfactory measure of the importance of an industry is the "value added by manufacture"—that is, the increment created by the manufacturing processes. This value measures the net addition to the value of commodities in existence—i. e., raw materials, semimanufactured materials, and fuel.

It is calculated by deducting the cost of materials, containers, fuel, and purchased electric energy used from the value of the products. (See "Profits and production costs," below.) The cost of purchased energy was included in the amount deducted at former censuses because it was included with the cost of fuel as reported by the manufacturers but was not given separately. At the census for 1929 the two items were reported separately for the first time; but in order to preserve, so far as possible, the comparableness of the statistics for 1929 with those for preceding census years, the cost of purchased electric energy has been included again in the amount deducted.

In comparing manufacturing industries with one another the relation between the value of finished products and the cost of materials should be kept constantly in mind. The products of one industry may be valued at the same amount as those of another, but the one may have added several times as much value to the materials as the other, and may therefore have been of correspondingly greater economic importance.

Statistics of "value added by manufacture" are almost entirely free from the duplication which is a factor in the total value of products. (See "Duplication in cost of materials and value of products," p. 6.) They include a small amount of duplication due to the fact, already mentioned (see "Contract work"), that certain establishments perform contract work on materials owned by other establishments either in the same or in affiliated industries. Such establishments report the amount received for contract work in lieu of value of products, and where they are classified in the same industry as the establishments which produce the finished commodities, this results in duplication in the total value of products and therefore in the total value added by manufacture. The amount of this duplication in value added by manufacture is insignificant except in a few industries, particularly the manufacture of clothing.

**28. Production as measured by physical volume.**—Because of price changes, the values of products for different census years are, in many instances, not properly comparable. Statistics of the actual physical quantities of products manufactured provide the most accurate available measure of the growth or decline of manufactures, but they are not available for all industries.

The number of wage earners employed is also a fairly satisfactory standard, but it must be remembered that, on the one hand, in some industries mechanical processes have displaced hand labor to such an extent as to make possible a marked increase in production with no increase in the number of wage earners, while, on the other hand, the average number of hours of labor per week has been decreasing for many years.

A study of the physical volume of output as disclosed by census figures was made for the Bureau of the Census by Edmund E. Day and Woodlief Thomas, and the results were published under the title "The Growth of Manufactures," as one of a series of census monographs.

The indexes of physical output given in Table 2, page 15, for 1899 to 1925, inclusive, are the Day-Thomas figures for

those years, and the index for 1927 was computed by the same method by Miss Aryness Joy, of the Federal Reserve Board.<sup>1</sup> These indexes are weighted geometric averages of relatives, computed on a 1919 base. The output of each product for which satisfactory quantity statistics were available was compared with the output for 1919, and the relatives weighted and combined by use of a geometric average. The index for 1929 was constructed by applying to the 1927 index as a base the per cent of increase of production in 1929 over that of 1927 as determined by the National Bureau of Economic Research, under the direction of Frederick C. Mills, by a method differing slightly from that employed by Day and Thomas.

The figures found in column 2 of Table 2, representing the total volume of wage-earner employment in each of the census years beginning with 1899, are a series of relatives computed by dividing the average number of wage earners employed in manufacturing establishments in 1899 (=100) into the average number for each census year thereafter. "Production per wage earner" (column 4), determined by dividing the index of physical output for each census year by the wage-earner index in column 2, indicates the general trend in output per wage earner, although in failing to reflect changes in mechanization of industry it falls short of being an entirely satisfactory index of productivity.

**29. Profits and production costs.**—Manufacturers' profits can not be calculated from census statistics, for the reason that these statistics do not show total production costs.

Costs for which data have not been collected comprise depreciation, interest, insurance, rent, taxes, and other miscellaneous expense items. The deduction of the sum of salaries, wages, and cost of materials, containers, fuel, and purchased electric energy from value of products leaves a miscellaneous item (equal to the remainder obtained by subtracting the sum of the salary and wage items from "value added by manufacture"<sup>2</sup>) representing all other manufacturing expenses plus *manufacturing* profits, but no basis exists in census data for distributing this amount among the constituent items of expense and profits. In fact, a manufacturer's books might show a considerable excess of value of products over the sum of the several expense items reported to the Census Bureau, and yet his plant might have been operated at a loss.

**30. Power equipment.**—Under the head "Horsepower," as used in census reports, is shown the combined rated horsepower capacity of prime movers—engines, turbines, and water wheels—and of electric motors driven by purchased energy.

The rated capacity of motors driven by energy generated in the establishments reporting is not included in the total, since this secondary power duplicates that of the prime movers which generate the energy.

The detailed power table for each industry, however, shows the number and the rated capacity both of electric motors driven by purchased energy and of those driven by energy generated in the establishments reporting, together with the rated capacity of electric generators and the amount of electric energy purchased.

The combined horsepower of steam engines and turbines, internal-combustion engines, and water wheels and turbines, for all industries, has not varied materially from census to census since and including that for 1919, whereas the power of

<sup>1</sup> The method employed in constructing the 1927 index was described in an article by Miss Joy in the Journal of the American Statistical Association, December, 1930, pp. 463-469.

<sup>2</sup> See "Value added by manufacture," above.



electric motors has increased rapidly. In other words, during the past decade the increase in the aggregate primary power is accounted for almost exactly by the increase in the power of electric motors driven by purchased energy. As a consequence, a considerable increase is shown in the proportion which electric power forms of the total, and this results in an exaggeration of the extent of the increase in the use of power-driven machinery, since the difference between the horsepower rating of electric motors and the actual amount of motor horsepower in daily use is greater than the corresponding difference in the case of engines, turbines, and water wheels. This condition is due to the fact that in many factories some of the motors are idle or are operating at considerably less than their rated capacity during a large part of the time, so that the combined rated capacity of all the motors greatly exceeds the amount of power delivered by them at any given moment. To illustrate: In a factory using steam power applied directly through shafting and belting an engine of 1,000 horsepower may be sufficient to drive all the machinery; but if, without any increase in the amount of machinery driven, the factory is equipped with electric power and a separate motor installed for each machine or each small group of machines, the combined rated capacity of these motors will almost certainly be much more than the 1,000 horsepower of the steam engine originally used. This would be necessary because each individual motor must be powerful enough to meet the maximum demand made upon it by the machine which it drives, whereas the steam engine need only be powerful enough to meet the maximum demand made upon it at any one time by all the machines taken as a group, which would be considerably less than the sum of the maximum demands made by the individual machines at different times. In other words, the maximum demand of the group of machines, which the steam engine must be able to meet, would be materially less than the sum of the maximum demands of the individual machines, which the motors must be able to meet. The number of horsepower hours of energy consumed would not, however, be any greater in a motorized factory than in a similar factory employing steam power.

Thus, the increase in the total rated capacity of prime movers, coming, as it does, wholly from new installations of electric motors, is not a true measure of the increase in the consumption of mechanical power in manufacturing establishments.

Moreover, data for numbers and ratings of the several types of power equipment are not reliable indicators of industrial activity, since they do not distinguish between active and inactive equipment.

Data in regard to power equipment were collected at the decennial and quinquennial censuses of manufactures covering the period from 1869 to 1919, and at the four biennial censuses beginning with that for 1923. At the census for 1925, for the first time, data in regard to the number and capacity of electric generators were collected and tabulated. Some establishments which do not ordinarily use energy generated in their own plants for their manufacturing operations nevertheless maintain one or more generators for emergency light and power purposes, and for this reason the figures for generators can not in all cases be coordinated with those for motors driven by energy generated in the establishments reporting.

**31. Disclosure of data for individual establishments.**—The Bureau of the Census is prohibited by law from publishing any statistics which might disclose data for individual establishments.

For this reason it is necessary in many cases to omit certain items in Chapters 3, 4, 5, 6, and 7, of Volume I; some of the State figures for practically every industry in Volume II; and some of the industry figures for every State, every industrial area, and every important county and city in Volume III. In

general, separate figures are given for a combination of three or more establishments, but this can not always be done. To illustrate: Suppose that the combined production of two manufacturers in a certain county amounted to 90 per cent or more of the total for the entire county. In this case either of the two important manufacturers, knowing that there was only one other important manufacturer in the county, could subtract the value of his products from the county total and thus obtain an amount which would not greatly exceed the value of the products of the other important manufacturer. Under these conditions the figures for the county are combined with those for one or more other counties in the same State.

**32. Changes in groups, industry titles, and classifications.**—The following list gives the changes in industry titles and classifications and names the abandoned industries as between 1927 and 1929:

#### GROUP 1

- Corn sirup, corn oil, and starch.**—Title changed to "Corn sirup, corn sugar, corn oil, and starch."  
**Lard substitutes and vegetable cooking oils.**—Title changed to "Shortenings (not including lard) and vegetable cooking oils."  
**Oleomargarine and other butter substitutes, not made in slaughtering and meat-packing establishments.**—Title changed to "Oleomargarine not made in meat-packing establishments."  
**Poultry killing and dressing.**—Omitted at the census for 1927; restored for 1929 but classification changed to cover packing. Title for 1929, "Poultry killing, dressing, and packing, wholesale."  
**Shortenings (not including lard) and vegetable cooking oils.**—New title for "Lard substitutes and vegetable cooking oils."  
**Slaughtering and meat packing, wholesale.**—Title changed to "Meat packing, wholesale."

#### GROUP 2

- Belting, other than leather and rubber, made from purchased fabrics.**—Title changed to "Belting other than leather and rubber, not made in textile mills."  
**Clothing, work (except shirts), men's.**—Title changed to "Clothing, work (including sheep-lined and blanket-lined work coats but not including shirts), men's."  
**Clothing, work (including sheep-lined and blanket-lined work coats but not including shirts), men's.**—See above.  
**Felt goods, wool or hair.**—Title changed to "Felt goods, wool, hair, or jute."  
**Gloves and mittens, cloth or chiefly cloth, made from purchased fabrics.**—Title changed to "Gloves and mittens, cloth or cloth and leather combined, made from purchased fabrics."  
**Hats and caps, except felt and straw.**—Title changed to "Hats and caps, except felt and straw, men's."  
**Silk manufactures.**—Title changed to "Silk and rayon manufactures."  
**Trimmings (not made in textile mills) and lace-trimmed articles, not elsewhere classified.**—Title changed to "Trimmings (not made in textile mills) and stamped art goods for embroidering." At the census for 1929 this classification was changed by the transfer of women's scarfs and other neckwear from this industry to the "Clothing, women's, not elsewhere classified" industry.

#### GROUP 3

- Caskets, coffins, burial cases, and morticians' goods.**—Title changed to "Caskets, coffins, burial cases, and other morticians' goods."  
**Furniture, including store and office fixtures.**—At the census for 1929 this classification was changed so as to cover manufacturers of sewing-machine cases, cabinets, and tables as

primary products. Such establishments were formerly assigned to the classification "Sewing machines, cases, and attachments," Group 12.

**Wooden goods, not elsewhere classified.**—Abandoned as a separate industry classification. See "Wood turned and shaped and other wooden goods, not elsewhere classified."

**Wood turned and shaped and other wooden goods, not elsewhere classified.**—New title for classification combining two industries, "Wooden goods, not elsewhere classified" and "Wood, turned, and shaped, not elsewhere classified," abandoned as separate classifications.

**Wood turned and shaped, not elsewhere classified.**—Abandoned as a separate industry classification. See "Wood turned and shaped and other wooden goods, not elsewhere classified."

## GROUP 4

**Boxes, paper and other, not elsewhere classified.**—Title changed to "Boxes, paper, not elsewhere classified."

**Paper patterns.**—Abandoned as a separate industry classification; now included in "Printing and publishing, book and job," Group 5.

## GROUP 5

**Printing materials, not including type or printing ink.**—Title changed to "Printing materials, not including type or ink."

**Printing and publishing, book and job.**—Classification changed to cover "Paper patterns," formerly a separate classification in Group 4.

## GROUP 6

**Alcohol, ethyl.**—Title changed to "Alcohol, ethyl, and distilled liquors."

**Chemicals, not elsewhere classified.**—Classification changed to cover the abandoned classification "Sulphuric, nitric, and mixed acids."

**Mucilage, paste, and other adhesives, not elsewhere classified.**—Title changed to "Mucilage, paste, and other adhesives, except glue and rubber cement."

**Oils, not elsewhere classified.**—Classification changed by transfer of manufacture of lubricating oils from this industry to the "Lubricating oils and greases, not made in petroleum refineries" industry, Group 7.

**Rayon.**—Title changed to "Rayon and allied products."

**Sulphuric, nitric, and mixed acids.**—Formerly separate classification; now included in "Chemicals, not elsewhere classified."

## GROUP 7

**Fuel, manufactured.**—Title changed to "Fuel: Briquettes and boulets."

**Lubricating greases, not made in petroleum refineries.**—Classification changed to cover establishments making lubricating oils as well as greases, and title changed to "Lubricating oils and greases, not made in petroleum refineries."

## GROUP 10

**Glass cutting, staining, and ornamenting.**—Title changed to "Glass products (except mirrors) made from purchased glass."

**Grindstones, pulp stones, and millstones.**—As establishments which prepare these commodities for market are primarily quarrying establishments, this industry classification was abandoned at the census for 1929.

**Hones, whetstones, and similar products.**—This classification, which formerly covered certain establishments engaged both in quarrying and in finishing the rough product and preparing it for market, is now limited to establishments which do not quarry the stone but purchase it in the rough and prepare it for market.

**Minerals and earths, ground or otherwise treated.**—This classification, which formerly covered certain establishments engaged both in mining and in manufacturing operations, is now limited to establishments which purchase the minerals and earths and perform manufacturing operations only.

**Wall plaster, wall board, and floor composition.**—Title changed to "Wall plaster, wall board, insulating board, and floor composition."

## GROUP 11

**Bolts, nuts, washers, and rivets, not made in rolling mills.**—Title changed to "Bolts, nuts, washers, and rivets, not made in plants operated in connection with rolling mills."

**Forgings, iron and steel, not made in steel works or rolling mills.**—Title changed to "Forgings, iron and steel, not made in plants operated in connection with rolling mills."

**Galvanizing and other coating, not done in rolling mills.**—Title changed to "Galvanizing and other coating, not done in plants operated in connection with rolling mills."

**Horseshoes, not made in rolling mills.**—Abandoned as a separate industry classification; combined with "Forgings, iron and steel, not made in plants operated in connection with rolling mills."

**Nails, spikes, etc., not made in rolling mills.**—Title changed to "Nails, spikes, etc., not made in wire mills or in plants operated in connection with rolling mills."

**Pens, steel and brass.**—Abandoned as a separate industry classification. See "Pens, fountain and stylographic; pen points, gold, steel, and brass," Group 16.

**Screw-machine products.**—Abandoned as a separate industry classifications, See "Screw-machine products and wood screws."

**Screw-machine products and wood screws.**—New title for classification combining two industries abandoned as separate classifications, "Screw-machine products" and "Screws, wood."

**Screws, wood.**—Abandoned as a separate industry classification. See "Screw-machine products and wood screws."

**Springs, steel, except wire, not made in rolling mills.**—Title changed to "Springs, steel, except wire, not made in plants operated in connection with rolling mills."

**Structural and ornamental iron and steel work, not made in rolling mills.**—Title changed to "Structural and ornamental iron and steel work, not made in plants operated in connection with rolling mills."

**Wrought pipe, welded and heavy riveted, not made in rolling mills.**—Title changed to "Wrought pipe, welded and heavy riveted, not made in plants operated in connection with rolling mills."

## GROUP 12

**Babbitt metal, white metal, type metal, and solder.**—Abandoned as a separate industry classification. See "Nonferrous-metal alloys and products, not including aluminum products."

**Brass, bronze, and other nonferrous alloys, and manufactures of these alloys and of copper, not specifically classified.**—Abandoned as a separate industry classification. See "Nonferrous-metal alloys and products, not including aluminum products."

**Clocks, time-recording devices, and clock movements.**—Title changed to "Clocks, clock movements, time-recording devices, and time stamps."

**Collapsible tubes.**—Formerly a part of the "Tin and other foils, not including gold and silver; collapsible tubes" industry; now a separate classification.

**Gold and silver, leaf and foil.**—Title changed to "Gold leaf and foil."

**Lead: Bar, pipe, and sheet.**—Abandoned as a separate industry classification. See "Nonferrous-metal alloys and products, not including aluminum products."

**Nonferrous-metal alloys and products, not including aluminum products.**—Title for new classification combining three abandoned classifications, "Babbitt metal, white metal, type metal, and solder"; "Brass, bronze, and other nonferrous alloys, and manufactures of these alloys and of copper, not specifically classified"; and "Lead: Bar, pipe, and sheet."

**Pens, gold.**—Abandoned as a separate industry classification. See "Pens, fountain and stylographic; pen points, gold, steel, and brass," Group 16.

**Stamped and enameled ware, not elsewhere classified.**—Abandoned as a separate industry classification. See "Stamped ware, enameled ware, and metal stamping, enameling, japanning, and lacquering."

**Stamped ware, enameled ware, and metal stamping, enameling, japanning, and lacquering.**—Title for new classification combining two abandoned classifications, "Enameling and japanning," Group 16, and "Stamped and enameled ware, not elsewhere classified," Group 12.

**Tin and other foils, not including gold and silver; collapsible tubes.**—Formerly a single classification; now two classifications, "Tin and other foils, not including gold foil" and "Collapsible tubes."

## GROUP 13

**Cash registers, adding machines, and calculating machines.**—Title changed to "Cash registers and adding, calculating, and card-tabulating machines."

**Engines, turbines, and water wheels.**—Title changed to "Engines, turbines, tractors, and water wheels."

**Gas machines and gas and water meters.**—Title changed to "Gas machines, gas meters, and water and other liquid meters."

**Machine-tool accessories and small metal-working tools, not elsewhere classified.**—New classification. Establishments manufacturing these commodities as primary products were formerly classified in "Machine tools" or in "Foundry and machine-shop products, not elsewhere classified," Group 13, or in "Tools, not including edge tools, machine tools, files, or saws," Group 11.

**Metal-working machinery, other than machine tools.**—Abandoned as a separate industry classification; now included in "Foundry and machine-shop products, not elsewhere classified."

**Sewing machines, cases, and attachments.**—Title changed to "Sewing machines and attachments." Establishments manufacturing sewing-machine cases, cabinets or tables as primary products are now classified in the "Furniture, including store and office fixtures" industry, Group 3.

**Typewriters and supplies.**—Title changed to "Typewriters and parts," and new classification, "Carbon paper and inked ribbons" established.

## GROUP 16

**Artificial limbs.**—Abandoned as a separate industry classification; combined with "Surgical appliances" under new title "Surgical and orthopedic appliances, including artificial limbs."

**Carbon paper and inked ribbons.**—New industry classification; formerly part of the classification "Typewriters and supplies." See "Typewriters and supplies," Group 13.

**Dental goods, including dental laboratory work.**—Classification changed to omit data for laboratory work and title changed to "Dental goods and equipment."

**Enameling and japanning.**—Abandoned as a separate industry classification; combined with "Stamped and enameled ware, not elsewhere classified," Group 12, under new title "Stamped ware, enameled ware, and metal stamping, enameling, japanning, and lacquering," Group 12.

**Musical-instrument materials: Piano and organ.**—Title changed to "Musical-instrument parts and materials: Piano and organ."

**Pencils, lead.**—Title changed to "Pencils, lead (including mechanical)."

**Paving materials, other than brick or granite.**—Title changed to "Paving materials: Asphalt, tar, crushed slag, and mixtures."

**Pens, fountain and stylographic.**—Abandoned as a separate industry classification. See "Pens, fountain and stylographic; pen points, gold, steel, and brass."

**Pens, fountain and stylographic; pen points, gold, steel, and brass.**—Title for new industry classification combining three abandoned classifications, "Pens, steel and brass," Group 11, "Pens, gold," Group 12, and "Pens, fountain and stylographic," Group 16.

**Roofing materials, not including wood, slate, burnt tile, asbestos, or metal.**—Title changed to "Roofing, built-up and roll; asphalt shingles; roof coatings other than paint."

**Steam and other packing, pipe and boiler covering, and gaskets, not made in textile mills.**—Title changed to "Steam and other packing, pipe and boiler covering, and gaskets, not elsewhere classified."

**Surgical and orthopedic appliances, including artificial limbs.**—New title for classification covering "Surgical appliances" and the abandoned classification "Artificial limbs."

**Surgical appliances.**—Title changed to "Surgical and orthopedic appliances, including artificial limbs."

**33. Industrial area.**—This term signifies an area having as its nucleus an important manufacturing city and comprising the county in which the city is located, together with any adjoining county or counties in which there is great concentration of manufacturing industry. The number of wage earners employed in each area is at least 40,000.

The industrial area must not be confused with the "metropolitan district," as established for population-census purposes, which includes, together with the central city or cities, all the adjacent and contiguous civil divisions having at least 150 inhabitants per square mile. Each industrial area comprises one or more entire counties, whereas nearly all metropolitan areas include parts of counties. Statistics by industries are given for 30 of the 33 industrial areas, but none are presented for the remaining three—Albany-Schenectady-Troy, Springfield-Holyoke, and Toledo—because in each case it is impossible to publish figures either for the most important industry or for industries which in the aggregate contributed at least 50 per cent of the total number of wage earners in the area, without disclosing, exactly or approximately, the data reported by individual establishments.

**34. Selected counties.**—This term is applied to the 95 counties which, together with the independent cities of Baltimore and St. Louis, compose the 33 industrial areas, and to the 103 other counties having some degree of industrial importance. In most of these counties at least 10,000 wage earners were employed, but exceptions were made in a considerable number of cases.

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The selection of counties for inclusion in industrial areas depended not only on the absolute number of wage earners employed, but also on the number of wage earners per square mile and on proximity to the central city. The selected counties outside the industrial areas include, in States of minor industrial importance, a number in which fewer than 10,000 wage earners were employed. In every State at least two counties were selected, provided at least 4,000 wage earners were employed in each county. That is to say, if no county, or only one county, in a given State reported the employment of as many as 10,000 wage earners, the limit was lowered to 4,000,

if necessary, but no further, in order to make possible the selection of two counties. One additional exception was made in the case of Dade County, Fla. (in which the city of Miami is located), with only 2,398 wage earners.

Statistics by industries are given for each of the selected counties for which it is possible to present separate figures, either for the most important industry or for industries which in the aggregate employed at least 50 per cent of the total number of wage earners in the county, without disclosing, exactly or approximately, the data reported by individual establishments.