CORDAGE AND TWINE AND JUTE AND LINEN GOODS

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THE MANUFACTURE OF CORDAGE AND TWINE AND JUTE AND LINEN GOODS.

GENERAL STATISTICS.

Scope of the industry.—This industry includes four classes of establishments, distinguished with respect to their primary products, as follows: (1) Those producing rope, binder twine, and cordage; (2) those producing gunny bagging and other goods in which jute is the principal material; (3) those producing crash, towels and toweling, linen thread, and other goods made chiefly from flax; and (4) those producing nets and seines. Separate statistics for these four classes of establishments are presented in a few of the tables, but in most cases figures are given only for the industry as a whole.

Summary for the four branches of the industry.—Table 1 presents a summary of the statistics of the industry as a whole and of each of the four branches for 1909.

The total value of products and the total cost of materials for the combined industry and for some of its branches involve a large amount of duplication by reason of the use of the products of one establishment as materials for other establishments in the industry or branch. Practically all of the material used in the manufacture of nets and seines, for example, is the product of the cordage and twine factories, and some of the establishments that make cordage and twine use as material yarn produced by other establishments engaged in the same industry. Similar duplications exist in the statistics for the jute goods and linen goods branches of the industry. This duplication must be taken into account in using the figures for statistical purposes. In the value added by manufacture, however, practically all duplication is eliminated, so that this item affords a fair basis for a comparison of the different branches of the industry.

The cordage and twine branch of the industry reported 68.3 per cent of the total number of establishments, 56.7 per cent of the average number of wage earners, and 68.7 per cent of the total value of products; the jute goods branch reported 14.6 per cent of the total number of establishments, 25.8 per cent of the total number of wage earners, and 17.7 per cent of the total value of products; the 15 establishments engaged in making linen goods employed 13.8 per cent of the wage earners and reported 10.5 per cent of the total value of products; and the 13 establishments making nets and seines employed 3.7 per cent of the wage earners and contributed 3.1 per cent of the total value of products.

Table 1 CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY: 1909

	Total for the industry.	Establishments engaged primarily in manufacturing—			
		Cordage and twine.	Jute goods.	Linen goods.	Nets and seines.
Number of establishments	164	112	24	15	13
Persons engaged in the industry	27,214	15,559	6,901	3,733	1,021
Proprietors and firm members	80	61	10	1	8
Salaried employees	1,314	869	227	159	59
Wage earners (average number)	25,820	14,629	6,664	3,573	954
Primary horsepower	78,549	47,269	20,993	8,829	1,458
Capital	$76,020,366	$52,304,938	$13,789,951	$7,457,426	$2,468,051
Expenses	59,076,532	38,057,147	10,302,272	5,831,908	1,885,205
Services	10,995,545	6,505,512	2,701,172	1,422,099	366,762
Salaries	1,862,546	1,201,122	375,531	208,888	77,005
Wages	9,132,999	5,304,390	2,325,641	1,213,211	289,757
Materials	40,914,810	29,315,402	6,254,918	3,966,572	1,377,918
Miscellaneous	4,166,177	2,236,233	1,346,182	443,237	140,525
Value of products	61,019,986	41,941,541	10,795,230	6,385,218	1,897,997
Value added by manufacture (value of products less cost of materials)	20,105,176	12,626,139	4,540,312	2,418,646	520,079

The total cost of the materials used by the establishments in the industry as a whole in 1909 was $40,914,810, which is equal to a little more than two-thirds (67.1 per cent) of the total value of products, while the value added by manufacture (that is, the value of products less the cost of materials) was $20,105,176.

Comparative summary for the industry as a whole.—The manufacture of rope and twine was among the earliest industries established in the United States, and statistics for it have appeared in the reports of practically all the censuses of manufactures. The statistics for the censuses prior to 1879, however, are not strictly comparable with those for the more recent years. Table 2 summarizes the statistics for the combined industry for each census from 1879 to 1909, inclusive.

Most of the important items for which comparative figures are given show an increase for each decade covered by the table, the value of products and the cost of materials reported for 1909 being about four times as great as in 1879. Between 1899 and 1909 the average number of wage earners increased 19.3 per cent and the value of products 24.3 per cent. The decrease of 5.6 per cent in the value of products between 1904 and 1909 was due largely to a falling off in the production of binder twine in 1909.

Table 2

CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.

	Number or amount.					Per cent of increase.[1]				
	1909	1904	1899	1889	1879	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889
Number of establishments	164	145	160	184	188	2.5	13.1	−9.4	−13.0	−2.1
Persons engaged in the industry	27,214	26,442	22,450	(2)	(2)	21.2	2.9	17.8	.....	.....
Proprietors and firm members	80	60	117	(2)	(2)	−31.6	33.3	−48.7	.....	.....
Salaried employees	1,314	1,050	682	(2)	(2)	92.7	25.1	54.0	.....	.....
Wage earners (average number)	25,820	25,332	21,651	16,137	7,584	19.3	1.9	17.0	34.2	(3)
Primary horsepower	78,549	66,244	47,999	27,911	(2)	63.6	18.6	38.0	72.0	.....
Capital	$76,020,366	$56,466,936	$43,152,544	$28,867,413	$8,602,925	76.2	34.6	30.9	49.5	235.5
Expenses	56,076,532	60,271,610	43,398,129	33,968,374	(2)	29.2	−7.0	38.9	27.8	.....
Services	10,995,545	10,421,016	7,574,622	5,699,544	2,138,813	45.2	5.5	37.6	32.9	166.5
Salaries	1,862,546	1,596,680	1,020,735	(2)	(2)	82.5	16.7	56.4	.....	.....
Wages	9,132,999	8,824,336	6,553,887	(2)	(2)	39.4	3.5	34.6	.....	.....
Materials	40,914,810	46,031,062	33,063,793	26,782,978	11,089,445	23.7	−11.1	39.2	23.4	141.5
Miscellaneous	4,166,177	3,819,532	2,759,714	1,485,852	(2)	51.0	9.1	38.4	85.7	.....
Value of products	61,019,986	64,064,241	49,077,629	38,315,217	15,283,369	24.3	−5.6	31.8	28.1	150.7
Value added by manufacture (value of products less cost of materials)	20,105,176	18,633,179	16,013,836	11,532,239	4,193,924	25.5	7.9	16.4	38.9	175.0

[1] A minus sign (−) denotes decrease. Where percentages are omitted, comparable figures are not available.
[2] Comparable figures not available.
[3] Figures not strictly comparable.

Summary, by states.—Table 3 summarizes the more important statistics of the industry as a whole, by states, for 1909, 1904, and 1899.

Table 3

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	1909	164	27,214	80	1,314	25,820	78,549	$76,020	$1,863	$9,133	$40,915	$61,020	$20,105
	1904	145	26,442	60	1,050	25,332	66,244	56,467	1,597	8,824	46,031	64,664	18,633
	1899	160	22,450	117	682	21,651	47,999	43,153	1,021	6,554	33,064	49,078	16,014
Alabama	1909	5	452	.....	25	427	1,700	749	27	117	479	996	517
	1904	4	305	.....	12	293	625	396	13	64	381	499	118
	1899	4	292	.....	10	282	625	298	11	48	166	254	88
Connecticut	1909	8	314	7	21	286	1,134	481	19	85	431	561	130
	1904	[1] 5	210	3	5	202	910	280	5	56	258	361	103
	1899	[2] 7	255	6	4	245	.....	277	3	63	179	285	106
Illinois	1909	7	1,884	.....	85	1,799	6,459	13,014	92	660	5,942	8,237	2,295
	1904	[3] 3	106	1	16	89	12	363	19	31	140	238	98
	1899	[2] 3	98	1	10	87	.....	149	19	25	125	186	61
Kentucky	1909	6	778	1	26	751	1,801	1,505	33	225	709	1,080	371
	1904	[1] 3	475	.....	23	452	1,448	943	27	115	307	598	291
	1899	[2] 4	404	2	18	384	.....	404	22	116	269	479	210
Massachusetts	1909	31	7,003	22	291	6,690	24,864	17,510	498	2,560	11,198	16,632	5,434
	1904	[1] 27	5,061	13	156	4,892	11,140	12,698	264	1,667	11,523	15,523	3,900
	1899	33	5,292	20	152	5,120	.....	11,008	234	1,709	8,028	12,250	4,222
New Jersey	1909	12	3,174	1	148	3,025	6,442	6,598	192	954	3,896	5,527	1,631
	1904	[3] 6	2,602	.....	67	2,535	4,310	4,076	100	858	2,060	3,371	1,311
	1899	6	.....	.....	57	2,127	.....	3,413	81	625	1,760	2,956	1,196
New York	1909	16	6,230	9	269	5,952	15,056	15,777	375	2,164	7,589	12,215	4,626
	1904	20	7,025	8	275	6,742	16,060	14,416	412	2,417	10,608	15,866	5,258
	1899	22	.....	.....	148	5,450	.....	10,312	306	1,714	7,516	11,675	4,159
North Carolina	1909	7	542	2	49	491	1,755	1,260	50	104	559	824	265
	1904	6	565	2	20	543	1,007	886	21	101	815	1,036	221
	[4] 1899	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	1909	8	848	3	54	791	3,225	2,743	81	313	1,984	2,728	744
	1904	[1] 8	1,140	.....	70	1,070	3,285	2,306	104	361	2,518	3,250	732
	1899	[1] 9	1,101	2	47	1,052	.....	2,148	54	318	2,326	2,958	632
Pennsylvania	1909	18	2,223	12	97	2,119	4,630	5,161	185	685	3,001	4,805	1,804
	1904	[1] 20	2,328	16	80	2,232	4,344	4,798	156	666	3,648	5,138	1,490
	1899	[1] 21	2,798	25	90	2,683	.....	6,163	104	762	5,448	7,257	1,809
Rhode Island	1909	6	156	8	9	139	477	190	8	48	176	257	81
	1904	4	106	4	4	98	275	122	4	29	121	178	57
	1899	5	95	7	4	84	.....	96	3	22	64	109	45
Wisconsin	1909	3	123	2	4	117	270	206	5	33	91	150	59
	1904	[2] 3	33	2	.....	31	35	41	.....	9	59	82	23
	1899	7	.....	.....	14	210	.....	219	10	40	112	197	85
All other states	1909	37	3,482	13	236	3,233	10,736	10,826	298	1,184	4,860	7,308	2,448
	1904	36	6,486	11	322	6,153	22,793	15,142	472	2,450	13,493	18,524	5,031
	1899	39	.....	.....	128	3,927	.....	8,666	174	1,112	7,071	10,472	3,401

[1] Excluding statistics for one establishment, to avoid disclosure of individual operations.
[2] Excluding statistics for two establishments, to avoid disclosure of individual operations.
[3] Excluding statistics for three establishments, to avoid disclosure of individual operations.
[4] Figures can not be shown without disclosing individual operations.

Massachusetts was the most important state in the industry in 1909, ranking first in average number of wage earners, value of products, and value added by manufacture. The number of wage earners employed in the industry in that state increased 30.7 per cent during the decade 1899–1909, and the value of products 35.8 per cent. New York ranked second in 1909, the value of products reported for his state decreasing 23 per cent during the five-year period 1904–1909, although for the decade 1899–1909 this item shows an increase of 4.6 per cent. Other notable increases in value of products from 1899 to 1909 among the less important states in the industry were increases of 174 per cent in Alabama and 135.8 per cent in Rhode Island. A decided decrease, on the other hand, took place in Pennsylvania and in Ohio.

Persons engaged in the industry.—Table 4 shows for 1909 the number of persons engaged in the industry as a whole and in each of the four branches, classified according to occupational status and sex, and in the case of wage earners, according to age also. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the introduction.

The average number of persons engaged in the industry as a whole during 1909 was 27,214, of whom 25,820, or 94.9 per cent, were wage earners, 474, or 1.7 per cent, proprietors and officials, and 920, or 3.4 per cent, clerks, this class including other subordinate salaried employees. Of the total number of wage earners, 51.8 per cent were males, and 48.2 per cent females. Male wage earners predominated only in the cordage and twine branch of the industry, in which they constituted 59.4 per cent of the total number of wage earners. In establishments making jute goods males represented 44.9 per cent of the total number, in those manufacturing linen goods 42.2 per cent, and in those making nets and seines 18.8 per cent.

The 1,763 wage earners under 16 years of age, 50.5 per cent of whom were males and 49.5 per cent females, formed 6.8 per cent of the total number of wage earners. The proportion of children varied decidedly in the different branches of the industry, this class of wage earners constituting 5.7 per cent of the total number in the cordage and twine factories, 5.7 per cent in the jute goods establishments, 10.6 per cent in establishments making linen goods, and 17.3 per cent in those making nets and seines.

The average number of wage earners employed in each state in 1909, 1904, and 1899 is given in Table 3. The average number distributed by sex and age is not shown for the individual states, but Table 19 gives such a distribution of the number employed on December 15, or the nearest representative day, for 1909. Of the total number of male wage earners over 16 years of age employed in the industry as a whole, Massachusetts reported 26.9 per cent, New York 21.4 per cent, and New Jersey 10.9 per cent, while of the female wage earners 16 years of age or over the proportions in these states were 23.7 per cent, 26.2 per cent, and 11.7 per cent, respectively.

Table 4

BRANCH OF INDUSTRY AND CLASS OF PERSONS.	PERSONS ENGAGED IN THE INDUSTRY: 1909		
	Total.	Male.	Female.
Cordage and twine and jute and linen goods	**27,214**	**14,526**	**12,688**
Proprietors and officials	474	461	13
Proprietors and firm members	80	72	8
Salaried officers of corporations	150	146	4
Superintendents and managers	244	243	1
Clerks	920	698	222
Wage earners (average number)	25,820	13,367	12,453
16 years of age and over	24,057	12,477	11,580
Under 16 years of age	1,763	890	873
Cordage and twine	**15,559**	**9,458**	**6,101**
Proprietors and officials	331	320	11
Proprietors and firm members	61	53	8
Salaried officers of corporations	108	105	3
Superintendents and managers	162	162	.....
Clerks	539	440	150
Wage earners (average number)	14,629	8,689	5,940
16 years of age and over	13,793	8,197	5,596
Under 16 years of age	836	492	344
Jute goods	**6,901**	**3,190**	**3,711**
Proprietors and officials	64	63	1
Proprietors and firm members	10	10	.....
Salaried officers and corporations	22	21	1
Superintendents and managers	32	32	.....
Clerks	173	137	36
Wage earners (average number)	6,664	2,990	3,674
16 years of age and over	6,281	2,769	3,512
Under 16 years of age	383	221	162
Linen goods	**3,733**	**1,646**	**2,087**
Proprietors and officials	47	47	.....
Proprietors and firm members	1	1	.....
Salaried officers of corporations	15	15	.....
Superintendents and managers	31	31	.....
Clerks	113	90	23
Wage earners (average number)	3,573	1,509	2,064
16 years of age and over	3,194	1,350	1,844
Under 16 years of age	379	159	220
Nets and seines	**1,021**	**232**	**789**
Proprietors and officials	32	31	1
Proprietors and firm members	8	8	.....
Salaried officers of corporations	5	5	.....
Superintendents and managers	19	18	1
Clerks	35	22	13
Wage earners (average number)	954	179	775
16 years of age and over	789	161	628
Under 16 years of age	165	18	147

In order to compare the distribution of the persons engaged in the industry in 1909 according to occupational status with that in 1904, it is necessary to use the classification employed at the earlier census. (See Introduction.) Such a comparison for the industry as a whole is made in Table 5.

Table 5 PERSONS ENGAGED IN THE CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.

CLASS.	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	27,214	100.0	26,442	100.0	2.9
Proprietors and firm members	80	0.3	60	0.2	33.3
Salaried employees	1,314	4.8	1,050	4.0	25.1
Wage earners (average number)	25,820	94.9	25,332	95.8	1.9

The average number of wage earners increased only 1.9 per cent from 1904 to 1909, while the proportion which they formed of the total number of persons engaged in the industry decreased slightly. The number of salaried employees increased 25.1 per cent during the five-year period, and the proportion which such employees formed of the total also increased.

Table 6 shows the average number of wage earners in the industry as a whole distributed according to age, and in the case of those 16 years of age and over, according to sex, for 1909, 1904, and 1899.

A noteworthy fact brought out in this table is the decrease in the number of children employed as wage earners and in their proportion of the total. The number of males over 16 years of age increased 23.8 per cent during the decade and the number of females 24.6 per cent, almost the entire increase among the men taking place in the first half of the decade.

Table 6 AVERAGE NUMBER OF WAGE EARNERS IN THE CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.

CLASS.	1909		1904		1899	
	Number.	Per cent distribution.	Number.	Per cent distribution.	Number.	Per cent distribution.
Total	25,820	100.0	25,332	100.0	21,651	100.0
16 years of age and over	24,057	93.2	23,215	91.6	19,373	89.5
Male	12,477	48.3	12,427	49.0	10,079	46.6
Female	11,580	44.9	10,788	42.6	9,294	42.9
Under 16 years of age	1,763	6.8	2,117	8.4	2,278	10.5

Wage earners employed, by months.—Table 7 gives for the industry as a whole the number of wage earners employed on the 15th (or the nearest representative day) of each month during the year 1909 in the eight states in which an average of 500 or more wage earners were employed in the industry during the year and for which the statistics can be given separately without disclosing individual operations.

Table 7 WAGE EARNERS EMPLOYED IN THE CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY: 1909[1]

STATE.	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	25,820	26,337	26,594	26,698	26,449	26,084	25,688	25,712	25,220	25,703	25,539	24,313	25,522
Illinois	1,799	1,782	1,780	1,754	1,737	1,755	1,779	1,782	*1,619*	1,783	1,777	1,905	2,147
Kentucky	751	742	752	759	761	740	749	730	*621*	718	**821**	814	803
Massachusetts	6,690	7,077	7,090	7,109	7,132	7,070	6,991	6,948	6,851	6,839	6,397	*5,133*	5,578
Missouri	820	835	852	828	804	832	801	800	*791*	836	806	801	858
New Jersey	3,025	3,075	3,085	3,081	3,052	2,975	2,985	*2,963*	2,988	2,983	2,997	3,027	3,096
New York	5,952	5,856	5,973	**6,069**	6,005	6,014	*5,716*	5,851	5,983	5,985	5,963	5,973	6,040
Ohio	791	900	922	930	932	802	745	738	*698*	678	735	715	807
Pennsylvania	2,119	2,095	2,123	2,116	2,053	*2,000*	2,053	2,104	2,140	2,179	2,176	**2,196**	2,193

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

This table shows that the industry as a whole is not subject to any considerable seasonal variation. The largest number of wage earners reported for any month of 1909 was 26,698, in March, and the smallest number, 24,313, in November, the minimum number being equal to 91.1 per cent of the maximum. In 1904 conditions were practically the same, the maximum number, 26,117, being reported for April, and the minimum number, 24,275, equal to 92.9 per cent of the maximum, for September. In some of the individual states, however, considerable variation is shown, the minimum number of wage earners employed in any month of 1909 being equal to only 72.7 per cent of the maximum in Massachusetts and 75.4 per cent in Illinois. In New York the minimum number was equal to 94.2 per cent of the maximum, and in New Jersey, to 95.7 per cent.

The months of maximum and minimum employment in 1909, and the number of wage earners reported for these months, are given for a larger number of states in Table 19.

Prevailing hours of labor.—In Table 8 the wage earners in the industry as a whole have been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or smaller number of hours.

Nearly two-thirds (63 per cent) of the wage earners employed in the industry as a whole in 1909 were in establishments where the prevailing hours per week were more than 54 but less than 60, this being the most common working time in seven of the eight states shown in the table, while practically all (96.1 per cent) were employed in establishments where the

prevailing hours were from 54 to 60 per week, inclusive. Only 2.6 per cent worked in establishments where the prevailing hours of employment were more than 60 per week, and only 1.3 per cent in establishments where the prevailing hours were less than 54 per week.

Table 8 — AVERAGE NUMBER OF WAGE EARNERS IN THE CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY: 1909

STATE.	Total.	In establishments with prevailing hours—					
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.
United States	**25,820**	**138**	**208**	**2,505**	**16,279**	**6,023**	**667**
Illinois	1,799	.....	65	.....	1,570	164	.....
Kentucky	751	5	.....	.....	.....	746	.....
Massachusetts	6,690	52	1	1,347	5,203	5	17
Missouri	820	.....	.....	52	768	.....	.....
New Jersey	3,025	1	.....	301	2,671	52	.....
New York	5,952	.....	.....	3	3,269	2,680	.....
Ohio	791	.....	.....	.....	637	154	.....
Pennsylvania	2,119	49	111	.....	1,110	849	.....

Character of ownership.—Table 9 presents statistics with respect to the character of ownership of the establishments in the industry.

Establishments under corporate ownership formed 69.5 per cent of the total number of establishments in 1909, as compared with 70.3 per cent in 1904, while the value of their products represented 96.4 per cent of the total value of products for the industry in 1909 and 97 per cent in 1904.

Table 9 — CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.

CHARACTER OF OWNERSHIP.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	**164**	**145**	**61,019,986**	**64,664,241**
Individual	33	[1] 33	1,011,355	[1] 1,136,674
Firm	17	10	1,171,345	819,950
Corporation	[2] 114	102	[2] 58,837,286	62,707,611
Per cent of total	**100.0**	**100.0**	**100.0**	**100.0**
Individual	20.1	[1] 22.8	1.7	[1] 1.8
Firm	10.4	6.9	1.9	1.3
Corporation	[2] 69.5	70.3	[2] 96.4	97.0

[1] Includes one establishment under another form of ownership, to avoid disclosure of individual operations.
[2] Includes one establishment under cooperative ownership, to avoid disclosure of individual operations.

Table 10 gives statistics for establishments classified according to form of ownership for each state in which an average of more than 500 wage earners were employed in 1909, and for which separate figures can be shown without disclosing individual operations. The one establishment under cooperative ownership has in this table been included with those under corporate ownership.

Table 10 — CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY: 1909

STATE.	Number of establishments owned by—			Wage earners in establishments owned by—			Value of products of establishments owned by—			Value added by manufacture in establishments owned by—		
	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.
United States	**33**	**17**	**114**	**515**	**596**	**24,709**	**$1,011,355**	**$1,171,345**	**$58,837,286**	**$310,544**	**$468,288**	**$19,326,344**
Illinois	.....	.....	7	.....	.....	1,799	.....	.....	8,237,165	.....	.....	2,295,534
Kentucky	1	.....	5	(X)	.....	751	(X)	.....	1,070,570	(X)	.....	370,473
Massachusetts	7	5	19	69	201	6,420	171,684	273,280	16,186,679	50,606	136,507	5,246,824
New Jersey	1	.....	11	(X)	.....	3,025	(X)	.....	5,526,721	(X)	.....	1,631,021
New York	3	2	11	149	(X)	5,803	300,907	(X)	11,914,093	115,696	(X)	4,510,354
Ohio	1	1	6	(X)	(X)	791	(X)	(X)	2,727,854	(X)	(X)	743,825
Pennsylvania	9	1	8	205	(X)	1,914	350,166	(X)	4,454,609	126,329	(X)	1,677,030

NOTE.—In some states, in order to avoid disclosing individual operations, the figures for one group have been consolidated with those for establishments under some other form of ownership. In such cases an (X) is placed in the column from which the figures have been omitted and the figures for the group with which they have been combined are printed in italics. One establishment under cooperative ownership is included with those under corporate ownership.

Establishments under corporate ownership outnumbered both of the other classes combined in all of the states shown in the table except Pennsylvania, and in this state, although such establishments formed only 44.4 per cent of the total number, they gave employment to 90.3 per cent of the wage earners and contributed 92.7 per cent of the total value of products for the industry.

Size of establishments.—Table 11 presents statistics for 1909 and 1904 for the establishments in the industry as a whole grouped according to the value of their products.

Establishments with products valued at $1,000,000 or over constituted the most important class, as measured by value of products, in both 1909 and 1904, reporting 54.3 per cent of the total for the industry in 1909 and 60.2 per cent in 1904. The number of such establishments decreased from 15 to 12 during the 5-year period, while the aggregate value of their products decreased $5,806,472, or 15 per cent. The other groups shown in the table, except that comprising the very smallest establishments, show an increase both in number of establishments and in value of products.

Table 11

VALUE OF PRODUCTS PER ESTABLISHMENT.	CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.			
	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	164	145	$61,019,986	$64,664,241
Less than $5,000	12	14	32,089	36,207
$5,000 and less than $20,000	20	13	218,217	119,674
$20,000 and less than $100,000	48	[1] 39	2,738,115	[1] 2,053,652
$100,000 and less than $1,000,000	72	64	24,887,181	23,503,852
$1,000,000 and over	12	15	33,144,384	38,950,856
Per cent of total	100.0	100.0	100.0	100.0
Less than $5,000	7.3	9.7	0.1	0.1
$5,000 and less than $20,000	12.2	9.0	0.4	0.2
$20,000 and less than $100,000	29.3	[1] 26.9	4.5	[1] 3.2
$100,000 and less than $1,000,000	43.9	44.1	40.8	36.3
$1,000,000 and over	7.3	10.3	54.3	60.2

[1] Includes one establishment with products valued at $5,000 and less than $20,000.

Table 12 shows for the industry as a whole, and for each of its four branches, the average number of wage earners, value of products, and value added by manufacture per establishment for 1909 and 1899.

During the decade 1899–1909 the average value of products per establishment for the industry as a whole increased from $306,735 to $372,073, the average value added by manufacture from $100,086 to $122,593, and the average number of wage earners per establishment from 135 to 157. Of the four branches of the industry, the establishments engaged in manufacturing jute goods showed the largest averages for 1909, while those manufacturing linen goods showed the largest gains in these averages from 1899 to 1909.

Table 12

BRANCH OF INDUSTRY.	AVERAGE PER ESTABLISHMENT.		
	Number of wage earners.	Value of products.	Value added by manufacture.
The industry as a whole:			
1909	157.4	$372,073	$122,593
1899	135.3	306,735	100,086
Cordage and twine:			
1909	130.6	374,478	112,733
1899	124.9	360,473	106,835
Jute goods:			
1909	277.7	449,801	189,180
1899	250.3	299,100	131,580
Linen goods:			
1909	238.2	425,681	161,243
1899	182.4	242,676	100,980
Nets and seines:			
1909	73.4	146,000	40,006
1899	39.4	77,685	32,111

Table 13 classifies the establishments in each of the nine leading states according to the number of wage earners employed.

Table 13

STATE.	CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.																	
	Total.		Establishments employing in 1909—															
			No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		over 1,000 wage earners.	
	Establishments.	Wage earners (average number).	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	164	25,820	2	20	53	31	371	26	946	26	1,863	34	5,066	12	4,407	8	5,071	5	8,043
Illinois	7	1,799	.....	.....	.....	2	17	.....	.....	1	56	2	296	.....	.....	2	1,430	.....	.....
Kentucky	6	751	.....	1	5	.....	.....	1	23	1	89	2	229	1	405	.....	.....	.....	.....
Massachusetts	31	6,690	1	7	21	5	68	3	115	1	82	10	1,727	1	417	1	635	2	3,625
Missouri	4	820	.....	.....	.....	.....	.....	.....	.....	1	52	1	190	2	578	.....	.....	.....	.....
New Jersey	12	3,025	.....	1	1	1	12	1	40	2	142	2	226	3	1,065	1	510	1	1,029
New York	16	5,952	.....	3	6	.....	.....	2	66	1	80	5	744	2	840	1	827	2	3,389
Ohio	8	791	.....	.....	.....	1	7	.....	.....	2	104	5	680	.....	.....	.....	.....	.....	.....
Pennsylvania	18	2,119	.....	3	10	6	78	1	26	3	203	2	229	1	473	2	1,100	.....	.....

Of the 164 establishments reported in 1909, 1.2 per cent employed no wage earners, 31.1 per cent employed from 1 to 20 wage earners, 31.7 per cent from 21 to 100, 28 per cent from 101 to 500, and 7.9 per cent over 500. Of the wage earners, 1.6 per cent were in establishments reporting from 1 to 20 wage earners each, 10.9 per cent in those employing from 21 to 100, 36.7 per cent in those employing from 101 to 500, and 50.8 per cent in the thirteen establishments employing more than 500.

Expenses.—As stated in the Introduction, the census figures representing expenses do not purport to show the total cost of manufacture, since they take no account of interest or depreciation; hence they can not properly be used for determining profits. Facts of interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 1 shows the total expenses in 1909 to have been $56,076,532, distributed as follows: Cost of materials, $40,914,810, or 73 per cent; wages, $9,132,999, or 16.3 per cent; salaries, $1,862,546, or 3.3 per cent; and miscellaneous expenses, made up of advertising, ordinary repairs of buildings and machinery, insurance, traveling expenses, and other sundry expenses, $4,166,177, or 7.4 per cent.

The following table gives, for the four branches of the industry, the percentages of the total reported expenses represented by the several classes in 1909:

Table 14 — BRANCH OF INDUSTRY.	PER CENT OF TOTAL REPORTED EXPENSES.			
	Cost of materials.	Salaries.	Wages.	Miscellaneous expenses.
The industry as a whole	**73.0**	**3.3**	**16.3**	**7.4**
Cordage and twine	77.0	3.2	13.9	5.9
Jute goods	60.7	3.6	22.6	13.1
Linen goods	68.0	3.6	20.8	7.6
Nets and seines	73.1	4.1	15.4	7.5

The cost of materials represented a smaller proportion of the total expenses and wages a larger proportion in the jute goods and the linen goods branches of the industry than in the other two branches. This condition is largely due to the more complicated manufacturing operations carried on in these two branches.

Engines and power.—Comparable figures as to the amount of power used in the industry as a whole are not available for the census of 1879, but Table 2 shows that the power employed in the industry increased from 27,911 horsepower in 1889 to 78,549 horsepower in 1909. Table 15 shows the statistics of power as reported for the industry as a whole at the censuses of 1909, 1904, and 1889.

The total primary power used in the industry increased from 47,999 horsepower in 1899 to 78,549 horsepower in 1909, or 63.6 per cent. In 1899 steam power constituted slightly more than four-fifths of the total primary power, but in spite of a considerable increase between 1899 and 1909, formed only about three-fourths of the total in 1909. Water power, on the other hand, formed 20.1 per cent of the total primary power in 1909, as compared with 17.2 per cent in 1899, and rented electric power formed 3.4 per cent of the total in 1909, as against seven-tenths of 1 per cent in 1899.

The horsepower of motors used for distributing power by means of current generated in the establishments in the industry increased from 1,596 in 1899 to 13,294, or nearly nine times as much, in 1909.

Table 15 — POWER.	CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.								
	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	**473**	**321**	**248**	**78,549**	**66,244**	**47,999**	**100.0**	**100.0**	**100.0**
Owned	301	301	248	75,908	65,234	47,673	96.6	98.5	99.3
Steam	197	208	159	58,855	52,532	38,473	74.9	79.3	80.2
Gas	14	7	11	1,285	103	951	1.6	0.2	2.0
Water wheels	89	85	78	15,761	12,589	8,249	20.1	19.0	17.2
Water motors	1	1	(1)	7	10	(1)	(2)	(2)	.....
Other	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rented	172	20	(1)	2,641	1,010	326	3.4	1.5	0.7
Electric	172	20	(1)	2,522	759	28	3.2	1.1	0.1
Other	.....	.....	.....	119	251	298	0.2	0.4	0.6
Electric motors	**570**	**211**	**44**	**15,816**	**8,293**	**1,624**	**100.0**	**100.0**	**100.0**
Run by current generated by establishment	398	191	44	13,294	7,534	1,596	84.1	90.8	98.3
Run by rented power	172	20	(1)	2,522	759	28	15.9	9.2	1.7

[1] Not reported. [2] Less than one-tenth of 1 per cent.

Table 16 shows, for 1909, the amount of the several kinds of power and of the different kinds of fuel used in the industry as a whole in each of the eight leading states.

Table 16 — STATE.	CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY: 1909														
	Primary horsepower.								Electric horsepower.		Fuel used.				
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.			Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water wheels and motors.	Other.	Electric.	Other.	Total, rented and generated by establishment.	Generated in the establishment reporting.	Anthracite (long tons).	Bituminous (short tons).				
United States	**156**	**78,549**	**75,908**	**58,855**	**1,285**	**15,768**	.....	**2,522**	**119**	**15,816**	**13,294**	**69,397**	**181,462**	.....	**392**	**22,113**	**31,273**
Illinois	7	6,459	6,310	6,300	10	.....	.....	149	.....	261	112	.....	30,293	.....	.....	30	.....
Kentucky	5	1,801	1,650	1,400	.....	250	.....	151	.....	161	10	.....	13,375	.....	.....	.....	.....
Massachusetts	29	24,864	24,769	12,180	1,204	11,385	.....	36	59	5,793	5,757	2,633	40,425	.....	59	2,031	812
Missouri	4	1,683	1,683	1,683	.....	.....	.....	.....	.....	.....	.....	.....	9,498	.....	.....	.....	.....
New Jersey	11	6,442	6,440	6,380	.....	60	.....	2	.....	2,213	2,211	27,095	1,223	.....	.....	.....	.....
New York	14	15,050	14,764	14,386	8	370	.....	202	.....	3,629	3,337	26,748	32,532	.....	.....	.....	377
Ohio	8	3,225	3,225	3,205	20	.....	.....	.....	.....	75	75	.....	13,390	.....	.....	.....	200
Pennsylvania	17	4,630	4,593	4,462	11	120	.....	37	.....	230	193	12,773	7,534	.....	2	120	381
All other states	61	14,380	12,474	8,859	32	3,583	.....	1,855	60	3,454	1,599	148	27,102	.....	331	19,932	29,503

In 1909, Massachusetts, New York, Illinois, and New Jersey, together reported 52,821 horsepower, or 67.2 per cent of the aggregate for the industry. Steam was the most important form of power in all of the states shown separately in the table. The largest amount of steam power, 14,386 horsepower, is shown for New York, and the largest amount of water power, 11,385 horsepower, for Massachusetts.

Fuel consumed.—Bituminous coal was the principal kind of fuel used in 1909, the largest amount being reported by establishments in Massachusetts. The largest amount of anthracite coal was reported by establishments in New Jersey.

SPECIAL STATISTICS RELATING TO MATERIALS AND PRODUCTS.

Materials.—Table 17 shows the quantity and cost of the materials used in the industry as a whole in 1909 and 1899, and the percentages of increase for each item. The fibers reported for the census years 1909 and 1899 as used in the manufacture of cordage and twine and jute and linen goods are assembled in three groups, hard fibers, soft fibers, and cotton. The hard fibers are those that form a structural part of the leaf of the plants from which they are derived and include manila hemp, sisal, New Zealand hemp, and istle or tampico fiber. The soft fibers include those found within the stem of the plant from which they are derived, such as true hemp, flax, and jute. In addition to the long, clean fibers of flax, hemp, and jute, there are used short and otherwise imperfect fibers of the same plants. In the case of flax and hemp these are called "tow," and in the case of jute they are known as "butts" or "rejections."

Table 17 MATERIALS USED IN THE MANUFACTURE OF CORDAGE AND TWINE AND JUTE AND LINEN GOODS.

MATERIAL.	1909	1899	Per cent of increase:[1] 1899–1909
Total	**$40,914,810**	**$33,063,793**	**23.7**
Hard fibers:			
Sisal and manila hemp—			
Pounds	335,460,574	269,594,673	24.4
Cost	$19,314,306	$17,743,624	8.9
Other kinds—			
Pounds	17,222,998	6,344,371	171.5
Cost	$707,802	$352,528	100.8
Soft fibers:			
Jute—			
Pounds	121,992,427	87,443,201	39.5
Cost	$4,134,265	$2,431,429	70.0
Jute butts—			
Pounds	138,364,122	118,806,625	16.5
Cost	$2,033,176	$1,795,653	13.2
Flax and flax tow—			
Pounds	26,954,785	16,980,646	58.7
Cost	$3,174,609	$2,080,862	52.6
Hemp and hemp tow—			
Pounds	19,724,070	25,588,715	−22.9
Cost	$1,496,125	$1,404,653	6.5
Cotton:			
Pounds	27,624,490	13,022,755	112.1
Cost	$2,922,933	$849,426	244.1
Yarns, purchased:			
Cotton—			
Pounds	7,077,959	4,973,080	42.3
Cost	$1,291,599	$709,889	81.9
Flax, hemp, jute, and ramie—			
Pounds	2,676,367	1,890,792	41.5
Cost	$445,378	$304,161	46.4
All other materials	$5,394,617	$5,391,568	0.1

[1] A minus sign (−) denotes decrease.

The total cost of the materials used in the industry increased from $33,063,793 in 1899 to $40,914,810 in 1909, or 23.7 per cent. Of the total for 1909, the cost of hard fibers represented 48.9 per cent; that of soft fibers, 26.5 per cent, that of cotton, 7.1 per cent, and that of yarns, 4.2 per cent; the corresponding percentages for 1899 were 54.7, 23.3, 2.6, and 3.1, respectively.

Sisal and manila hemp constituted 95.1 per cent of the total quantity of hard fibers used in 1909, and 97.7 in 1899. Jute and jute butts combined constituted 84.8 per cent of the total quantity of soft fibers used in 1909, as compared with 82.9 per cent of that used in 1899. Of the materials shown separately in the table, "other" hard fibers show the largest percentage of increase in quantity (171.5), while cotton shows the largest relative increase in cost (244.1 per cent).

Products.—Table 18 shows the quantity and value of the principal products of the industry as a whole for 1909 and 1899.

Table 18 PRODUCTS OF THE CORDAGE AND TWINE AND JUTE AND LINEN GOODS INDUSTRY.

PRODUCT.	1909	1899	Per cent of increase:[1] 1899–1909
Total value	**[2] $61,019,986**	**$49,077,629**	**24.3**
Rope and binder twine	$33,930,306	$26,909,027	26.1
Rope—			
Pounds	239,031,893	141,841,052	68.5
Value	$19,850,635	$12,723,446	56.0
Binder twine—			
Pounds	189,172,151	165,609,429	14.2
Value	$14,079,671	$14,185,581	− 0.7
Sisal—			
Pounds	225,756,526	172,238,291	31.1
Value	$15,960,280	$14,005,566	14.0
Manila—			
Pounds	150,169,682	123,584,201	21.5
Value	$12,892,347	$12,192,798	5.7
Cotton rope—			
Pounds	16,760,763	1,615,824	937.3
Value	$3,011,613	$247,250	1,118.0
Jute rope—			
Pounds	27,749,512	10,012,165	177.2
Value	$1,566,160	$463,413	238.0
All other—			
Pounds	7,767,561	[3]	.....
Value	$499,906	[3]	.....
Twine, other than binder twine	$8,934,352	$4,341,441	105.8
Cotton—			
Pounds	20,412,631	8,691,707	134.9
Value	$3,518,036	$1,133,040	210.3
Jute—			
Pounds	35,516,217	1,679,127	2,015.2
Value	$2,557,744	$117,539	2,076.1
Hemp—			
Pounds	8,013,349	9,065,024	−11.6
Value	$1,091,291	$1,019,590	7.0
Flax—			
Pounds	2,967,053	3,845,978	−22.9
Value	$830,969	$969,469	−14.3
Flax or hemp mixed with jute—			
Pounds	8,907,403	12,924,067	−31.1
Value	$936,312	$1,101,203	−15.0
Yarns for sale	$5,434,037	$4,455,734	22.0
Jute—			
Pounds	62,512,247	54,271,860	15.2
Value	$4,361,550	$3,230,835	35.0
Flax and hemp—			
Pounds	5,486,891	8,259,653	−33.6
Value	$982,742	$1,125,971	−12.7
Other—			
Pounds	732,120	946,567	−22.7
Value	$89,745	$98,928	− 9.3
Linen thread:			
Pounds	6,530,503	4,021,044	62.4
Value	$3,407,008	$2,332,287	46.1
Gunny bagging:			
Square yards	69,311,288	74,090,760	− 6.5
Value	$3,507,482	$3,462,479	1.3
Jute carpets and rugs:			
Square yards	2,206,114	2,953,658	−25.3
Value	$549,221	$357,568	53.6
All other products	$5,257,580	$7,219,093	−27.2

[1] A minus sign (−) denotes decrease.
[2] In addition, cordage and twine and jute and linen goods to the value of $890,629 were made by establishments engaged primarily in the manufacture of products other than those covered by the industry designation.
[3] Not reported.

The total production of rope and twine in 1909 (exclusive of the production in penal institutions) was 512,196,164 pounds; of this amount 504,020,697 pounds were made by establishments in the cordage and twine and jute and linen goods industry, as shown in Table 18, while 8,175,467 pounds were produced by establishments in other industries.

At the census of 1909 two establishments reported the manufacture of rope, and one the manufacture of linen thread, on contract, from material furnished by the parties for whom the work was done. The total production of the three establishments, however, did not exceed 4,500,000 pounds.

The production of rope shows an increase of 68.5 per cent in quantity and 56 per cent in value during the decade 1899–1909. The output of binder twine increased 14.2 per cent in amount but decreased slightly in value.

Separate statistics for linen toweling and for other linen woven goods can not be given without disclosing the operations of individual establishments, and their total value is included in the amount shown for "all other products" in Table 18. Both of these products, however, show a decided increase between 1899 and 1909.

DETAILED STATE TABLE.

The principal statistics secured by the census inquiry concerning the industry as a whole are presented by states in Table 19, showing, for 1909, the number of establishments, number of persons engaged in the industry, primary horsepower, capital, salaries, wages, value of products, and value added by manufacture.

CORDAGE AND TWINE AND JUTE AND LINEN GOODS—DETAILED STATISTICS, BY STATES: 1909.

Table 19

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.									WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DATE.					Primary horsepower.
		Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks.		Wage earners.				Total.	16 and over.		Under 16.		
					Male.	Female.	Average number.	Number, 15th day of— Maximum month.		Number, 15th day of— Minimum month.		Male.	Female.	Male.	Female.	
United States	164	27,214	80	394	698	222	25,820	Mh	26,698	No 24,313	26,941	13,019	12,083	928	911	78,549
Alabama	5	452	.....	11	7	7	427	Ja	502	No 390	402	198	102	47	55	1,700
Connecticut	8	314	7	13	3	5	286	Au	315	No 114	297	148	140	7	2	1,134
Illinois	7	1,884	.....	49	28	8	1,799	De	2,147	An 1,619	2,162	956	1,142	14	50	6,459
Kentucky	6	778	1	13	9	4	751	Oc	821	Au 621	815	393	399	21	2	1,801
Maryland	4	363	2	5	6	4	346	Oc	375	Je 319	351	80	191	18	62	1,115
Massachusetts	31	7,003	22	64	147	80	6,690	Ap	7,132	No 5,188	6,917	3,496	2,863	266	292	24,864
New Jersey	12	3,174	1	31	103	14	3,025	De	3,096	Jy 2,903	3,096	1,421	1,419	140	116	6,442
New York	16	6,230	9	62	165	42	5,952	Mh	6,069	Je 5,716	5,991	2,781	3,165	21	24	15,656
North Carolina	7	542	2	17	30	2	491	My	506	Ja 475	523	224	178	75	46	1,755
Ohio	8	848	3	17	25	12	791	Ap	932	Au 498	912	678	227	5	2	3,225
Pennsylvania	18	2,228	12	37	52	8	2,119	No	2,196	My 2,000	2,193	1,048	906	134	105	4,630
Rhode Island	6	156	8	5	3	1	139	Ja[1]	165	Au 103	160	90	64	.....	6	477
Virginia	3	102	4	3	7	.....	88	My	112	Ja 61	69	22	45	2	.....	32
Wisconsin	3	123	2	1	3	.....	117	Oc	156	My 93	121	48	49	24	.....	270
All other states [2]	30	3,017	7	66	110	35	2,799	.....		.....	2,932	1,436	1,193	154	149	9,589

STATE.	Capital.	EXPENSES.										Value of products.	Value added by manufacture (value of products less cost of materials).
		Total.	Services.			Materials.		Miscellaneous.					
			Officials.	Clerks.	Wage earners.	Fuel and rent of power.	Other.	Rent of factory.	Taxes, including internal revenue.	Contract work.	Other.		
United States	$76,020,366	$56,076,532	$1,005,984	$856,562	$9,132,999	$687,184	$40,227,626	$141,531	$454,484	$13,575	$3,556,587	$61,019,986	$20,105,176
Alabama	749,281	689,661	21,647	5,647	117,307	15,900	462,705	1,047	4,314	.....	61,094	695,910	217,305
Connecticut	480,682	555,743	13,570	5,224	84,737	4,003	427,268	3,065	2,368	.....	15,508	561,264	129,993
Illinois	13,014,494	6,888,306	66,908	24,658	659,584	66,222	5,875,409	3,000	50,079	.....	142,386	8,237,165	2,295,534
Kentucky	1,505,196	1,058,143	25,150	7,786	224,946	16,611	692,486	2,332	5,580	.....	83,252	1,079,570	370,473
Maryland	1,072,406	711,882	8,635	9,767	94,083	9,071	530,519	1,260	6,983	.....	51,564	708,529	168,939
Massachusetts	17,510,244	15,436,123	236,759	261,534	2,560,324	157,481	11,040,225	8,057	148,283	2,404	1,021,056	16,031,643	5,433,937
New Jersey	6,598,245	5,395,697	68,729	63,711	953,792	78,875	3,816,825	3,000	38,363	369	312,033	5,526,721	1,631,021
New York	15,776,978	11,442,917	195,339	179,800	2,163,560	159,452	7,429,498	93,469	104,184	10,602	1,107,022	12,215,000	4,626,050
North Carolina	1,269,585	748,888	24,859	24,948	103,778	8,201	551,228	4,485	2,146	.....	29,243	823,864	264,435
Ohio	2,743,489	2,561,362	48,265	32,725	312,704	26,774	1,957,255	2,100	18,499	.....	163,040	2,727,854	743,825
Pennsylvania	5,161,095	3,997,428	119,660	65,801	685,170	41,932	2,959,484	1,050	8,850	200	115,281	4,804,775	1,803,359
Rhode Island	190,197	245,578	6,750	1,356	48,444	6,117	170,084	4,150	868	.....	7,809	256,857	80,656
Virginia	198,600	191,292	3,336	4,600	27,660	559	146,025	2,225	1,138	.....	5,749	212,740	66,156
Wisconsin	205,585	136,409	1,500	3,000	33,004	2,287	88,943	.....	1,381	.....	6,294	150,482	59,252
All other states [2]	9,554,389	6,017,103	134,817	136,005	1,063,906	93,699	4,079,672	12,300	61,448	.....	435,256	6,387,612	2,214,241

[1] Same number reported for one or more other months.
[2] All other states embrace: California, 2 establishments; Delaware, 1; Georgia, 2; Indiana, 2; Iowa, 1; Louisiana, 1; Maine, 2; Michigan, 1; Minnesota, 1; Mississippi, 3; Missouri, 4; New Hampshire, 2; Oklahoma, 1; Oregon, 2; South Carolina, 3; Tennessee, 1; Washington, 1.

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DYEING AND FINISHING TEXTILES

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THE DYEING AND FINISHING OF TEXTILES.

GENERAL STATISTICS.

Scope of the industry.—The census classification "dyeing and finishing textiles" includes all establishments engaged primarily in the dyeing and finishing of textiles. It covers the bleaching, dyeing, and mercerizing of raw fibers, and of yarns and woven cloth, and the printing of piece goods, and also includes establishments engaged in the beaming and winding of yarns and in the spooling of thread, as well as a few establishments engaged in dyeing and bleaching straw braids. Although some establishments make a specialty of dyeing and finishing silk yarns and fabrics, and a number specialize in work on other classes of textiles, so large a number dye and finish more than one variety of fabric that it is impossible to compile statistics which will correctly represent the work done on any particular class.

A considerable number of the cotton, silk, and woolen mills carry on, in the same establishment, one or more of these subordinate processes in connection with the manufacture of textiles, and where practicable, separate returns were secured for the dyeing and finishing departments of such mills, in which case these departments were treated as separate establishments and the statistics concerning them were included in the present report on the dyeing and finishing industry. Most of these mills, however, made no separate report for the operations of the dyeing and finishing department, such statistics being included with those for the entire establishment in a single report. The statistics for the dyeing and finishing industry, therefore, do not fully cover the dyeing and finishing operations carried on in connection with the textile industries.

Comparison with earlier censuses.—Statistics for the dyeing and finishing industry were first obtained at the census of 1849, when 42 establishments were reported, giving employment to an average of 4,080 hands. The returns for cost of materials and value of products included the value of the cloth treated and are therefore not comparable with those for later censuses, but the value added by manufacture was $3,218,761. At the census of 1859 there were 29 establishments engaged in the industry, giving employment to an average of 4,005 hands and reporting products to the value of $7,971,064; the value added by manufacture was $4,086,249. At the census of 1869, 42 establishments, employing an average of 8,894 hands, were reported; the value of the cloth treated was included with the value of products at this census also, but the value added by manufacture amounted to $8,072,686.

Table 1 summarizes the statistics for the industry for each census from 1879 to 1909, inclusive.

Table 1

	DYEING AND FINISHING TEXTILES.									
	Number or amount.					Per cent of increase.[1]				
	1909	1904	1899	1889	1879	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889
Number of establishments	420	360	298	248	191	43.0	18.3	20.8	20.2	29.8
Persons engaged in the industry	47,303	38,071	31,394	(2)	(2)	50.7	24.2	21.3	.....	.....
Proprietors and firm members	318	310	300	(2)	(2)	6.0	2.6	3.3	.....	.....
Salaried employees	2,939	2,196	1,318	(2)	(2)	123.0	33.8	66.6	.....	.....
Wage earners (average number)	44,046	35,565	29,776	19,601	16,698	47.9	23.8	19.4	(3)	(3)
Primary horsepower	107,746	84,868	69,238	57,035	(2)	55.6	27.0	22.6	21.4	.....
Capital	$114,092,654	$88,708,576	$60,643,104	$38,450,800	$26,223,981	88.1	28.6	46.3	57.7	46.6
Expenses	68,847,853	44,476,116	37,089,528	25,233,312	20,138,659	85.1	54.3	19.9	47.0	25.3
Services	26,261,634	18,876,586	14,993,444	9,717,011	6,474,364	75.2	39.1	25.9	54.3	50.1
Salaries	5,034,710	3,407,381	2,267,128	(2)	(2)	122.1	47.8	50.3	.....	.....
Wages	21,226,924	15,469,205	12,726,316	(2)	(2)	66.8	37.2	21.6	.....	.....
Materials	35,261,301	19,621,253	17,958,137	12,385,220	13,664,295	96.4	79.7	9.3	45.0	−9.4
Miscellaneous	7,124,918	5,978,277	4,137,947	3,131,081	(2)	72.2	19.2	44.5	32.2	.....
Value of products	83,556,432	50,849,545	44,903,331	28,900,560	32,297,420	85.8	64.3	13.1	55.6	−10.5
Value added by manufacture (value of products less cost of materials)	48,295,131	31,228,292	27,005,194	16,515,340	18,633,125	78.8	54.7	15.6	63.5	−11.4

[1] A minus sign (−) denotes decrease. Where the percentages are omitted, comparable figures can not be given.
[2] Comparable figures not available.
[3] Figures not strictly comparable.

The number of independent dyeing and finishing establishments shows a considerable increase for each of the intercensal periods covered by the table, the number in 1909 being more than twice that in 1879. A substantial increase in value of products took place during each of the decades between 1889 and 1909; there was a decrease of 10.5 per cent, however, during the decade 1879–1889, this decrease probably being

due to the fact that competition and improved processes had reduced the rates charged for work done.[1] The value of products in 1909 was more than two and one-half times that in 1879. Between 1899 and 1909 the average number of wage earners increased 14,270, or 47.9 per cent, and the value of products $38,593,101, or 85.8 per cent, the greater part of these increases taking place during the second half of the decade. In general, the cost of materials consists chiefly of the amount expended for dyestuffs and other chemicals used, and the value of products represents the amount which is charged for performing the dyeing and finishing processes, the goods dyed or finished in most instances belonging to other concerns; but in some instances the goods dyed or finished are owned by the establishments which perform these final operations and under such circumstances the cost of the fabric is included in the cost of materials while the value of the finished cloth is included in the value of products. The large increases in cost of materials and value of products shown for the five-year period 1904–1909, therefore, may be due in part to the fact that a larger proportion of the value of the fabrics treated was included in the cost of materials in 1909 than in 1904.

[1] Eleventh Census of the United States, 1890, Part III, Selected Industries, page 231.

At the census of 1909, 426 establishments were returned as engaged in the dyeing and finishing industry, these establishments giving employment to an average of 47,303 persons during the year, paying out $26,261,634 in salaries and wages, and reporting products to the value of $83,556,432, to produce which materials costing $35,261,301 were utilized. The value added by manufacture—that is, the value of products less the cost of materials—was $48,295,131, equal to 57.8 per cent of the total value of products.

Summary, by states.—Table 2 summarizes the more important statistics of the industry by states, the states being arranged according to the value of products reported for 1909. The states shown in this table are given their actual ranking among all states, the rank of certain states for which figures can not be presented being higher than that of some named in the table. The extent to which the establishments in the several states owned the materials upon which they worked greatly influences their rank in value of products, and no doubt largely accounts for the seeming discrepancy between the proportion of the total value of products contributed by certain states as compared with the proportion which the same states contributed of the total number of wage earners, or the value added by manufacture.

Table 2 DYEING AND FINISHING TEXTILES.

	Number of establishments: 1909	Wage earners.				Value of products.				Value added by manufacture.				Per cent of increase.[1]								
		Average number: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Wage earners (average number).			Value of products.			Value added by manufacture.		
				1909	1904			1909	1904			1909	1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904
United States.	426	44,046	100.0	.....	.....	$83,556,432	100.0	.....	.....	$48,295,131	100.0	.....	.....	47.9	23.8	19.4	85.8	64.3	13.1	78.8	54.7	15.6
Massachusetts	48	9,079	20.6	2	3	21,892,890	26.2	1	2	11,423,624	23.7	1	2	94.1	20.9	60.5	146.9	98.1	24.6	98.4	66.3	19.3
New Jersey	67	10,129	23.0	1	1	15,795,788	18.9	2	1	9,443,092	19.6	2	1	43.2	33.3	7.4	50.6	31.9	14.2	31.9	36.3	15.9
Rhode Island	45	7,702	17.7	3	2	13,955,700	16.7	3	3	8,636,419	17.9	3	3	31.1	3.0	27.3	64.5	39.8	17.6	60.0	36.2	17.5
Pennsylvania	135	6,086	13.8	4	4	12,059,297	14.4	4	4	6,728,610	13.9	4	4	29.0	32.7	−2.8	71.3	77.7	−3.6	74.2	64.7	5.7
New York	81	5,252	11.9	5	5	9,673,228	11.6	5	5	5,533,967	11.5	5	5	68.5	46.5	15.0	166.8	121.8	20.3	148.8	83.1	35.9
Connecticut	10	1,719	3.9	6	6	3,561,927	4.3	6	6	2,081,859	4.3	6	6	32.2	22.3	8.2	56.9	60.8	−2.4	52.8	61.6	−5.5
Ohio	6	184	0.4	11	.....	423,144	0.5	10	.....	180,368	0.4	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	12	172	0.4	12	12	362,787	0.4	11	14	257,303	0.5	10	12	.....	39.8	.....	.....	125.5	317.2	.....	96.9	.....
North Carolina	4	330	0.7	10	10	306,853	0.4	13	10	194,327	0.4	11	10	79.3	9.6	63.6	74.4	22.3	42.6	139.5	17.6	.....
Maryland	3	79	0.2	17	.....	126,570	0.2	17	.....	65,985	0.1	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
All other states	15	3,224	7.3	.....	.....	5,398,248	6.5	.....	.....	3,749,577	7.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Percentages are based on figures in Table 14. A minus sign (−) denotes decrease. Percentages not shown where base is less than 100 for wage earners or less than $100,000 for value of products or value added by manufacture, or where comparative figures can not be given without disclosing individual operations.

In 1909 Massachusetts ranked first in respect to value of products, reporting 26.2 per cent of the total for the industry in the United States, and in value added by manufacture, but was second in average number of wage earners, New Jersey ranking first in this respect. The number of wage earners employed in the industry in Massachusetts increased 94.1 per cent during the decade ending with 1909, and the value of products 146.9 per cent. In 1909 New Jersey ranked second in value of products and value added by manufacture, having dropped from first place since 1904. Rhode Island ranked third in value of products and in value added by manufacture in both 1909 and 1904, and third in number of wage earners in 1909, having changed places with Massachusetts since 1904. Of the states for which the percentages of increase are given in the table, New York shows the largest relative gain from 1899 to 1909 in value of products and value added by manufacture, the increases being 166.8 per cent and 148.8 per cent, respectively; Massachusetts, however, shows the largest percentage of increase in number of wage earners.

Persons engaged in the industry.—Table 3 shows, for 1909, the number of persons engaged in the industry, classified according to occupational status and sex, and in the case of wage earners according to age also. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

Table 3

CLASS.	PERSONS ENGAGED IN THE DYEING AND FINISHING OF TEXTILES: 1909		
	Total.	Male.	Female.
All classes	**47,303**	**38,581**	**8,722**
Proprietors and officials	1,218	1,190	28
Proprietors and firm members	318	308	10
Salaried officers of corporations	289	287	2
Superintendents and managers	611	595	16
Clerks	2,039	1,595	444
Wage earners (average number)	44,046	35,796	8,250
16 years of age and over	43,002	35,057	7,945
Under 16 years of age	1,044	739	305

The average number of persons engaged in the industry during 1909 was 47,303, of whom 44,046, or 93.1 per cent, were wage earners; 1,218, or 2.6 per cent, proprietors and officials; and 2,039, or 4.3 per cent, clerks, this class including other subordinate salaried employees. Of the total number of persons engaged in the industry, 81.6 per cent were males and 18.4 per cent females. Over nine-tenths (94.6 per cent) of the females were wage earners. Of the 1,044 children under 16 years of age employed as wage earners, 70.8 per cent were males and 29.2 per cent females.

The average number of wage earners employed in the industry in 1909, 1904, and 1899 is given for each state in Table 14. The distribution of the average number by sex and age is not shown for the individual states, but Table 15 gives such a distribution of the number employed on December 15, or the nearest representative day. Female wage earners were reported from all of the 10 states shown in the table. The largest number, 2,222 was reported from Massachusetts, and the next largest number, 1,646, from New York.

In order to compare the distribution of the persons engaged in the industry in 1909 according the occupational status with that in 1904, it is necessary to use the classification employed at the earlier census. (See Introduction.) Such a comparison is made in Table 4.

Table 4

CLASS.	PERSONS ENGAGED IN THE DYEING AND FINISHING OF TEXTILES.				
	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	**47,303**	**100.0**	**38,071**	**100.0**	**24.2**
Proprietors and firm members	318	0.7	310	0.8	2.6
Salaried employees	2,939	6.2	2,196	5.8	33.8
Wage earners (average number)	44,046	93.1	35,565	93.4	23.8

Table 5 shows the average number of wage earners engaged in the industry, distributed according to age, and in the case of those 16 years of age and over, according to sex, for 1909, 1904, and 1899.

Table 5

CLASS.	AVERAGE NUMBER OF WAGE EARNERS ENGAGED IN THE DYEING AND FINISHING OF TEXTILES.					
	1909		1904		1899	
	Number.	Per cent distribution.	Number.	Per cent distribution.	Number.	Per cent distribution.
Total	**44,046**	**100.0**	**35,565**	**100.0**	**29,776**	**100.0**
16 years of age and over	43,002	97.6	34,141	96.0	28,672	96.3
Male	35,057	79.6	28,483	80.1	24,419	82.0
Female	7,945	18.0	5,658	15.9	4,253	14.3
Under 16 years of age	1,044	2.4	1,424	4.0	1,104	3.7

The absolute number of males and females 16 years of age and over increased during each of the two five-year periods covered by the table, but the number of children under 16 years of age, though larger in 1904 than in 1899, was less in 1909 than in either 1904 or 1899. The number of women employed as wage earners increased 86.8 per cent during the decade 1899–1909, and the proportion which they represented of the total number also increased appreciably. The proportion of males 16 years of age or over and of children under 16 years of age declined during the decade.

Wage earners employed, by months.—Table 6 gives the number of wage earners employed in the industry on the 15th (or the nearest representative day) of each month during 1909 for each state in which an average of 500 or more wage earners were employed during the year, and for which statistics can be given without disclosing individual operations.

Table 6

STATE.	WAGE EARNERS EMPLOYED IN THE DYEING AND FINISHING OF TEXTILES: 1909 [1]												
	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	**44,046**	**43,715**	**44,209**	**44,863**	**44,635**	**43,840**	**43,405**	**43,212**	**43,447**	**44,171**	**44,031**	**44,797**	**44,157**
Connecticut	1,719	1,720	1,716	1,754	1,768	1,738	1,735	1,700	1,688	*1,679*	1,704	1,701	1,730
Delaware	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580
Maine	523	528	532	532	528	*488*	526	523	508	508	516	531	552
Massachusetts	9,079	8,932	8,964	9,206	9,039	9,012	9,113	9,152	9,116	**9,278**	8,778	9,235	9,125
New Hampshire	625	*512*	564	549	553	658	661	622	669	694	673	667	682
New Jersey	10,129	10,239	10,557	10,548	10,555	10,253	9,641	*9,526*	9,876	9,907	10,018	10,289	10,137
New York	5,252	5,312	5,408	5,516	5,378	5,175	5,188	5,157	4,955	5,461	5,571	5,230	*4,682*
Pennsylvania	6,086	6,122	6,005	6,138	6,132	6,026	5,994	*5,954*	5,990	5,970	6,075	6,250	6,376
Rhode Island	7,792	*7,548*	7,700	7,783	7,829	7,660	7,726	7,737	7,823	7,855	7,891	7,994	7,957

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

The largest number of wage earners reported for any month of 1909 was 44,863 for March, and the smallest number, 43,212, for July, the minimum number being equal to 96.3 per cent of the maximum. In 1904 the maximum number, 37,072, was reported for December, and the minimum number, 33,793, equal to 91.2 per cent of the maximum, for August. The months of maximum and minimum employment for 1909, and the number of wage earners reported for these months, are given for a larger number of states in Table 15.

Prevailing hours of labor.—In Table 7 the wage earners in the industry have been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or smaller number of hours.

Table 7 AVERAGE NUMBER OF WAGE EARNERS EMPLOYED IN THE DYEING AND FINISHING OF TEXTILES: 1909

STATE.	Total.	In establishments with prevailing hours—					
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.
United States	44,046	107	1,102	398	28,172	12,639	1,628
Connecticut	1,719	.....	.....	2	351	1,366	.....
Delaware	1,580	.....	.....	.....	1,580	.....	.....
Maine	523	.....	.....	.....	.....	523	.....
Massachusetts	9,079	8	119	56	8,009	542	345
New Hampshire	625	.....	.....	.....	625	.....	.....
New Jersey	10,129	4	33	60	6,194	2,968	870
New York	5,252	65	816	197	2,830	1,324	20
Pennsylvania	6,036	10	39	33	2,078	3,874	52
Rhode Island	7,792	.....	.....	.....	6,334	1,438	20

Over nine-tenths (96.4 per cent) of the wage earners in the industry were employed in establishments where the prevailing number of hours was more than 54 per week. Almost two-thirds (64 per cent) of the total number worked in establishments where the prevailing hours were between 54 and 60 per week, while somewhat more than one-fourth (28.7 per cent) were in establishments where they were 60 per week. In six of the states for which figures are given in the table, the most common working time was between 54 and 60 hours; in Connecticut, Maine, and Pennsylvania, however, the largest number of wage earners were employed in establishments where the prevailing hours were 60 per week. Only 3.7 per cent of the total number of wage earners in the industry were in establishments where the prevailing number of hours of employment per week exceeded 60, and only 3.6 per cent in establishments where it was as low as 54.

Character of ownership.—Table 8 presents statistics with respect to the character of ownership of the dyeing and finishing establishments.

Table 8 DYEING AND FINISHING TEXTILES.

CHARACTER OF OWNERSHIP.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	426	360	$83,556,432	$50,849,545
Individual	123	110	5,502,502	4,760,339
Firm	89	[1] 87	5,805,379	4,411,722
Corporation	214	163	72,248,551	41,677,484
Per cent of total	100.0	100.0	100.0	100.0
Individual	28.9	30.6	6.6	9.4
Firm	20.9	[1] 24.2	6.9	8.7
Corporation	50.2	45.3	86.5	82.0

[1] Includes two establishments under "other" ownership, to avoid disclosure of individual operations.

In 1909, of the total number of establishments reported, 50.2 per cent were under corporate ownership, as compared with 45.3 per cent in 1904; the value of the products of these establishments represented 86.5 per cent of the total value of products for all establishments engaged in the industry in 1909 and 82 per cent in 1904.

Table 9 gives statistics for establishments classified according to form of ownership in the five leading states.

Table 9 DYEING AND FINISHING TEXTILES.

STATE.	Number of establishments owned by—			Wage earners in establishments owned by—			Value of products of establishments owned by—			Value added by manufacture in establishments owned by—		
	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.
United States	123	89	214	3,166	2,483	38,397	$5,502,502	$5,805,379	$72,248,551	$3,532,366	$2,961,507	$41,801,258
Massachusetts	6	7	35	248	306	8,525	283,436	660,369	20,949,085	176,557	357,144	10,889,923
New Jersey	19	6	42	296	466	9,367	388,837	702,380	14,704,571	300,449	373,391	8,769,252
New York	31	16	34	422	334	4,496	1,119,383	1,837,907	6,715,938	627,868	684,967	4,221,132
Pennsylvania	48	50	37	859	1,160	4,067	1,432,593	2,056,104	8,570,600	885,980	1,256,886	4,585,744
Rhode Island	10	3	32	1,171	57	6,564	2,023,878	69,469	11,862,353	1,379,941	46,378	7,210,100

Of the total number of wage earners employed in the industry in 1909, 3,166, or 7.2 per cent, were employed in establishments under individual ownership; 2,483, or 5.6 per cent, in those under firm ownership; and 38,397, or 87.2 per cent, in those owned by corporations.

There was considerable variation among the states in the relative importance of the establishments operated by individuals, firms, and corporations, respectively. Thus, in Massachusetts, the leading state in the industry, establishments controlled by corporations constituted almost three-fourths of the total number of establishments, gave employment to 93.9 per cent of the wage earners, and reported 95.7 per cent of the total value of products. The proportions for Connecticut, where 8 out of 10 establishments were under corporate ownership, were very high also, but the percentages can not be given without disclosing individual operations. In Pennsylvania, on the other hand, corporations controlled only 27.4 per cent of the establishments, but these establishments gave employment to 66.8 per cent of the wage earners, and contributed 71.1 per cent of the total value of products.

Size of establishments.—Table 10 presents statistics for 1909 and 1904 for the establishments in the industry grouped according to the value of their products.

Of the 426 establishments reported for 1909, 20, or 4.7 per cent, reported products valued at $1,000,000 or over. In 1904 there were 9 establishments of this class out of a total of 360. While such establishments represented an insignificant proportion of the total number at both censuses, they reported a considerable proportion of the total value of products—44.6 per cent in 1909 and 25.4 per cent in 1904. The increase in the value of products for this class of establishments represented 74.6 per cent of the total for the entire industry.

On the other hand, the small establishments—that is, those having products valued at less than $20,000—constituted 29.8 per cent of the total number of establishments, but the value of their products represented only 1.4 per cent of the total. The great bulk of the value of products of the industry was reported by establishments having products valued at $100,000 or over, such establishments reporting 89.4 per cent of the total value in 1909 and 84.9 per cent in 1904.

Table 10

VALUE OF PRODUCTS PER ESTABLISHMENT.	DYEING AND FINISHING TEXTILES.			
	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	426	360	$33,556,432	$50,849,545
Less than $5,000	38	28	109,788	83,441
$5,000 and less than $20,000	89	94	1,079,228	1,086,059
$20,000 and less than $100,000	165	137	7,663,519	6,518,795
$100,000 and less than $1,000,000	114	92	37,395,345	30,256,218
$1,000,000 and over	20	9	37,308,552	12,905,032
Per cent of total	100.0	100.0	100.0	100.0
Less than $5,000	8.9	7.8	0.1	0.2
$5,000 and less than $20,000	20.9	26.1	1.3	2.1
$20,000 and less than $100,000	38.7	38.1	9.2	12.8
$100,000 and less than $1,000,000	26.8	25.6	44.8	59.5
$1,000,000 and over	4.7	2.5	44.6	25.4

During the five-year period from 1904 to 1909 the average value of products per establishment increased from $141,249 to $196,142, the average value added by manufacture, as computed from Table 1, from $86,745 to $113,369, and the average number of wage earners per establishment from 98.8 to 103.4.

Table 11 classifies the establishments in the industry by states, according to the number of wage earners employed.

Table 11

STATE.	DYEING AND FINISHING TEXTILES.																	
	Total.		Establishments employing in 1909—															
			No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number).	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	426	44,046	4	78	240	126	1,631	80	2,602	47	3,109	41	6,675	23	8,056	21	13,896	6	7,837
Connecticut	10	1,719	.....	1	2	3	50	3	127	.....	.....	.....	.....	1	256	2	1,284	.....	.....
Delaware	1	1,580	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1,580
Maine	1	523	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	523	.....	.....
Massachusetts	48	9,079	1	3	10	8	84	7	225	6	357	12	1,999	5	1,733	5	3,576	1	1,095
New Hampshire	2	625	.....	.....	.....	.....	.....	.....	.....	1	68	.....	.....	.....	.....	1	557	.....	.....
New Jersey	67	10,129	.....	12	34	15	170	12	369	11	691	7	1,098	2	614	5	3,042	3	4,111
New York	81	5,252	2	17	48	33	441	14	451	4	308	3	543	5	1,477	3	1,984	.....	.....
Pennsylvania	135	6,086	.....	29	98	46	630	32	1,019	15	948	9	1,236	3	1,261	1	894	.....	.....
Rhode Island	45	7,792	.....	7	25	10	149	6	211	4	343	8	1,515	6	2,462	3	2,036	1	1,051

Of the 426 establishments reported, four employed no wage earners; 47.9 per cent employed from 1 to 20 wage earners; 29.8 per cent, from 21 to 100; 9.6 per cent, from 101 to 250; and 11.7 per cent, more than 250 wage earners. Of the 44,046 wage earners, 4.2 per cent were reported by the establishments employing from 1 to 20 wage earners; 13 per cent by those employing from 21 to 100; 15.2 per cent by those employing from 101 to 250; and 67.6 per cent by those employing more than 250. Six establishments employed more than 1,000 wage earners, the number of wage earners in these establishments forming 17.8 per cent of the total for the industry.

Expenses.—As stated in the Introduction, the census figures representing expenses do not purport to to show the total cost of manufacture, since they take no account of interest or depreciation; hence they can not properly be used for calculating profits. Facts of

interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 1 shows the total reported expenses in 1909 to have been $68,647,853, distributed as follows: Cost of materials, $35,261,301, or 51.4 per cent; wages, $21,226,924, or 30.9 per cent; salaries, $5,034,710, or 7.3 per cent; and miscellaneous expenses, made up of advertising, ordinary repairs of buildings and machinery, insurance, traveling expenses, and other sundry expenses, $7,124,918, or 10.4 per cent. The variations in the proportions represented by the different classes of expenses in the several states which are shown in Table 15 are largely due to differences in the relative importance of the various classes of work covered by the industry designation (dyeing, bleaching, finishing, etc.), and to differences in the extent to which the work was done on purchased materials.

Engines and power.—Table 12 shows the statistics of power as reported at the censuses of 1909, 1904, and 1899.

The total primary power used in the industry increased from 69,238 horsepower in 1899 to 107,746 horsepower in 1909, or 55.6 per cent. At each census steam power constituted the major part of the primary power employed in the industry, the proportion which it formed of the total increasing from 82.6 per cent in 1899 to 85.6 per cent in 1909. The amount of water-power increased only 640 horsepower, or 6.8 per cent from 1899 to 1909, while the proportion which it formed of the total primary power decreased from 13.7 per cent to 9.3 per cent. There was a considerable increase in the horsepower of electric motors operated by purchased current (rented electric power). The number and horsepower of electric motors used for distributing power by means of current generated in the establishments in the industry show a very decided increase, the horsepower of such motors in 1909 amounting to 21,346, as compared with only 1,949 10 years earlier.

Table 12 DYEING AND FINISHING TEXTILES.

POWER.	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	2,181	1,663	1,623	107,746	84,868	69,238	100.0	100.0	100.0
Owned	1,990	1,621	1,623	103,605	81,396	68,322	96.2	95.9	98.7
Steam	1,893	1,533	1,535	92,284	70,385	57,216	85.6	82.9	82.6
Gas	20	10	2	1,207	711	8	1.1	0.8	(1)
Water wheels	76	71	86	10,074	10,125	9,474	9.3	11.9	13.7
Water motors	1	7	(2)	40	5	(2)	(1)	(1)	(2)
Other					170	1,624		0.2	2.3
Rented	191	42	(2)	4,141	3,472	916	3.8	4.1	1.3
Electric	191	42	(2)	2,665	1,087	50	2.5	1.3	0.1
Other				1,476	2,385	866	1.4	2.8	1.2
Electric motors.	1,419	488	131	24,011	11,724	1,999	100.0	100.0	100.0
Run by current generated by establishment	1,228	446	131	21,346	10,637	1,949	88.9	90.7	97.5
Run by rented power	191	42	(2)	2,665	1,087	50	11.1	9.3	2.5

[1] Less than one-tenth of 1 per cent. [2] Not reported.

Table 13 shows for 1909 statistics as to the power and the fuel used in the industry in the six leading states.

Table 13 DYEING AND FINISHING TEXTILES.

STATE.	Primary horsepower.								Electric horsepower.		Fuel used.					
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.			Total, rented and generated by establishment.	Generated in the establishment reporting.	Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water wheels and motors.	Other.	Electric.	Other.				Anthracite (long tons).	Bituminous (short tons).				
United States	388	107,746	103,605	92,284	1,207	10,114	.....	2,665	1,476		24,011	21,346	593,093	869,216	2,576	746	10,037	64,657
Connecticut	10	5,851	5,851	2,911	15	2,925	.....	.....	.....		974	974	1,456	53,795	.....	10	993	3,850
Massachusetts	46	24,513	23,956	21,466	.....	2,490	.....	370	187		7,524	7,154	106,083	171,315	2,016	.....	1,143	46
New Jersey	61	19,989	19,521	18,965	16	540	.....	401	67		3,607	3,206	304,610	109,535	190	.....	1,640	39,122
New York	63	8,750	7,588	7,239	114	235	.....	758	404		1,284	526	49,371	65,844	2	74	24	7,953
Pennsylvania	126	13,560	12,986	12,829	62	95	.....	203	371		1,513	1,310	60,512	166,532	228	.....	22	5,756
Rhode Island	44	21,179	20,987	18,131	1,000	1,856	.....	75	117		6,248	6,173	57,061	192,327	140	635	6,213	7,443
All other states	38	13,904	12,716	10,743	.....	1,973	.....	858	330		2,861	2,003	5,000	109,868	.....	27	2	487

The states which ranked highest with respect to the amount of power used were Massachusetts, Rhode Island, New Jersey, and Pennsylvania. The total horsepower reported for these states in 1909 was 79,241, or 73.5 per cent of the total for the United States. Steam was the most important form of power in all of the states shown in the table except Connecticut. The largest amount of steam power was reported for Massachusetts, the largest amount of water power for Connecticut, and the largest amount of rented electric power for New York.

Fuel consumed.—Bituminous coal was the principal class of fuel used, 869,216 short tons being consumed in 1909. The largest quantity of anthracite coal, 304,610 long tons, or more than one-half of the total for the industry, was reported for New Jersey.

DETAILED STATE TABLES.

The principal statistics secured by the census inquiry concerning the dyeing and finishing of textiles are presented, by states, in Tables 14 and 15.

Table 14 shows for 1909, 1904, and 1899 the number of establishments, number of persons engaged in the industry, primary horsepower, capital invested, salaries, wages, cost of materials, value of products, and value added by manufacture. Table 15 gives the statistics of the industry for 1909 in somewhat greater detail.

DYEING AND FINISHING TEXTILES—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 14

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	1909	426	47,303	318	2,939	44,046	107,746	$114,093	$5,035	$21,227	$35,261	$83,556	$48,295
	1904	360	38,071	310	2,196	35,565	84,888	88,709	3,407	15,469	19,621	50,850	31,229
	1899	298	31,394	300	1,318	29,776	69,238	60,643	2,287	12,726	17,958	44,963	27,005
Connecticut	1909	10	1,817	3	95	1,719	5,851	5,375	198	872	1,480	3,562	2,082
	1904	10	1,496	2	88	1,406	4,883	4,562	162	640	927	2,215	1,288
	1899	5	1,339	.....	39	1,300	4,724	3,244	101	579	907	2,270	1,363
Illinois	1909	12	203	9	22	172	386	339	21	92	105	363	258
	1904	8	153	2	28	123	532	247	32	45	30	161	131
	1899	4	93	2	7	84	160	114	7	28	33	87	54
Massachusetts	1909	48	9,683	21	583	9,079	24,513	30,597	1,143	4,430	10,469	21,893	11,424
	1904	46	7,935	24	403	7,508	19,242	30,875	759	3,262	4,179	11,049	6,870
	1899	37	4,941	24	239	4,678	14,292	15,206	548	2,081	3,111	8,868	5,757
New Jersey	1909	67	10,722	32	561	10,129	19,989	23,315	1,033	5,016	6,353	15,796	9,443
	1904	57	8,180	31	552	7,597	12,835	13,069	847	3,466	5,052	11,980	6,928
	1899	59	7,474	47	353	7,074	12,335	11,601	615	3,003	4,514	10,489	5,975
New York	1909	81	5,782	68	462	5,252	8,750	11,259	765	2,321	4,139	9,673	5,534
	1904	55	3,850	60	204	3,586	7,128	7,530	258	1,578	1,339	4,362	3,023
	1899	42	3,274	50	107	3,117	6,885	6,231	134	1,425	1,402	3,626	2,224
North Carolina	1909	4	358	3	25	330	556	613	25	86	113	307	194
	1904	4	330	2	27	301	705	829	28	83	86	251	165
	1899	5	197	5	8	184	345	294	7	45	95	176	81
Pennsylvania	1909	135	6,688	155	447	6,086	13,560	13,242	528	2,988	5,331	12,059	6,728
	1904	123	5,070	161	324	4,585	9,712	9,923	445	2,076	2,701	6,786	4,085
	1899	105	5,087	155	216	4,716	10,100	7,680	260	2,066	3,175	7,038	3,863
Rhode Island	1909	45	8,405	16	597	7,792	21,179	21,926	981	3,616	5,319	13,956	8,637
	1904	37	7,984	19	403	7,562	18,705	16,970	672	3,182	3,639	9,981	6,342
	1899	24	6,204	6	256	5,942	14,820	12,853	450	2,474	3,088	8,485	5,397
All other states	1909	24	3,645	11	147	3,487	12,962	7,427	271	1,806	1,952	5,947	3,995
	1904	20	3,073	9	167	2,897	11,126	4,704	204	1,137	1,668	4,065	2,397
	1899	17	2,785	11	93	2,681	5,578	3,420	145	1,025	1,633	3,924	2,291

DYEING AND FINISHING TEXTILES—DETAILED STATISTICS, BY STATES: 1909.

Table 15

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States	426	47,303	318	900	1,595	444	44,046	Mh 44,863	Jy 43,212	45,841	36,486	8,269	769	317	107,746
Connecticut	10	1,817	3	36	46	13	1,719	Ap 1,768	Se 1,679	1,730	1,474	211	33	12	5,851
Illinois	12	203	9	8	2	12	172	My 178	Ja 162	174	134	40	.....	.....	386
Maryland	3	85	1	3	2	.....	79	Fe [1] 86	Se [1] 72	80	59	18	.....	3	93
Massachusetts	48	9,683	21	142	354	87	9,079	Se 9,278	Oc 8,778	10,053	7,600	2,060	231	162	24,513
New Jersey	67	10,722	32	162	340	59	10,129	Fe 10,557	Jy 9,526	10,186	8,718	1,361	75	32	19,989
New York	81	5,782	68	131	247	84	5,252	Oc 5,571	De 4,682	5,553	3,883	1,640	24	6	8,750
North Carolina	4	358	3	10	10	5	330	De 366	Oc 293	366	244	98	12	12	556
Ohio	6	206	1	5	12	4	184	Ap 218	Ja 169	176	150	26	.....	.....	4,578
Pennsylvania	135	6,688	155	156	216	75	6,086	De 6,376	Jy 5,954	6,222	5,230	753	202	37	13,560
Rhode Island	45	8,405	16	196	313	88	7,792	No 7,994	Ja 7,548	7,961	6,186	1,585	144	46	21,179
All other states [2]	15	3,354	9	51	53	17	3,224	.....	.....	3,340	2,808	477	48	7	8,291

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States	$114,092,654	$63,647,853	$3,007,431	$2,027,279	$21,226,924	$4,451,077	$30,810,224	$282,090	$565,126	$337,422	$5,940,280	$83,556,432	$48,295,131
Connecticut	5,375,233	2,828,323	122,880	75,404	872,202	199,458	1,280,610	1,000	32,326	.....	244,443	3,561,927	2,081,859
Illinois	339,036	250,067	11,090	9,698	91,961	13,816	91,668	7,520	1,333	800	22,181	362,787	257,393
Maryland	109,268	113,569	5,900	910	31,583	5,041	55,544	.....	791	.....	13,800	126,570	65,985
Massachusetts	30,597,076	18,010,736	625,038	517,883	4,429,978	997,417	9,471,849	11,041	209,184	10,453	1,737,893	21,892,890	11,423,624
New Jersey	23,314,817	13,518,868	639,264	393,846	5,015,561	980,052	5,372,644	47,709	70,473	.....	999,319	15,705,788	9,443,092
New York	11,258,953	8,248,384	489,897	274,814	2,321,016	409,069	3,730,192	99,203	55,483	320,232	548,478	9,073,228	5,533,967
North Carolina	612,655	246,102	18,200	6,922	85,859	14,284	98,242	.....	2,907	496	19,132	306,853	194,327
Ohio	692,580	406,581	16,500	10,627	94,361	23,849	218,927	1,628	3,447	.....	37,242	423,144	180,368
Pennsylvania	13,241,764	10,079,020	356,531	241,374	2,988,496	650,393	4,680,294	70,035	51,199	2,741	1,038,857	12,059,297	6,728,610
Rhode Island	21,926,333	10,804,221	595,302	416,157	3,616,496	852,376	4,466,905	11,836	92,088	2,700	779,761	13,955,700	8,636,419
All other states [2]	6,624,939	4,141,082	156,829	79,644	1,679,411	305,322	1,343,349	32,118	45,235	.....	499,174	5,398,248	3,749,577

[1] Same number reported for one or more other months.

[2] "All other states" embrace: Alabama, 1 establishment; Delaware, 1; Indiana, 2; Iowa 1; Kentucky, 2; Maine, 1; Michigan, 1; Missouri, 1; New Hampshire, 2; Oregon, 1; South Carolina, 1; West Virginia, 1.

OILCLOTH AND LINOLEUM

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THE OILCLOTH AND LINOLEUM INDUSTRY.

GENERAL STATISTICS.

Scope of the industry.—This industry embraces establishments engaged primarily in the manufacture of floor coverings of oilcloth and linoleum (including cork carpet) and of enameled oilcloth, including table, shelf, and upholsters' oilcloth, etc. Some of the establishments in the industry also manufacture buckram and burlap wall coverings, which are included under "all other products" in Table 9. Establishments which manufacture opaque window shade cloth, however, are not included. The report also takes cognizance of establishments manufacturing artificial leather (included with "upholstering materials" in 1909), to the extent of including in Table 9, but not elsewhere, statistics of the quantity and value of this product, which is closely allied to oilcloth and linoleum in composition.

In reports of previous censuses the statistics for the industry have been published separately under two classifications, "oilcloth, enameled," and "oilcloth and linoleum, floor," but at the present census, because of the overlapping of the statistics, the two classifications have been combined under the designation "oilcloth and linoleum."

Summary for the two branches of the industry.—Table 1 presents statistics for the oilcloth and linoleum industry as a whole and for its two branches separately for 1909.

Table 1

ESTABLISHMENTS MANUFACTURING PRIMARILY—	Number of establishments.	Wage earners (average number).	Wages.	Cost of materials.	Value of products.	Value added by manufacture.
Total	31	5,201	$2,825,545	$15,550,101	$23,339,022	$7,788,921
Oilcloth and linoleum, floor	19	4,225	2,309,404	10,145,316	15,813,331	5,668,015
Oilcloth, enameled	12	970	516,141	5,404,785	7,525,691	2,120,906

The oilcloth and linoleum branch of the industry contributed 67.8 per cent of the total value of products reported for the industry as a whole and 72.7 per cent of the value added by manufacture. Of the total number of wage earners, 81.2 per cent were reported by the floor oilcloth and linoleum branch.

Comparison with earlier censuses.—Table 2 summarizes the statistics for the manufacture of oilcloth and linoleum as reported at each census from 1869 to 1909, inclusive. The financial figures for 1869 are given in currency, which at that time was worth only about 80 cents, gold, to the dollar. For strict comparison, therefore, these figures should be reduced about 20 per cent.

Table 2

	NUMBER OR AMOUNT.						PER CENT OF INCREASE.[1]					
	1909	1904	1899	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	31	27	27	28	29	34	14.8	14.8	.....	−3.6	−3.4	−14.7
Persons engaged in the industry	5,557	4,112	3,409	(2)	(2)	(2)	63.0	35.1	20.6	.....	.....	.....
Proprietors and firm members	11	12	26	(2)	(2)	(2)	−57.7	−8.3	−53.8	.....	.....	.....
Salaried employees	345	217	153	(2)	(2)	(2)	125.5	59.0	41.8	.....	.....	.....
Wage earners (average number)	5,201	3,883	3,230	1,862	1,993	1,411	61.0	33.9	20.2	73.5	(3)	(3)
Primary horsepower	16,125	10,112	7,561	2,669	(2)	424	113.3	59.5	33.7	183.3	.....	.....
Capital	$19,634,138	$13,803,232	$8,879,102	$4,477,256	$3,744,550	$2,237,000	121.1	42.2	55.5	98.3	19.6	67.4
Expenses	20,860,264	13,724,541	9,094,265	4,676,936	(2)	(2)	108.7	52.0	37.3	113.7	.....	.....
Services	3,474,628	2,304,987	1,922,636	1,050,430	849,862	687,288	80.7	50.7	19.9	83.0	23.6	23.7
Salaries	649,083	361,230	294,523	(2)	(2)	(2)	120.4	79.7	22.6	.....	.....	.....
Wages	2,825,545	1,943,757	1,628,113	(2)	(2)	(2)	73.5	45.4	19.4	.....	.....	.....
Materials	15,550,101	10,050,009	7,549,672	3,363,813	3,982,908	2,548,768	106.0	54.7	33.1	124.4	−15.5	56.3
Miscellaneous	1,835,535	1,369,545	521,957	262,693	(2)	(2)	251.7	34.0	162.4	98.7	.....	.....
Value of products	23,339,022	14,792,246	11,402,620	5,481,087	5,814,587	4,211,579	104.7	57.8	29.7	108.0	−5.7	38.1
Value added by manufacture (value of products less cost of materials)	7,788,921	4,742,237	3,852,948	2,117,274	1,831,679	1,662,811	102.2	64.2	23.1	82.0	15.6	10.2

[1] A minus sign (−) denotes decrease. Where percentages are omitted comparable figures are not available.
[2] Comparable figures not available.
[3] Figures not strictly comparable.

The manufacture of oilcloth in the United States commenced about 1807. Statistics for the industry first appeared in the census reports for 1810, when 1 establishment in Philadelphia was reported as engaged in "floor cloth stamping." Its product was given as 1,500 yards, valued at $3,000. At the census of 1849, 56 establishments were reported, with 650 wage earners and products valued at $1,256,994. The census of 1859 showed 49 establishments, with 1,538 wage earners and products valued at $3,602,216.

The industry has shown continuous and substantial increases for the entire period covered by Table 2, with the single exception of the decade 1879–1889, when slight decreases appeared in several of the principal items shown. The value of products for 1909 was more than five times that in 1869, and the

number of wage earners increased 268.6 per cent between those years. The value of products and cost of materials more than doubled during the decade 1899–1909, the percentage of increase in each case being slightly less than during the preceding decade. The number of wage earners increased 61 per cent and the amount paid in wages 73.5 per cent from 1899 to 1909. Salaried employees were included to some extent with wage earners at the earlier censuses, and comparative figures for this class, therefore, are not shown for censuses prior to that of 1899.

The value of products of establishments engaged in manufacturing oilcloth and linoleum in 1909 was $23,339,022, two-thirds of which ($15,550,101) represented the cost of materials. The value added by manufacture (value of products less cost of materials) was, therefore, $7,788,921.

Summary, by states.—Detailed statistics for 1909 are given for each state in the industry in Table 11, so far as figures can be presented without disclosing individual operations. New Jersey was the leading state in the industry in 1909, reporting 40.8 per cent of the total number of wage earners and 43.5 per cent of the total value of products. Pennsylvania ranked second in value of products; figures for this state can not be given, however, without disclosing individual operations. New York ranked third in value of products in 1909, reporting 15.1 per cent of the total value of products and 21.2 per cent of the total number of wage earners.

Persons engaged in the industry.—Table 3 shows, for 1909, the number of persons engaged in the industry classified according to occupational status and sex, and in the case of wage earners, according to age also. It should be borne in mind that the sex and age classification of the wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

Table 3

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.		
	Total.	Male.	Female.
All classes	**5,557**	**5,345**	**212**
Proprietors and officials	111	110	1
Proprietors and firm members	11	10	1
Salaried officers of corporations	48	48	.....
Superintendents and managers	52	52	.....
Clerks	245	191	54
Wage earners (average number)	5,201	5,044	157
16 years of age and over	5,154	4,997	157
Under 16 years	47	47	.....

The average number of persons engaged in the industry during 1909 was 5,557, of whom 93.6 per cent were wage earners, 2 per cent proprietors and officials, and 4.4 per cent clerks, this class including other subordinate salaried employees. Of the total number of persons engaged in the industry, 5,345, or 96.2 per cent, were males. The number of children reported as wage earners was only 47.

In order to compare the distribution of the persons engaged in the industry in 1909 according to occupational status with that in 1904 it is necessary to use the classification employed at the earlier census. (See Introduction.) Such a comparison is made in Table 4.

Table 4

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.				
	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	**5,557**	**100.0**	**4,112**	**100.0**	**35.1**
Proprietors and firm members	11	0.2	12	0.3	.....
Salaried employees	345	6.2	217	5.3	59.0
Wage earners (average number)	5,201	93.6	3,883	94.4	33.9

Wage earners employed, by months.—Table 5 gives the number of wage earners employed in the oilcloth and linoleum industry on the 15th (or nearest representative day) of each month during the year 1909.

Table 5

MONTH.	WAGE EARNERS IN THE INDUSTRY: 1909	
	Number.	Per cent of maximum.
January	5,083	93.5
February	5,110	94.0
March	5,100	93.8
April	5,057	93.0
May	5,133	94.4
June	5,158	94.9
July	5,169	95.1
August	5,221	96.1
September	5,282	97.2
October	5,351	98.5
November	5,321	97.9
December	5,435	100.0

In the industry as a whole the largest number of wage earners employed during any month of 1909 was 5,435 in December, and the smallest number, 5,057, in April, the minimum number being equal to 93 per cent of the maximum. In 1904 the maximum number, 3,953, was shown for August, and the minimum number, 3,780, for November, the minimum number being equal to 95.6 per cent of the former.

Prevailing hours of labor.—In Table 6 the wage earners in the oilcloth and linoleum industry have been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or smaller number of hours.

Table 6

PREVAILING HOURS OF LABOR PER WEEK.	WAGE EARNERS IN THE INDUSTRY: 1909	
	Average number.	Per cent of total.
Total	**5,201**	**100.0**
48 and under	14	0.3
Between 48 and 54	16	0.3
54	370	7.1
Between 54 and 60	2,074	39.9
60	2,727	52.4

Of the 5,201 wage earners reported for 1909, 2,727, or 52.4 per cent, were employed in establishments where the prevailing hours of labor were 60 per week; 2,074, or 39.9 per cent, in establishments where the prevailing hours were between 54 and 60 per week; and 400, or 7.7 per cent, in establishments where the prevailing hours were 54 or less than 54 per week.

Character of ownership.—Table 7 presents statistics with respect to the character of ownership of the establishments engaged in the oilcloth and linoleum industry.

Table 7
CHARACTER OF OWNERSHIP.

	NUMBER OF ESTABLISHMENTS.		VALUE OF PRODUCTS.	
	1909	1904	1909	1904
Total	31	27	$23,339,022	$14,792,246
Individual	2	3	.....	135,150
Firm	3	3	[1] 906,044	1,082,489
Corporation	26	[2] 21	22,432,978	[2] 13,574,607
Per cent of total	100.0	100.0	100.0	100.0
Individual	6.5	11.1	.....	0.9
Firm	9.7	11.1	[1] 3.9	7.3
Corporation	83.9	[2] 77.8	96.1	[2] 91.8

[1] Includes two establishments under individual ownership, to avoid disclosure of individual operations.
[2] Includes one establishment under firm ownership, to avoid disclosure of individual operations.

Establishments under corporate ownership increased both absolutely and relatively in number and in value of products during the five-year period 1904 to 1909.

Size of establishments.—The average size of the establishments in this industry, as measured by value of products, is larger than in most other industries. Eight establishments reported a value of products in excess of $1,000,000; nineteen, a value of products of $100,000 but less than $1,000,000; and four a value of products of $20,000 but less than $100,000. The average value of products per establishment, as computed from figures in Table 2, increased from $422,319 in 1899 to $752,872 in 1909, and the value added by manufacture advanced from $142,702 to $251,256 during the same period. The average number of wage earners per establishment increased from 119.6 in 1899 to 168 in 1909.

Expenses.—As stated in the Introduction, the census statistics representing expenses do not purport to show the total cost of manufacture, since they take no account of interest or depreciation; hence they can not properly be used for determining profits. Facts of interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 2 shows the total expenses in the oilcloth and linoleum industry in 1909 to have been $20,860,264, distributed as follows: Cost of materials, $15,550,101, or 74.5 per cent; wages, $2,825,545, or 13.5 per cent; salaries, $649,083, or 3.1 per cent; and miscellaneous expenses, made up of advertising, ordinary repairs of buildings and machinery, insurance, traveling expenses, and other sundry expenses, $1,835,535, or 8.8 per cent. There were considerable variations in the proportions of the total reported expenses represented by the various classes in the several states, due largely to differences in the grades of oilcloth and linoleum manufactured. In the four principal states in the industry, as shown in Table 11, the cost of materials ranged from 82 per cent of the total expenses in Massachusetts to 69.8 per cent in New York.

Engines and power.—The amount of power used in the industry was first reported at the census of 1869. Table 2 shows that the total power used increased from 424 horsepower in 1869 to 16,125 in 1909. Table 8 shows the statistics of power as reported at the censuses of 1909, 1904, and 1899.

Table 8
POWER.

	NUMBER OF ENGINES OR MOTORS.			HORSEPOWER.			PER CENT DISTRIBUTION OF HORSEPOWER.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	223	158	117	16,125	10,112	7,561	100.0	100.0	100.0
Owned	175	148	117	15,048	9,984	7,561	93.3	98.7	100.0
Steam	174	146	117	15,040	9,831	7,461	93.3	97.2	98.7
Gas	1	2	([1])	2	47	([1])	([2])	0.5	.....
Other	.....	.....	.....	.....	106	100	.....	1.0	1.3
Rented	48	8	([1])	1,077	128	([1])	6.7	1.3	.....
Electric	48	8	([1])	1,002	93	([1])	6.2	0.9	.....
Other	.....	.....	.....	75	35	.....	0.5	0.3	.....
Electric motors	336	125	75	4,540	1,275	718	100.0	100.0	100.0
Run by current generated by establishment	288	117	75	3,538	1,182	718	77.9	92.7	100.0
Run by rented power	48	8	([1])	1,002	93	([1])	22.1	7.3	.....

[1] Not reported. [2] Less than one-tenth of 1 per cent.

The total primary power used in the oilcloth and linoleum industry increased from 7,561 horsepower in 1899 to 16,125 horsepower in 1909, or 113.3 per cent. Steam power formed the major part of the primary power employed in the industry, though the proportion which it formed of the total primary power decreased from 98.7 per cent in 1899 to 93.3 per cent in 1909. Rented electric power increased from 93 horsepower in 1904 to 1,002 horsepower in 1909. This class of power was not reported for the industry in 1899. The horsepower of electric motors run by current generated in the establishments in the industry was nearly five times as great in 1909 as in 1899.

SPECIAL STATISTICS RELATING TO PRODUCTS.

Summary for the United States.—Table 9 shows the quantity and value of the different kinds of oilcloth and linoleum manufactured in 1909 and 1904 by establishments in the industry, and also the quantity and value of the artificial leather produced in 1909.

Table 9 PRODUCT.	1909	1904
Total value	[1] $26,253,796	$14,792,246
Oilcloth	$11,681,012	$8,648,337
Floor—		
Square yards	18,354,851	21,456,615
Value	$3,775,660	$3,565,689
Enameled—		
Square yards	17,338,440	11,574,986
Value	$2,265,146	$1,542,467
Table—		
Square yards	61,168,777	38,026,083
Value	$5,639,206	$3,540,181
Linoleum	$10,844,928	$5,328,800
Linoleum, including cork carpet—		
Square yards	26,215,979	14,765,284
Value	$7,850,437	$4,223,992
Inlaid linoleum—		
Square yards	4,460,275	2,126,178
Value	$2,994,491	$1,104,808
Artificial leather:		
Square yards	11,869,875	[2]
Value	$3,448,617	[2]
All other products	$279,239	$815,109

[1] In addition, products to the value of $33,328 were reported by establishments engaged primarily in the manufacture of products other than those covered by the industry designation. The production of artificial leather is included under "upholstering materials" in the general reports.
[2] Figures not available.

Each of the varieties of oilcloth and linoleum shows a considerable percentage of increase in quantity and value except floor oilcloth, the output of which decreased 14.5 per cent in quantity, although its value increased 5.9 per cent. The decrease in the output of floor oilcloth is explained by the increased degree to which linoleum has been substituted for it as a floor covering. Inlaid linoleum shows the largest percentages of gain of any of the products of the industry during the five-year period, 109.8 per cent in output and 171 per cent in value. The output of table oilcloth, the most important of the oilcloth products in 1909, increased 60.9 per cent and its value 59.3 per cent between 1904 and 1909.

Floor oilcloth, which was the principal kind of oilcloth manufactured in 1904, representing 41.2 per cent of the total value of oilcloth produced, contributed only 32.3 per cent of the total value in 1909. The proportion of the total value represented by table oilcloth, on the other hand, increased from 40.9 per cent in 1904 to 48.3 per cent in 1909, and the proportion represented by enameled oilcloth from 17.8 per cent in the earlier year to 19.4 per cent in the later year.

In 1909 the value of linoleum represented 48.1 per cent of the total value of the combined value of oilcloth and linoleum, as compared with 38.1 per cent in 1904. "Linoleum, including cork carpet," represented 72.4 per cent of the total value of linoleum produced in 1909, as compared with 79.3 per cent in 1904.

The manufacture of artificial leather is so closely allied to the oilcloth industry that the quantity and value of this product has been included for 1909 in the preceding table. The total value of products as shown in Table 9 is not comparable with the total for 1904, since the value of artificial leather was not included at the former census. Artificial leather, although used to some extent in bookbinding, is used principally in the upholstering trade, and the reports for the manufacture of this product were included with those for the industry designated "upholstering materials" in the general census reports of 1909.

A detailed statement of the different products can not be given for any individual state except New Jersey without disclosing the operations of individual establishments. New Jersey was the leading state in the industry both in 1909 and 1904. The total value of products of the oilcloth and linoleum industry, including artificial leather, for this state in 1909 was $11,519,680, which constituted 43.9 per cent of the total value for the United States. Linoleum represented more than half (57.5 per cent) of the total value of the products of the industry for the state, its value, $5,834,338, being 53.8 per cent of the total value of linoleum for the United States. Of the total value of the different varieties of linoleum manufactured by the establishments in New Jersey in 1909, inlaid linoleum constituted 22.5 per cent and "linoleum, including cork carpet," 77.5 per cent. The proportion which the value of the different varieties of oilcloth constituted of the total value of oilcloth produced in the state was as follows: Floor oilcloth, 34.4 per cent; enameled oilcloth, 28.2 per cent; and table oilcloth, 37.4 per cent. The value of artificial leather manufactured in New Jersey in 1909 was $1,377,084, or 39.9 per cent of the total for the United States.

Exports and imports.—Table 10 gives the amount and value of the imports and the value of the exports of oilcloth and linoleum from 1898 to 1910, inclusive, as compiled from the reports of the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Table 10 YEAR ENDING JUNE 30—	IMPORTS.		Exports (value).
	Square yards.	Value.	
1910	4,848,615	$1,834,640	$482,086
1909	5,306,329	1,894,810	359,764
1908	6,114,568	2,102,313	359,801
1907	7,109,067	2,313,772	353,808
1906	5,470,460	1,744,530	286,577
1905	3,508,855	1,220,372	269,929
1904	3,381,534	1,201,070	231,297
1903	3,358,655	1,105,894	221,417
1902	1,824,579	681,464	189,291
1901	1,306,222	532,255	172,635
1900	832,405	407,008	141,917
1899	416,658	216,210	132,532
1898	[1]	[1]	118,641

[1] Not reported separately prior to 1899.

The statistics of imports and exports in the reports of the Bureau of Foreign and Domestic Commerce do not make a clear distinction between cotton oilcloth and other cotton cloths; therefore, only the imports of floor oilcloth and linoleum are included in Table 10. The exports, however, include the statistics for all classes of oilcloth.

In 1899 the imports of oilcloth and linoleum amounted to only 416,658 square yards, valued at $216,210, but increased steadily from year to year until 1907, when 7,109,067 square yards, valued at $2,313,772, were reported. From 1907 to 1910 the imports decreased to 4,848,615 square yards, valued at $1,834,640.

The value of the exports of oilcloths has also increased with each successive year, with the single exception that there was a decrease in 1909 as compared with 1908.

DETAILED STATE TABLE.

The principal statistics secured by the census concerning the oilcloth and linoleum industry are presented, by states, in Table 11, which gives detailed statistics for 1909 concerning the number of establishments, number of persons engaged in the industry, wage earners on December 15, or the nearest representative day, primary horsepower, capital, expenses, value of products, and value added by manufacture.

OILCLOTH AND LINOLEUM—DETAILED STATISTICS, BY STATES: 1909.

Table 11

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.								WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY.					Primary horsepower.
		Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks.		Wage earners.			Total.	16 and over.		Under 16.		
					Male.	Female.	Average number.	Number, 15th day of— Maximum month.	Number, 15th day of— Minimum month.		Male.	Female.	Male.	Female.	
United States	31	5,557	11	100	191	54	5,201	De 5,435	Ap 5,057	5,541	5,324	167	50	.....	16,125
Massachusetts	3	239	.....	8	8	3	220	Ap [1] 224	Ja 211	226	186	40	.....	.....	375
Michigan	3	59	.....	8	10	2	39	Au 42	Ap [1] 37	41	41	.....	.....	.....	210
New Jersey	10	2,204	6	32	73	30	2,123	Oc 2,230	Ap 2,035	2,294	2,247	16	31	.....	7,819
New York	4	1,153	2	15	28	6	1,102	De 1,173	Au 1,037	1,173	1,070	103	.....	.....	2,384
All other states [2]	11	1,842	3	37	72	13	1,717	.....	.....	1,807	1,780	8	19	.....	5,337

STATE.	Capital.	EXPENSES.										Value of products.	Value added by manufacture (value of products less cost of materials).
		Total.	Services.			Materials.		Miscellaneous.					
			Officials.	Clerks.	Wage earners.	Fuel and rent of power.	Other.	Rent of factory.	Taxes, including internal revenue.	Contract work.	Other.		
United States	$19,634,138	$20,860,264	$330,585	$268,498	$2,825,545	$525,740	$15,024,361	$5,772	$68,677	$27,645	$1,733,441	$23,339,022	$7,788,921
Massachusetts	688,617	1,476,153	29,598	12,816	117,764	12,573	1,197,947	2,760	4,942	.....	97,753	1,704,470	493,950
Michigan	137,418	227,289	14,400	6,255	26,133	4,720	156,025	1,800	1,100	.....	16,856	256,159	95,414
New Jersey	8,109,744	8,839,919	96,003	97,334	1,187,248	237,217	6,400,777	.....	32,650	4,207	784,483	10,142,596	3,504,602
New York	2,901,569	3,104,373	71,114	42,316	570,630	83,430	2,082,131	.....	11,899	.....	242,853	3,521,689	1,356,128
All other states [2]	7,796,790	7,212,530	169,470	109,777	923,770	187,800	5,187,481	1,212	18,086	23,438	591,496	7,714,108	2,338,827

[1] Same number reported for one or more other months.
[2] All other states embrace: Illinois, 1 establishment; Indiana, 1; Maine, 2; Minnesota, 1; Ohio, 3; Pennsylvania, 3.

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IRON AND STEEL

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THE BLAST FURNACE, STEEL WORKS AND ROLLING MILL, WIRE, AND TIN-PLATE AND TERNEPLATE INDUSTRIES.

PART I.—THE GROUP AS A WHOLE.

Relationship of the Industries.—The present report embraces statistics for four classes of establishments—namely, blast furnaces, steel works and rolling mills, wire-drawing establishments, and tin-plate and terneplate dipping establishments—which are treated by the Census Bureau as belonging to separate industries. These industries are considered together because of their intimate relation to one another. The blast furnaces supply material for the steel works and rolling mills, and these in turn furnish the material for the tin-plate and wire industries. In fact, two or more different branches of manufacture are frequently carried on in establishments under the same ownership and in the same plant.

The fact that two or more of these industries are frequently conducted in a single plant renders the presentation of separate statistics for the industries very difficult. In order to bring out as clearly as possible the relative importance of the different industries, the Census Bureau has secured separate reports for the blast furnaces and for the tin-plate and terneplate dipping business, even when these are associated with steel works and rolling mills. It was found impossible to make a complete segregation of the statistics for the wire departments of steel works and rolling mills.

To state the matter somewhat more in detail, the bulk of the pig iron produced by the blast furnaces of the country is converted into steel and the steel fabricated into rolled forms in the same industrial plant, although, of course, there are some concerns which operate only blast furnaces and some which operate only steel works and rolling mills. Where the two branches of business are combined, separate reports are secured for the blast-furnace department, on the one hand, and the steel-works and rolling-mill department on the other hand. Each department is called an "establishment." A transfer value is assigned to the pig iron delivered to the steel works, and this transfer value appears as part of the value of products of the blast-furnace "establishment" and as part of the cost of materials of the steel-works and rolling-mill "establishment."

Again, the bulk of the business of dipping tin plate and terneplate is conducted in departments of rolling mills which produce the black plates, there being comparatively few independent dipping establishments which buy their black plates. Nevertheless, the dipping departments of rolling mills are treated as separate establishments by the Census Bureau. The statistics for the black-plate rolling mills, exclusive of the dipping departments, are included with the general statistics for steel works and rolling mills, although in the special report on the tin-plate and terneplate industry separate statistics for black-plate mills are also presented. The black plates transferred to the dipping departments are assigned a value which appears as part of the value of products of the rolling-mill industry and in turn as part of the cost of materials of the tin-plate industry.

Finally, a very considerable proportion of the wire produced in the country is drawn in the wire departments of iron and steel rolling mills and of brass and copper rolling mills, the latter mills being assigned to the industry "brass and bronze products." The rolling mills produce the wire rods and turn them over to the wire departments for drawing. It was found impossible, however, to segregate the statistics in detail for the wire departments of rolling mills; consequently, in most tables of the census reports the statistics given for the "wire" industry represent only the business of wire-drawing establishments which purchase the wire rods, and therefore by no means fully cover the wire industry in the broad and true sense. In Part V—the section devoted to the wire industry—in this report, however, such statistics as are available regarding the wire industry as a whole are presented. In the statistics for steel works and rolling mills the entire value of the wire and wire products made by such mills appears as part of the value of products of the industry.

Duplication in value of products and cost of materials.—It is evident from what has been said that to add together the values of products as shown for the blast-furnace industry, the steel works and rolling mills, the wire industry, and the tin-plate and terneplate dipping industry would give a total having no particular significance, because of the great duplication due to the use of the products of one establishment as materials for another establishment in the group. It may be noted that there is not only duplication as among the four industries distinguished by the Census Bureau, but also considerable duplication within the single industry designated as "steel works and rolling mills."

The following table shows at least approximately the extent of the duplication in the value of products, and the net value of the products of the four industries combined, exclusive of such duplication. Although for convenience in calculation the amount of duplication is given in exact figures, it should not be understood that

these figures are absolutely complete and correct. The last column shows the approximate value of the products of each industry which were produced for sale to establishments outside of this group of four industries. For example, the blast furnaces turned out in 1909 products (practically all pig iron) valued at $391,429,283. Of this total, however, products to the value of over $297,000,000 were for consumption in the steel works and rolling mills, while nearly $94,000,000 worth of products of the blast furnaces were for use in other industries, the foundry and machine-shop industry being the most important consumer.

Table 1 BLAST-FURNACE, ROLLING-MILL, WIRE, AND TIN-PLATE INDUSTRIES: 1909

INDUSTRY.	Number of establishments.	Gross value of products.	Value of products used by establishments within this industry group.		Value of products not used by establishments within this industry group.
			By establishments owned or controlled by same company (interplant transfer).	By establishments not owned or controlled by same company (purchase).	
Total	741	$1,509,607,980	$329,320,476	$181,217,703	$999,069,801
Blast furnaces	208	391,429,283	228,250,824	69,220,298	93,958,161
Steel works and rolling mills	446	985,722,534	101,069,652	111,997,405	772,665,477
Wire mills (using purchased rods only)	56	84,486,513	.....	.....	84,486,518
Tin-plate and terneplate dipping establishments	31	47,969,645	.....	.....	47,969,645

The net value of the products of this group of four industries in 1909 was in the neighborhood of a billion dollars. This is not to be confused with the value added to materials by manufacture—that is, the value of products less the cost of all materials—which for the four industries combined amounted to $429,036,870.

The last column in the above table should not, of course, be taken as indicating at all the relative importance of the four branches of industry; nor, on the other hand, can the column showing gross value of products be taken as indicating such relative importance. The only available statistics tending to show the relative importance of the four industries are those of the average number of wage earners and of the value added to materials by manufacture. Such statistics are presented in Table 2.

It will be seen from this table that the number of wage earners employed in the blast furnaces is very much less than the number employed in the steel works and rolling mills, and also that very much less value is added to materials by manufacture in the former industry than in the latter. Immensely important as is pig iron in the iron and steel industry, the greater part of the value of pig iron is not produced by blast furnaces but is represented by the ore and fuel. So, too, the tin-plate plants perform relatively simple processes upon the materials which they obtain from the rolling mills, so that the number of wage earners and the value added to materials by manufacture for this industry is small in proportion to the value of the output. The same is true in somewhat less degree of the wire mills using purchased rods.

Table 2 BLAST-FURNACE, ROLLING-MILL, WIRE, AND TIN-PLATE INDUSTRIES: 1909

INDUSTRY.	Wage earners (average number).		Value added to materials by manufacture.	
	Number.	Per cent of total.	Amount.	Per cent of total.
Total	301,941	100.0	$429,036,870	100.0
Blast furnaces	38,429	12.7	70,791,394	16.5
Steel works and rolling mill	240,076	79.5	328,221,678	76.5
Wire mills (using purchased rods only)	18,084	6.0	23,943,587	5.6
Tin-plate and terneplate dipping establishments	5,352	1.8	6,080,211	1.4

Unit of measure.—In all statements of tonnage relating to blast furnaces and steel works and rolling mills the ton of 2,240 pounds is used except where otherwise stated. On the other hand, the ton of 2,000 pounds is used in expressing the quantities for the wire industry.

Number of industrial plants in the four industries.—By reason of the fact that the Census Bureau treats some plants as consisting of two or more establishments, the total number of establishments reported in 1909, for the four industries under consideration, 741, is considerably greater than the actual number of separate plants, which was 657. Of the 208 blast-furnace "establishments" shown, 57 were operated in connection with steel works; and of the 31 tin-plate and terneplate "establishments," 27 were departments of rolling mills.

PART II.—BLAST FURNACES AND STEEL WORKS AND ROLLING MILLS COMBINED.

The United States as a whole.—Because of the fact that a very large proportion of the output of pig iron is produced in blast furnaces operated in immediate conjunction with steel works, it has been the custom of the Census Bureau for several censuses past to present combined statistics for the two branches of industry. In the case of such a combination of statistics, however, the aggregate value of products, as well as the aggregate cost of materials, obtained by adding the figures for all establishments involves so much duplication as to have little significance. It is possible to determine approximately the amount of these duplications for the later censuses but not for the earlier. On the other hand, the statistics as to persons engaged in the industries, horsepower, capital, and expenses other than cost of materials, as well as those relating to value added to materials by manufacture, can, of course, properly be combined. Such

statistics for the two industries combined, for the censuses from 1869 to 1909, are presented in Table 3. It may be noted that for 1869 the statistics include both active and idle establishments, but for the later censuses only active establishments, and also that the financial figures for 1869 are given in currency, which at that time was worth only about 80 cents gold to the dollar.

Table 3 — BLAST FURNACES AND STEEL WORKS AND ROLLING MILLS COMBINED.

	Number or amount.						Per cent of increase.[1]					
	1909	1904 [2]	1899 [2]	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	654	605	668	719	792	[3] 808	−2.1	8.1	−9.4	−7.1	−9.2	−2.0
Persons engaged in the industry	303,823	259,291	231,871	(4)	(4)	(4)	31.0	17.2	11.8	.....	.....	.....
Proprietors and firm *members*	95	90	170	(4)	(4)	(4)	−44.1	5.6	−47.1	.....	.....	.....
Salaried employees	25,223	16,501	9,211	(4)	(4)	(4)	173.8	52.3	79.8	.....	.....	.....
Wage earners (average number)	278,505	242,040	222,490	171,131	[5] 140,798	[5] 77,555	25.2	14.8	9.1	30.0	(6)	(6)
Primary horsepower	3,274,400	2,422,577	1,598,073	784,358	(4)	(4)	104.9	35.2	51.6	103.5	.....	.....
Capital	$1,402,315,770	$936,327,839	$573,301,663	$405,771,786	$209,904,965	$121,772,074	160.3	54.9	63.3	41.3	93.3	72.4
Services	$220,523,364	$162,177,898	$132,559,764	(4)	(4)	(4)	66.4	36.0	22.3	.....	.....	.....
Salaries	$32,716,076	$20,751,392	$11,737,488	(4)	(4)	(4)	178.7	57.7	76.8	.....	.....	.....
Wages	$187,807,288	$141,426,506	$120,820,276	(4)	(4)	(4)	55.4	32.8	17.1	.....	.....	.....
Miscellaneous expenses	$53,049,520	$47,101,970	$32,274,100	$18,214,948	(4)	(4)	66.2	13.8	46.1	77.2	.....	.....
Value added by manufacture (value of products less cost of *materials*)	$399,013,072	$285,041,383	$281,570,341	$151,414,674	$105,286,535	$71,682,564	41.7	39.7	1.4	86.0	43.8	46.9
Pig iron produced (tons)	25,651,798	16,623,625	14,447,791	8,845,185	3,375,912	1,832,876	77.5	54.3	15.1	63.3	162.0	84.2
Steel produced (tons)	23,473,718	13,066,408	10,685,000	4,174,652	1,027,381	(4)	119.7	71.8	27.9	155.9	306.3	.....
Finished rolled products and forgings produced (tons)	19,276,237	12,759,003	10,398,796	8,023,041	3,414,694	1,566,478	85.4	51.1	22.7	29.6	135.0	118.0

[1] A minus sign (−) denotes decrease. Where percentages are omitted, comparable figures are not available.
[2] Excluding statistics for a blast furnace operated by a penal institution.
[3] Includes idle establishments.
[4] Comparable figures not available.
[5] Includes employees engaged in mining operations when the mines, ovens, quarries, or kilns were owned or operated by concerns operating the blast furnaces.
[6] Percentage not shown because figures are not strictly comparable.

The number of wage earners in the two industries combined increased from 77,555 in 1869 to 278,505 in 1909, nearly quadrupling. The value added to materials by manufacture was $71,682,564 in 1869, and almost $400,000,000 in 1909. The tonnage of products, however, increased much more rapidly than the number of wage earners or the value added by manufacture. The amount of pig iron produced in 1869 was 1,832,876 tons, as compared with 25,651,798 tons in 1909, while the amount of steel produced and the amount of finished rolled products and forgings made by the mills increased in still greater proportion. The table indicates clearly the increased productivity of labor due to improved methods and machinery. The statistics for horsepower are not available for censuses prior to 1889, but during the 20 years from 1889 to 1909 the number of wage earners in the two industries combined increased only 62.7 per cent, while the primary horsepower more than quadrupled. The statistics of capital have very little significance.

Summary for the two industries combined, by states.—Table 4 shows, for blast furnaces and steel works and rolling mills combined, by states, the average number of wage earners and the value added to materials by manufacture in 1909, together with the percentages of increase in these items for the decade 1899–1909 and the two five-year periods. The value of products is not shown because of the extensive duplications. In determining the rank of the states, all states are considered, whether or not they are shown separately in the table. Certain states included under "all other states" held a higher rank than some of the states for which separate figures are given. The predominance of Pennsylvania in these industries is clearly shown in the table.

Table 4 — BLAST FURNACES AND STEEL WORKS AND ROLLING MILLS COMBINED.

STATE.	Number of establishments: 1909	Wage earners: 1909			Value added by manufacture: 1909			Per cent of increase.[1]					
								Wage earners (average number).			Value added by manufacture.		
		Average number.	Per cent of total.	Rank.	Amount.	Per cent of total.	Rank.	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904
United States	***654***	***278,505***	***100.0***	.....	***$399,013,072***	***100.0***	.....	***25.2***	***14.7***	***9.0***	***42.0***	***39.6***	***1.4***
Pennsylvania	255	141,432	50.8	1	197,834,959	49.6	1	27.6	13.4	12.5	30.8	34.6	−2.8
Ohio	115	45,881	16.5	2	73,811,404	18.5	2	36.2	38.2	−1.4	55.0	75.0	−11.4
Illinois	30	20,077	7.2	3	37,755,109	9.5	3	20.6	9.4	10.3	103.3	27.1	59.9
New York	34	12,389	4.4	5	19,347,032	4.8	4	128.7	36.4	67.7	213.0	89.2	65.4
Wisconsin	19	2,882	1.0	10	3,701,885	0.9	10	50.0	20.2	24.8	6.0	(3)	5.9
Kentucky	11	2,703	1.0	12	2,581,520	0.6	14	(2)	(2)	(2)	(2)	(2)	(2)
Michigan	19	2,199	0.8	16	2,672,627	0.7	13	11.5	1.9	9.4	25.3	9.0	15.0
California	5	1,038	0.4	19	1,172,046	0.3	20	87.0	34.3	39.3	197.5	65.1	80.2
Delaware	5	710	0.3	20	656,346	0.2	22	−52.3	−32.7	−29.2	−57.0	−0.2	−56.9
All other states	161	49,194	17.7	.....	59,480,144	14.9	.....	.....	.....	.....	.....	.....	.....

[1] A minus sign (−) denotes decrease. [2] Included in "all other states" in 1899 and 1904. [3] Less than one-tenth of 1 per cent.

PART III.—BLAST FURNACES.

GENERAL STATISTICS.

Description of the industry.—The iron product of the blast furnace is called "pig iron," regardless of the character or grade of the iron or the disposition made of the product—whether cast into pigs, into finished forms or shapes, or passed on in the molten state to subsequent processes of manufacture. Formerly al-almost the entire product was cast into pigs, whence originated the term "pig iron." With the development of the steel industry, economy in manufacture was effected by subjecting a large proportion of the iron while yet in the molten state to further manufacturing processes, most of it being converted into steel.

The term "pig iron," unqualified, embraces all grades of iron, including spiegeleisen, ferromanganese, ferrosilicon, and other ferroalloys produced by blast furnaces.[1]

[1] Establishments manufacturing ferroalloys in electric furnaces are classified as engaged in the chemical industry, in the branch comprising establishments manufacturing "chemical substances produced by the aid of electricity." The production can not be shown without disclosing individual operations.

Pig iron is classified according to the kind of fuel used in the smelting and also according to the purpose for which it is adapted or according to the composition of the iron. The statistics of the production of pig iron classified according to kind of fuel used and according to grade will be found in later tables.

Inasmuch as statistics for all blast furnaces associated with steel works or other enterprises have been segregated and included in the tables of the present report, it gives a complete presentation of the industry.

Summary and comparison with earlier censuses.—Table 5 summarizes the statistics of the blast-furnace industry for each census from 1869 to 1909, inclusive.

The industry in 1909 employed 38,429 wage earners, to whom $24,606,530 was paid in wages. The value of the products was reported as $391,429,283, but the cost of materials (including the large item of fuel cost) was $320,637,889, equal to 81.9 per cent of the value of products. The processes in the industry are comparatively simple, and the value added by manufacture is relatively much less than in most other industries.

Table 5 BLAST FURNACES.

	Number or amount.						Per cent of increase.[1]					
	1909	1904[2]	1899[3]	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	208	190	223	304	341	[3] 386	−6.7	9.5	−14.8	−26.6	−10.9	−11.7
Persons engaged in the industry	43,061	37,335	41,046	(4)	(4)	(4)	4.9	15.3	−9.0	.....	.....	.....
Proprietors and firm members	48	26	48	(4)	(4)	(4)	.....	84.6	−45.8	.....	.....	.....
Salaried employees	4,534	2,231	1,757	(4)	(4)	(4)	160.9	105.5	27.0	.....	.....	.....
Wage earners (average number)	38,429	35,078	39,241	[5] 33,415	[6] 41,695	27,554	−2.1	9.6	−10.6	17.4	(6)	(6)
Primary horsepower	1,173,422	773,278	497,272	248,928	(4)	63,900	136.0	51.7	55.5	99.8	.....	.....
Capital	$487,580,659	$236,145,529	$143,159,232	$129,547,485	$89,531,362	$56,145,326	240.6	106.5	65.0	10.5	44.7	59.5
Expenses	$362,810,409	$210,555,467	$159,755,409	$132,667,435	(4)	(4)	127.1	72.3	31.8	20.4	.....	.....
Services	$31,131,142	$21,825,410	$20,788,520	$16,226,145	$12,655,428	$12,475,250	49.8	42.6	5.0	28.1	(6)	(6)
Salaries	$6,524,612	$2,890,897	$2,304,120	(4)	(4)	(4)	183.2	125.7	25.5	.....	.....	.....
Wages	$24,606,530	$18,934,513	$18,484,400	(4)	(4)	(4)	33.1	30.0	2.4	.....	.....	.....
Materials	$320,637,889	$178,941,918	$131,503,655	$110,098,615	$58,619,742	$45,498,017	143.8	79.2	36.1	19.4	87.8	28.8
Miscellaneous	$11,041,378	$9,788,139	$7,463,234	$6,342,675	(4)	(4)	47.9	12.8	31.2	17.7	.....	.....
Value of products	$391,429,283	$231,822,707	$206,756,557	$145,643,153	$89,315,569	$69,640,498	89.3	68.8	12.1	42.0	63.1	28.3
Value added by manufacture (value of products less cost of materials)	$70,791,394	$52,880,789	$75,252,902	$35,544,538	$30,695,827	$24,142,481	−5.9	33.9	−29.7	111.7	15.8	27.1
Pig iron produced (tons)	25,651,798	16,623,625	14,447,791	8,845,185	3,375,912	1,832,876	77.5	54.3	15.1	63.3	162.0	84.2

[1] A minus sign (−) denotes decrease. Where percentages are omitted, comparable figures are not available.
[2] Excluding statistics for a blast furnace operated by a penal institution. [3] Includes idle establishments. [4] Comparable figures not available.
[5] Includes employees engaged in mining operations when the mines, ovens, quarries, or kilns were owned or operated by concerns operating the blast furnaces.
[6] Percentage omitted because figures are not strictly comparable.

The production of all kinds of pig iron during the census year 1909 amounted to 25,651,798 tons, as compared with 16,623,625 tons in 1904 and 14,447,791 tons in 1899, an increase of 54.3 per cent for the period 1904–1909 and of 15.1 per cent for the period 1899–1904. For the decade the increase was 11,204,007 tons, or 77.5 per cent. During the decade there was, however, a decrease in number of establishments and of wage earners. The value added by manufacture in 1909, though greater than that in 1904, was less than that in 1899, the decrease being due, in the main, to increase in the prices of materials, particularly of ore and coke. The average cost of materials per ton of pig iron in 1909 was $12.50, or 81.9 per cent of the average value per ton of pig iron produced ($15.12), whereas in 1899 it was $9.10, or 63.6 per cent of the value of the pig iron ($14.29). It should be borne in mind in this connection, however, that much of the ore and fuel used in blast furnaces at present is produced by the owners of the furnaces or by affiliated concerns, and that the values assigned to materials are doubtless in many cases more or less arbitrary. The decrease in the average number of wage earners is due to improvements in equipment and methods.

There has been an increase in the average annual pig-iron product per wage earner from 265 tons in 1889 to 368 tons in 1899, 474 tons in 1904, and 668 tons in 1909. The average tonnage per wage earner for the largest plants is much higher. The 13 establishments producing over 500,000 tons of iron each employed 9,195 wage earners in 1909 and reported an output of 10,384,146 tons of iron, or an average of 1,129 tons per wage earner.

The figures representing the per capita production of pig iron, as given in Table 6, indicate the great development of the iron and steel industry during the last few decades.

Table 6

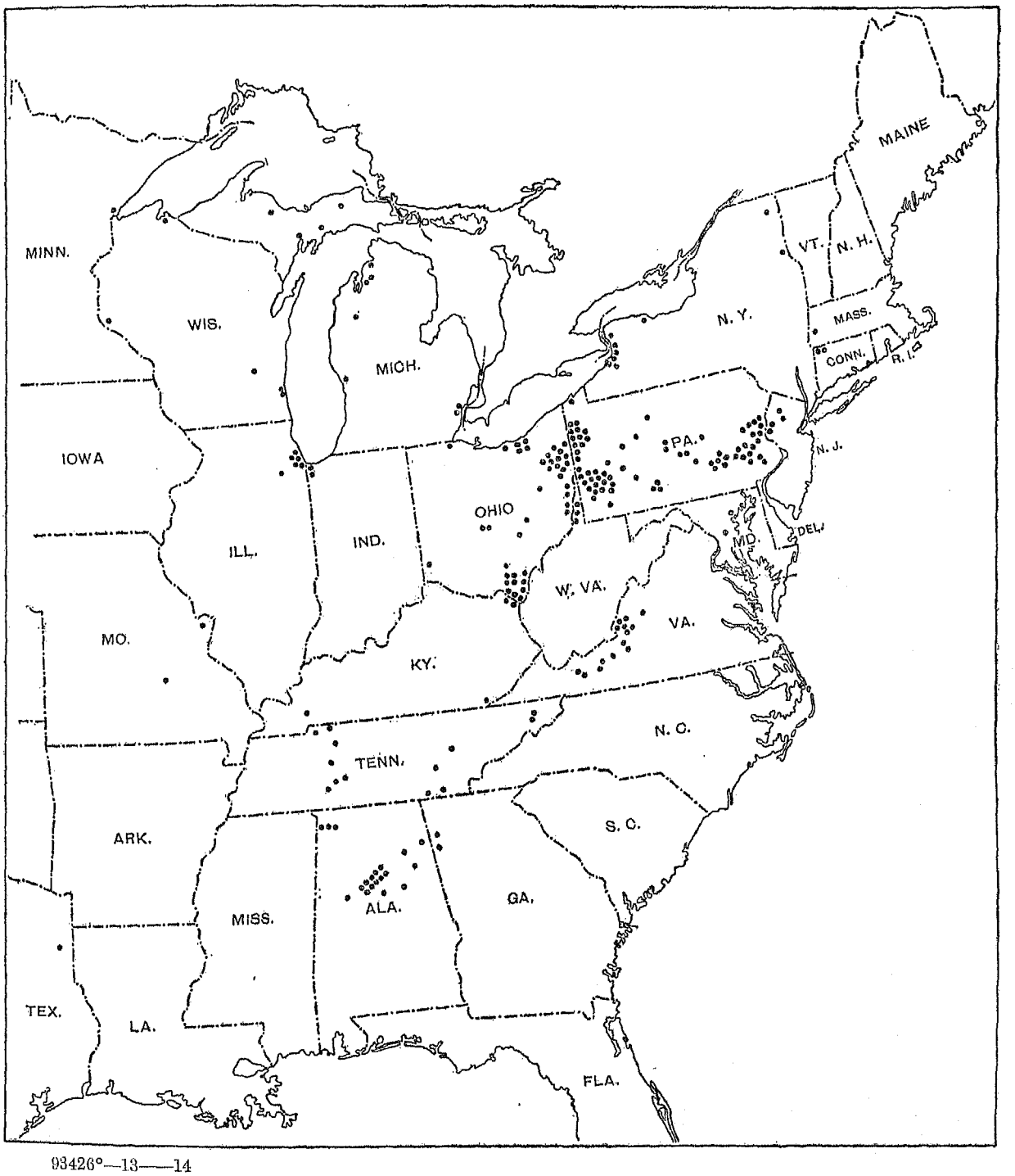
CENSUS.	Population of the United States.	PIG-IRON PRODUCTION (TONS).	
		Total.	Per capita.
1910	91,972,266	25,651,798	0.2789
1900	75,994,575	14,447,791	0.1901
1890	62,947,714	8,845,185	0.1405
1880	50,155,783	3,375,912	0.0673
1870	38,558,371	1,832,876	0.0475

The population is for the year in which the census was taken; the production of pig iron is that, in general, of the preceding calendar year.

During this period of 40 years the population of the country increased 138.5 per cent, while the pig-iron production increased 1,299.5 per cent.

Geographic distribution.—The distribution of the active blast-furnace establishments is shown by the following map. All establishments of this kind are indicated, with the exception of one in Pueblo County, Colo. On the Pacific coast, one establishment in Washington and one in Oregon were idle in 1909.

BLAST FURNACES—LOCATION OF ESTABLISHMENTS: 1909.

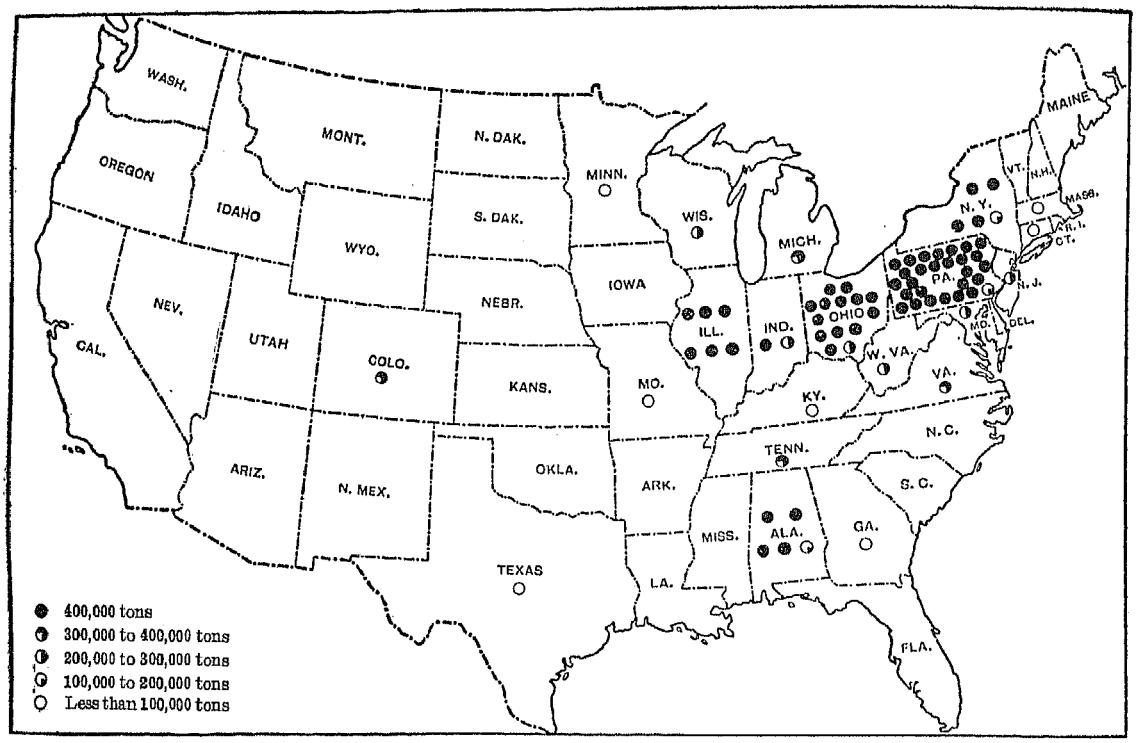


More than two-fifths of the pig-iron product of the country is produced in western Pennsylvania, eastern Ohio (not including counties bordering on Lake Erie), and the panhandle of West Virginia. This district reported, in 1909, 105 active furnaces, which produced 10,677,527 tons of pig iron, or 41.6 per cent of the total output of the country. The ores used are almost exclusively from the Lake Superior district, coming down by water to Lake Erie ports, and thence being transported by rail to the furnaces.

Other important districts in which cheap freights on ore and fuel meet consist of the counties bordering on Lake Erie and on the southern end of Lake Michigan. The Lake Erie district, comprising parts of Michigan, Ohio, Pennsylvania, and New York, reported 34 furnaces, which produced 3,387,998 tons of pig iron; and the district bordering the southern part of Lake Michigan, including counties in Wisconsin, Illinois, and Indiana, reported 34 furnaces, with an output of 3,228,167 tons. All of the establishments in this region use Lake Superior ores.

The map here presented shows graphically the pig-iron output of the iron-producing states in 1909. Further details as to production, by states, are presented later. The production and rank of the principal states for each census since 1879 are given in Table 20.

PIG-IRON PRODUCTION, BY STATES: 1909.



Summary, by states.—Table 7 summarizes the more important statistics by states, the states being arranged according to the value of products reported for 1909.

Table 7

STATE.	BLAST FURNACES. Number of establishments: 1909	Wage earners. Average number: 1909	Wage earners. Per cent of total: 1909	Wage earners. Rank. 1909	Wage earners. Rank. 1904	Products. Total value. Amount: 1909	Products. Total value. Per cent of total: 1909	Products. Total value. Rank. 1909	Products. Total value. Rank. 1904	Products. Pig iron (tons). Amount: 1909	Products. Pig iron (tons). Rank. 1909	Products. Pig iron (tons). Rank. 1904	Value added by manufacture. Amount: 1909	Value added by manufacture. Per cent of total: 1909	Value added by manufacture. Rank. 1909	Value added by manufacture. Rank. 1904
United States	208	38,429	100.0	...	...	$391,429,283	100.0	...	...	25,651,798	...	...	$70,791,394	100.0	...	...
Pennsylvania	66	14,521	37.8	1	1	168,578,413	43.1	1	1	10,911,676	1	1	26,504,385	37.4	1	1
Ohio	40	7,295	19.0	2	2	83,699,238	21.4	2	2	5,446,971	2	2	15,274,516	21.6	2	2
Illinois	6	2,493	6.5	4	4	38,299,897	9.8	3	3	2,468,772	3	3	7,391,435	10.4	3	3
New York	9	2,298	6.0	5	5	26,620,948	6.8	4	5	1,717,091	5	5	5,703,788	8.1	5	5
Alabama	19	3,783	9.8	3	3	21,235,984	5.4	5	4	1,764,544	4	4	5,758,623	8.1	4	4
Michigan	11	1,016	2.6	8	7	5,824,396	1.5	7	6	327,644	9	9	1,600,885	2.3	6	6
Virginia	14	1,320	3.4	6	8	5,389,287	1.4	8	11	387,328	7	8	971,086	1.4	9	11
Wisconsin	5	758	2.0	10	12	4,793,756	1.2	10	12	285,454	13	12	875,296	1.2	11	7
Tennessee	13	1,143	3.0	7	6	4,653,125	1.2	12	10	333,416	8	6	1,272,459	1.8	8	8
Kentucky	4	331	0.9	14	14	1,478,595	0.4	15	14	86,371	15	15	362,765	0.5	16	16
All other states	21	3,471	9.0	...	...	30,855,644	7.9	...	...	1,922,531	...	...	5,076,156	7.2	...	...

STATE.	Per cent of increase.[1] Wage earners (average number). 1899-1909	1904-1909	1899-1904	Value of products. 1899-1909	1904-1909	1899-1904	Value added by manufacture. 1899-1909	1904-1909	1899-1904
United States	−2.1	9.6	−10.6	89.3	68.8	12.1	−5.9	33.9	−29.7
Pennsylvania	−9.7	4.7	−13.7	66.0	56.9	5.8	−29.3	25.4	−43.6
Ohio	20.8	34.2	−10.0	107.3	104.8	1.2	−9.2	82.2	−50.2
Illinois	−17.2	30.5	−36.5	152.7	40.1	80.4	114.5	−11.2	141.6
New York	122.5	47.4	50.9	427.6	208.3	71.1	270.9	152.3	47.0
Alabama	−24.0	−23.6	−1.6	57.4	27.6	23.4	−2.0	2.2	−4.2
Michigan	98.1	−10.8	122.0	150.3	25.4	90.6	73.5	3.9	67.0
Virginia	−17.2	22.1	−32.2	−17.2	61.2	−48.6	−54.4	55.1	−70.6
Wisconsin	37.6	57.3	−12.5	65.3	55.9	6.0	−1.0	6.3	−6.9
Tennessee	−35.2	−15.8	−23.0	−0.9	35.7	−27.0	−16.5	55.3	−46.3
Kentucky									
All other states									

[1] Percentages are based upon figures in Table 34. A minus sign (−) denotes decrease.

The table shows that although Pennsylvania is far in advance of all other states, the blast-furnace industry increased much less rapidly, proportionately, between 1899 and 1909 in that state than in either New York, Illinois, Michigan, or Ohio. A further discussion of the relative importance of the states in this industry is presented in connection with the statistics of tonnage. The rankings shown in the table represent the rank of the specified state among all the states, those not shown separately being taken into consideration.

Persons engaged in the industry.—Table 8 shows, by classes, for 1909, the number of persons engaged in the blast-furnace industry.

Table 8

CLASS.	PERSONS ENGAGED IN THE BLAST-FURNACE INDUSTRY: 1909		
	Total.	Male.	Female.
All classes	**43,061**	**42,715**	**346**
Proprietors and officials	1,119	1,112	7
Proprietors and firm members	48	43	5
Salaried officers of corporations	262	260	2
Superintendents and managers	809	809	.....
Clerks	3,513	3,182	331
Wage earners (average number)	38,429	38,421	8
16 years of age and over	38,361	38,353	8
Under 16 years of age	68	68	.....

Of the total number of persons engaged in the industry, 2.6 per cent were proprietors and officials, 8.2 per cent were clerks (this class including other subordinate salaried employees) and 89.2 per cent were wage earners. The number of women and children employed as wage earners is insignificant.

In order to compare the distribution of persons engaged in the industry according to occupational status in 1909 with that shown at the census of 1904, it is necessary to use the classification employed at the earlier census (see Introduction). Such a comparison is made in Table 9.

Table 9

CLASS.	PERSONS ENGAGED IN THE BLAST-FURNACE INDUSTRY.				
	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	**43,061**	**100.0**	**37,335**	**100.0**	**15.3**
Proprietors and firm members	48	0.1	26	0.1	84.6
Salaried employees	4,584	10.6	2,231	6.0	105.5
Wage earners (average number)	38,429	89.2	35,078	94.0	9.6

Wage earners employed, by months.—Table 10 gives, for 1909, the number of wage earners employed in the blast-furnace industry on the 15th (or the nearest representative day) of each month during the year for the 10 states in which an average of at least 500 wage earners were employed during the year.

Table 10

STATE.	WAGE EARNERS EMPLOYED IN THE BLAST-FURNACE INDUSTRY: 1909[1]												
	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	**38,429**	**34,755**	**34,369**	**34,156**	**33,458**	**34,606**	**36,537**	**37,429**	**38,182**	**41,988**	**43,841**	**45,092**	**46,727**
Alabama	3,783	3,567	3,442	3,486	3,401	3,394	*3,318*	3,477	3,811	4,146	4,306	**4,609**	*4,436*
Illinois	2,493	*2,053*	2,252	2,293	2,202	2,412	2,569	2,484	2,309	2,646	2,854	2,874	**2,997**
Michigan	1,016	*699*	806	836	911	1,055	944	974	1,062	**1,235**	1,206	1,234	1,227
New Jersey	754	632	635	594	553	*538*	668	729	767	873	945	1,025	**1,083**
New York	2,298	2,016	2,086	2,060	*1,939*	1,944	2,175	2,349	2,335	2,605	2,649	2,582	**2,842**
Ohio	7,295	6,371	*6,214*	6,428	6,393	6,458	7,145	7,264	7,226	8,050	8,288	8,535	**9,168**
Pennsylvania	14,521	13,347	12,909	*12,559*	12,753	13,377	13,801	14,187	14,627	15,926	16,463	16,896	**17,407**
Tennessee	1,143	**1,461**	1,373	1,213	929	*893*	947	977	913	1,072	1,245	1,337	1,362
Virginia	1,320	1,141	1,147	1,246	1,155	*1,114*	1,119	1,185	1,433	1,396	*1,545*	1,652	**1,704**
Wisconsin	758	698	756	765	792	889	817	854	*581*	743	780	813	804

[1]The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

In the industry as a whole the largest number of wage earners employed during any month of 1909 was 46,727, in December, and the smallest number, 33,458, in April. In the majority of the states the maximum number was employed in December and the minimum number in the spring or early summer months. For the entire industry the number employed in April was 71.6 per cent of the number in December. For January the number employed was 74.4 per cent of that in December, the number decreasing from January to April and then increasing from April to December. The average number employed during the year formed 82.2 per cent of the maximum number. This industry is not affected by seasonal climatic conditions, but is much affected by changes in general business activity. The increase in the number of wage earners from April to December was due to the recovery of business generally after the depression of 1907 and 1908.

Prevailing hours of labor.—In Table 11 the wage earners have been classified according to the hours of labor prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed in each establishment during the year is classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or a less number of hours.

Table 11 AVERAGE NUMBER OF WAGE EARNERS IN THE BLAST-FURNACE INDUSTRY: 1909

STATE.	Total.	In establishments with prevailing hours—			
		Between 54 and 60.	60.	Between 60 and 72.	72 and over.
United States	**38,429**	**190**	**1,149**	**4,057**	**33,033**
Alabama	3,783	.....	108	1,454	2,221
Illinois	2,493	.....	.....	.....	2,493
Michigan	1,016	.....	.....	55	961
New Jersey	754	.....	86	.....	668
New York	2,298	.....	101	374	1,823
Ohio	7,295	.....	.....	606	6,689
Pennsylvania	14,521	117	601	166	13,637
Tennessee	1,143	.....	189	.....	954
Virginia	1,320	73	.....	145	1,102
Wisconsin	758	.....	.....	.....	758

The operation of a blast furnace is necessarily continuous, and most furnaces operate with two 12-hour shifts and work seven days a week. Of the total number of wage earners, 31,729, or 82.6 per cent, were in establishments where the prevailing hours were over 72 per week, and 1,304, or 3.4 per cent, in establishments where they were 72 per week. No establishments reported their prevailing hours of labor as 54 per week or less, and but one-half of 1 per cent of the wage earners were employed in establishments where the prevailing hours were between 54 and 60 per week, 3 per cent in establishments where they were 60 per week, and 10.6 per cent in establishments where they were between 60 and 72 per week.

Character of ownership.—Only 12 establishments in the blast-furnace industry, or 5.8 per cent of the total number, were owned by individuals or firms in 1909, and the value of the products of such establishments was only $4,913,632, or 1.3 per cent of the total. The business is one of large units, and is mainly in the hands of corporations.

Size of establishments.—In order to throw some light upon the subject of the prevailing scale of operations in the industry, the establishments are grouped, first, according to value of products, and then according to number of wage earners. It should be noted that in this classification each establishment is considered by itself and no regard is paid to the fact that two or more plants may be controlled by a single concern.

Table 12 groups the establishments according to value of products, and shows for each group, for 1909 and 1904, the value of products and the amount of pig iron produced. It also gives the average value of products and output of pig iron per establishment.

In 1909, 86 of the blast-furnace establishments, or 41.3 per cent of the total number, reported products valued at $1,000,000 or over, as compared with 49, or 25.8 per cent of the total, in 1904. While these establishments represented a minority of the total number reported, they reported 85.8 per cent of the total value of products and 86.1 per cent of the pig-iron tonnage in 1909, and 74.8 per cent of the value of all products and 73.5 per cent of the pig-iron tonnage in 1904.

Table 12 BLAST FURNACES.

VALUE OF PRODUCTS PER ESTABLISHMENT.	Number of establishments.	Value of all products.	Pig iron produced (tons).
Total:			
1909	**208**	**$391,429,283**	**25,651,798**
1904	**190**	**231,822,707**	**16,623,625**
Less than $100,000:			
1909	14	700,718	31,123
1904	19	783,533	45,334
$100,000 and less than $1,000,000:			
1909	108	54,735,742	3,536,186
1904	122	57,717,931	4,352,893
$1,000,000 and over:			
1909	86	335,992,823	22,084,489
1904	49	173,321,243	12,225,398
Per cent of total:			
1909	**100.0**	**100.0**	**100.0**
1904	**100.0**	**100.0**	**100.0**
Less than $100,000:			
1909	6.7	0.2	0.1
1904	10.0	0.3	0.3
$100,000 and less than $1,000,000:			
1909	51.9	14.0	13.8
1904	64.2	24.9	26.2
$1,000,000 and over:			
1909	41.3	85.8	86.1
1904	25.8	74.8	73.5
Average per establishment:			
1909	.....	$1,881,872	123,326
1904	.....	1,220,120	87,493

The average number of wage earners per establishment was the same (185) in 1909 as in 1904, but during this five-year period the average value of products per establishment increased from $1,220,120 to $1,881,872, or 54.2 per cent, and the average value added by manufacture from $278,320 to $340,343, or 22.3 per cent. The average output of pig iron per establishment increased from 87,493 tons in 1904 to 123,326 tons in 1909.

Table 13 gives, for 1909, a classification of establishments according to average number of wage earners, and shows the average number of wage earners employed in establishments of each group for 10 of the leading states.

Of the 208 establishments, 5.3 per cent employed from 1 to 20 wage earners each; 12.5 per cent, from 21 to 50; 25 per cent, from 51 to 100; 35.6 per cent, from 101 to 250; 14.9 per cent, from 251 to 500; and 6.7 per cent, over 500. Of the total number of wage earners, 55.3 per cent were in establishments employing over 250 wage earners. The per cent distribution of the wage earners by groups was as follows: In establishments employing 1 to 50 wage earners, 2.9 per cent; in those employing 51 to 100, 10.7 per cent; in those employing 101 to 250, 31.1 per cent; in those employing 251 to 500, 27.3 per cent; and in those employing over 500, 28 per cent.

Table 13

STATE.	TOTAL.		BLAST FURNACES EMPLOYING IN 1909—															
			1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number).	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	208	38,429	2	7	9	118	26	988	52	4,094	74	11,958	31	10,496	13	9,241	1	1,527
Alabama	19	3,783	.....	.....	.....	.....	2	73	3	211	10	1,529	2	727	2	1,243	.....	.....
Illinois	6	2,493	.....	.....	.....	.....	.....	.....	1	80	.....	.....	3	900	2	1,513	.....	.....
Michigan	11	1,016	.....	.....	.....	.....	2	75	6	394	2	284	1	263	.....	.....	.....	.....
New Jersey	4	754	.....	.....	.....	.....	.....	.....	1	86	2	351	1	317	.....	.....	.....	.....
New York	9	2,298	.....	.....	.....	.....	.....	.....	3	281	2	348	3	1,149	1	520	.....	.....
Ohio	40	7,205	1	2	.....	.....	3	112	8	632	20	3,155	6	2,198	2	1,196	.....	.....
Pennsylvania	66	14,521	1	5	5	55	6	251	15	1,137	22	3,938	11	3,705	5	3,903	1	1,527
Tennessee	13	1,143	.....	.....	.....	.....	6	241	5	404	1	189	1	309	.....	.....	.....	.....
Virginia	14	1,320	.....	.....	1	20	1	50	7	616	5	634	.....	.....	.....	.....	.....	.....
Wisconsin	5	758	.....	.....	1	15	.....	.....	1	92	2	381	1	270	.....	.....	.....	.....

Expenses.—As stated in the Introduction, the census does not purport to furnish figures that can be used for determining profits or the total cost of manufacture. Facts of interest can, however, be brought out concerning the relative importance of the principal classes of expense which make up the total. Table 14 shows in percentages, for 1909, 1904, and 1899, the distribution of these expenses among the several classes indicated for the country as a whole, with figures for 10 of the leading states, for 1909 only.

Table 14

STATE.	PER CENT OF TOTAL REPORTED EXPENSES OF BLAST FURNACES REPRESENTED BY—			
	Salaries.	Wages.	Materials.	Miscellaneous expenses.
United States:				
1909	1.8	6.8	88.4	3.0
1904	1.4	9.0	85.0	4.6
1899	1.4	11.6	82.3	4.7
Individual states: 1909:				
Alabama	3.0	10.9	81.0	4.2
Illinois	1.4	5.2	90.4	2.9
Kentucky	2.8	11.8	80.0	5.4
Michigan	2.8	11.9	79.4	5.9
New York	1.7	7.4	88.0	2.9
Ohio	1.8	6.6	88.5	3.1
Pennsylvania	1.5	6.0	89.6	2.9
Tennessee	3.5	12.4	80.8	3.3
Virginia	3.5	10.1	81.8	4.6
Wisconsin	2.2	10.6	83.8	3.3

The cost of materials (including fuel) constitutes by far the most important element of expense in pig-iron production. For the United States as a whole a comparison of the per cent distribution of expenses for 1909 with that for 1899 indicates a marked increase in the relative importance of cost of materials and a decrease in that of wages.

Miscellaneous expenses, which constituted 3 per cent of the total expenses in 1909, are relatively less important in this industry than in most others. In fact, among the leading industries, only the construction and repair shops operated by steam-railroad companies and the copper and lead smelting industries show a lower proportion. The percentage for all manufacturing industries combined was 10.5.

Illinois shows, for 1909, the lowest proportion of expenses for services, 6.6 per cent, and the highest for materials, 90.4 per cent. The lowest percentage for materials was reported for Michigan, 79.4 per cent. The lower ratio in this state is due in part to the fact that most of the Michigan plants are charcoal furnaces manufacturing their own charcoal, and in some cases the labor employed in wood cutting and charcoal burning was charged not to material, but to wages.

Engines, power, and fuel.—The amount of power was first reported for the industry at the census of 1869, and the total horsepower increased from 63,900 in 1869 to 1,173,422 in 1909. Table 15 shows the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower, as reported at the censuses of 1909, 1904, and 1899. It also shows separately the number and horsepower of electric motors, including those operated by current generated in the establishments.

Table 15

POWER.	BLAST FURNACES.								
	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	3,093	1,617	1,316	1,173,422	773,278	497,272	100.0	100.0	100.0
Owned	2,640	1,603	1,316	1,158,572	773,139	497,272	98.7	100.0	100.0
Steam	2,568	1,555	1,294	1,033,033	762,382	494,798	88.0	98.6	99.5
Gas	60	27	8	125,230	3,757	122	10.7	0.5	(1)
Water wheels and motors	12	21	14	309	680	582	(1)	0.1	0.1
Other	.....	.....	.....	.....	6,320	1,770	.....	0.8	0.4
Rented—Electric	453	14	.....	14,850	139	.....	1.3	(1)	.....
Electric motors.	3,462	1,384	227	135,143	52,810	8,693	100.0	100.0	100.0
Run by current generated by establishment	3,009	1,370	227	120,293	52,471	8,693	89.0	99.7	100.0
Run by rented power	453	14	.....	14,850	139	.....	11.0	0.3	.....

[1] Less than one-tenth of 1 per cent.

The total primary power increased from 497,272 horsepower in 1899 to 1,173,422 in 1909, or 136 per cent. This is a rate of increase much higher than that for ore consumption or pig-iron production. This increase in power used doubtless explains in part the fact that the average number of wage earners employed in 1909 was less by 812 than that in 1899.

There has been a striking increase in the use of gas engines. Gas engines are of special interest as they represent largely the utilization of what was formerly a waste product—blast-furnace gas. Some of the gas engines now employed rank in power with the largest steam engines. The 60 gas engines reported in 1909 had an aggregate rating of 125,230 horsepower, or an average of 2,087 horsepower per unit; the largest were of 4,000 horsepower. At the plant of the Indiana Steel Company at Gary, Ind., the use of blast-furnace gas has been carried to the point where it is the chief reliance as a source of power, and except for various auxiliary purposes and as a reserve in case the blast furnaces are shut down, steam has no place either in the furnace department or in the steel plant or the rolling mill. The air blast is the largest consumer of power in blast-furnace operations, a large furnace requiring 30,000 or more cubic feet of air per minute to be pumped against a pressure of 11 pounds and upward per square inch.

There has also been a very marked increase in the use of electric motors as a means of applying the power generated within the establishment. The total horsepower of such motors increased from 8,693 in 1899 to 120,293 in 1909.

Table 16 shows, for 1909, the amount of each of the several kinds of power and of the different kinds of fuel used in the industry, by states.

Table 16 BLAST FURNACES: 1909

STATE.	Primary horsepower.							Electric horsepower.		Fuel used.						
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.				Rented (electric).	Total, rented and generated by establishment.	Generated in the establishment reporting.	Coal.		Coke (short tons).	Wood (cords)	Oil, including gasoline (barrels).	Gas (1,000 feet).[1]	Charcoal (bushels).
			Total.	Steam engines.	Gas engines.	Water wheels and motors.				Anthracite (long tons).	Bituminous (short tons).					
United States	**208**	**1,173,422**	**1,158,572**	**1,033,033**	**125,230**	**309**	**14,850**	**135,143**	**120,293**	**273,543**	**1,166,135**	**31,649,865**	**[2] 7,141**	**19,446**	**940,622**	**38,032,618**
Alabama	19	106,189	106,064	106,040	.....	24	125	7,081	6,956	.....	142,649	2,907,745	91	.....	6,000	3,735,045
Illinois	6	70,453	70,053	63,053	7,000	.....	400	5,423	5,023	.....	37,389	2,894,991	950	4,360	.....	.....
Michigan	11	17,403	17,403	17,403	.....	.....	.....	1,714	1,714	.....	9,167	123,174	[2] 353	.....	.....	21,846,630
New Jersey	4	12,025	12,025	12,025	.....	.....	.....	350	350	3,663	7,025	419,491	830	.....	.....	.....
New York	9	95,416	86,477	52,157	34,320	.....	8,939	12,479	3,540	1,317	74,586	2,155,893	946	.....	.....	.....
Ohio	40	215,739	213,699	194,899	18,800	.....	2,040	25,012	22,972	.....	277,951	6,183,253	521	271	72	16,000
Pennsylvania	66	476,680	474,292	449,032	25,100	160	2,388	68,185	65,797	267,478	445,716	13,248,651	2,906	14	940,558	476,790
Tennessee	13	18,150	18,150	18,150	.....	.....	.....	310	310	.....	30,298	565,386	152	201	.....	500,897
Virginia	14	17,320	17,320	17,320	.....	.....	.....	330	330	.....	39,341	628,163	.....	.....	.....	615,663
Wisconsin	5	12,975	12,715	12,715	.....	.....	260	850	590	110	8,902	328,786	125	14,000	129	4,156,478
All other states	21	131,072	130,374	90,239	40,010	125	698	13,409	12,711	975	93,111	2,194,332	267	.....	2,863	6,685,115

[1] Exclusive of blast-furnace gas.
[2] Not including 171,871 cords used for charcoal manufacture, and reported as wood in the tables of Volume VIII (Table 9, Chapter XIII; Table 3, Chapter XIV; and General Table II).

The quantity of each kind of fuel shown in the table includes both that used for smelting and that used for the production of power. The returns for 1904 and prior censuses did not distinguish between the fuel used for smelting and that used for generating power or for other purposes, but the returns for 1909 make this distinction.

The coke, charcoal, and anthracite coal are essentially all used for smelting. In 1909, 115,173 short tons of bituminous coal were used for smelting, leaving a balance of 1,050,962 tons for other purposes. The total expenditure for fuel for both purposes and for rent of power in 1909 was $108,536,921, as compared with $44,199,382 in 1899, $37,893,283 in 1889, and $21,917,002 in 1879. The increase for the decade 1899–1909 was 145.6 per cent. In 1909 fuel and rent of power accounted for 33.8 per cent of the total cost of materials, as compared with 35.1 per cent in 1904 and 33.6 per cent in 1899. More fuel is used in the blast-furnace industry than in any other. The amount of coke consumed in 1909, 31,649,865 tons, represents the product of substantially 48,000,000 tons of bituminous coal, equal to over one-eighth of the total production of such coal in that year.

The gas shown in Table 16 is natural gas and does not include blast-furnace gas made and consumed. The quantity of blast-furnace gas utilized as fuel for steam production and in gas engines was reported for a number of the large plants, from which it has been estimated that there was produced by all plants during the year approximately 2,900,000,000,000 cubic feet of blast-furnace gas, of which only a small portion was utilized. The caloric power of blast-furnace gas is low, about 110 British thermal units per thousand cubic feet, as compared with about 1,100 British thermal units for natural gas, but it represents the equivalent of 290,000,000,000 cubic feet of natural

gas. At the Gary plant, before referred to, approximately 30 per cent of the gas is used for heating the blast, 7.5 per cent for steam production, 12.5 per cent for the gas engines used for blowing, 45 per cent for the gas engines of the electric power stations which supply power for all other purposes to the entire plant, and 5 per cent is consumed by various auxiliaries or lost in the process of cleaning.

SPECIAL STATISTICS RELATING TO MATERIALS, PRODUCTS, AND EQUIPMENT.

Materials used—Summary.—Table 17 shows, in detail, the quantity and cost of the materials used in blast furnaces during each census year from 1879 to 1909, inclusive, for the United States as a whole.

Table 17

BLAST FURNACES—MATERIALS USED.

MATERIAL.	1909		1904[1]		1899[1]	
	Tons.	Cost.	Tons.	Cost.	Tons.	Cost.
Total		$320,637,889		$178,941,918		$131,503,655
Iron ore	48,353,677	187,264,601	30,032,862	100,945,369	25,366,894	65,902,922
Domestic	46,605,930	177,589,789	29,202,944	96,206,246	24,612,511	61,795,473
Foreign	1,747,747	9,674,812	829,918	4,739,123	754,383	4,107,449
Mill cinder, scrap, etc	1,982,530	5,644,859	1,865,385	3,830,961	1,600,313	3,772,385
Fluxes	13,570,845	12,239,493	8,325,209	6,888,647	7,324,743	5,054,725
Fuel:						
Coke	[2] 31,640,865	[3] 102,134,423	[2] 19,739,671	57,126,997	[2] 16,461,533	38,976,770
Charcoal	[4] 38,032,618	2,787,026	[4] 37,273,569	2,521,887	[4] 30,677,585	1,823,881
Anthracite coal	273,543	[5] 904,102	500,637	1,812,779	836,564	2,297,419
Bituminous coal	[2] 1,166,135	[6] 168,561	[2] 897,837	1,340,997	[2] 932,103	1,101,312
Cost of fuel for generating power, and rent of power		2,542,809		[7] 85,529		[8]
All other materials		7,052,015		4,388,752		12,574,241

BLAST FURNACES—MATERIALS USED—continued.

MATERIAL.	1889		1879		Per cent of increase.[9]					
					1899–1909		1889–1899		1879–1889	
	Tons.	Cost.	Tons.	Cost.	Tons.	Cost.	Tons.	Cost.	Tons.	Cost.
Total		$110,098,615		$58,619,742		143.8		19.5		87.8
Iron ore	15,022,421	63,505,530	6,479,182	33,205,278	90.6	184.2	68.9	3.8	131.9	91.3
Domestic	14,048,571	57,007,945			89.4	187.4	75.3	7.3		
Foreign	973,850	5,897,585			131.7	135.5	−22.5	−30.4		
Mill cinder, scrap, etc	1,145,599	3,080,808	318,114	910,667	23.9	47.0	39.7	22.2	262.4	239.0
Fluxes	5,021,688	4,196,878	2,829,598	2,547,336	85.3	142.1	45.9	20.6	77.5	64.8
Fuel:										
Coke	[2] 9,237,935	27,435,780	[2] 2,128,255	8,129,240	92.3	(10)	78.2	42.1	334.1	237.5
Charcoal	[4] 67,672,156	4,523,320	[4] 53,909,828	3,679,120	24.0	52.8	−54.7	−59.7	25.5	22.9
Anthracite coal	1,796,854	5,165,761	2,334,984	8,012,755	−69.1	(10)	−50.7	−55.5	−23.0	−35.5
Bituminous coal	[2] 551,608	759,522	[2] 1,051,753	2,095,887	25.1	(10)	69.2	45.0	−47.6	−63.8
Cost of fuel for generating power, and rent of power		[8]		[8]						
All other materials		1,425,016		39,459						

[1] Excluding statistics for a blast furnace operated by a penal institution.
[2] Tons of 2,000 pounds.
[3] Cost of 31,436,536 tons used for smelting; the cost of coke used for generating power, etc., was not reported separately and is included below under "cost of fuel for generating power."
[4] Bushels.
[5] Cost of 265,401 tons used for smelting; the cost of anthracite coal used for generating power, etc., was not reported separately and is included below under "cost of fuel for generating power."
[6] Cost of 115,173 short tons used for smelting; the cost of bituminous coal used for generating power, etc., was not reported separately and is included below under "cost of fuel for generating power."
[7] Cost of natural gas and rent of power and heat.
[8] Not reported separately; fuel included above.
[9] A minus sign (−) denotes decrease.
[10] Figures not strictly comparable.

Of the total cost of materials in 1909, which amounted to $320,637,889, that of iron ore and other iron-bearing materials represented 60.1 per cent, that of fluxes 3.8 per cent, that of fuel—for smelting and for other purposes combined—33.8 per cent, and that of all other materials only 2.2 per cent.

Ore.—The consumption of iron ore by blast furnaces in 1909 was 48,353,677 tons. The quantity used increased 90.6 per cent during the decade 1899–1909, as compared with an increase of 68.9 per cent from 1889 to 1899, and 131.9 per cent from 1879 to 1889. The consumption of foreign ore more than doubled during the period 1904–1909.

Foreign ore constituted, in 1909, 3.6 per cent of the total ore consumption, as compared with 2.8 per cent in 1904, 3 per cent in 1899, and 6.5 per cent in 1889. In 1909 the bulk of the foreign ore (73.1 per cent) was consumed by furnaces located in Pennsylvania, the next largest consumer being Maryland. The importations of ore during the year 1909 aggregated 1,909,186 tons, including 212,765 tons of manganese ores and oxides. The imported iron ores were obtained from Cuba, Spain, Newfoundland, Greece, Russia, Sweden, French Africa, and Canada, and the manganese ores and oxides chiefly from British India, Brazil, France, Cuba, England, Japan, Russia, and

Germany. Manganese ore enters into the manufacture of spiegeleisen and ferromanganese.

The total amount of iron ore shipped by mines in this country in 1909, as reported by the mines, was 50,521,208 tons (including ore used by furnaces adjoining the mines). The consumption of domestic ore by the blast furnaces was 46,605,930 tons, and that by the steel works and rolling mills 823,306 tons, making a total consumption of 47,429,236 tons. The difference between production and consumption, approximately 3,000,000 tons, represents increase in stocks at the mines, the lake ports, and the furnaces, together with exports, which amounted to 455,934 tons.

Table 18 shows, by districts, the total amount of iron ore used and sold in 1909, the amount shipped to furnaces owned or controlled by the producer (distinguishing furnaces at a distance and those adjoining the mines), and the quantity sold.

Table 18 — IRON ORE MINED: 1909

KIND OF ORE AND METHOD OF DISPOSITION.	Amount (tons).	Per cent of total.
ALL ORE.		
Total amount used or sold	50,521,208	100.0
Used in blast furnaces affiliated with the mines	32,239,481	63.8
At a distance	27,806,673	55.0
At the mines	4,432,808	8.8
Sold	18,281,727	36.2
LAKE SUPERIOR ORE.		
Total amount used or sold	41,242,374	81.6
Used in blast furnaces affiliated with the mines	25,467,822	50.4
At a distance	25,364,248	50.2
At the mines	103,574	0.2
Sold	15,774,552	31.2
SOUTHERN DISTRICT ORE.		
Total amount used or sold	5,181,605	10.3
Used in blast furnaces affiliated with the mines	4,632,318	9.2
At a distance	1,164,334	2.3
At the mines	3,467,984	6.9
Sold	549,287	1.1
ORE OF ALL OTHER DISTRICTS.		
Total amount used or sold	4,097,229	8.1
Used in blast furnaces affiliated with the mines	2,139,341	4.2
At a distance	1,278,091	2.5
At the mines	861,250	1.7
Sold	1,957,888	3.9

This table brings out the large extent to which iron mining and iron manufacture are controlled by common interests. Of the total production, 63.8 per cent was for use in furnaces owned or controlled by the same concerns as controlled the mines and only 36.2 per cent was for sale to others. The Lake Superior district (Michigan, Minnesota, and Wisconsin) furnished 81.6 per cent of the total supply, the southern district (Alabama, Georgia, and Tennessee, 10.3 per cent, and the remainder of the country (chiefly New York, Virginia, Pennsylvania, and New Jersey), 8.1 per cent. Most ore from the Lake Superior district, whether sold or otherwise disposed of, is shipped to a distance, while most southern ore is used by blast furnaces adjoining the mines.

Yield obtained from ore and other iron-bearing material.—In addition to ores the blast furnaces in 1909 smelted 1,982,530 tons of mill cinder, scrap, and other iron materials, making with the ore a total of 50,336,207 tons of iron-bearing material. They produced from this material 25,651,798 tons of pig iron, the average yield thus being equal to 51 per cent of the weight of the iron-bearing materials used. The average yield of pig iron was 52.1 per cent in 1904, 53.6 per cent in 1899, 54.7 per cent in 1889, and 49.7 per cent in 1879. Although these variations in yield are due to some extent to changes in the proportion of foreign ore and of mill cinder, scrap, etc., used, they are due chiefly to changes in the grade of domestic ore used. The increase in the percentage of yield for the decade 1879–1889 was due to the development of the rich deposits of Lake Superior. Twenty years ago almost all the ore shipped from the Lake Superior region analyzed over 60 per cent iron, but in the later years more and more ores of lower grade have been sent down to the furnaces.

Table 19 shows the average percentage of pig iron from ore (including mill cinder and scrap) for furnaces using exclusively southern ores and furnaces using exclusively Lake Superior ores, respectively.

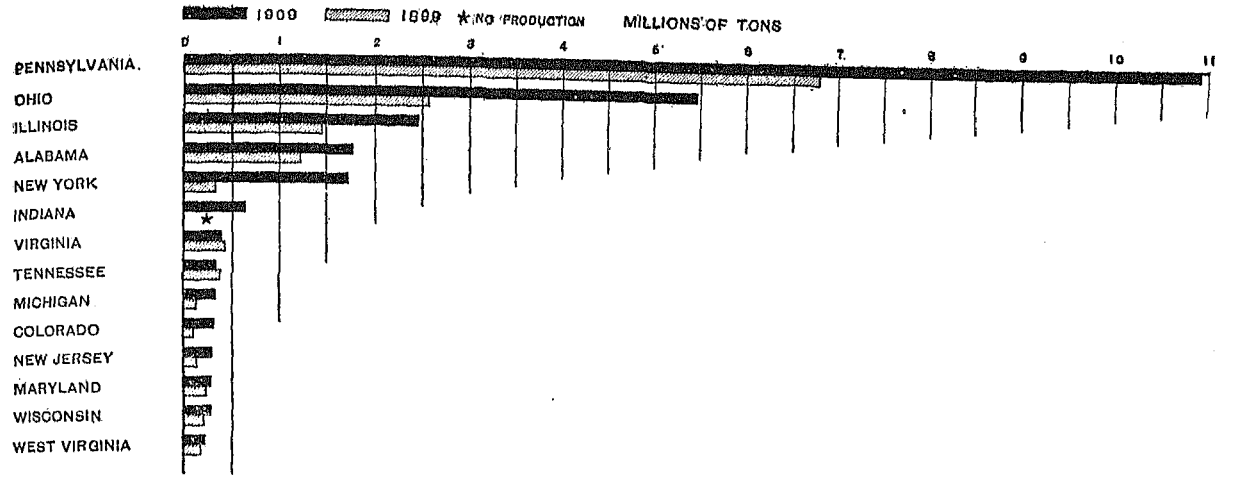
Table 19

CLASS.	AVERAGE PERCENTAGE OF PIG IRON FROM ORE.				
	1909	1904	1899	1889	1879
All furnaces	51.0	52.1	53.6	54.7	49.7
Furnaces using southern ores exclusively	40.6	41.4	43.1	44.1	43.6
Furnaces using Lake Superior ores exclusively	52.3	53.4	57.7	63.3	58.2

There was a greater difference between the two classes of furnaces specified with respect to percentage of yield in 1879 and 1889 than in later years. Both classes of furnaces show a decline in yield since 1889.

Total production of pig iron, by states.—The following diagram shows the production of pig iron, by states, for states having a product in excess of 200,000 tons in 1909. The product of all the states not shown in the diagram aggregated but 256,203 tons in 1909.

PIG-IRON PRODUCTION OF LEADING STATES: 1909 AND 1899.



Comparative statistics, by states, of the number of furnaces (stacks) and the tonnage and value of the pig-iron product are given in Table 20.

Pennsylvania, Ohio, Illinois, and Alabama have been the four leading states in the industry at each of the last four censuses, and Pennsylvania and Ohio, the first and second, respectively, at all censuses covered by the table.

In 1909 Pennsylvania produced 42.5 per cent of the pig iron made in the country; Ohio, 21.2 per cent; Illinois, 9.6 per cent; Alabama, 6.9 per cent; and New York, 6.7 per cent. These five states together reported nearly seven-eighths of the total.

There is considerable diversity in the average values per ton in the several states, due to differences in distance from markets, in grade of product, and in method of disposition of output. A large part of the product in some states is delivered in a molten condition to steel works forming part of the same plant, while in other states the entire product is cast and sold. Because of the lack of significance in the average values by states they have not been shown in the table.

Table 20

STATE.	BLAST FURNACES. Number of completed furnaces at end of year in active establishments.	Production of pig iron. Quantity (tons). Amount.	Per cent of total.	Rank of state.	Value.
United States:					
1909	388	25,651,798	100.0	.....	$387,830,443
1904	343	[1] 16,623,625	100.0	.....	[1] 228,011,116
1899	343	[2] 14,447,791	100.0	.....	[2] 209,512,755
1889	473	8,845,185	100.0	.....	145,612,983
1879	[3] 681	3,375,912	100.0	.....	88,204,010
Pennsylvania:					
1909	145	10,911,676	42.5	1	167,588,407
1904	131	7,720,278	46.5	1	107,305,757
1899	136	6,778,584	46.9	1	101,555,787
1889	202	4,345,986	49.1	1	75,212,758
1879	269	1,723,492	51.1	1	44,940,028
Ohio:					
1909	67	5,446,971	21.2	2	82,048,712
1904	53	2,987,787	18.0	2	40,705,777
1899	51	2,559,694	17.7	2	40,308,758
1889	59	1,203,142	13.6	2	19,800,203
1879	103	489,921	14.5	2	12,908,286
Illinois:					
1909	23	2,468,772	9.6	3	38,299,897
1904	21	1,660,610	10.0	3	25,508,271
1899	17	1,469,530	10.2	3	15,033,695
1889	14	666,676	7.5	4	10,136,960
1879	10	85,239	2.5	7	2,301,850
Alabama:					
1909	40	1,764,544	6.9	4	21,221,707
1904	38	1,471,378	8.9	4	16,614,577
1899	37	1,203,277	8.3	4	13,487,769
1889	47	817,508	9.2	3	10,315,691
1879	15	55,657	1.6	10	1,402,156
New York:					
1909	18	1,717,091	6.7	5	26,596,413
1904	15	609,588	3.7	5	8,411,946
New York—Continued.					
1899	12	334,512	2.3	7	$5,042,550
1889	26	307,446	3.5	5	5,182,606
1879	57	279,793	8.3	3	6,697,349
Virginia:					
1909	17	387,328	1.5	7	5,324,997
1904	13	279,103	1.7	8	3,333,273
1899	19	428,117	3.0	5	6,505,218
1889	23	278,809	3.2	6	3,925,431
1879	31	15,988	0.5	17	429,695
Tennessee:					
1909	15	333,416	1.3	8	4,644,667
1904	19	303,624	1.8	6	3,426,932
1899	17	374,249	2.6	6	4,693,215
1889	17	264,187	3.0	7	3,366,464
1879	21	42,744	1.3	13	824,932
Michigan:					
1909	12	327,644	1.3	9	5,694,564
1904	11	270,933	1.6	9	4,630,183
1899	7	141,377	1.0	12	2,327,153
1889	19	203,417	2.3	8	3,982,278
1879	27	106,774	3.2	5	3,123,245
Wisconsin:					
1909	6	285,454	1.1	13	4,591,351
1904	5	189,141	1.1	12	2,761,107
1899	6	217,451	1.5	9	2,899,912
1889	9	192,092	2.2	9	3,114,892
1879	14	105,609	3.1	6	3,293,635
All other states:					
1909	45	2,008,902	7.8	.....	31,819,728
1904	37	[1] 1,122,183	6.7	.....	[1] 16,123,293
1899	41	[1] 941,000	6.5	.....	[1] 14,658,697
1889	57	565,332	6.4	.....	10,575,650
1879	134	470,695	13.9	.....	12,192,834

[1] Not including 4,669 tons, valued at $66,419, produced by a blast furnace operated by a penal institution.
[2] Not including 4,443 tons, valued at $66,645, produced by a blast furnace operated by a penal institution.
[3] Furnaces in all establishments, both active and idle.

Production of pig iron, by kind of fuel used.—The value of all products reported for the blast furnaces, and the tonnage and value of the pig-iron product (of all grades and varieties combined) classified according to the kind of fuel used in smelting, are given in Table 21.

Table 21

	BLAST FURNACES—PRODUCTS.				
	1909	1904	1899	1889	1879
Pig iron, total quantity, tons	25,651,798	16,623,625	14,447,791	8,845,185	3,375,912
Mineral fuel	25,279,563	16,214,123	14,095,675	8,251,693	2,987,235
Coke [1]	24,608,572	14,909,029	12,253,818	6,265,865	1,354,958
Anthracite or mixed anthracite and coke [2]	670,991	1,305,094	1,841,857	1,985,828	1,632,277
Charcoal	372,235	409,502	[3] 352,116	593,492	388,677
Per cent of total	100.0	100.0	100.0	100.0	100.0
Mineral fuel	98.5	97.5	97.5	93.3	88.5
Coke	95.9	89.6	84.8	70.8	40.1
Anthracite or mixed anthracite and coke	2.6	7.9	12.7	22.5	48.3
Charcoal	1.5	2.5	2.5	6.7	11.5
All products, total value	$391,429,283	$231,822,707	$206,756,557	$145,643,153	$89,315,569
Pig iron, total	387,830,443	228,911,116	206,512,755	145,612,983	88,204,010
Mineral fuel	380,646,786	221,918,031	200,441,796	133,655,273	75,715,266
Coke	369,684,636	203,814,049	173,763,091	100,687,256	35,513,233
Anthracite or mixed anthracite and coke	10,962,150	18,103,982	26,678,705	32,968,017	40,202,033
Charcoal	7,183,657	6,993,085	6,070,959	11,957,710	12,488,744
All other products	3,598,840	2,911,591	243,802	30,170	1,111,559

[1] Including pig iron smelted with bituminous coal and coke mixed. The quantity so made in 1909 was 86,420 tons; it was not reported separately for prior years.
[2] The following quantities were smelted with anthracite alone: 1909, none; 1904, 30,373 tons; 1899, 45,857 tons; 1889, 295,434 tons; 1879, 994,250 tons.
[3] Includes 52,992 tons smelted with charcoal and coke mixed.

The percentages of increase in tonnage and value of products for the last three decades, based on Table 21, are shown in Table 22.

Table 22

PRODUCT.	PER CENT OF INCREASE.[1]		
	1899–1909	1889–1899	1879–1889
All products, total value	89.3	42.0	63.1
Pig iron:			
Tons	77.5	63.3	162.0
Value	87.8	41.8	65.1
Mineral fuel—			
Tons	79.3	70.8	176.2
Value	89.9	50.0	76.5
Coke—			
Tons	100.8	95.6	362.4
Value	112.8	72.6	183.5
Anthracite—			
Tons	−63.6	−7.2	21.7
Value	−58.9	−19.1	−18.0
Charcoal—			
Tons	5.7	−40.7	52.7
Value	18.3	−49.2	−4.3
All other products	1,376.1	708.1	−97.3

[1] A minus sign (−) denotes decrease.

During the three decades covered by the table, the total production of pig iron increased from 3,375,912 tons to 25,651,798 tons. The highest percentage of increase for any individual decade was 162 per cent from 1879 to 1889, but the absolute increase in tonnage for that decade was less than half that from 1899 to 1909, which amounted to 11,204,007 tons.

The production of mineral-fuel iron formed 88.5 per cent of the total product in 1879 and 98.5 per cent in 1909. The increase in output has been confined to coke iron. The production in 1909 of anthracite iron (including straight anthracite and anthracite and coke mixed) was only about two-fifths that in 1879; and in 30 years it has fallen from 48.4 per cent to 2.6 per cent of the total output of pig iron. Charcoal iron has about held its own in absolute amount. The production of 1909, though somewhat less than that of 1904, was in excess of that of 1899. Coke iron constituted only 40.1 per cent of the total in 1879; in 1909 the proportion was 95.9 per cent.

Table 23 shows the average value per ton, at furnaces, of pig iron made with the several kinds of fuel at each census.

Table 23

KIND OF FUEL USED.	AVERAGE VALUE PER TON OF PIG IRON PRODUCED.				
	1909	1904	1899	1889	1879
Pig iron, total	$15.12	$13.77	$14.29	$16.46	$26.13
Mineral fuel	15.06	13.69	14.22	16.20	25.35
Coke	15.02	13.67	14.18	16.07	26.21
Anthracite	16.34	13.87	14.48	16.60	24.63
Charcoal	19.30	17.08	17.24	20.15	32.13

The average value of charcoal iron is considerably higher than the average for the other kinds. The average values reported, except that of charcoal iron, were lower in 1904 than in any other year for which figures are given, but were lower in 1909 than in 1879 or 1889. It is to be borne in mind that a constantly increasing proportion of the product has been consumed in steel works operated by the producer or by affiliated concerns; the value placed upon such interplant or interdepartment transfers, however, presumably conforms in general to the commercial value of pig iron sold in the open market. In any case the changes in the average values can not be taken as indicating closely the changes in prevailing prices. The pig iron produced by each class of fuel includes different grades and the proportions represented by the several grades have varied from census to census. Moreover, the value of pig iron at the furnace varies in different parts of the country, and there have been changes in the relative importance of different sections in the production of iron.

Charcoal iron.—For censuses prior to 1909 separate statistics were presented for furnaces using mineral fuel and for those using charcoal. Such statistics have, however, become of little interest, since the product is now practically all made with bituminous fuel.

The special character of the charcoal-iron branch of the industry, however, renders it desirable to present the more important data for it separately.

The manufacture of charcoal iron has fluctuated considerably, but on the whole the production has increased little for more than half a century. In 1854 the production was 305,623 tons and in 1909, 372,235 tons. The maximum production during any census year was 593,492 tons in 1889.

Table 24 gives the statistics for this branch of the industry for the census years from 1889 to 1909.

Table 24 — BLAST FURNACES MAKING CHARCOAL IRON.

	1909	1904 [1]	1899 [1]	1889
Number of establishments	26	32	31	83
Salaried employees and wage earners	1,663	2,405	1,653	(2)
Salaried employees	157	200	147	(2)
Wage earners (average number)	1,506	2,205	1,506	3,267
Capital	$13,134,329	$9,778,981	$5,712,030	$17,372,724
Expenses	$7,106,100	$6,672,202	$4,193,139	$10,940,204
Services	$1,178,612	$1,223,084	$715,478	$1,549,099
Salaries	$261,091	$260,350	$169,120	(2)
Wages	$917,521	$963,634	$546,358	(2)
Materials	$5,609,250	$5,056,194	$3,216,895	$8,370,150
Miscellaneous	$318,238	$392,924	$260,766	$1,011,955
Value of products	$7,815,275	$7,388,748	$5,277,870	$11,957,775
Pig iron—				
Tons	372,235	409,502	299,124	593,492
Value	$7,183,657	$6,993,085	$5,272,004	$11,957,710
All other products	$631,618	$395,663	$5,776	$65
Value added by manufacture	$2,206,025	$2,332,554	$2,060,975	$3,578,025
Principal materials:				
Iron ore—				
Tons	755,075	809,438	588,861	1,169,802
Cost	$2,401,381	$2,632,596	$1,654,950	$3,638,537
Mill cinder, scrap, etc.—				
Tons	94	549	949	625
Cost	$263	$2,045	$3,224	$2,417
Fluxes—				
Tons	64,678	68,884	68,483	136,526
Cost	$67,311	$67,089	$50,391	$158,169
Charcoal—				
Bushels	38,632,618	[3] 39,756,724	28,527,512	67,672,156
Cost	$2,787,026	$2,694,189	$1,722,572	$4,523,320

[1] Not including a blast furnace operated by a penal institution.
[2] Comparable figures not available.
[3] Includes 2,486,700 bushels of charcoal, the stumpage and labor cost of which was reported under "expenses."

Pig iron produced for consumption.—As already stated, while a segregation has in all cases been made between the data for blast furnaces and those for steel works and rolling mills or other related enterprises, each branch of the business being treated as a separate "establishment," yet as a matter of fact the two are very commonly conducted in the same plant. The manufacture of pig iron for consumption was reported by 57 establishments in 1909. These establishments together produced 16,890,473 tons, or 65.8 per cent of the total output, of which amount, 15,858,203 tons, or 93.9 per cent, were for consumption. Both of these percentages are slightly higher than the corresponding percentages in 1904 (65.6 and 91, respectively). In other words, in 1909 over three-fifths of the total output of pig iron was consumed in steel works and rolling mills or in foundries, etc., which were affiliated with blast furnaces. Table 25 gives the statistics bearing on this subject.

Table 25 — BLAST FURNACES.

	Total.	Establishments producing for consumption in whole or in part.	Establishments producing only for sale.
Number of establishments:			
1909	208	57	151
1904	190	52	138
Total pig-iron production (tons):			
1909	25,651,798	16,890,473	8,761,325
1904	16,623,625	10,909,371	5,714,254
For consumption—			
1909	15,858,203	15,858,203	.....
1904	9,926,545	9,926,545	.....
For sale—			
1909	9,793,595	1,032,270	8,761,325
1904	6,697,080	982,826	5,714,254
Per cent of total production	100.0	100.0	100.0
For consumption—			
1909	61.8	93.9	.....
1904	59.7	91.0	.....
For sale—			
1909	38.2	6.1	100.0
1904	40.3	9.0	100.0

The distribution of the pig-iron product may be further summarized for 1909 and 1904, as follows:

Table 26 — BLAST FURNACES—PIG-IRON PRODUCTION.

METHOD OF DISPOSITION.	1909		1904		Per cent of increase.
	Tons.	Per cent of total.	Tons.	Per cent of total.	
Total production	**25,651,798**	**100.0**	**16,623,625**	**100.0**	**54.3**
For consumption in works of company producing	15,858,203	61.8	9,926,545	59.7	59.8
By steel works and rolling mills	15,252,736	59.5	(1)	.....	.....
Otherwise, by foundries, etc.	605,467	2.4	(1)	.....	.....
For sale	9,793,595	38.2	6,697,080	40.3	46.2
To steel works and rolling mills	3,824,153	14.9	2,264,683	13.6	68.9
To foundries, for export, etc.	5,969,442	23.3	4,432,397	26.7	34.7
Total for consumption by steel works and rolling mills	19,076,889	74.4	12,191,228	73.3	56.5
Total for other consumption, export, etc	6,574,909	25.6	4,432,397	26.7	48.3

[1] Figures not available.

Production of pig iron, by grades.—Table 33 gives the production of pig iron, classified by grades, for 1909, by states. The characteristics of the various grades are based on the various uses to which the iron is put or the methods of handling it in subsequent processes. The United States totals are given in Table 27.

Statistics as to the amounts of the different grades of pig iron produced were not taken prior to the census of 1899. Low-phosphorus pig iron was included with Bessemer in that year. Malleable Bessemer, a low-silicon Bessemer used for casting purposes, was not reported separately in 1899. At that census some of the reports included it under Bessemer iron, in some cases it was reported under foundry iron, and in other cases under white and mottled iron and miscellaneous grades.

Table 27 BLAST FURNACES—PIG-IRON PRODUCTION.

GRADE.	1909 Tons.	1909 Per cent of total.	1904 Tons.	1904 Per cent of total.	1899 Tons.	1899 Per cent of total.
Total	25,651,798	100.0	16,623,625	100.0	14,447,791	100.0
Bessemer	10,147,052	39.6	8,894,584	53.5	8,475,530	58.7
Low phosphorus	248,720	1.0	192,795	1.2	(1)	.....
Basic	7,741,759	30.2	2,553,940	15.4	937,439	6.5
Foundry	5,539,410	21.6	3,675,310	22.1	3,510,300	24.3
Forge or mill	586,685	2.3	601,677	3.6	1,057,616	7.3
Malleable Bessemer	934,211	3.6	316,964	1.9	.....	.....
White, mottled, and miscellaneous	110,810	0.4	98,627	0.6	208,323	1.4
Direct castings	16,181	0.1	9,469	0.1	7,123	(2)
Spiegeleisen	142,223	0.6	169,630	1.0	163,672	1.1
Ferromanganese	82,208	0.3	57,072	0.3	51,878	0.4
Ferrosilicon and ferrophosphorus	102,539	0.4	53,557	0.3	35,910	0.2

[1] Included with Bessemer. [2] Less than one-tenth of 1 per cent.

A noticeable fact brought out by the table is the decrease in the relative amount of Bessemer iron produced and the very large increase in that of basic pig iron. This change corresponds to the change that has taken place in the relative importance of the different methods of converting iron into steel.

The production of iron intended for steel making—comprising Bessemer, low-phosphorus and basic pig iron, ferrosilicon and ferrophosphorus, spiegeleisen, and ferromanganese—aggregated 18,464,501 tons in 1909, as compared with 11,921,578 tons in 1904 and 9,664,429 tons in 1899, an increase of 91.1 per cent for the decade. Foundry iron increased 57.8 per cent between 1899 and 1909. On the other hand, iron for use in puddling furnaces—forge, and white and mottled iron—aggregated only 697,495 tons in 1909, as compared with 700,304 tons in 1904 and 1,265,939 tons in 1899, a decrease of 44.9 per cent for the decade.

In 1909 Bessemer pig iron constituted 39.6 per cent of the total, basic, 30.2 per cent, and foundry, 21.6 per cent, leaving only 8.6 per cent for all other grades.

The production of spiegeleisen in 1909 amounted to 142,223 tons, and that of ferromanganese to 82,208 tons, a total of 224,431 tons. There has been little change in the aggregate output of these two grades, but the proportion of ferromanganese in the combined total has materially increased. The production of these grades of iron was all from Pennsylvania and Illinois in 1909, but a few other states produced small quantities in 1904.

In 1909 ferrosilicon was reported as made in Ohio, Kentucky, Tennessee, Pennsylvania, and Illinois, and ferrophosphorus in Tennessee. Other ferroalloys—ferrotitanium, ferrotungsten, ferrovanadium, etc., are products of electric furnaces and are not here included.

Production of pig iron, by method of delivery or casting.—Table 28 gives the pig-iron tonnage according to method of delivery or casting in 1909 and 1904. It shows a large increase in iron passed on in a molten condition to subsequent manufacturing processes. This is usually done only in the furnaces which are associated with steel works. In 1909, 12,197,686 tons, or 47.6 per cent of the total product, was delivered to steel works in a molten condition, as compared with 5,898,744 tons, or 35.5 per cent, in 1904. Although the tonnage both of sand-cast and machine-cast pig iron increased materially during the five-year period, the proportion of the total product consisting of sand-cast iron decreased from 36.6 per cent to 29.8 per cent, and the proportion of machine-cast iron decreased from 25.9 per cent to 19.9 per cent. The production of chill-cast iron and direct castings is relatively small.

Table 28 BLAST FURNACES—PIG-IRON PRODUCTION.

METHOD OF CASTING OR DELIVERY.	Number of establishments reporting. 1909	1904	Quantity of product. Tons. 1909	1904	Per cent of total. 1909	1904
United States	203	190	25,651,798	16,623,625	100.0	100.0
Delivered in molten condition to steel works	38	25	12,197,686	5,898,744	47.6	35.5
Sand cast	172	165	7,655,568	6,078,844	29.8	36.6
Machine cast	49	37	5,096,797	4,307,108	19.9	25.9
Chill cast	19	8	685,566	329,460	2.7	2.0
Direct castings	15	17	16,181	9,469	0.1	0.1
Pennsylvania	66	65	10,911,676	7,729,278	100.0	100.0
Delivered in molten condition to steel works	18	11	5,887,507	3,579,501	54.0	46.3
Sand cast	50	49	1,907,514	1,490,312	17.5	19.3
Machine cast	23	21	2,837,576	2,376,870	26.0	30.8
Chill cast	7	4	274,516	279,054	2.5	3.6
Direct castings	5	8	4,563	2,941	(1)	(1)
Ohio	40	33	5,446,971	2,987,787	100.0	100.0
Delivered in molten condition to steel works	9	7	2,723,700	1,105,159	50.0	37.0
Sand cast	33	30	1,625,073	1,361,161	29.8	45.6
Machine cast	12	7	945,036	516,338	17.3	17.3
Chill cast	3	.....	152,824	.....	2.8	.....
Direct castings	1	5	338	5,129	(1)	0.2
All other states	102	92	9,293,151	5,906,560	100.0	100.0
Delivered in molten condition to steel works	11	7	3,586,479	1,214,084	38.6	20.6
Sand cast	89	86	4,122,981	3,227,371	44.4	54.6
Machine cast	14	9	1,314,185	1,413,900	14.1	23.9
Chill cast	9	4	258,226	49,806	2.8	0.8
Direct castings	9	4	11,280	1,399	0.1	(1)

[1] Less than one-tenth of 1 per cent.

Dry-air blast.—The variableness in the humidity of the atmosphere, which interferes greatly with the uniform operation of a furnace, is sometimes overcome by the use of artificially dried air so that the moisture contained may be a minimum and constant quantity. In the report for the census of 1904[1] reference was made to the dry-air blast installation at the Isabella furnaces and comparative statistics were given for runs made with natural air and with air from which moisture had been extracted. At the present census seven establishments reported 14 furnaces as operated with dry blast, the product of these furnaces amounting to 1,418,685 tons of pig iron.

Number and capacity of furnaces.—Table 20 shows the number of completed furnaces of the active establishments in the industry at the end of the respective census years. The increase in the size of furnaces constructed is shown by the fact that during the 20-

[1] Manufactures, 1905, Part IV, p. 45.

year period 1889–1909, although the number of furnaces in active establishments decreased from 473 to 388, the product increased 190 per cent.

The increase in number of stacks from 343 in 1904 to 388 in 1909 does not represent in all cases new furnaces, for there were some stacks in establishments that were idle in 1904 but active in 1909. Reports were not secured from idle establishments at the present census, and consequently statistics are not available relative to the furnace equipment of all establishments.

Of the 388 completed furnaces reported by active establishments at the end of the year 1909, some were not in operation at any time during the year. There were 370 furnaces active at some time during the year. Twenty-four furnaces in active establishments were idle during the entire year; 11 furnaces were completed during the year; 10 furnaces were in course of construction at the end of the year; 8 furnaces were being rebuilt at the end of the year; and 3 furnaces were abandoned or dismantled during the year.

Table 29 gives, by states, for 1909, 1904, and 1899, the number and daily capacity of the furnaces in active establishments, distributed according to fuel used. In 1889 there were 473 furnaces, with an aggregate daily capacity of 39,411 tons.

Table 29

STATE, AND KIND OF FUEL USED.	NUMBER OF COMPLETED FURNACES.			DAILY CAPACITY (TONS).		
	1909	1904	1899	1909	1904 [1]	1899 [1]
United States	388	343	343	101,447	77,816	54,433
Coke [2]	332	260	[3] 227	97,426	69,953	45,070
Anthracite and coke [4]	25	48	80	2,545	6,127	7,966
Charcoal	31	35	36	1,476	1,736	1,397
Alabama	40	38	37	8,370	6,385	5,216
Coke	37	35	32	8,190	6,205	4,956
Charcoal	3	3	5	180	180	260
Colorado (coke)	6	5	2	1,800	1,450	400
Connecticut (charcoal)	3	3	2	48	48	30
Georgia	2	4	3	130	300	145
Coke	1	1	1	70	150	60
Charcoal	1	3	2	60	150	85
Illinois (coke)	23	21	17	7,775	6,552	4,408
Indiana (coke)	7	.....	.....	3,050	.....	.....
Kentucky	6	3	5	710	180	450
Coke	5	3	5	700	180	450
Charcoal	1	.....	.....	10	.....	.....
Maryland	5	5	6	1,415	1,415	1,045
Coke	4	4	5	1,400	1,400	1,030
Charcoal	1	1	1	15	15	15
Massachusetts (charcoal)	2	2	3	30	30	40
Michigan	12	11	7	1,208	1,137	480
Coke	2	1	.....	321	250	.....
Charcoal	10	10	7	887	887	480
Minnesota (coke)	1	1	1	225	225	75
Missouri	2	2	2	208	208	208
Coke	1	1	1	150	150	150
Charcoal	1	1	1	58	58	58
New Jersey	6	8	10	1,440	1,492	737
Coke	5	3	1	1,290	1,000	55
Anthracite and coke	1	5	9	150	492	682
New York	18	15	12	6,508	3,931	1,690
Coke	18	11	4	6,508	3,475	850
Anthracite and coke	.....	2	6	.....	303	810
Charcoal	.....	2	2	.....	153	30
North Carolina (coke)	.....	.....	2	.....	.....	62
Ohio	67	53	51	21,017	15,897	10,468
Coke	66	51	47	21,008	15,865	10,360
Charcoal	1	2	4	9	32	108
Pennsylvania	145	131	136	41,707	33,247	23,497
Coke	117	86	68	39,294	27,891	16,999
Anthracite and coke	24	41	65	2,395	5,332	6,474
Charcoal	4	4	3	18	24	24
Tennessee	15	19	17	1,569	1,939	1,970
Coke	13	17	16	1,545	1,915	1,955
Charcoal	2	2	1	24	24	15
Texas	1	[5]	2	70	.....	100
Coke	1	.....	.....	70	.....	.....
Charcoal	.....	[5]	2	.....	.....	100
Virginia	17	13	19	1,982	1,395	1,907
Coke	16	12	17	1,970	1,385	1,880
Charcoal	1	1	2	12	10	27
West Virginia (coke)	4	4	3	1,125	1,125	750
Wisconsin	6	5	6	1,060	860	755
Coke	5	4	5	935	735	630
Charcoal	1	1	1	125	125	125

[1] Differences in figures as here given from figures published in former reports are due to changes in rating of capacity. In cases where capacity as reported at the census of 1909 differed from that reported for the same and unaltered furnaces at prior censuses the 1909 rating is used for the former years.
[2] Includes mixed bituminous coal and coke.
[3] Includes 5 mixed charcoal and coke furnaces with a daily capacity of 350 tons.
[4] Includes furnaces using anthracite alone; none reported in 1909.
[5] One charcoal furnace was operated by a penal institution.

There has been a marked increase in the output of furnaces. In 1889 the average capacity was 83 tons of pig iron per day; in 1899, 159 tons; in 1904, 227 tons; and in 1909, 261 tons.

During the decade 1899–1909 the number of furnaces increased 13.1 per cent, the aggregate daily capacity 86.4 per cent, and the average capacity per furnace 64.2 per cent. The increase was confined to furnaces using coke. Anthracite furnaces decreased in number and capacity—that is, the furnaces changed from anthracite to coke. Charcoal furnaces were five less in number in 1909 than in 1899, several charcoal furnaces having changed to coke, but they show a slight increase in aggregate capacity.

In 1899, 82.8 per cent of the total capacity was that of coke furnaces, 14.6 per cent that of anthracite and mixed anthracite and coke furnaces, and 2.6 per cent that of charcoal furnaces; in 1909 the corresponding percentages were 96, 2.5, and 1.5 per cent, respectively.

Table 30 shows the distribution of the furnaces according to size in 1909 and 1904.

In both years the largest number of furnaces was in the group having a daily capacity of 100 to 199 tons. The largest capacity tonnage in 1909 was in the 400 to 499 ton group, and in 1904 in the 300 to 399 ton group. In the two lower groups there was a decrease, and in the four higher groups an increase, both in the number and the capacity of furnaces, between 1904 and 1909. The largest increase both in number of furnaces and in capacity was in the group comprising furnaces of 400 to 499 tons capacity.

Table 30

STATE.	ALL FURNACES.		FURNACES HAVING A DAILY CAPACITY OF—											
			Less than 100 tons.		100 to 199 tons.		200 to 299 tons.		300 to 399 tons.		400 to 499 tons.		500 tons and over.	
	1909	1904	1909	1904	1909	1904	1909	1904	1909	1904	1909	1904	1909	1904
United States:														
Number	388	343	57	69	82	95	77	66	81	59	62	31	29	23
Daily capacity, tons	101,447	[1] 77,816	3,006	3,627	11,769	13,586	17,838	15,357	26,568	19,556	26,841	13,590	15,425	12,100
Alabama	40	38	5	3	7	24	20	11	8					
Colorado	6	5					2	2	4	3				
Connecticut	3	3	3	3										
Georgia	2	4	2	3		1								
Illinois	23	21				2	5	5	13	12	2		3	2
Indiana	7								1		6			
Kentucky	6	3	2	3	3		1							
Maryland	5	5	1	1					4	4				
Massachusetts	2	2	2	2										
Michigan	12	11	8	6	3	4	1	1						
Minnesota	1	1					1	1						
Missouri	2	2	1	1	1	1								
New Jersey	6	8		2	3	3	1	1			2	2		
New York	18	15		1	1	3	4	4	8	6	1		4	1
Ohio	67	53	4	6	11	6	12	13	13	11	20	10	7	7
Pennsylvania	145	131	16	27	32	26	23	25	29	22	30	18	15	13
Tennessee	15	19	5	6	9	13	1							
Texas	1	[2]	1											
Virginia	17	13	6	5	9	8	2							
West Virginia	4	4					2	2	1	1	1	1		
Wisconsin	6	5	1		3	4	2	1						

[1] Differences between figures for 1904 as here given and as published in 1905 report are due to changes in rating of capacity of furnaces. In cases where capacity as reported for 1904 differed from that reported for the same furnace, unchanged, in 1909, the later rating is used for both years.
[2] One furnace was operated by a penal institution in 1904.

Maximum production per furnace.—The record for the maximum production of pig iron in a single day is that of Furnace "K" of the Edgar Thomson group of the Carnegie Steel Company, with an output of 918 gross tons on March 30, 1905; the record prior thereto was 901 tons. The largest production for a week, 5,315 tons, was made by Furnace No. 1 of the Duquesne works of the Carnegie Steel Company for the week March 25–31, 1906; and the largest month's production, 21,272 tons, in March, 1905, by the Edgar Thomson Furnace "K." Table 31 gives the statistics in regard to the maximum production for a single day, week, and month for each state in which there are any furnaces with a record of 400 tons or over for a single day. There are, of course, a number of furnaces in some of the leading states which have surpassed the production of any furnace in some of the other states.

Table 31

STATE AND PERIOD.	BLAST FURNACES—MAXIMUM FURNACE RECORDS.				STATE AND PERIOD.	BLAST FURNACES—MAXIMUM FURNACE RECORDS.			
	Pig-iron production (tons).	Date.	Furnace dimensions.			Pig-iron production (tons).	Date.	Furnace dimensions.	
			Height.	Bosh.				Height.	Bosh.
Pennsylvania:			*Ft. in.*	*Ft. in.*	West Virginia:			*Ft. in.*	*Ft. in.*
Day	918	March, 1905	90 10	22 0	Day	569	October, 1907	82 6	21 0
Week	5,315	March, 1906	100 0	23 0	Week	3,707	October, 1907		
Month	21,272	March, 1905	90 10	22 0	Month	14,228	October, 1907		
Ohio:					New Jersey:				
Day	806	December, 1901	106 0	23 0	Day	504	February, 1909	100 0	21 0
Week	4,689	March, 1906			Week	2,940	December, 1908		
Month	19,734	March, 1902			Month	11,835	January, 1909		
Illinois:					Maryland:				
Day	727	March, 1909	90 0	22 0	Day	452	October, 1909	85 0	13 0
Week	4,380	April, 1909			Week	(1)	(1)		
Month	18,335	May, 1909			Month	11,433	July, 1909		
New York:					Alabama:				
Day	679	November, 1905	94 0	24 0	Day	450	October, 1905	(2)	(2)
Week	3,814	October, 1908	94 0	22 9	Week	3,250	October, 1905		
Month	16,795	October, 1908	94 0	22 9	Month	11,544	October, 1905		
Indiana:					Colorado:				
Day	591	December, 1909	85 0	21 6	Day	442	March, 1909	80 0	21 0
Week	3,435	September, 1909			Week	2,844	March, 1909		
Month	13,639	May, 1909			Month	11,903	March, 1909		

[1] Not reported.
[2] Capacity in cubic feet, 15,065.

Blast furnaces require relining from time to time. For this and other reasons they shut down—go "out of blast"—for longer or shorter intervals. Table 32 gives the names of those furnaces which at any time since 1880 have been continuously in blast for five years or more, and shows in each case the number of

days in blast, date of run, time lost by banking, average daily capacity, and production during the period. The list includes furnaces ranging from 65 to 482 tons average daily capacity. Four of these furnaces were still in blast at the time the reports were made.

The record for the largest output on a single lining is still held by the Duquesne Furnace No. 1 of the Carnegie Steel Company, which was in blast between 1896 and 1903, 2,689 days and produced during the time 1,287,381 tons of pig iron.

Table 32

FURNACE AND PERIOD IN BLAST.	RECORD OF FURNACES IN BLAST FIVE YEARS OR MORE. Number of days in blast.	Number of times banked.	Days lost in banking.	Average daily capacity.	Tons of pig iron made during the period.
Shoenberger, No. 2, Pa., March, 1897–August, 1906	3,431	11	69	197	633,208
Edgar Thomson, "H," Pa., March, 1894–June, 1903	3,386	1	35	371	1,256,193
Pioneer No. 1, Mich., October, 1899–October, 1908	3,284	7	555	104	283,923
South Works, No. 7, Ill., March, 1894–January, 1903	3,156	.....	.....	400	1,250,000
Eliza, No. —, Pa., May, 1900–January, 1908	2,810	13	106	444	1,202,056
Duquesne, No. 1, Pa., June, 1896–October, 1903	2,689	.....	.....	479	1,287,381
Iroquois, Ill., December, 1899–March, 1907	2,621	.....	.....	(1)	(1)
Bethlehem, "B," Pa., December, 1880–January, 1888	2,597	.....	.....	(1)	132,653
Newburg, No. 4, Ohio, November, 1896–November, 1903	2,554	.....	.....	218	557,819
Carrie, No. 3, Pa., February, 1901–September, 1907	2,390	3	39	482	1,132,739
Spring Lake Iron Co., Mich., September, 1903–December, 1909	[2] 2,304	10	48	72	164,833
Rockwood, No. —, Tenn., March, 1895–July, 1901	2,280	.....	.....	.....	322,880
Lucy, No. 1, Pa., January, 1904–January, 1910	2,185	.....	.....	117	256,375
Pioneer, No. 2, Mich., April, 1903–April, 1909	2,177	16	288	113	212,851
Bellaire, No. 2, Ohio, November, 1901–October, 1907	2,167	14	166	313	626,800
Cambria, No. —, Pa., August, 1900–July, 1906	2,147	1	9	322	682,656
Mingo, No. 1, Ohio, April, 1902–November, 1907	2,057	2	234	250	429,902
Niagara, N. Y., October, 1904–March, 1910	[2] 1,961	.....	.....	250	416,330
New Castle, No. —, Pa., August, 1904–December, 1909	[2] 1,952	3	50	450	830,967
Warwick, No. —, Pa., December, 1896–March, 1902	1,904	.....	.....	160	306,290
Lake Superior Iron & Chemical Co., Mich., January, 1905–March, 1910	[2] 1,894	26	294	70	112,107
Carbon Iron & Steel Co. (Ltd.), Pa., March, 1899–June, 1904	1,893	5	56	113	176,558
Thomas, No. 5, Pa., February, 1879–April, 1884	1,890	.....	.....	65	73,878
Isabella, No. —, Pa., August, 1902–November, 1907	1,870	1	90	375	668,211

[1] Figures not available.

[2] In blast at time of making report.

Slag pits.—In 1909, 54 establishments reported 85 pits for granulated slag. The capacity of 12 pits was not reported, but the remaining 73 pits had an annual capacity of 5,699,000 tons. In Pennsylvania 22 establishments had 39 slag pits, with an aggregate capacity of 2,703,000 tons. In Ohio 19 establishments had 25 slag pits, of which number 19 had a capacity of 1,149,000 tons. In 1904, 31 establishments reported 47 slag pits with an annual capacity of 3,338,200 tons. The use of granulated slag in cement manufacture was reported by 4 blast-furnace establishments in Pennsylvania, 1 in Ohio, and 1 in Illinois. The slag is also used for filling, railroad ballast, roofing, and roadway macadam.

Pig-iron casting machines.—For 1909 the use of 104 pig-casting machines was reported by 53 establishments, of which 26 were in Pennsylvania, 14 in Ohio, 3 in Illinois, 2 each in Indiana, New Jersey, and New York, and 1 each in Alabama, Colorado, Maryland, and West Virginia. The machines are chiefly of the Heyl and Patterson and the Uehling types, with a few Davis and Hartman machines, and others of special design. As before stated, 5,096,797 tons of pig iron were machine cast in 1909.

Materials, products, and equipment in detail, by states.—Detailed statistics of materials, products, and equipment, by states, are given in Table 33 for 1909.

BLAST FURNACES—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909.

[Tons of 2,240 pounds.]

Table 33

	United States.	Alabama.	Illinois.	Kentucky.	Michigan.	New York.	Ohio.	Pennsylvania.	Tennessee.	Virginia.	Wisconsin.	All other states.[1]
Number of establishments	208	19	6	4	11	9	40	66	13	14	5	21
MATERIALS USED.												
Total cost	$320,037,880	$15,477,361	$30,908,462	$1,115,630	$4,223,511	$20,917,160	$68,424,722	$142,074,028	$3,380,666	$4,418,201	$3,918,480	$25,779,488
Iron ore:												
Tons	48,353,677	4,431,585	4,368,654	175,722	633,478	3,374,227	9,884,358	19,698,996	768,202	873,614	562,687	3,582,154
Cost	$187,204,601	$5,521,702	$17,020,643	$640,320	$2,189,535	$11,698,863	$41,830,645	$90,171,795	$1,298,635	$2,084,685	$1,806,500	$13,001,278
Domestic—												
Tons	46,605,930	4,431,585	4,344,742	175,722	633,478	3,371,104	9,877,788	18,421,393	768,202	873,614	562,687	3,145,610
Cost	$177,589,789	$5,521,702	$16,690,146	$640,320	$2,189,535	$11,688,445	$41,808,121	$82,790,018	$1,298,635	$2,084,685	$1,806,500	$11,071,682
Foreign—												
Tons	1,747,747	.....	23,912	.....	.....	3,123	6,570	1,277,598	.....	.....	.....	436,544
Cost	$9,674,812	.....	$330,497	.....	.....	$10,418	$22,524	$7,381,777	.....	.....	.....	$1,929,596
Mill cinder, scrap, scale, slag, etc.—												
Tons	1,982,530	28,080	212,127	3,051	1,533	45,298	368,931	1,123,027	9,551	13,807	7,347	169,662
Cost	$6,544,859	$155,065	$371,915	$9,040	$4,338	$107,014	$1,041,384	$3,332,335	$20,651	$38,130	$14,149	$440,832
Fluxes—												
Tons	13,570,845	893,010	1,170,357	68,415	77,530	994,561	2,693,423	5,819,912	205,481	430,021	148,187	1,150,948
Cost	$12,239,493	$588,900	$1,075,445	$60,270	$74,900	$819,800	$2,597,107	$5,298,591	$156,444	$315,942	$110,669	$1,141,365

[1] All other states embrace: Colorado, 1 establishment; Connecticut, 2; Georgia, 2; Indiana, 2; Maryland, 2; Massachusetts, 1; Minnesota, 1; Missouri, 2; New Jersey, 4; Texas, 1; and West Virginia, 3.

BLAST FURNACES—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909—Continued.

[Tons of 2,240 pounds.]

Table 33—Continued.	United States.	Alabama.	Illinois.	Kentucky.	Michigan.	New York.	Ohio.	Pennsylvania.	Tennessee.	Virginia.	Wisconsin.	All other states.[1]
MATERIALS USED—continued.												
Fuel for smelting, cost	$105,994,112	$8,188,517	$12,168,346	$372,657	$1,878,278	$7,782,794	$20,593,130	$39,506,062	$1,752,228	$1,721,933	$1,836,407	$10,193,760
Coke—												
Tons (2,000 pounds)	31,436,536	2,810,215	2,884,642	127,326	122,874	2,200,586	6,050,491	13,245,622	575,371	613,716	328,562	2,477,131
Cost	$102,134,423	$7,892,681	$12,168,346	$333,738	$390,794	$7,782,794	$20,433,086	$35,556,786	$1,718,884	$1,678,770	$1,501,145	$9,676,799
Coal—												
Tons	[2] 368,234			6,532			96,301	264,481				920
Cost	[2] $1,072,663			$9,917			$158,644	$900,607				$3,495
Charcoal—												
Bushels	38,032,618	3,735,045		457,398	21,846,630		16,000	476,790	500,897	615,663	4,156,478	6,227,717
Cost	$2,787,026	$295,836		$29,002	$1,487,484		$800	$48,669	$33,344	$43,163	$335,262	$513,466
All other materials	$9,594,824	$1,022,177	$272,113	$33,537	$76,460	$508,629	$2,362,456	$3,765,245	$152,708	$257,511	$150,735	$993,253
PRODUCTS.												
Total value	**$391,429,283**	**$21,235,984**	**$38,299,897**	**$1,478,595**	**$5,824,396**	**$26,620,948**	**$83,699,238**	**$168,578,413**	**$4,653,126**	**$5,389,287**	**$4,793,756**	**$30,855,644**
Pig iron:												
Tons	25,651,798	1,764,544	2,468,772	86,371	327,644	1,717,091	5,446,971	10,911,676	333,416	387,328	285,454	1,922,531
Value	$387,830,443	$21,221,707	$38,299,897	$1,440,276	$5,694,564	$26,596,413	$82,048,712	$167,588,407	$4,644,667	$5,324,997	$4,591,351	$30,379,452
For consumption in works of company producing—												
Tons	15,858,203	[3]	2,152,608			770,429	3,564,358	7,628,653			[3]	1,435,305
Value	$239,387,017	[3]	$33,174,513			$11,977,428	$53,108,589	$115,422,575			[3]	$22,139,375
For sale—												
Tons	9,793,595	[3]	316,164	86,371	327,644	946,662	1,882,613	3,283,023	333,416	387,328	[3]	487,226
Value	$148,443,426	[3]	$5,125,384	$1,440,276	$5,694,564	$14,618,985	$28,940,123	$52,165,832	$4,644,667	$5,324,997	[3]	$8,240,077
All other products	$3,598,840	$14,277		$38,319	$129,832	$24,535	$1,650,526	$990,006	$8,458	$64,290	$202,405	$476,192
Pig iron classified according to fuel used:												
Coke—												
Tons	24,522,152	[3]	2,468,772	68,088	[3]	1,717,091	5,376,398	10,259,155	[3]	384,544	239,280	1,849,714
For consumption	15,826,734	[3]	2,152,608			770,429	3,564,358	7,597,184			[3]	1,435,305
For sale	8,695,418	[3]	316,164	68,088	[3]	946,662	1,812,040	2,661,971	[3]	384,544	[3]	414,409
Value	$368,131,822	[3]	$38,299,897	$1,042,864	[3]	$26,596,413	$80,813,570	$156,834,660	[3]	$5,262,357	$3,806,393	$28,822,159
Bituminous coal and coke mixed—												
Tons	86,420			[3]			[3]					
Value	$1,552,814			[3]			[3]					
Anthracite and coke—												
Tons	670,991							[3]				[3]
For consumption	31,469							[3]				[3]
For sale	639,522							[3]				[3]
Value	$10,962,150							[3]				[3]
Charcoal—												
Tons	372,235	[3]		[3]	[3]		[3]	[3]	[3]	2,784	46,174	51,308
Value	$7,183,657	[3]		[3]	[3]		[3]	[3]	[3]	$62,640	$748,958	$1,231,862
Pig iron classified by grades, total, tons	25,651,798	1,764,544	2,468,772	86,371	327,644	1,717,091	5,446,971	10,911,676	333,416	387,328	285,454	1,922,531
Bessemer (0.04 to 0.10 per cent phosphorus)	10,147,052		1,805,718	41,769		622,115	3,447,020	3,775,728	[3]		[3]	417,375
For consumption	8,978,732		1,736,102			[3]	3,055,963	3,147,975			[3]	414,216
For sale	1,168,320		69,616	41,769		[3]	391,057	627,753	[3]		[3]	3,159
Low phosphorus (below 0.04 per cent phosphorus)	248,720	19,219				[3]	9,111	137,521	[3]			9,211
For consumption	4,279							4,279				
For sale	244,441	19,219				[3]	9,111	133,242	[3]			9,211
Basic	7,741,759	358,046	352,381			262,846	798,173	4,815,840		62,324		1,092,149
For consumption	5,999,384	266,131	352,381			181,965	428,505	3,887,041				882,761
For sale	1,742,375	91,915				80,881	369,668	928,199		62,324		209,388
Foundry	5,539,410	1,279,109	60,151	23,681	291,310	629,905	714,322	1,542,722	271,562	321,813	195,258	209,577
For consumption	424,918	1,309						398,122			2,184	23,303
For sale	5,114,492	1,277,800	60,151	23,681	291,310	629,905	714,322	1,144,600	271,562	321,813	193,074	186,274
Forge or mill	586,685	74,014	2,633			48,446	60,805	366,808	12,693	2,373		18,913
For consumption	74,777							74,777				
For sale	511,908	74,014	2,633			48,446	60,805	292,031	12,693	2,373		18,913
Malleable Bessemer	934,211		173,871		30,342	107,973	364,067	37,642			53,578	166,738
For consumption	187,418						79,552				853	107,013
For sale	746,793		173,871		30,342	107,973	284,515	37,642			52,725	59,725
White, mottled, and miscellaneous	110,810	31,568	9,893		5,992	299	5,783	51,916	4,176	689		494
For consumption	35,667							35,667				
For sale	75,143	31,568	9,893		5,992	299	5,783	16,249	4,176	689		494
Direct castings	16,181	2,588				440	338	4,563	49	129		8,074
Ferroalloys	326,970		64,125	20,921			47,352	178,936	15,636			
For consumption	140,557		64,125					76,432				
For sale	186,413			20,921			47,352	102,504	15,636			
Spiegeleisen	142,223		56,531					85,692				
Ferromanganese	82,208		799					81,409				
Ferrosilicon, including Bessemer ferrosilicon (7 per cent or over silicon) and ferrophosphorus	102,539		6,795	20,921			47,352	11,835	15,636			

[1] All other states embrace: Colorado, 1 establishment; Connecticut, 2; Georgia, 2; Indiana, 2; Maryland, 2; Massachusetts, 1; Minnesota, 1; Missouri, 2; New Jersey, 4; Texas, 1; and West Virginia, 3.

[2] Includes 265,401 long tons of anthracite, costing $904,102, and 102,833 long tons of bituminous, costing $168,561.

[3] Included in totals but amount not shown, to avoid disclosure of individual operations.

BLAST FURNACES—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909—Continued.

[Tons of 2,240 pounds.]

Table 33—Continued.	United States.	Alabama.	Illinois.	Kentucky.	Michigan.	New York.	Ohio.	Pennsylvania.	Tennessee.	Virginia.	Wisconsin.	All other states.[1]
PRODUCTS—continued.												
Pig iron, classified by method of delivery or casting, total tons	25,051,798	1,764,544	2,408,772	86,371	327,644	1,717,091	5,446,971	10,911,676	333,416	387,328	285,454	1,922,531
Delivered in molten condition to steel works	12,197,080	227,570	1,731,870			692,691	2,723,700	5,887,507				934,348
Sand cast	7,655,568	1,403,910	292,723	86,371	327,644	764,800	1,625,073	1,907,514	333,367	326,732	285,454	301,980
Machine cast	5,096,797	79,305	444,179			205,880	945,036	2,837,576				584,821
Chill cast	685,566	51,171				53,280	152,824	274,516		60,467		93,308
Direct castings	16,181	2,588				440	338	4,563	49	129		8,074
Pig iron made with dry-air blast (moisture extracted from the air), tons	1,418,085		(2)		(2)		(2)	(2)			(2)	
EQUIPMENT.												
Furnaces in active establishments:												
Completed furnaces at end of year (not including furnaces rebuilding)—												
Number	388	40	23	6	12	18	67	145	15	17	6	39
Daily capacity, tons	101,447	8,370	7,775	710	1,208	6,508	21,017	41,707	1,569	1,982	1,060	9,541
Active during the year—												
Number	370	32	24	4	11	19	65	143	14	15	7	36
Daily capacity, tons	98,973	7,040	8,125	475	1,148	6,701	20,677	41,557	1,557	1,692	1,310	8,691
Coke furnaces—												
Number	312	30	24	2	2	19	60	115	13	14	6	27
Daily capacity, tons	94,499	6,930	8,125	350	321	6,701	20,388	38,944	1,545	1,680	1,185	8,330
Bituminous coal and coke mixed furnaces—												
Number	5			1			4					
Daily capacity, tons	395			115			280					
Anthracite and coke mixed furnaces—												
Number	25							24				1
Daily capacity, tons	2,745							2,595				150
Charcoal furnaces—												
Number	28	2		1	9		1	4	1	1	1	8
Daily capacity, tons	1,334	110		10	827		9	18	12	12	125	211
Operated with dry-air blast (moisture extracted from the air)	14		3		1		2	6			2	
Completed during the year—												
Number	11		1				2	4				4
Daily capacity, tons	3,807		300				700	1,007				1,800
Coke furnaces—												
Number	9		1				2	2				4
Daily capacity, tons	3,800		300				700	1,000				1,800
Charcoal furnaces—												
Number	2							2				
Daily capacity, tons	7							7				
Rebuilding at end of year—												
Number	8	1	1			1		2	2		1	
Daily capacity, tons	1,873	280	350			193		500	300		250	
Coke furnaces—												
Number	7	1	1			1		1	2		1	
Daily capacity, tons	1,623	280	350			193		250	300		250	
Anthracite and coke furnaces—												
Number	1							1				
Daily capacity, tons	250							250				
In course of construction at end of year—												
Number	10				1	1	1	5				2
Daily capacity, tons	4,100				250	425	325	2,200				900
Idle during the entire year—												
Number	24	8		2	1		3	4	1	2		3
Daily capacity, tons	4,027	1,330		235	60		600	600	12	290		900
Coke furnaces—												
Number	19	7		1			3	3		2		3
Daily capacity, tons	3,750	1,260		150			600	550		290		900
Bituminous coal and coke mixed furnaces—												
Number	1			1								
Daily capacity, tons	85			85								
Anthracite furnaces—												
Number	1							1				
Daily capacity, tons	50							50				
Charcoal furnaces—												
Number	3	1			1				1			
Daily capacity, tons	142	70			60				12			
Abandoned or dismantled in the course of the year—												
Number	3						2	1				
Daily capacity, tons	710						535	175				
Pig-casting machines, number	104	2	7			5	20	56				14
Granulated-slag pits—												
Number	85		3	2		6	25	39			1	9
Annual capacity, tons	5,699,259		503,252			806,000	1,148,818	2,702,974			30,000	508,215
Gas engines operated with blast-furnace gas:												
Number	85		4			24	10	13			1	33
Horsepower	198,040		14,000			40,000	20,140	32,100			800	91,000
Department in which used—												
Blast furnace—												
Number	42					16	4	6				16
Horsepower	98,640					32,000	10,640	16,000				40,000
Rolling mill—												
Number	2							2				
Horsepower	2,800							2,800				
Electric generation—												
Number	41		4			8	6	5			1	17
Horsepower	96,600		14,000			8,000	9,500	13,300			800	51,000

[1] All other states embrace: Colorado, 1 establishment; Connecticut, 2; Georgia, 2; Indiana, 2; Maryland, 2; Massachusetts, 1; Minnesota, 1; Missouri, 2; New Jersey, 4; Texas, 1; and West Virginia, 3.

[2] Included in totals, but figures can not be shown without disclosing individual operations.

DETAILED STATE TABLES.

The principal facts derived from the census inquiry concerning the blast-furnace industry, other than those relating to specific materials, products, and equipment, are presented, by states, in two general tables. Table 34 shows, for 1909, 1904, and 1899, the number of establishments, persons engaged in the industry, primary power used, capital invested, principal classes of expenses, value of products, and value added by manufacture for the United States and for each of the principal producing states. Table 35 gives more detailed statistics on the same subjects for 1909 only.

BLAST FURNACES—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 34

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.				Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
			Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).		Expressed in thousands.					
United States	**1909**	**208**	**43,061**	**48**	**4,584**	**38,429**	**1,173,422**	**$487,581**	**$6,525**	**$24,607**	**$320,638**	**$391,429**	**$70,791**
	1904	**190**	**37,335**	**26**	**2,231**	**35,078**	**773,278**	**236,146**	**2,891**	**18,935**	**178,942**	**231,823**	**52,881**
	1899	**223**	**41,046**	**48**	**1,757**	**39,241**	**497,272**	**143,159**	**2,304**	**18,484**	**131,504**	**206,757**	**75,253**
Alabama	1909	19	4,325	.....	542	3,783	106,189	23,816	740	2,077	15,477	21,236	5,759
	1904	19	5,216	.....	262	4,954	101,048	19,326	321	1,939	11,012	16,646	5,634
	1899	19	5,182	.....	148	5,034	58,844	11,587	237	1,382	7,610	13,488	5,878
Illinois	1909	6	2,927	.....	434	2,493	70,453	52,390	496	1,793	30,908	38,300	7,392
	1904	4	1,993	.....	83	1,910	45,487	14,263	101	1,398	19,005	27,331	8,326
	1899	4	3,220	.....	210	3,010	35,520	10,684	295	2,176	11,708	15,154	3,446
Michigan	1909	11	1,101	.....	85	1,016	17,403	8,291	148	632	4,224	5,824	1,600
	1904	11	1,236	.....	97	1,139	7,491	4,253	110	588	3,104	4,644	1,540
	1899	7	557	.....	44	513	2,704	2,030	64	216	1,405	2,327	922
New York	1909	9	2,502	.....	264	2,298	95,416	39,666	408	1,758	20,917	26,621	5,704
	1904	9	1,635	.....	76	1,559	39,080	14,645	157	1,161	6,374	8,635	2,261
	1899	9	1,078	.....	45	1,033	15,263	3,390	81	632	3,508	5,046	1,538
Ohio	1909	40	8,278	7	976	7,295	215,739	94,533	1,366	5,090	68,425	83,699	15,274
	1904	33	5,829	.....	395	5,434	167,740	43,196	508	3,471	32,477	40,862	8,385
	1899	43	6,342	17	286	6,039	95,040	22,347	342	3,287	23,543	40,367	16,824
Pennsylvania	1909	66	16,215	34	1,660	14,521	476,080	194,708	2,400	9,457	142,074	168,578	26,504
	1904	65	14,782	24	891	13,867	304,154	107,742	1,114	7,704	86,322	107,455	21,133
	1899	77	16,712	28	609	16,075	217,326	72,513	787	8,038	64,095	101,575	37,480
Tennessee	1909	13	1,268	.....	125	1,143	18,150	7,122	147	519	3,381	4,653	1,272
	1904	13	1,486	.....	128	1,358	21,011	5,688	128	546	2,609	3,428	819
	1899	13	1,845	1	81	1,763	13,350	5,252	103	439	3,169	4,693	1,524
Virginia	1909	14	1,425	.....	105	1,320	17,320	6,305	190	546	4,418	5,389	971
	1904	10	1,150	.....	69	1,081	12,465	3,157	82	340	2,717	3,343	626
	1899	16	1,710	.....	116	1,594	21,605	4,783	147	529	4,374	6,505	2,131
Wisconsin	1909	5	817	.....	59	758	12,975	6,145	103	497	3,918	4,794	876
	1904	4	521	.....	39	482	5,875	2,649	63	257	2,251	3,075	824
	1899	5	577	.....	26	551	4,160	1,637	42	308	2,015	2,900	885
All other states	1909	25	4,143	7	334	3,802	143,097	54,605	527	2,238	26,896	32,335	5,439
	1904	22	3,487	2	191	3,294	68,927	21,227	247	1,465	13,071	16,404	3,333
	1899	30	3,823	2	192	3,629	33,460	8,930	206	1,477	10,077	14,702	4,625

BLAST FURNACES—DETAILED STATISTICS, BY STATES: 1909.

Table 35

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.								WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY.					Primary horsepower.
		Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks.		Wage earners.			Total.	16 and over.		Under 16.		
					Male.	Female.	Average number.	Number, 15th day of— Maximum month.	Number, 15th day of— Minimum month.		Male.	Female.	Male.	Female.	
United States	208	43,061	48	1,071	3,182	331	38,429	De 46,727	Ap 33,458	47,278	47,184	10	84	.....	1,173,422
Alabama	19	4,325	.....	208	300	34	3,783	No 4,609	Je 3,318	4,513	4,483	.....	30	.....	106,189
Illinois	6	2,927	.....	37	341	56	2,493	De 2,997	Ja 2,053	2,997	2,997	.....	.....	.....	70,453
Kentucky	4	359	4	12	10	2	331	Je 481	Au 205	325	325	.....	.....	.....	7,895
Michigan	11	1,101	.....	36	44	5	1,016	Se 1,235	Ja 699	1,227	1,226	1	.....	.....	17,403
New York	9	2,562	.....	39	200	25	2,298	De 2,842	Ap 1,929	2,842	2,839	3	.....	.....	95,416
Ohio	40	8,278	7	202	717	57	7,295	De 9,168	Fe 6,214	9,187	9,184	3	.....	.....	215,739
Pennsylvania	66	16,218	34	359	1,182	119	14,521	De 17,407	Mh 12,559	17,556	17,532	.....	24	.....	476,680
Tennessee	13	1,268	.....	48	69	8	1,143	Ja 1,461	My 893	1,539	1,526	.....	13	.....	18,150
Virginia	14	1,425	.....	31	69	5	1,320	De 1,704	My 1,114	1,699	1,684	.....	15	.....	17,320
Wisconsin	5	817	.....	13	41	5	758	My 889	Au 581	804	804	.....	.....	.....	12,975
All other states [1]	21	3,784	3	86	209	15	3,471	.....	.....	4,589	4,584	3	2	.....	135,202

STATE.	Capital.	EXPENSES.									Value of products.	Value added by manufacture (value of products less cost of materials).
		Total.	Services.			Materials.		Miscellaneous.						
			Officials.	Clerks.	Wage earners.	Fuel and rent of power.	Other.	Rent of factory.	Taxes, including internal revenue.	Contract work.	Other.		
United States	$487,580,659	$362,810,409	$3,078,887	$3,445,725	$24,606,530	$108,536,921	$212,100,068	$492,404	$1,684,744	$68,608	$8,825,622	$391,429,283	$70,791,394
Alabama	23,816,400	19,103,561	479,804	260,038	2,077,477	8,383,340	7,094,021	11,615	133,068	3,225	660,973	21,235,984	5,758,623
Illinois	52,389,822	34,196,611	174,841	320,726	1,792,965	12,256,101	18,652,361	.....	184,249	.....	814,768	38,299,397	7,391,435
Kentucky	2,588,590	1,395,399	24,918	14,001	165,226	379,347	736,483	3,000	24,062	.....	48,362	1,478,595	362,765
Michigan	8,290,548	5,317,635	96,434	52,031	632,096	1,865,917	2,357,594	3,000	48,511	12,346	249,706	5,824,396	1,660,885
New York	39,660,101	23,769,980	211,226	197,171	1,758,054	7,967,326	12,949,834	78,165	103,635	.....	504,569	26,620,948	5,703,788
Ohio	94,532,845	77,273,870	565,058	890,777	5,089,969	21,227,222	47,197,500	38,520	430,205	26,360	1,898,259	83,699,238	15,274,516
Pennsylvania	194,708,463	158,531,392	990,977	1,408,840	9,456,714	40,480,064	101,593,964	271,970	568,769	9,445	3,750,649	168,578,413	26,504,385
Tennessee	7,122,172	4,186,377	107,846	39,115	519,274	1,802,704	1,577,962	.....	22,922	310	116,244	4,653,125	1,272,459
Virginia	6,304,888	5,403,889	121,875	67,653	545,749	1,780,341	2,637,860	27,970	34,439	.....	188,002	5,389,287	971,086
Wisconsin	6,144,881	4,674,658	50,840	51,062	497,404	1,860,253	2,058,207	.....	35,147	.....	120,845	4,703,750	875,206
All other states [1]	52,015,949	28,957,037	255,068	233,411	2,071,602	10,534,306	15,245,182	28,164	99,737	16,922	473,245	30,855,644	5,076,156

[1] All other states embrace: Colorado, 1 establishment; Connecticut, 2; Georgia, 2; Indiana, 2; Maryland, 2; Massachusetts, 1; Minnesota, 1; Missouri, 2; New Jersey, 4; Texas, 1; West Virginia, 3.

PART IV.—STEEL WORKS AND ROLLING MILLS.

GENERAL STATISTICS.

Description of the industry.—The establishments assigned to this classification are engaged primarily in the conversion of iron into steel and in the rolling of iron and steel. The statistics also include the figures for forges and bloomeries, which at earlier censuses were tabulated separately. Formerly the manufacture, for sale as such, of hammered charcoal blooms, billets, and bars direct from the ore and from pig iron and scrap was an important part of the industry, and in 1869 there were still 82 establishments of this class, but by 1899 the number of active establishments was reduced to 7, and the tabulation of the statistics for this class of establishments as a separate industry was discontinued in 1904.

In addition to the establishments classified as "steel works and rolling mills" there were, in 1909, 29 establishments which were engaged primarily in making other more highly finished products but which had steel-making or hot-rolling facilities as minor features of their equipment. These 29 establishments were in the following industries: Agricultural implements, 1; steam-railroad cars, 4; cutlery and tools, 1; electrical machinery, apparatus, and supplies, 2; files, 1; foundry and machine-shop products, 16; saws, 1; shipbuilding, 1; and wire, 2. Data for these establishments are not included in the present section except as indicated.[1]

Many steel-rolling establishments subject the primary products of the rolling mill to further processes of manufacture; for example, they manufacture wire from wire rods, wrought-welded pipe and tubes from skelp, cut nails from nail plates, etc. The statistics in the present section show not only the direct or primary rolled products of the mills, but also such more highly finished products as were made therefrom in the same establishments, except that the tin-plate dipping departments of rolling mills have been treated as separate establishments. The relation of the steel works and rolling mills to the blast furnaces has already been discussed.

Summary and comparison with earlier censuses.—Table 36 summarizes the statistics for the industry for each census from 1869 to 1909, inclusive.

Steel works and rolling mills constitute one of the largest industries in the country. The number of persons engaged in the industry in 1909 was 260,762, of whom 240,076 were wage earners, the amount paid in wages being $163,200,758. The value of products shown in the table conveys no precise idea as to the magnitude of the industry, since it involves considerable duplication due to the sale or transfer of the products of one establishment in the industry to another establishment in the industry for use in further manufacture. Similarly, the reported cost of materials involves much duplication. Were it not for this duplication within the industry itself, the ratio of the value added by manufacture to the value of products would be much higher. The value added by manufacture in 1909 was $328,221,678.

[1] The value of the steel castings and rolled-steel products of these 29 establishments was $6,627,039, of which $5,013,407 represented that of products for consumption in the same establishments and $1,613,632 that of products for sale.

Table 36 STEEL WORKS AND ROLLING MILLS.

	Number or amount.						Per cent of increase.[1]					
	1909	1904	1899	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	446	415	445	415	451	[2] 422	0.2	7.5	−0.7	7.2	−8.0	6.9
Persons engaged in the industry	260,762	221,956	193,825	[3]	[3]	[3]	36.6	17.5	16.3	.....	.....	.....
Proprietors and firm members	47	64	122	[3]	[3]	[3]	−61.5	−26.6	−47.5	.....	.....	.....
Salaried employees	20,639	14,330	7,454	[3]	[3]	[3]	176.9	44.0	92.2	.....	.....	.....
Wage earners (average number)	240,076	207,562	183,249	137,766	99,103	50,001	31.0	15.7	13.3	33.0	[4]	[4]
Primary horsepower	2,100,978	1,649,299	1,100,801	535,430	[3]	[3]	90.9	27.4	49.8	105.6	.....	.....
Capital	$1,004,735,111	$700,182,310	$430,232,441	$276,224,301	$120,373,603	$65,626,748	133.5	43.5	62.7	55.8	129.5	83.4
Expenses	889,501,220	618,930,751	527,475,387	308,556,550	[3]	[3]	68.6	43.7	17.3	70.9	.....	.....
Services	189,302,222	140,352,488	111,769,244	79,510,047	42,796,082	28,039,731	69.4	34.9	25.6	40.6	85.8	52.6
Salaries	26,191,464	17,860,495	9,433,368	[3]	[3]	[3]	177.6	46.6	89.3	.....	.....	.....
Wages	163,200,758	122,491,993	102,335,876	[3]	[3]	[3]	59.5	33.2	19.7	.....	.....	.....
Materials	657,500,856	441,204,432	390,895,277	217,174,230	132,651,408	90,028,115	68.2	49.0	12.9	80.0	63.7	47.3
Miscellaneous	42,608,142	37,373,331	24,810,866	11,872,273	[3]	[3]	71.7	14.0	50.6	109.0	.....	.....
Value of products	985,722,534	673,905,026	597,211,716	333,044,366	207,242,116	137,568,198	65.1	46.3	12.9	79.3	60.7	50.6
Value added by manufacture (value of products less cost of materials)	328,221,678	232,760,594	206,316,439	115,870,136	74,590,708	47,540,083	59.1	41.0	12.8	78.1	55.3	56.9

[1] A minus sign (−) denotes decrease. Where percentages are omitted, comparable figures are not available.
[2] Includes idle establishments, which were not reported separately in 1869.
[3] Comparable figures not available.
[4] Percentage omitted because figures are not strictly comparable.

Because of the possibility that the amount of duplication in value of products and cost of materials may have varied more or less from census to census, the statistics for these items may not be altogether comparable. Doubtless, however, they do show roughly the growth in the volume of business as meas-

ured in terms of money. Because of changes in prevailing prices of iron and steel products from time to time, however, the statistics as to value of products do not very closely represent the changes which have taken place in the quantity of output.

The total number of establishments, including forges and bloomeries for all years, has not varied greatly, the increase for the 40 years covered by the table being only 5.7 per cent. In the case of value of products, however, the amount for 1909 was over seven times that for 1869 and the average value of products per establishment shows a steady increase from census to census—from $325,991 in 1869 to $2,210,140 in 1909. The rate of increase in value of products for the successive decades has been quite uniform, ranging from a minimum increase of 50.6 per cent for the decade 1869–1879 to a maximum of 79.3 per cent for the decade 1889–1899. The increase in value of products from 1899 to 1909 is perhaps partly attributable to advance in prices, but for some of the more important products the prices—at least the quoted prices in trade journals—were substantially the same in both years.

Table 37, which gives separately the total number of establishments and value of products for the steel works and rolling mills proper and for forges and bloomeries at each decennial census since 1879, indicates the comparative unimportance of the latter at the present time.

Table 37

	The combined industry.	Steel works and rolling mills proper.	Forges and bloomeries.
Number of establishments:			
1909	446	442	4
1899	445	438	7
1889	415	395	20
1879	451	358	93
Value of products:			
1909	$985,722,534	$985,374,068	$348,466
1899	597,211,716	596,689,284	522,432
1889	333,044,366	331,860,872	1,183,494
1879	207,242,116	203,274,042	3,968,074

Geographic distribution.—The steel-works and rolling-mill industry is concentrated largely in the Middle Atlantic and East North Central states, and the panhandle of West Virginia. Of the 446 establishments in 1909, 362, or 81.2 per cent, were located in seven contiguous states—New York, New Jersey, Pennsylvania, West Virginia, Ohio, Indiana, and Illinois. The value of products for these seven states amounted to $897,365,567, or 91 per cent of the total for the United States. The map on the next page shows the location of the establishments in each state as far west as Minnesota and Missouri. In addition, Texas, Colorado, Wyoming, and Washington reported 1 establishment each, Oregon reported 2, and California 5.

Leading counties.—There are 36 counties which for 1909 reported products from steel works and rolling mills exceeding $5,000,000 in value each. These 36 counties contained 251 establishments, or 56.3 per cent of the total for the industry, with products valued at $865,248,156, or 87.8 per cent of the total. Of these counties 15 are in Pennsylvania, 7 in Ohio, 4 in Illinois, 2 in Indiana, 2 in West Virginia, and 1 each in Alabama, Colorado, Maryland, Massachusetts, New York, and Wisconsin. Table 38 gives for these counties the number of establishments and the value of products so far as this can be shown without disclosing individual operations. The counties are arranged in the order of value of products.

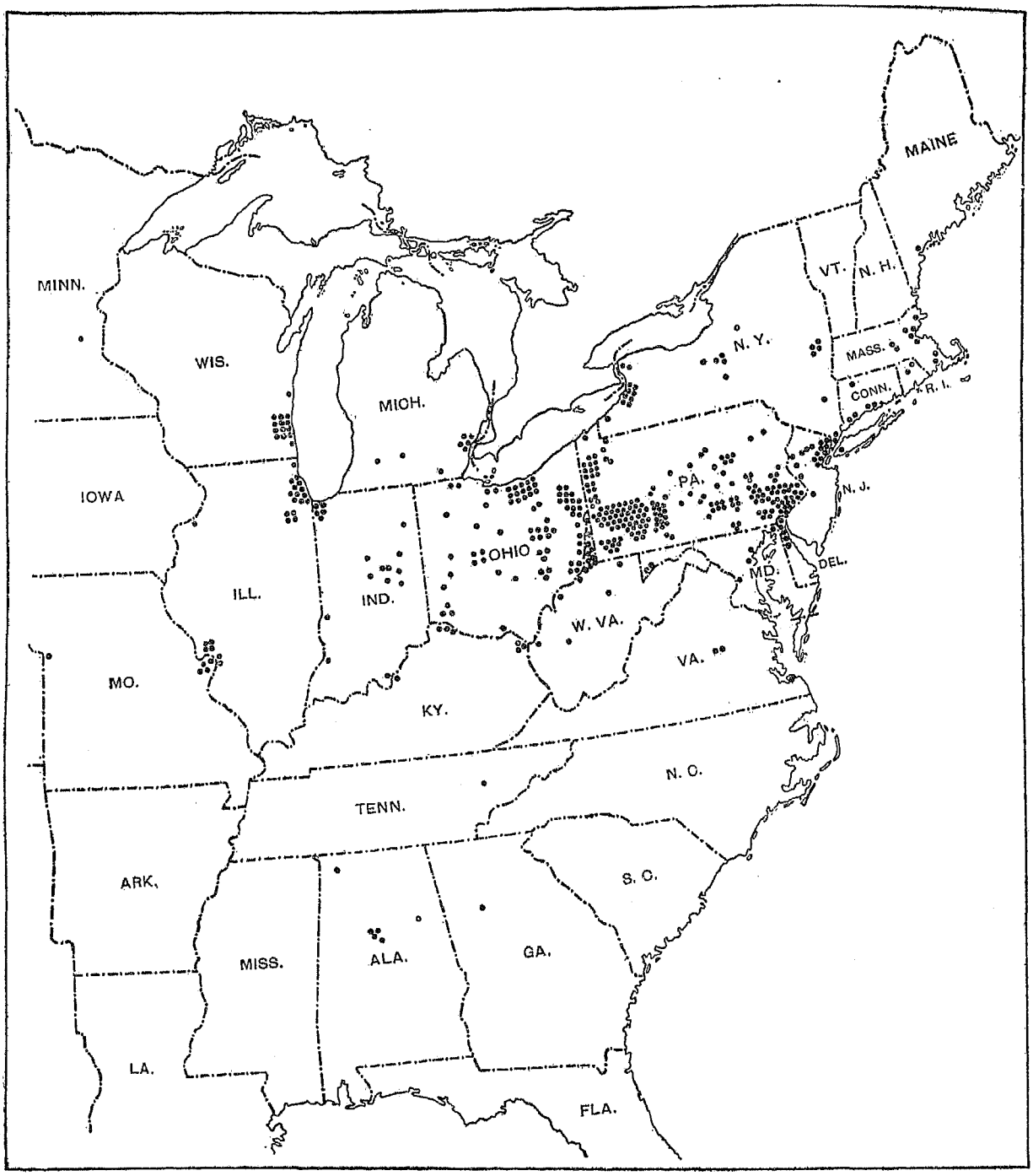
Table 38 STEEL WORKS AND ROLLING MILLS: 1909

COUNTY.	Number of establishments.	Value of products. Amount.	Per cent of total.
United States	**446**	**$985,722,534**	**100.0**
Counties with products valued at $5,000,000 and over:			
Allegheny, Pa.	55	241,126,750	24.5
Mahoning, Ohio	9	62,664,563	6.4
Cook, Ill.	11	48,522,905	4.9
Westmoreland, Pa.	15	40,366,714	4.1
Cuyahoga, Ohio	15	39,580,581	4.0
Erie, N. Y.	8	27,775,674	2.8
Dauphin, Pa.	6	23,363,013	2.4
Lake, Ind.	5	23,009,369	2.3
Jefferson, Ohio	3	22,507,222	2.3
Washington, Pa.	9	22,316,607	2.3
Lawrence, Pa.	4	21,521,969	2.2
Mercer, Pa.	11	20,073,466	2.0
Montgomery, Pa.	8	16,058,535	1.6
Chester, Pa.	5	15,745,014	1.6
Philadelphia, Pa.	8	11,788,721	1.2
Milwaukee, Wis.	12	10,671,641	1.1
Stark, Ohio	8	10,543,760	1.1
Belmont, Ohio	4	10,506,347	1.1
Berks, Pa.	10	9,763,311	1.0
Madison, Ind.	3	7,570,027	0.8
Ohio, W. Va.	5	7,015,595	0.7
Madison, Ill.	4	6,272,950	0.6
Tuscarawas, Ohio	3	5,907,154	0.6
Lehigh, Pa.	3	5,896,364	0.6
Lebanon, Pa.	5	5,098,452	0.5
Other counties (11)[1]	22	149,581,752	15.2
All other counties	195	120,474,378	12.2

[1] Includes Lorain in Ohio; Cambria, Northampton, and Mifflin in Pennsylvania; Will and Lake in Illinois; Pueblo in Colorado; Worcester in Massachusetts; Baltimore in Maryland; Marshall in West Virginia; and Jefferson in Alabama.

Different classes of works.—The steel-works and rolling-mill industry comprises three classes of establishments: (1) Those equipped both with furnaces for making steel and with hot rolls for rolling it; (2) those equipped with steel furnaces but not with hot rolls; and (3) those equipped with hot rolls but not with steel furnaces. Most of the largest establishments belong to the first group. All steel plants operated in conjunction with blast furnaces are also equipped with rolling departments. On the other hand, no establishments of the second group have blast furnaces, but all buy pig iron and scrap for steel making. Establishments of the third group include those purchasing their material in the form of ingots, blooms, slabs, or other shapes, pig iron for puddling furnaces, and also the few independent bloomeries.

STEEL WORKS AND ROLLING MILLS—LOCATION OF ESTABLISHMENTS: 1909.



NOTE.—The total number of establishments in Allegheny County, Pennsylvania (55), not shown because of lack of space.

Table 39 shows, for 1909, the number of establishments and value of products for the respective groups for the United States and the states of Pennsylvania and Ohio. In the country as a whole steel works and rolling mills combined produced 61.6 per cent of the aggregate value of products in 1909; steel works without rolling mills, only 4.7 per cent; and rolling mills without steel works, 33.8 per cent. These percentages, however, give a somewhat exaggerated idea of the importance of the latter class of mills, because the value of their product consists in considerable part of the value of the crude steel purchased.

Table 39

STATE AND CLASS OF WORKS.	STEEL WORKS AND ROLLING MILLS: 1909			
	Number of establishments.	Value of products.	Per cent of total.	
			Number of establishments.	Value of products.
United States	**446**	**$985,722,534**	**100.0**	**100.0**
Steel works and rolling mills	89	607,036,138	20.0	61.6
Steel works only	99	45,876,568	22.2	4.7
Rolling mills only	258	332,809,828	57.8	33.8
Pennsylvania	**189**	**500,343,995**	**100.0**	**100.0**
Steel works and rolling mills	44	329,652,618	23.3	65.9
Steel works only	33	20,786,673	17.5	4.2
Rolling mills only	112	149,904,704	59.2	30.0
Ohio	**75**	**197,780,043**	**100.0**	**100.0**
Steel works and rolling mills	13	100,239,521	17.3	50.7
Steel works only	13	5,117,556	17.3	2.6
Rolling mills only	49	92,422,966	65.3	46.7
All other states	**182**	**287,598,496**	**100.0**	**100.0**
Steel works and rolling mills	32	177,143,999	17.6	61.6
Steel works only	53	19,972,339	29.1	6.9
Rolling mills only	97	90,482,158	53.3	31.5

Summary, by states.—Table 40 summarizes the more important statistics of the industry by states, the states being arranged according to the value of products reported for 1909. The figures representing rank indicate the actual rank of the state among all states, including those not shown separately in the table. Pennsylvania in 1909 contributed over half (50.7 per cent) of the total value of products; Ohio, about one-fifth (20.1 per cent); Illinois, 8.8 per cent; New York, 4 per cent; and Indiana, 3.9 per cent.

The highest percentage of increase in value of products from 1904 to 1909 is shown for California, a state of relatively minor importance in the industry. Of the leading producing states, Indiana, owing to the recent great development at Gary, shows the highest percentages of increase—69.9 per cent in wage earners, 128.4 per cent in value of products, and 108.7 per cent in value added by manufacture.

Table 40

STATE.	STEEL WORKS AND ROLLING MILLS.																			
	Number of establishments: 1909	Wage earners.				Value of products.				Value added by manufacture.				Per cent of increase.[1]								
		Average number: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Wage earners (average number).			Value of products.			Value added by manufacture.		
				1909	1904			1909	1904			1909	1904	1899-1909	1904-1909	1899-1904	1899-1909	1904-1909	1899-1904	1899-1909	1904-1909	1899-1904
United States	**446**	**240,076**	**100.0**			**$985,722,534**	**100.0**			**$328,221,678**	**100.0**			**31.0**	**15.7**	**13.3**	**65.1**	**46.3**	**12.9**	**69.1**	**41.0**	**12.8**
Pennsylvania	189	126,911	52.9	1	1	500,343,995	50.8	1	1	171,330,574	52.2	1	1	33.9	14.4	17.0	50.3	37.5	9.3	50.5	36.1	10.6
Ohio	75	38,586	16.1	2	2	197,780,043	20.1	2	2	58,536,888	17.8	2	2	39.6	39.0	0.4	100.7	76.6	13.6	90.2	73.3	9.8
Illinois	24	17,584	7.3	3	3	86,608,137	8.8	3	3	30,363,674	9.2	3	3	29.0	6.9	20.7	91.8	44.3	32.9	100.7	42.1	41.3
New York	25	10,091	4.2	5	5	30,532,414	4.0	4	4	13,643,244	4.2	4	4	130.1	34.1	71.6	348.6	86.2	140.9	193.8	71.2	71.6
Indiana	17	12,255	5.1	4	6	38,051,848	3.9	5	6	12,553,089	3.8	5	6	61.7	69.9	−4.8	99.9	128.4	−12.5	82.0	108.7	−12.8
West Virginia	16	5,060	2.1	6	8	22,435,411	2.3	6	7	6,530,111	2.0	6	8	27.3	14.8	10.9	67.5	66.7	0.4	40.1	38.7	1.0
Massachusetts	9	3,115	1.3	8	7	13,567,628	1.4	7	8	3,535,355	1.1	9	7	−48.9	−31.4	−25.5	1.2	13.6	−10.9	−40.3	−29.9	−14.8
New Jersey	16	4,671	1.9	7	[2] 4	12,013,719	1.2	9	[2] 5	5,378,679	1.6	7	[2] 5	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Wisconsin	14	2,124	0.9	13	12	10,732,989	1.1	10	11	2,826,589	0.9	11	11	55.0	10.9	39.8	78.7	45.5	22.9	8.3	−1.8	10.3
Kentucky	7	2,372	1.0	9	11	7,779,320	0.8	13	13	2,218,755	0.7	13	13	34.3	10.4	21.7	55.4	26.1	23.2	17.4	13.7	3.3
Missouri	4	2,227	0.9	11	15	5,012,827	0.5	14	15	2,153,842	0.7	14	15	38.8	65.1	−15.9	56.7	67.2	−6.3	35.0	52.7	−11.5
Connecticut	5	2,352	1.0	10	10	4,070,572	0.4	15	14	2,041,702	0.6	15	12	31.8	−21.3	67.4	0.1	−21.0	26.6	9.3	−19.1	35.1
California	5	1,038	0.4	17	19	3,519,824	0.4	16	19	1,172,046	0.4	17	17	87.0	34.3	39.3	290.7	136.4	65.3	197.5	65.1	80.2
Michigan	8	1,183	0.5	16	18	2,669,872	0.3	17	16	1,071,742	0.3	18	16	−18.9	16.2	−30.2	−25.3	−1.5	−24.1	−11.4	17.5	−24.6
Delaware	5	710	0.3	19	16	1,715,341	0.2	18	17	656,346	0.2	21	19	−52.3	−32.7	−29.2	−45.7	7.4	−49.5	−57.0	−0.2	−56.9
All other states	27	9,797	4.1			39,288,594	4.0			14,200,042	4.3											

[1] Percentages are based upon figures in Table 88. A minus sign (−) denotes decrease. [2] Figures for 1904 and 1899 not comparable with those for 1909.

Persons engaged in the industry.—Table 41 shows, by classes, the number of persons engaged in the industry in 1909. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

The average number of persons engaged in the industry in 1909 was 260,762, of whom 240,076, or 92.1 per cent, were wage earners; 4,286, or 1.6 per cent, proprietors and officials; and 16,400, or 6.3 per cent, clerks. Individual proprietors and firm members were few in number, the industry being mainly controlled by corporations.

Table 41

CLASS.	PERSONS ENGAGED IN THE STEEL-WORKS AND ROLLING-MILL INDUSTRY: 1909		
	Total.	Male.	Female.
All classes	**260,762**	**257,962**	**2,800**
Proprietors and officials	4,286	4,278	8
Proprietors and firm members	47	43	4
Salaried officers of corporations	779	779	.....
Superintendents and managers	3,460	3,456	4
Clerks	16,400	14,613	1,787
Wage earners (average number)	240,076	239,071	1,005
16 years of age and over	238,937	237,996	941
Under 16 years of age	1,139	1,075	64

Females constituted 1.1 per cent of the total number of persons employed, 10.9 per cent of the clerks, and four-tenths of 1 per cent of the wage earners. The number of wage earners under 16 years of age was 1,139.

In order to compare the distribution according to occupational status of persons engaged in the industry in 1909 with that in 1904, it is necessary to use the classification employed at the earlier census (see Introduction). Such comparison is made in Table 42. The rate of increase for salaried employees was much higher than that for wage earners, the proportion for the latter class being less in 1909 than in 1904.

Table 42 — PERSONS ENGAGED IN THE STEEL WORKS AND ROLLING MILLS.

CLASS.	1909		1904		Per cent of increase: 1904–1909 [1]
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	260,762	100.0	221,956	100.0	17.5
Proprietors and firm members	47	(2)	64	(2)	−26.6
Salaried employees	20,639	7.9	14,330	6.5	44.0
Wage earners (average number)	240,076	92.1	207,562	93.5	15.7

[1] A minus sign (−) denotes decrease.
[2] Less than one-tenth of 1 per cent.

Table 43 shows the average number of wage earners, distributed according to age periods, and in the case of those 16 years of age and over according to sex, for 1909, 1904, and 1899.

Table 43 — AVERAGE NUMBER OF WAGE EARNERS IN STEEL WORKS AND ROLLING MILLS.

CLASS.	1909		1904		1899	
	Number.	Per cent of total.	Number.	Per cent of total.	Number.	Per cent of total.
Total	240,076	100.0	207,562	100.0	183,249	100.0
16 years of age and over	238,937	99.5	205,741	99.1	181,439	99.0
Male	237,996	99.1	204,290	98.4	180,374	98.4
Female	941	0.4	1,451	0.7	1,065	0.6
Under 16 years of age	1,139	0.5	1,821	0.9	1,810	1.0

There was an increase from 1899 to 1904 in the number of women employed and a slight increase in the number of children, but in 1909 the number reported for each of these two classes was less than in 1899.

Wage earners employed, by months.—Table 44 gives the number of wage earners employed on the 15th (or the nearest representative day) of each month during the year 1909 for 15 states in which an average of at least 500 wage earners were employed during the year.

Table 44 — WAGE EARNERS EMPLOYED IN STEEL WORKS AND ROLLING MILLS: 1909 [1]

STATE.	Average number employed during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	240,076	216,349	215,650	215,076	217,307	218,424	235,533	234,151	242,077	258,925	269,255	274,525	283,629
California	1,038	1,065	1,073	1,089	1,100	1,037	1,098	*716*	824	1,041	1,097	1,175	1,144
Connecticut	2,352	*2,041*	2,219	2,084	2,053	2,109	2,257	2,338	2,426	2,471	2,605	2,720	2,887
Delaware	710	589	579	*559*	578	629	673	717	826	794	803	859	909
Illinois	17,584	16,108	15,758	*15,581*	16,145	15,424	16,219	16,750	16,442	18,875	20,203	21,552	22,141
Indiana	12,255	*10,268*	10,860	11,501	11,163	10,995	11,450	11,655	12,445	13,444	14,066	14,407	14,806
Kentucky	2,372	2,395	2,444	*2,048*	2,332	2,231	2,398	2,186	2,443	2,435	2,468	2,594	2,484
Massachusetts	3,115	2,990	2,958	2,898	*2,820*	2,866	3,050	3,035	3,065	3,225	3,438	3,479	3,544
Michigan	1,183	1,091	1,264	1,112	1,167	1,109	1,123	*1,050*	1,121	1,175	1,266	1,386	1,331
Missouri	2,227	*1,761*	1,926	1,992	2,049	1,778	2,103	2,102	1,878	2,396	2,636	2,989	3,128
New Jersey	4,671	4,409	4,282	4,522	4,341	*4,236*	4,297	4,264	4,538	4,937	5,184	5,266	5,773
New York	10,091	9,587	9,556	9,402	9,710	*8,841*	9,974	9,496	9,186	10,691	11,358	11,423	11,785
Ohio	38,586	34,205	*33,345*	35,415	34,096	35,082	40,633	37,446	39,548	40,836	42,549	42,936	45,151
Pennsylvania	126,911	114,241	113,347	*111,954*	114,449	116,987	123,920	125,641	129,745	137,838	142,009	144,210	148,591
West Virginia	5,060	*3,469*	3,502	3,625	3,890	4,028	5,044	5,783	5,966	6,288	6,197	6,055	5,973
Wisconsin	2,124	*1,781*	1,793	1,815	1,902	1,970	2,034	2,145	2,239	2,370	2,367	2,463	2,604

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

In the industry as a whole and in all of the states shown except four the largest number employed during any month in 1909 was in December, and in three of the other states the largest number was in November. In the country as a whole the minimum number employed was in March, this number being 75.8 per cent of the number in December. Massachusetts shows the smallest fluctuation in number of wage earners, the minimum number being 79.6 per cent of the maximum, while West Virginia shows the widest fluctuation, the minimum number being 55.2 per cent of the maximum number, reported for September. The percentage which the number employed each month represented of the maximum number is given in Table 45 for the entire industry. The general increase in employment from March to December reflects the improvement in business conditions taking place during that time.

Table 45

MONTH.	Per cent of maximum.	MONTH.	Per cent of maximum.
January	76.3	July	82.6
February	76.0	August	85.3
March	75.8	September	91.3
April	76.6	October	94.9
May	77.0	November	96.8
June	83.0	December	100.0

The months of maximum and of minimum employment for 1909, and the number reported for these months, are given for each state in Table 44.

Prevailing hours of labor.—In Table 46 the wage earners have been classified according to the hours of labor prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or less number of hours.

Table 46 AVERAGE NUMBER OF WAGE EARNERS IN STEEL WORKS AND ROLLING MILLS: 1909

STATE.	Total.	In establishments with prevailing hours—						
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.	72 and over.
United States	240,076	18,283	4,094	23,982	29,022	82,130	30,247	52,318
California	1,038	.....	348	69	179	442	.....	.....
Connecticut	2,352	.....	100	147	1,984	61	.....	.....
Delaware	710	290	.....	.....	420	.....	.....	.....
Illinois	17,584	.....	.....	2,763	1,142	3,230	247	10,202
Indiana	12,255	101	.....	1,647	.....	4,120	1,518	4,869
Kentucky	2,372	1,446	.....	.....	256	180	.....	490
Massachusetts	3,115	.....	13	30	376	2,687	.....	.....
Michigan	1,183	.....	.....	.....	317	866	.....	.....
Missouri	2,227	846	.....	.....	.....	1,381	.....	.....
New Jersey	4,671	.....	225	1,007	2,134	224	1,081	.....
New York	10,091	.....	67	423	1,695	4,745	.....	3,161
Ohio	38,586	1,493	44	5,442	7,200	13,352	6,296	4,709
Pennsylvania	126,911	12,245	3,237	11,014	12,292	45,527	17,921	24,675
West Virginia	5,060	1,779	.....	812	312	315	1,842	.....
Wisconsin	2,124	10	.....	10	102	977	.....	1,025

Of the total number of wage earners in 1909, 34.2 per cent were in establishments where the prevailing hours were 60 per week, or 10 hours a day for six days in the week, while 34.4 per cent were in establishments where the prevailing hours were over 60 per week, and 21.8 per cent where they were 72 per week and over. The eight-hour day is not found to any large extent, only 9.3 per cent of the wage earners being employed in establishments where the prevailing hours were less than 54 per week. The proportion in establishments in which the prevailing hours of labor were 72 or more per week was especially high in Illinois, Wisconsin, and Indiana.

Character of ownership.—Table 47 has for its purpose the presentation of conditions in respect to the character of ownership, or legal organization, of establishments. Establishments owned by individuals and firms are few and small, and seem to be decreasing in number and importance from census to census. Steel works and rolling mills are more largely in the hands of corporations than any other industry in the country with the exception of the lead smelting and refining industry. Establishments operated by corporations reported 99.5 per cent of the total value of products in 1909, as compared with 98.9 per cent in 1904.

Table 47 STEEL WORKS AND ROLLING MILLS.

CHARACTER OF OWNERSHIP.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	446	415	$985,722,534	$673,965,026
Individual	8	11	937,230	1,693,223
Firm [1]	14	19	4,238,687	5,641,183
Corporation	424	385	980,546,617	666,630,620
Per cent of total	100.0	100.0	100.0	100.0
Individual	1.8	2.7	0.1	0.3
Firm [1]	3.1	4.6	0.4	0.8
Corporation	95.1	92.8	99.5	98.9
Average per establishment:				
Individual	.....	.....	$117,154	$153,929
Firm	.....	.....	302,763	296,904
Corporation	.....	.....	2,312,610	1,731,508

[1] Includes one establishment under "other" ownership in 1904.

Size of establishments.—The tendency toward concentration in large establishments is very marked in the steel industry. Some light is thrown upon this tendency by grouping the establishments reported according to value of products and according to number of wage earners.

Table 48 gives data for establishments classified according to the value of their products.

Table 48 STEEL WORKS AND ROLLING MILLS.

VALUE OF PRODUCTS PER ESTABLISHMENT.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	446	415	$985,722,534	$673,965,026
Less than $20,000	15	13	195,454	133,948
$20,000 and less than $100,000	44	44	2,643,474	2,357,509
$100,000 and less than $1,000,000	201	227	86,119,267	101,297,782
$1,000,000 and over	186	131	896,764,339	570,175,787
$1,000,000 and less than $10,000,000	163	116	471,227,229	323,487,102
$10,000,000 and over	23	15	425,537,110	246,688,685
Per cent of total	100.0	100.0	100.0	100.0
Less than $20,000	3.4	3.1	(1)	(1)
$20,000 and less than $100,000	9.9	10.6	0.3	0.3
$100,000 and less than $1,000,000	45.1	54.7	8.7	15.0
$1,000,000 and over	41.7	31.6	91.0	84.6
$1,000,000 and less than $10,000,000	36.5	28.0	47.8	48.0
$10,000,000 and over	5.2	3.6	43.2	36.6
Average per establishment	.....	.....	$2,210,140	$1,624,012

[1] Less than one-tenth of 1 per cent.

There is no other industry in which so many plants of great size are found. In 1909, 41.7 per cent of the establishments reported products valued at $1,000,000 or more, as compared with 31.6 per cent in 1904. This group of establishments in 1909 included 23, and in 1904, 15 with products in excess of $10,000,000 in value. The value of the output of the establishments with products valued at $1,000,000 or over formed 91 per cent of the total for all establishments in 1909, as compared with 84.6 per cent in 1904, and that of the establishments with products valued at

$10,000,000 or over constituted 43.2 per cent of the total in 1909, as compared with 36.6 per cent in 1904.

The average number of wage earners per establishment increased from 500 in 1904 to 538 in 1909, or 7.6 per cent; the average value of products, from $1,624,000 to $2,210,000, or 36.1 per cent; and the average value added by manufacture, from $561,000 to $736,000, or 31.2 per cent. The increase in average value of products per establishment may perhaps be due partly to increase in prices of commodities, but is by no means wholly due to that cause.

The distribution of establishments reported in 1909 by size groups is shown for Pennsylvania and Ohio, and for all other states combined, in Table 49.

Table 49

VALUE OF PRODUCTS PER ESTABLISHMENT.	NUMBER OF ESTABLISHMENTS. United States.	Pennsylvania.	Ohio.	All other states.
Total	446	189	75	182
Less than $100,000	59	16	8	35
$100,000 and less than $1,000,000	201	86	27	88
$1,000,000 and less than $10,000,000	163	76	34	53
$10,000,000 and over	23	11	6	6
Per cent of total	100.0	100.0	100.0	100.0
Less than $100,000	13.2	8.5	10.7	19.2
$100,000 and less than $1,000,000	45.1	45.5	36.0	48.4
$1,000,000 and less than $10,000,000	36.5	40.2	45.3	29.1
$10,000,000 and over	5.2	5.8	8.0	3.3

A classification of the establishments for 15 of the leading states according to the number of wage earners employed is presented in the following table:

Table 50

STATE.	STEEL WORKS AND ROLLING MILLS: 1909 — Total. Establishments.	Total. Wage earners (average number).	Establishments employing— 1 to 5 wage earners. Establishments.	1 to 5 wage earners. Wage earners.	6 to 20 wage earners. Establishments.	6 to 20 wage earners. Wage earners.	21 to 50 wage earners. Establishments.	21 to 50 wage earners. Wage earners.	51 to 100 wage earners. Establishments.	51 to 100 wage earners. Wage earners.	101 to 250 wage earners. Establishments.	101 to 250 wage earners. Wage earners.	251 to 500 wage earners. Establishments.	251 to 500 wage earners. Wage earners.	501 to 1,000 wage earners. Establishments.	501 to 1,000 wage earners. Wage earners.	Over 1,000 wage earners. Establishments.	Over 1,000 wage earners. Wage earners.
United States	446	240,076	5	16	21	271	34	1,151	60	4,532	89	14,977	98	34,988	82	57,198	57	126,943
California	5	1,038	1	2	.....	.....	.....	.....	1	67	1	179	2	790	.....	.....	.....	.....
Connecticut	5	2,352	.....	.....	.....	.....	.....	.....	1	60	2	307	.....	.....	1	782	1	1,203
Delaware	5	710	.....	.....	.....	.....	1	40	1	75	3	595	.....	.....	.....	.....	.....	.....
Illinois	24	17,584	.....	.....	.....	.....	1	42	2	177	7	1,234	5	1,511	4	2,610	5	12,010
Indiana	17	12,255	.....	.....	.....	.....	.....	.....	2	189	3	466	1	400	8	5,213	3	5,987
Kentucky	7	2,372	.....	.....	.....	.....	.....	.....	1	55	2	330	3	1,190	1	701	.....	.....
Massachusetts	9	3,115	.....	.....	2	26	2	49	.....	.....	2	254	2	554	.....	.....	1	2,232
Michigan	8	1,183	.....	.....	.....	.....	1	49	4	294	1	186	2	654	.....	.....	.....	.....
Missouri	4	2,227	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	715	2	1,512	.....	.....
New Jersey	16	4,671	.....	.....	1	6	.....	.....	4	277	5	845	3	1,027	2	1,435	1	1,081
New York	25	10,091	2	5	1	12	3	118	4	291	4	588	6	2,219	2	1,573	3	5,285
Ohio	75	38,586	.....	.....	5	66	5	157	7	534	17	2,867	17	6,780	16	12,149	8	16,033
Pennsylvania	189	126,911	1	4	5	65	12	438	25	1,894	34	5,772	40	13,847	42	28,855	30	76,036
West Virginia	16	5,060	.....	.....	1	13	1	44	2	164	3	489	7	2,537	1	650	1	1,163
Wisconsin	14	2,124	1	5	3	38	4	111	3	236	1	140	.....	.....	1	568	1	1,026

Establishments employing 1,000 wage earners or more in 1909 employed altogether 52.9 per cent of the total number of wage earners in the industry; in fact, 18.5 per cent of the total were in establishments employing over 4,000 each.

Table 51 gives the percentage which the number of wage earners in establishments of each group formed of the total number of wage earners in the industry.

Table 51

CLASS.	Per cent of total number of wage earners in steel works and rolling mills: 1909
Total	100.0
Establishments employing:	
1 to 20 wage earners	0.1
21 to 50 wage earners	0.5
51 to 100 wage earners	1.9
101 to 250 wage earners	6.2
251 to 500 wage earners	14.6
501 to 1,000 wage earners	23.8
Over 1,000 wage earners	52.9
1,001 to 2,000 wage earners	19.1
2,001 to 4,000 wage earners	15.2
Over 4,000 wage earners	18.5

Expenses.—As stated in the Introduction, the census does not purport to furnish figures that can be used for determining the total cost of manufacture and, consequently, the profits. Facts of interest can, however, be brought out concerning the relative importance of the different classes of expense which make up the total. Table 52 shows, in percentages, for each census from 1889 to 1909, the distribution of the total expenses reported for the industry in the country as a whole among the four classes indicated, and a similar distribution for 15 states separately for 1909.

Labor is a materially more important factor in this branch of the industry than in the blast furnaces. In the steel works and rolling mills expenditures for services (salaries and wages) constituted, in 1909, 21.2 per cent of the total expenses reported, as compared with 8.6 per cent for the blast-furnace branch of the industry; and those for materials represented 73.9 per cent, as compared with 88.4 per cent for the blast furnaces.

In this connection it should be borne in mind that the cost of materials in the case of the steel works and

rolling mills involves much duplication, due to the sale or transfer of partially finished products from one plant in the industry to another. Were it not for this duplication the percentage of the total reported expenses represented by cost of materials would be much lower. In the case of blast furnaces, on the other hand, there is virtually no such duplication in cost of materials.

Table 52

STATE.	STEEL WORKS AND ROLLING MILLS: PER CENT OF TOTAL REPORTED EXPENSES REPRESENTED BY—			
	Salaries.	Wages.	Materials.	Miscellaneous expenses.
United States:				
1909	2.9	18.3	73.9	4.8
1904	2.9	19.8	71.3	6.0
1899	1.8	19.4	74.1	4.7
1889	1.6	24.2	70.4	3.8
Individual states: 1909:				
California	2.3	23.9	67.7	6.1
Connecticut	6.1	34.0	53.4	6.6
Delaware	5.6	25.2	64.1	5.1
Illinois	3.1	17.2	74.8	4.9
Indiana	3.0	22.7	70.7	3.6
Kentucky	1.4	17.6	76.8	4.2
Massachusetts	2.9	15.1	76.4	5.7
Michigan	5.0	25.7	62.1	7.2
Missouri	4.2	26.2	56.8	12.8
New Jersey	6.2	25.6	60.1	8.2
New York	3.7	18.2	74.7	3.3
Ohio	2.3	16.1	78.2	3.5
Pennsylvania	3.0	18.8	72.8	5.4
West Virginia	2.2	18.8	76.8	2.1
Wisconsin	2.3	14.2	79.8	3.6

The considerable variation among the states in the proportions represented by the several classes of expenses is due largely to the diversity in the character of products made and to differences among the states with respect to the amount of duplication in cost of materials.

During the 20 years covered by the table the percentage of the total reported expenses represented by wages fell from 24.2 to 18.3, while the proportion represented by materials rose from 70.4 per cent to 73.9 per cent and the proportions for other classes also advanced. These figures doubtless indicate approximately the actual changes in conditions, but it should be borne in mind that in all probability variations have taken place from census to census in the relative amount of duplication in cost of materials, which would tend to affect the significance of all the percentages.

Engines and power.—The amount of power used was first reported for the industry at the census of 1889, and Table 36 shows that the total horsepower increased from 535,430 in 1889 to 2,100,978 in 1909. Table 53 shows the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower at the censuses of 1909, 1904, and 1899. It also shows separately the number and horsepower of electric motors, including those operated by current generated in the establishment.

Table 53

POWER.	STEEL WORKS AND ROLLING MILLS.								
	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	8,244	6,359	5,562	2,100,978	1,649,299	1,100,801	100.0	100.0	100.0
Owned	6,033	5,858	5,562	2,042,066	1,635,081	1,099,667	97.2	99.1	99.9
Steam	5,805	5,740	5,441	1,955,346	1,610,612	1,086,897	93.1	97.7	98.7
Gas	118	53	16	79,391	11,808	1,543	3.8	0.7	0.1
Water wheels and motors	50	59	105	5,829	4,795	8,067	0.3	0.3	0.7
Other	.....	.....	.....	1,500	7,868	3,160	0.1	0.5	0.3
Rented	2,211	501	(1)	58,912	14,218	1,134	2.8	0.9	0.1
Electric	2,211	501	(1)	58,797	6,798	877	2.8	0.4	0.1
Other	.....	.....	.....	115	7,420	257	(2)	0.4	(2)
Electric motors	27,709	12,684	3,220	716,609	254,258	64,658	100.0	100.0	100.0
Run by current generated by establishment	25,558	12,183	3,220	657,812	247,460	63,781	91.8	97.3	98.6
Run by rented power	2,211	501	(1)	58,797	6,798	877	8.2	2.7	1.4

[1] Not reported.

[2] Less than one-tenth of 1 per cent.

The total primary power amounted to 1,100,801 horsepower in 1899 and 2,100,978 in 1909, an increase of 1,000,177 horsepower, or 90.9 per cent. Although the bulk of the increase was in steam power, yet the rate of increase in this form of power was very much lower than that for the power of gas and other internal combustion engines, or of electric motors operated by purchased current. The number of gas engines increased from 16, with an average of 96 horsepower per engine, in 1899, to 118, with an average horsepower of 673, in 1909. In a number of cases where blast furnaces are operated in conjunction with steel works and rolling mills, blast-furnace gas is utilized in internal-combustion engines for the steel making and rolling departments as well as for the blast-furnace department (see p. 14). There has also been a great increase in the practice of applying primary power generated in the establishments by means of electric motors.

The increase in power from 1899 to 1909 was 90.9 per cent, as compared with an increase of only 77.5 per cent in tonnage of products. This difference, when

taken in connection with the fact that there was an increase of only 31 per cent in the number of wage earners, indicates that there has been a material extension in labor-saving equipment during the decade.

Table 54 shows for 1909 the amount of each of the several kinds of primary power, the horsepower of all electric motors, and the amount of the different kinds of fuel used in the industry in 15 leading states.

Table 54 STEEL WORKS AND ROLLING MILLS: 1909

STATE.	Primary horsepower.									Electric horsepower.		Fuel used.					
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.		Total, rented and generated by establishment.	Generated in the establishment reporting.	Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water wheels and motors.	Other.	Electric.	Other.			Anthracite (long tons).	Bituminous (short tons).				
United States ..	446	2,100,978	2,042,066	1,955,346	79,391	5,829	1,500	58,797	115	716,609	657,812	765,145	19,759,678	648,637	55,809	2,063,736	261,601,204
California	5	3,945	3,007	3,007	.....	.....	.....	938	.....	1,638	700	.....	384	3,402	68	123,604	.....
Connecticut	5	14,860	14,855	14,855	.....	.....	.....	5	.....	1,341	1,336	47,057	62,511	2,020	200	78,712	3,860
Delaware	5	4,912	4,912	4,912	.....	.....	.....	.....	.....	1,743	1,743	2,619	34,014	3,300	145	560	450
Illinois	24	152,470	150,260	138,260	12,000	.....	.....	2,210	.....	85,352	83,142	15,311	3,088,782	86,143	4,704	260,003	.....
Indiana	17	111,806	111,806	60,631	51,175	.....	.....	.....	.....	99,839	99,839	5	1,028,754	14,083	300	351,932	502,360
Kentucky	7	29,640	29,640	29,640	.....	.....	.....	.....	.....	1,288	1,288	.....	137,438	16,052	384	.....	1,876,647
Massachusetts	9	24,500	24,485	23,050	810	625	.....	.....	15	7,844	7,844	1,861	155,952	2,231	335	140,432	645
Michigan	8	4,290	4,065	4,065	.....	.....	.....	225	.....	1,503	1,278	.....	42,471	1,237	80	47,142	.....
Missouri	4	6,255	6,255	6,175	80	.....	.....	.....	.....	2,142	2,142	3	77,885	3,153	.....	143,482	7,750
New Jersey	16	29,699	29,684	28,949	.....	735	.....	15	.....	8,148	8,133	31,671	252,611	8,964	877	32,086	3,347
New York	25	136,456	106,766	99,904	5,912	950	.....	29,590	100	36,326	6,736	9,106	769,404	32,678	6,015	71,464	831,417
Ohio	75	515,813	505,042	504,186	856	.....	.....	10,771	.....	116,903	106,132	105	3,460,695	136,964	10,030	73,275	64,620,688
Pennsylvania	189	896,440	882,270	872,746	8,005	419	1,100	14,170	.....	325,109	310,939	650,587	9,447,159	238,459	25,204	520,604	189,133,915
West Virginia	16	46,508	46,508	46,508	.....	.....	.....	.....	.....	3,638	3,638	.....	275,223	24,650	240	.....	3,704,375
Wisconsin	14	10,064	9,810	9,385	25	.....	400	254	.....	1,812	1,558	158	117,043	3,171	112	48,942	.....
All other states	27	113,320	112,701	109,073	528	3,100	.....	619	.....	21,983	21,364	6,662	809,352	72,150	7,106	171,498	915,750

Fuel consumed in the industry.—Bituminous coal is the principal kind of fuel used, 19,759,678 tons being consumed during 1909. The gas reported includes 174,104,855 thousand cubic feet of blast-furnace gas consumed in steel works and rolling mills, the remainder being chiefly, if not entirely, natural gas. The quantity of blast-furnace gas consumed in steel works and rolling mills was reported only in Ohio and Pennsylvania, the former reporting 54,707,000 thousand cubic feet and the latter 119,397,000. Most of the natural gas was also used in these two states.

The expenditure for fuel and rent of power in 1909 amounted to $46,136,725. Such expenditures are shown by states in Table 89.

SPECIAL STATISTICS RELATING TO MATERIALS, PRODUCTS, AND EQUIPMENT.

MATERIALS.

Table 55 shows the statistics for the chief classes of materials reported by the steel works and rolling mills for 1909, 1904, and 1899. Detailed statistics, by states, for 1909, are given in Table 87.

The data for the several classes of materials do not include materials produced and consumed in the same establishment; consequently, except in the case of pig iron, ferroalloys, and iron ore they by no means represent the total consumption. On the other hand, there is much duplication in the total cost of materials, due to the fact that the product of one plant is often sold or transferred to another plant for further manufacture. The pig iron reported represents the total consumption, the blast-furnace departments of steel works having been treated as separate establishments. The ingots, blooms, billets, slabs, muck and scrap bar, and sheet and tin-plate bars represent steel and partly rolled material acquired by the reporting establishments from outside sources for further hot rolling, including material received by transfer from other plants owned by the same company. In some rolling mills finished hot-rolled products are subjected to further processes of manufacture, and the cost of such rolled forms acquired from outside sources, with the exception of skelp and wire rods, which are reported separately, is included under "all other materials."

It is evident that the quantities of the partly rolled products and of the finished rolled forms reported as used as materials by establishments in the industry may vary from census to census merely because of changes in the relationship of plants and the methods of conducting business, so that the changes in the consumption of these materials shown in the table have little significance as indicating the extent of the growth of the industry.

The consumption of pig iron increased 6,885,661 tons, or 56.5 per cent, during the period 1904–1909, the increase during the decade 1899–1909 being 83.3 per cent, as compared with 78 per cent and 147.6 per cent, respectively, for the two preceding decades.

Table 55 STEEL WORKS AND ROLLING MILLS—MATERIALS USED.

MATERIAL.	1909	1904	1899	Per cent of increase.[1] 1904–1909	1899–1904
Total cost	$657,500,856	$441,204,432	$390,895,277	49.0	12.9
Iron and steel:					
For furnaces and hot rolls—					
Pig iron, including ferroalloys—					
Tons	19,076,889	12,191,228	10,411,281	56.5	17.1
Cost	$297,471,122	$172,101,436	$151,064,348	72.8	13.9
Pig iron—					
Tons	18,712,304	(2)	(2)		
Cost	$282,663,740	(2)	(2)		
Ferroalloys—spiegeleisen, ferromanganese, etc.—					
Tons	364,585	(2)	(2)		
Cost	$14,807,382	(2)	(2)		
Scrap from outside sources, including old rails not intended for rerolling—					
Tons	4,803,617	5,124,277	4,126,080	−6.3	24.2
Cost	$72,722,831	$67,001,248	$66,852,621	7.6	1.1
Ingots, blooms, billets, slabs, muck and scrap bar, rails for rerolling, and sheet and tin-plate bars (from outside sources)—					
Tons	6,508,249	4,920,177	3,876,456	32.3	26.9
Cost	$145,575,635	$110,268,828	$97,809,926	32.0	12.7
Rolled forms for further manufacture (from outside sources)—					
Skelp—					
Tons	176,717	259,643	(2)	−31.9	
Cost	$5,704,856	$7,331,935	(2)	−22.2	
Wire rods—					
Tons	146,425	161,914	136,725	−9.6	18.4
Cost	$4,252,695	$4,774,383	$5,419,617	−10.9	−11.9
Iron ore:					
Tons	835,338	549,995	346,310	51.9	58.8
Cost	$4,292,963	$2,396,792	$1,348,809	79.1	77.7
Fuel and rent of power	$46,136,725	$35,386,666	$22,463,209	30.4	57.5
All other materials	$81,344,020	$41,343,144	$45,936,747	96.8	−10.0

[1] A minus sign (−) denotes decrease. [2] Not reported separately.

As is indicated by Table 56, the greater part of the pig iron used as material in steel works and rolling mills is produced in blast furnaces owned by the companies consuming.

Table 56 STEEL WORKS AND ROLLING MILLS: 1909

MATERIAL AND SOURCE.	United States.	Pennsylvania.	Ohio.	All other states.
	PIG IRON CONSUMED (TONS).			
All pig iron	19,076,889	9,317,903	4,209,149	5,549,837
Produced by companies consuming	15,252,736	7,274,901	3,182,915	4,794,920
Purchased	3,824,153	2,043,002	1,026,234	754,917
Pig iron, not including ferroalloys	18,712,304	9,158,260	4,172,114	5,381,930
Produced by companies consuming	15,108,244	7,197,182	3,172,453	4,738,609
Purchased	3,604,060	1,961,078	999,661	643,321
Ferroalloys—spiegeleisen, ferromanganese, etc.	364,585	159,643	37,035	167,907
Produced by companies consuming	144,492	77,719	10,462	56,311
Purchased	220,093	81,924	26,573	111,596
	PER CENT OF TOTAL.			
All pig iron	100.0	100.0	100.0	100.0
Produced by companies consuming	80.0	78.1	75.6	86.4
Purchased	20.0	21.9	24.4	13.6
Pig iron, not including ferroalloys	100.0	100.0	100.0	100.0
Produced by companies consuming	80.7	78.6	76.0	88.0
Purchased	19.3	21.4	24.0	12.0
Ferroalloys—spiegeleisen, ferromanganese, etc.	100.0	100.0	100.0	100.0
Produced by companies consuming	39.6	48.7	28.2	33.5
Purchased	60.4	51.3	71.8	66.5

The scrap iron and steel reported in Table 55 is only that acquired from outside sources. The quantity of scrap made and consumed in the works where made exceeds somewhat the quantity acquired from outside sources. Table 57 gives the statistics for all scrap consumed.

Table 57 SCRAP IRON AND STEEL CONSUMED (TONS): 1909

SOURCE.	United States.	Pennsylvania.	Ohio.	All other states.
Total	9,929,710	5,723,508	1,402,722	2,803,480
Procured from outside sources	4,803,617	2,669,773	530,408	1,603,436
Purchased	4,029,774	2,053,354	461,483	1,514,937
Produced in other works of companies reporting	773,843	616,419	68,925	88,499
Produced in works where consumed	5,126,093	3,053,735	872,314	1,200,044

Of the consumption of 6,508,249 tons of ingots and partially rolled material acquired from outside sources in 1909, as shown in Table 55, 3,427,577 tons represented purchases from unaffiliated concerns and 3,080,672 tons transfers from other plants controlled by the company reporting.

Of the skelp from outside sources used in 1909, 141,496 tons were purchased and 35,221 tons were transferred from other plants of the company reporting. Besides this, 1,401,573 tons of skelp were consumed in further manufacture in rolling mills where produced, making a total of 1,578,290 tons consumed in rolling-mill establishments in the manufacture of wrought-welded pipe and tubes. This is a much larger consumption of skelp than that in pipe-manufacturing concerns independent of rolling mills.

The 146,425 tons of wire rods reported under "materials" for 1909 include 18,134 tons purchased and 128,291 tons transferred from other plants of the companies reporting. In addition, wire departments of the rolling mills consumed 1,318,796 tons of wire rods made in the same establishments, making a total of 1,465,221 tons of wire rods used in the manufacture of wire in connection with iron and steel rolling mills. This is not, of course, the total consumption of wire rods, as many are used by concerns in the wire industry proper—that is, by wire plants independent of rolling mills.

The statistics given in the foregoing paragraph relate to iron and steel products only. Considerable copper is handled by the iron and steel mills, the quantity consumed in 1909 (included under "all other materials" in Table 55) being 19,545 tons (21,890 short tons) and the cost $5,756,018.

The statistics do not show the cost of the different kinds of fuel, but the total expenditure for fuel and rent of power in 1909 was $46,136,725, or 7 per cent of the total cost of materials, as compared with 8 per cent in 1904, and 5.7 per cent in 1899.

PRODUCTS.

Summary of products.—Table 58 shows the total value of products of steel works and rolling mills and

the quantity and value of the leading individual classes of products. In this table duplications due to the consumption of one product in further manufacture in the same plant are eliminated, but, as in most other industries, there are duplications due to the use of the product of one plant as material for another. In fact, the duplications are of enormous amount. The extent of these duplications, so far as they are due to transfers from one plant to another of the same company, is shown in later tables, but the amount due to purchases of partly manufactured materials can not be determined.

Table 58

PRODUCT.	STEEL WORKS AND ROLLING MILLS—PRODUCTS.				
	1909	1904	1899	Per cent of increase.[1] 1904–1909	Per cent of increase.[1] 1899–1904
Total value	[2]$985,722,534	[2]$673,965,026	$597,211,716	46.3	12.9
I. Rolled, forged, and other classified iron and steel products:					
A. Finished rolled products and forgings—					
Tons	19,276,237	12,759,993	10,398,796	51.1	22.7
Value	$667,393,177	$447,150,695	$391,252,528	49.3	14.3
Rails—					
Tons	2,858,599	2,194,605	2,251,337	30.3	−2.5
Value	$81,128,295	$58,256,750	$46,533,159	39.3	25.2
Steel—					
Tons	2,858,599	2,193,705	2,250,457	30.3	−2.5
Value	$81,128,295	$58,236,050	$46,501,979	39.3	25.2
Bessemer—					
Tons	1,643,527	2,065,024	[3]	−20.4	.....
Value	$44,727,515	$54,627,488	[3]	−18.1	.....
Open-hearth (basic)—					
Tons	1,215,072	128,681	[3]	844.3	.....
Value	$36,400,780	$3,608,562	[3]	908.7	.....
Iron—					
Tons	.....	900	880	.....	2.3
Value	.....	$20,700	$31,180	.....	−33.6
Rerolled or renewed rails—					
Tons	106,352	[4] 99,530	[3]	.....	.....
Value	$2,683,017	$2,480,328	[3]	.....	.....
Rail fastenings (splice bars, tie-plates, fish-plates, etc.)—					
Tons	396,911	174,055	[3]	128.0	.....
Value	$14,488,412	$5,663,052	[3]	155.8	.....
Structural shapes, not including plates used for making girders—					
Tons	2,123,630	954,537	856,983	122.5	11.4
Value	$65,564,593	$32,730,901	$29,361,522	100.3	11.5
Steel—					
Tons	2,102,300	950,062	829,892	121.3	14.5
Value	$64,853,466	$32,585,701	$28,309,966	99.0	15.1
Open-hearth—					
Tons	[5] 1,934,230	618,391	566,092	212.8	9.2
Value	[5] $59,789,948	$21,496,531	$19,928,249	178.1	7.9
Bessemer—					
Tons	168,070	331,671	263,800	−49.3	25.7
Value	$5,063,518	$11,089,170	$8,381,717	−54.3	32.3
Iron—					
Tons	21,330	4,475	27,091	376.6	−83.5
Value	$711,127	$145,200	$1,051,556	389.8	−86.2
Bars and rods (merchant, shovel, finger, and horseshoe bars, spike, chain, bolt, and nut rods, etc.) not elsewhere specified—					
Tons	3,784,248	2,442,810	2,493,159	62.7	−2.0
Value	$121,488,423	$84,069,122	$100,597,221	51.2	−16.4
Bars for reenforced concrete—					
Tons	191,358				
Value	$5,588,963				
Wire rods—					
Tons	2,295,279	1,792,704	916,587	28.0	95.6
Value	$61,947,953	$52,995,031	$35,529,529	16.9	49.2
Plates and sheets, not elsewhere specified—					
Tons	3,332,733	1,856,469	1,488,066	79.9	24.8
Gage—					
16 and heavier	2,392,144				
17 to 24	328,583	[3]	[3]	.....	.....
25 and lighter	612,006				
Value	$133,272,393	$77,802,001	$68,109,223	71.3	14.2
Black plates, or sheets, for tinning—					
Tons	631,435	504,025	394,014	25.3	27.9
Value	$30,955,967	$25,297,079	$20,967,806	22.4	20.6

PRODUCT.	STEEL WORKS AND ROLLING MILLS—PRODUCTS.				
	1909	1904	1899	Per cent of increase.[1] 1904–1909	Per cent of increase.[1] 1899–1904
I. Rolled, forged, and other classified iron and steel products—Continued.					
A. Finished rolled products and forgings—Con.					
Skelp, flue and pipe—					
Tons	2,084,286	1,557,690		33.8	
Value	$64,514,728	$46,780,202		37.9	
Hoops, bands, and cotton ties—			1,195,189		58.5
Tons	341,043	337,223		1.1	
Value	$10,429,681	$12,760,010	$49,159,747	−18.3	21.1
Nail and tack plates—					
Tons	68,557	86,601	97,604	−20.8	−11.3
Value	$2,540,022	$2,462,076	$3,116,558	3.2	−21.0
Axles, rolled or forged—					
Tons	102,348	83,585	102,606	22.4	−18.5
Value	$3,831,344	$2,875,829	$4,482,937	33.2	−35.8
Armor plates, gun forgings, and ordnance—					
Tons	20,845	24,433	15,302	9.9	59.7
Value	$10,649,079	$10,549,620	$7,526,479	0.9	40.2
All other rolled products—					
Tons	566,627	377,665	506,880	50.0	−25.5
Value	$39,570,061	$16,743,727	$19,202,606	136.3	−12.8
All other forged products—					
Tons	365,986	274,061	81,009	33.5	238.3
Value	$18,740,241	$15,684,967	$6,065,741	19.5	135.3
B. Partly finished rolled products—					
Tons	6,799,436	4,074,511	4,375,067	36.7	13.7
Value	$153,493,360	$113,552,102	$102,202,474	35.2	11.0
Blooms, billets, and slabs [6]—					
Tons	4,887,796				
Value	$108,514,747				
Rolled forging blooms and billets [6]—					
Tons	84,383	4,823,585	4,172,286	37.3	15.6
Value	$2,247,133	$109,611,104	$96,321,887	35.5	13.8
Sheet and tin-plate bars [6]—					
Tons	1,652,761				
Value	$37,745,209				
Muck and scrap bar [6]—					
Tons	174,496	150,926	203,681	15.6	−25.9
Value	$4,986,211	$3,940,998	$5,940,587	26.5	−33.7
C. Unrolled steel—					
Tons	647,601	483,729	280,863	33.9	72.2
Value	$42,456,174	$24,585,446	$17,301,038	72.7	41.4
Ingots [6]—					
Tons	142,745	196,404	103,707	−27.3	89.4
Value	$3,593,726	$3,985,310	$2,781,145	−9.8	43.3
Direct steel castings—					
Tons	[7] 504,856	287,325	177,156	75.7	62.2
Value	[7] $38,862,448	$20,600,136	$14,609,893	88.7	41.0
II. Scrap steel and iron: [6]					
Tons	1,238,554	877,177		41.2	.....
Value	$18,163,624	$11,079,831		63.9	.....
III. All other steel and iron products, including value added to iron and steel rolling-mill products by further manufacture	$86,534,369	$61,977,284	$86,305,676	39.6	.....
IV. All products, other than steel and iron, including custom work and repairing	$17,681,830	$15,619,668		13.2	.....

[1] A minus sign (−) denotes decrease.
[2] In addition, steel castings and rolled steel, valued at $6,627,039 in 1909 and $347,264 in 1904, were produced by establishments not classified as "steel works and rolling mills."
[3] Not reported separately.
[4] Not including 4,899 tons rerolled on a toll basis.
[5] Includes 149,688 tons of steel, valued at $4,537,625, not distributable by kind into open-hearth or Bessemer.
[6] Includes only product for sale or transfer to other works of same company.
[7] Total production, including 57,050 tons, valued at $4,162,254, consumed in works where produced.

The value of products as reported by steel works and rolling mills in 1909 totaled $985,722,534, an increase of $311,757,508, or 46.3 per cent, over that in 1904, and of $388,510,818, or 65.1 per cent, over that in 1899.

As already stated, the duplication in the total value of products at different censuses may have varied in relative amount, so that the increases shown do not necessarily indicate accurately the true movement of production as measured in terms of money.

The great bulk of the output of steel works and rolling mills consists of products of Group I designated in the table as "rolled, forged, and other classified iron and steel products." The combined reports of the several plants regarding the output of these products for sale or transfer to other works showed in 1909 a total of 26,723,274 tons, valued at $863,342,711. These totals, however, have very little significance, as they involve much duplication, due to the sale or transfer of partly rolled products or of unrolled steel from one plant to another. The most feasible way to measure the volume of output of the steel works and rolling mills is by considering the total production of products at different stages, regardless of the question whether the products are sold or transferred, or consumed in the industry itself. Statistics as to the total output of unrolled steel and of certain partly finished rolled products are presented in subsequent tables.

The figures given in the table as to the total output of finished rolled products and forgings (subgroup A) are substantially free from duplication. The quantity reported in 1909 by establishments assigned to the steel-works and rolling-mill industry was 19,276,237 tons, and the value $667,393,177.

Some of the completely rolled products produced by rolling mills are subjected to further processes of manufacture in the same establishments. In other words, many rolling-mill concerns do not confine their business to the rolling of iron and steel proper, but make more advanced products similar to those made by establishments in other industries which buy their material from the rolling mills. Under the heading of "finished rolled products and forgings," however, in Table 58 are shown the total quantity and value of each class of rolled products, whether sold or transferred to other works, on the one hand, or consumed in further processes of manufacture in the works where produced, on the other hand. Duplication in total value of products is avoided in the latter case by including in Group III in the table ("all other iron and steel products") only the value added to such rolled material by further processes of manufacture in the works, and not the total value of the products as turned out. The values assigned to the rolling-mill products thus used in further processes of manufacture in the same works were calculated in the Census Bureau on the basis of average values as computed from the reports of representative establishments.

Partly finished rolled products are those which are ordinarily subjected to further rolling by hot rolls. The class includes blooms, billets, slabs, sheet and tin-plate bars, and muck and scrap bar. All finished rolled products, except shapes rolled direct from the ingot, pass through one or another of these intermediate forms. The greater part of these intermediate products, however, are not sold but are rolled into finished forms in the same works. Only the output made for sale or for transfer to other works of the producing company is shown in the table, so that there is no duplication in the figures for any given plant, although the greater part of the value of this group of products represents duplication in cost of materials and value of products for the industry taken as a whole. That this is true is shown by the fact that the tonnage of ingots, blooms, billets, slabs, etc., reported in Table 55 as material acquired by purchase or by transfer from other plants of the same company for rolling (which, however, includes some rails for rerolling) was equal to 93.7 per cent in 1909, 95.2 per cent in 1904, and 86.5 per cent in 1899, of the tonnage of ingots and unfinished rolled products shown in Table 58 as produced for sale or for transfer to other works of the same company. In other words, 93.7 per cent of such unfinished products were in 1909 consumed as materials in other plants in the industry, with the result that their value appears a second time in the total value of products of the industry.

Unrolled steel and castings include ingots and direct steel castings. Ingots are nearly all subjected to rolling processes in the same works, and the table only includes the small amount sold or transferred to other works. The total production of steel castings, whether made for sale or for consumption in the establishments reporting, is shown in the table, but the quantity consumed in the same establishments was small.

Decided differences appear among the several classes of finished rolled products and forgings with respect to the rate of increase in tonnage and value from census to census. Wire rods show a higher rate of increase in tonnage between 1899 and 1909 than any other of the rolled products (150.4 per cent), followed by structural shapes (147.8 per cent), plates and sheets (124 per cent), and skelp, hoops, bands, and cotton ties (102.9 per cent). The increases in the production of black plates, bars and rods, and rails, though considerable, are much less marked. The output of nail and tack plates decreased, owing to the decline in the cut-nail industry.

The changes in the output, for sale or transfer, of partly rolled products and of ingots are much affected by changes in the relationships of plants and in the method of conducting the steel industry; the total product differs very greatly from the amount for sale or transfer.

Table 59 shows, by percentages, the distribution of the total tonnage of "finished rolled products and forgings" among the several classes at each of the last three censuses.

Table 59

PRODUCT.	STEEL WORKS AND ROLLING MILLS—PER CENT OF TOTAL TONNAGE OF FINISHED ROLLED PRODUCTS AND FORGINGS.		
	1909	1904	1899
Finished rolled products and forgings	100.0	100.0	100.0
Bars and rods	19.6	19.1	24.0
Plates and sheets, not including those for tinning, nail and tack plates, tie-plates, fishplates, or armor plates	17.3	14.5	14.3
Rails	14.8	17.2	21.6
Wire rods	11.9	14.1	8.8
Structural shapes	11.0	7.5	8.2
Skelp	10.8	12.2	11.5
Hoops, bands, and cotton ties	1.8	2.6	
Black plates or sheets for tinning	3.3	3.9	3.8
All other	8.5	8.9	7.7

The percentages of the total represented by the several products in 1909 differed considerably from those of 10 years before, reflecting the decided differences in the percentages of increase in these products as shown in Table 58.

Average values.—Table 60 shows average values per ton for the principal classes of products specified in Table 58.

Table 60

PRODUCT.	STEEL WORKS AND ROLLING MILLS—AVERAGE VALUE PER TON.		
	1909	1904	1899
Finished rolled products and forgings:			
Bars and rods	$32.10	$34.41	$40.35
Plates and sheets	39.99	41.91	45.77
Rails	28.38	26.55	20.67
Wire rods	26.99	29.56	38.76
Structural shapes	30.87	34.29	34.26
Skelp	30.95	30.03	41.13
Hoops, bands, and cotton ties	30.58	37.84	
Black plates or sheets for tinning	49.02	50.19	53.22
Partly finished rolled products:			
Blooms, billets, and slabs, rolled forging blooms and billets, and sheet and tin-plate bars	22.42	22.72	23.08
Muck and scrap bar	28.57	26.11	29.17
Unrolled steel:			
Ingots	25.18	20.29	26.82
Direct steel castings	76.98	71.70	82.47

It should be borne in mind that these averages in the case of products transferred to other works of the same concern and products consumed in the same works involve values assigned by the producer or computed on the basis of reports of representative establishments, and may be more or less arbitrary. This condition affects somewhat the comparability of the averages from census to census. The comparability is still more affected by the fact that each class of products includes a considerable variety of individual commodities, sizes, shapes, etc. The values per ton of the different individual products included in each class often differ considerably from one another, and the proportion which these individual products represent of the total may vary considerably from one census to another. Even for such a commodity as rails, it is impossible to draw definite conclusions regarding the movement of prices from averages based on the total production, as there are considerable variations in prices as between different kinds of rails. Thus the rail product of 1909 includes a larger tonnage of alloy steel rails of high value per ton than was included in the production reported at the two preceding censuses. Nevertheless, the figures in Table 60 doubtless reflect in a rough way the movement of market prices.

It is obvious that the same conditions which affect the comparability of the average values of products from census to census also affect the comparability of the percentages of increase in tonnage with those in value, as shown in Table 58.

Kinds of steel used in leading products.—Table 58 distinguishes between the production of rails and of structural shapes from open-hearth steel and that from Bessemer steel. It is noteworthy that between 1904 and 1909 there was an absolute decrease in the production of rails and structural shapes of Bessemer steel, as against a very great increase in the production of those made from open-hearth steel. In 1904 Bessemer rails were made by 12 establishments and open-hearth by 5, while in 1909, 8 produced Bessemer rails and 11 open-hearth. In both years some establishments rolled both kinds of rails.

Production of finished rolled products and forgings, by states.—The distribution of the 19,276,237 tons of finished rolled products and forgings made by steel works and rolling mills in 1909 among the principal producing states is shown in Table 61, together with comparative figures for 1904. It may be noted that a similar distribution of the total tonnage, including that of unfinished rolled products and unrolled steel made for sale or transfer to other works, would have little significance because of the variations among the states in the amount of duplication and of the fact that partly finished products made in one state are often transferred to other states for further manufacture in the rolling mills there.

Table 61

STATE.	STEEL WORKS AND ROLLING MILLS—FINISHED ROLLED PRODUCTS AND FORGINGS.			
	Quantity (tons).		Per cent of total.	
	1909	1904	1909	1904
United States	19,276,237	12,759,993	100.0	100.0
Pennsylvania	9,903,162	6,923,608	51.4	54.3
Ohio	3,097,426	1,659,272	16.1	13.0
Illinois	2,086,120	1,301,870	10.8	10.2
Indiana	965,174	407,156	5.0	3.2
New York	798,225	533,726	4.1	4.2
West Virginia	437,388	288,793	2.3	2.3
Colorado, Maryland, Alabama	925,005	651,737	4.8	5.1
Wisconsin	260,226	189,269	1.3	1.5
Massachusetts	150,613	143,320	0.8	1.1
New Jersey	137,679	149,724	0.7	1.2
Kentucky	127,851	143,566	0.7	1.1
Missouri	83,990	63,123	0.4	0.5
Connecticut	66,586	77,448	0.3	0.6
California	50,931	30,466	0.3	0.2
All other states	185,861	196,915	1.0	1.5

Pennsylvania produced 51.4 per cent of the total output of these products in 1909, as compared with 54.3 per cent in 1904. Ohio increased its proportion of the output from 13 per cent in the earlier to 16.1 per cent in the later year. Indiana and Illinois showed higher percentages of the total output in 1909 than in 1904; but the proportions reported by New York and West Virginia remained approximately the same.

Table 62 shows the number of establishments in each state which reported the manufacture in 1909 of each of the principal classes of products covered by Table 58. It will be understood, of course, that most of these establishments make several different classes of products.

Table 62

NUMBER OF ESTABLISHMENTS MANUFACTURING SPECIFIED PRODUCTS IN 1909.

PRODUCT.	United States.	Alabama.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Georgia.	Illinois.	Indiana.	Kentucky.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Missouri.	New Jersey.	New York.	Ohio.	Oregon.	Pennsylvania.	Rhode Island.	Tennessee.	Texas.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.
All products	446	6	5	1	5	5	1	1	24	17	7	1	5	9	8	1	4	16	25	75	2	189	2	1	1	3	1	16	14	1
Rails	13	1	....	1	....	....	....	....	1	1	....	....	1	....	....	....	....	....	1	1	....	6	....	....	....	....	....	....	....	....
Rerolled or renewed rails	9	....	....	1	....	....	....	....	1	1	....	....	1	....	....	....	....	....	....	1	....	2	....	....	....	....	1	1	....	....
Rail fastenings, fishplates, etc.	25	1	1	1	....	....	....	1	4	....	....	....	....	....	....	....	....	....	2	3	....	8	....	....	....	1	1	....	1	1
Structural shapes	27	....	2	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1	1	3	....	17	....	....	....	....	....	....	1	....
Bars and rods, not elsewhere specified	132	4	3	1	2	....	....	1	9	7	2	1	1	1	2	....	2	6	12	15	1	51	1	1	1	3	1	2	1	1
Bars for reenforced concrete	25	....	1	1	1	....	....	1	3	3	2	1	....	....	....	....	1	1	2	4	....	3	....	....	....	....	1	....	....	....
Wire rods	29	....	....	1	....	....	....	1	3	2	1	....	....	1	....	....	....	2	2	6	....	9	1	....	....	....	....	....	....	....
Plates and sheets, not elsewhere specified	105	1	....	....	....	2	....	....	1	6	2	....	....	....	....	....	1	....	4	28	....	52	....	....	....	....	....	8	....	....
Black plates or sheets for tinning	20	....	....	....	....	....	....	....	1	1	....	....	1	....	....	....	....	....	....	6	....	14	....	....	....	....	....	6	....	....
Skelp	42	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	7	....	29	....	....	....	....	....	4	....	....
Hoops, bands, and cotton ties	15	1	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	....	2	....	9	....	....	....	....	....	....	....	....
Nail and tack plates	12	....	1	....	....	....	....	....	1	1	1	....	....	1	....	....	....	....	....	....	....	6	....	....	....	....	....	1	....	....
Axles	8	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	5	....	....	....	....	....	....	....	....
Armor plates, gun forgings, and ordnance	5	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	3	....	....	....	....	....	....	....	....
Muck and scrap bar	116	3	3	....	2	....	....	....	6	6	2	1	1	1	....	....	2	4	8	14	1	53	1	1	1	2	1	2	....	1
Steel	189	1	2	1	2	3	1	1	12	4	2	....	2	6	5	1	1	3	13	27	1	79	1	....	....	....	....	3	13	....
Ingots	100	1	1	1	1	....	1	1	6	2	2	....	2	2	....	....	....	3	7	14	....	52	1	....	....	....	....	3	....	....
Castings	115	....	1	1	1	3	....	....	8	3	1	....	....	5	5	1	1	5	7	16	1	42	....	....	....	....	....	1	13	....

Detailed statistics regarding the quantity and value of individual classes of products made in each state can not be presented as to do so would in many cases disclose the operations of individual establishments. It may be noted, however, that in 1909 Pennsylvania produced only 29.7 per cent of the tonnage of rails, as compared with 37 per cent in 1904 and more than 50 per cent in 1899. This state, however, produced 76 per cent of all structural steel in 1909, though the proportion was somewhat lower than in 1904, when it was 86.6 per cent. Of the tonnage of wire rods, Pennsylvania in 1909 produced 37.5 per cent, or a larger proportion than in 1904 (33.3 per cent). Pennsylvania reported about three-fifths of the output of plates and sheets in 1909, as compared with somewhat over two-thirds in 1904; of the skelp produced in 1909, a little more than one-half was made in Pennsylvania and about one-third in Ohio; of the output of hoops, bands, and cotton ties, Pennsylvania produced 81.9 per cent; of that of nail and tack plates, 55.1 per cent.

Disposition of finished rolled products.—As already stated, the finished rolled products shown in Table 58 represent the total output, whether sold or used in the establishment where made. Many steel works and rolling mills have facilities for the manufacture of certain products of the hot rolls into more highly elaborated forms. Table 63 has been prepared in order to show the proportion of the total output of the finished rolled products that was in 1909 consumed in the same works in which rolled, the proportion transferred to other works of the same company, and that sold.

Table 63

STEEL WORKS AND ROLLING MILLS—FINISHED ROLLED PRODUCTS AND FORGINGS: 1909

PRODUCT.	Total (shown in Table 58).		For consumption in works where produced.			For transfer to other works of same company.			For sale.		
			Tonnage.			Tonnage.			Tonnage.		
	Tonnage.	Value.	Amount.	Per cent of total.	Value.	Amount.	Per cent of total.	Value.	Amount.	Per cent of total.	Value.
All finished rolled products and forgings	19,276,237	$667,393,177	4,045,272	21.0	$128,360,958	1,206,415	6.3	$47,035,208	14,024,550	72.8	$491,997,011
Rails	2,858,599	81,128,295	14,538	0.5	435,413	....	....	....	2,844,061	99.5	80,692,882
Rerolled or renewed rails	106,352	2,683,017	....	....	....	....	....	....	106,352	100.0	2,683,017
Rail fastenings	396,911	14,488,412	4,565	1.2	166,621	....	....	....	392,346	98.8	14,321,791
Structural shapes	2,123,630	65,564,593	26,811	1.3	822,976	....	....	....	2,096,819	98.7	64,741,617
Bars and rods	3,784,248	121,488,423	632,679	16.7	19,252,366	....	....	....	3,151,569	83.3	102,236,057
Bars for reenforced concrete	191,358	5,588,963	....	....	....	....	....	....	191,358	100.0	5,588,963
Wire rods	2,295,279	61,947,958	1,318,796	57.5	34,932,338	465,161	20.3	12,334,512	511,322	22.3	14,681,108
Plates and sheets	3,332,733	133,272,393	463,665	13.9	22,101,398	61,954	1.9	2,872,134	2,807,114	84.2	108,298,861
Black plates or sheets for tinning	631,435	30,955,967	....	....	....	575,160	91.1	28,219,571	56,275	8.9	2,736,396
Skelp, flue and pipe	2,084,286	64,514,728	1,401,573	67.2	42,587,649	102,027	4.9	3,511,475	580,686	27.9	18,415,604
Hoops, bands, and cotton ties	341,043	10,429,681	....	....	....	....	....	....	341,043	100.0	10,429,681
Nail and tack plates	68,557	2,540,022	42,690	62.3	1,579,530	....	....	....	25,867	37.7	960,492
Axles	102,348	3,831,344	8,826	8.6	330,975	....	....	....	93,522	91.4	3,500,369
Armor plates, gun forgings, and ordnance	26,845	10,649,079	....	....	....	....	....	....	26,845	100.0	10,649,079
All other	932,613	58,310,302	131,129	14.1	6,151,692	2,113	0.2	97,516	799,371	85.7	52,061,094

The table shows that, of the total output of finished rolled products and forgings in 1909, 21 per cent was produced for use in the same works and 6.3 per cent for transfer to other works of the same company, leaving 72.8 per cent for sale.

A very large proportion of the output of skelp, black plates, and wire rods, and a very considerable proportion of some of the other products listed, were, in 1909, used in the works producing them or transferred for further manufacture to other works of the same company. It should be noted that while most of the black plates or sheets are shown as produced for transfer to other works of the same company, this results from the fact that, in order to distinguish the tin-plate industry as a separate industry, the tinning departments of rolling-mill establishments are treated as separate plants, even though directly connected with the rolling mills.

Total production and disposition of unrolled and partly rolled products.—Table 58, as already stated, shows, with reference to unrolled and partly rolled products, only the quantity produced for sale or for transfer to other plants of the same concern. Table 64 shows for 1909 the total production of the specified intermediate products, the quantity produced for consumption in the same works, the quantity produced for transfer to other works of the same company, and that produced for sale.

Table 64 STEEL WORKS AND ROLLING MILLS—PARTLY FINISHED PRODUCTS: 1909

PRODUCT.	Total.		For consumption in works where produced.		For transfer or sale.					
					Total (shown in Table 58).		For transfer to other works of same company.		For sale.	
	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.
Partly finished rolled products	19,885,137	$443,312,206	13,085,701	$289,818,846	6,799,436	$153,493,360	3,093,395	$66,828,401	3,706,041	$86,664,959
Blooms, billets, and slabs	16,263,418	353,091,220	11,375,622	244,576,473	4,887,796	108,514,747	3,045,977	65,492,759	1,841,819	43,021,988
Rolled forging blooms	160,997	4,287,364	76,614	2,040,231	84,383	2,247,133	.....	.....	84,383	2,247,133
Sheet and tin-plate bars	2,094,398	47,814,593	441,637	10,069,324	1,652,761	37,745,269	27,353	639,400	1,625,408	37,105,869
Muck and scrap bar	1,366,324	38,119,029	1,191,828	33,132,818	174,496	4,986,211	20,065	696,242	154,431	4,289,969
Unrolled steel	23,473,718	478,736,988	22,883,167	440,443,068	[1] 590,551	[1] 38,293,920	112,301	2,080,281	478,250	36,213,639
Ingots	22,968,862	439,874,540	22,826,117	436,280,814	142,745	3,593,726	112,301	2,080,281	30,444	1,513,445
Direct castings	504,856	38,862,448	57,050	4,162,254	[1] 447,806	[1] 34,700,194	.....	.....	447,806	34,700,194

[1] Exclusive of 57,050 tons, valued at $4,162,254, consumed in the works where produced, which are included in Table 58.

It will be seen that the total amount of some of these classes of products is very much greater than that intended for sale or transfer, the great bulk being subjected to further processes in the producing works.

Total production and disposition of scrap.—The scrap steel and iron reported in Table 58 is only that which was sold or transferred to other plants of the same company. The greater portion of the scrap produced is consumed in the furnaces of the producing plants. Table 65 shows the total production and the disposition made thereof in 1909.

Table 65 STEEL WORKS AND ROLLING MILLS—SCRAP IRON AND STEEL PRODUCTS: 1909

DISPOSITION.	Quantity.		Value.
	Tons.	Per cent of total.	
Total production	6,364,647	100.0	$89,386,136
For consumption in works where produced	5,126,093	80.5	71,222,512
For transfer or sale (as shown in Table 58)	1,238,554	19.5	18,163,624
For transfer to other works of same company	398,436	6.3	5,530,852
For sale	840,118	13.2	12,632,772

Summary as to disposition of products and quantity and value of products in condition in which marketed.—It has already been shown that of the finished rolled products and forgings, the total quantity and value of which are included in Group I in Table 58, considerable quantities undergo further processes of manufacture in the same works. It has also been stated that the table mentioned does not show the total value of such more highly elaborated products in Group III, but only the value added to the rolling-mill products by further manufacture. It is desirable, therefore, to show the quantity and value of all products of the industry in the condition in which sold.

In Table 66 the total value of the products in the condition in which sold ($864,247,792) contains no duplication due to the use of one product as material for further manufacture in the same plant or in another plant controlled by the same company; but it is impossible to avoid the duplication where the partly finished product of one plant is used as material by another plant in the industry not controlled by the same concern. This duplication, however, is not very great.

Table 66 — STEEL WORKS AND ROLLING MILLS—PRODUCTS: 1909

PRODUCT.	Total.		For consumption in works where produced.		For transfer to other works of same company.		Products in form and condition for sale.		
	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value.	Tonnage.	Value. Amount.	Value. Per cent of total.
Total					4,810,547	$121,474,742		$864,247,792	100.0
Unrolled steel	23,473,718	$478,736,988	22,883,167	$440,443,068	112,301	2,080,281	478,250	36,213,639	4.2
Partly finished rolled products	19,885,137	443,312,206	13,085,701	289,818,846	3,093,395	66,828,401	3,705,041	86,664,959	10.0
Finished rolled products and forgings	19,276,237	667,393,177	4,045,272	128,360,958	1,206,415	47,035,208	14,024,550	491,997,011	56.9
Manufactures from rolling-mill products		213,537,183						213,537,183	24.7
Scrap steel and iron	6,364,647	89,386,136	5,126,093	71,222,512	398,436	5,530,852	840,118	12,632,772	1.5
Castings other than direct steel castings	128,670	5,520,398					128,670	5,520,398	0.6
Products other than steel and iron, and custom work and repairing		17,681,830						17,681,830	2.0

Manufactures from iron and steel rolling-mill products made in rolling mills.—The quantity and value of the principal products made in rolling-mill establishments from iron and steel rolled products and forgings, and the percentages of increase, are given in Table 67 for 1909 and 1904. Similar products made by establishments assigned to industries other than the rolling-mill industry are not here included. As already stated the tin-plate dipping departments of rolling mills are treated as belonging to a separate industry.

Table 67 — MANUFACTURES FROM IRON AND STEEL ROLLING MILL PRODUCTS MADE IN ROLLING-MILL ESTABLISHMENTS.

PRODUCT.	1909	1904	Per cent of increase.[1]
Total value	$213,537,183	$139,241,015	(2)
Wire and wire products:			
Tons (2,000 pounds)	1,634,855	1,416,494	15.4
Value	$71,624,024	$67,551,443	6.0
Pipe and tubes:			
Wrought-welded—			
Tons	1,314,771	849,047	54.9
Value	$68,471,573	$43,985,728	55.7
Seamless—hot-rolled or drawn—			
Tons	54,273	20,636	243.1
Value	$5,050,739	$2,290,234	189.8
All other, not cast—			
Tons	17,561		
Value	$986,699		
Bolts, nuts, rivets, forged spikes, washers, etc.:			
Kegs (200 pounds)	4,471,985	3,105,827	44.0
Value	$20,538,858	$13,854,635	48.2
Cut nails and spikes:			
Kegs (100 pounds)	1,009,319	1,311,549	−23.0
Value	$2,218,207	$2,394,108	−7.3
Horse and mule shoes:			
Kegs (200 pounds)	996,383	768,253	29.7
Value	$7,202,897	$5,483,137	31.4
Springs—car, furniture, and all other, not including wire springs:			
Tons	6,191	22,022	−71.9
Value	$374,924	$1,708,632	−78.1
Galvanized plates or sheets:			
Tons	431,658	(3)	
Value	$25,912,056	(3)	
Stamped ware:			
Tons	24,612	(3)	
Value	$2,206,707	$292,923	684.1
Shovels, spades, scoops, etc	$540,321	$410,500	31.6
Steel cars, machinery, switches, frogs, etc	$7,720,178	$1,269,675	(3)

[1] A minus sign (−) denotes decrease. [2] Not comparable. [3] Not reported.

The number of establishments reporting the chief of these more advanced products in 1909 is given in Table 68. Some establishments make no such products while some make two or more kinds.

Table 68

	Number of establishments: 1909
All steel works and rolling mills	446
Establishments reporting the manufacture of—	
Wire and wire products	23
Pipe and tubes—	
Wrought-welded	15
Seamless—hot rolled or drawn	4
Bolts, nuts, rivets, forged spikes, washers, etc	35
Cut nails and spikes	12
Horse and mule shoes	11
Springs—car, furniture, and all other, not including wire springs	6
Galvanized plates and sheets	23
Stamped ware	7
Shovels, spades, scoops, etc	4

Wire and wire products made in rolling mills.—Wire rods were rolled by 29 establishments in the industry "iron and steel, steel works and rolling mills" in 1909, and of these 23 drew wire. Of these 23 establishments 16 reported the manufacture of wire nails or spikes, 13 that of woven-wire products, and 19 that of other wire goods. Table 69 gives the tonnage and value of the wire products of rolling mills for the years 1909, 1904, and 1899; similar products made by establishments in other industries are not included.

Table 69 — IRON AND STEEL WIRE AND WIRE PRODUCTS MADE IN STEEL WORKS AND ROLLING MILLS.[1]

PRODUCT.	1909	1904	1899	Per cent of increase. 1904–1909	Per cent of increase. 1899–1904
Total:					
Tons (2,000 pounds)	1,634,855	1,416,494	879,298	15.4	61.1
Value	$71,624,024	$67,551,443	$47,728,784	6.0	41.6
Wire drawn for sale, plain or coated:					
Tons	478,789	963,419	649,146	15.8	48.4
Value	$19,774,056	$50,056,081	$35,283,688	2.7	41.9
Wire manufactures, not including nails and spikes:					
Tons	637,211				
Value	$31,616,241				
Wire nails and spikes:					
Tons[2]	518,855	453,075	230,150	14.5	96.9
Value	$20,233,727	$17,495,362	$12,445,096	15.7	40.6

[1] See report on wire, Part V of this report, for total wire production.
[2] Reported in kegs of 100 pounds: 1909, 10,377,108; 1904, 9,061,512; 1899, 4,603,000.

Nails and spikes constituted 31.7 per cent of the tonnage of wire and wire products in 1909, 32 per cent

in 1904, and 26.2 per cent in 1899. Reference should be made to Part V, which relates to the wire industry, for the total wire production.

Combined production of certain products in rolling mills and in other establishments.—In addition to the products derived from rolled material which are made in rolling-mill establishments and covered by Table 67, large quantities of the same classes of products are made in establishments which do not have rolling-mill facilities but purchase rolled material. For some of these classes of products detailed returns relative to quantity and value were obtained from the producing establishments and for some other classes estimates were made. Table 70 shows the reported or estimated amount and value of these various classes of products for establishments other than rolling mills and for rolling-mill establishments, respectively, and the total for all establishments. In stating the number of establishments not rolling mills making each class of articles, only those which made such articles as their chief product are included, but the quantities and values given include the product—small in the aggregate—of establishments engaged primarily in other industries but which make the specified commodities incidentally.

Table 70 LEADING PRODUCTS DERIVED FROM ROLLED MATERIAL.

PRODUCT.	Total.			Made in rolling-mill establishments.		Made in other establishments.	
	1909	1904	Per cent of increase.[1]	1909	1904	1909	1904
Wrought-welded pipe or tubes:							
Establishments reporting	21	27	−22.2	15	14	6	13
Tons	1,739,771	1,149,047	51.4	1,314,771	849,047	[2] 425,000	[2] 300,000
Value	$90,621,573	$59,527,178	52.2	$68,471,573	$43,985,728	[3] $22,150,000	[3] $15,541,450
Bolts, nuts, rivets, forged spikes, washers, etc.:							
Establishments reporting	143	118	21.2	35	30	108	88
Kegs (200 pounds)	9,889,985	6,305,827	56.8	4,471,985	3,105,827	[2] 5,418,000	[2] 3,200,000
Value	$45,406,212	$28,138,607	61.4	$20,538,858	$13,854,035	[4] $24,867,354	[4] $14,283,972
Cut nails and spikes:							
Establishments reporting	16	.....	.....	12	17	4	[5]
Kegs (100 pounds)	1,036,089	1,470,149	−29.5	1,009,319	1,311,549	[2] 26,770	[2] 158,600
Value	$2,274,955	$2,684,449	−15.3	$2,218,207	$2,394,108	$56,748	$290,341
Wire nails and spikes:							
Establishments reporting	36	.....	.....	16	21	20	[5]
Kegs (100 pounds)	13,926,861	12,587,512	10.6	10,377,108	9,061,512	3,549,753	3,526,000
Value	$27,575,774	$24,300,351	13.5	$20,233,727	$17,495,362	$7,342,047	$6,804,989
Horse and mule shoes:							
Establishments reporting	30	19	57.9	11	11	19	8
Kegs (200 pounds)	1,137,383	880,253	29.2	996,383	768,253	[2] 141,000	[2] 112,000
Value	$8,223,304	$6,282,118	30.9	$7,202,897	$5,483,137	[4] $1,020,407	[4] $798,981
Springs, not including wire springs:							
Establishments reporting	60	61	−1.6	6	9	54	52
Tons	.....	.....	.....	6,191	22,022	.....	.....
Value	$9,090,778	$7,449,468	22.0	$374,924	$1,708,632	[4] $8,715,854	[4] $5,740,836
Galvanized plates and sheets:							
Establishments reporting	68	.....	.....	22	[6]	46	36
Tons	.....	.....	.....	431,658	[6]	[6]	[6]
Value	$33,345,483	.....	.....	$25,912,056	[6]	[4] $7,433,427	[4] $6,418,850

[1] A minus sign (−) denotes decrease.
[2] Estimated on basis of average unit value for rolling-mill product.
[3] Estimated from reports of establishments purchasing skelp.
[4] Value of all products of establishments manufacturing the articles named as chief product, including, for 1909, by-products from other establishments and excluding specific products other than the articles named.
[5] Figures not available.
[6] Not reported.

The above table includes only classes of products of which a large proportion is made in rolling-mill establishments. A much larger proportion of each of the other classes of products covered by Table 67 is made by other establishments than by rolling-mill establishments, and the statistics regarding the total output of these products scarcely belong in a discussion of the general iron and steel industry.

Copper rods.—Four of the iron and steel rolling mills reported the rolling in 1909 of 17,809 short tons of copper rods, valued at $4,824,443; of these rods, 765 tons were for sale and 17,044 tons for further manufacture in the wire-drawing departments of the mills.

Products sold for export.—Table 71 gives the quantity of each of the chief products reported by the rolling mills as sold direct for export in 1909, the percentage of the total output represented by each, and the number of establishments reporting such sale for export. Doubtless certain additional quantities of the same classes of rolling-mill products are exported by others who buy them in the domestic market.

Of the finished rolling-mill products not subjected to further manufacture in the mills, rails show the largest proportion exported—11.11 per cent. For galvanized plates or sheets the exports equaled 18.36 per cent of the rolling-mill production. The quantities of wrought-welded pipe and tubes and of sheet and tin-plate bars exported are relatively large, constituting 6.19 per cent and 5.15 per cent, respectively, of the product made for sale by the rolling mills.

Table 71

PRODUCT.	STEEL WORKS AND ROLLING MILLS—PRODUCTS SOLD FOR EXPORT: 1909		
	Number of establishments reporting.	Tonnage.	Per cent of total production.[1]
Rails	10	317,455	11.11
Rerolled or renewed rails	2	3,674	3.45
Rail fastenings	9	20,118	5.07
Structural shapes	11	60,764	3.29
Bars or rods and bars for reinforced concrete, not including wire rods	21	50,621	1.27
Wire rods	9	18,738	0.82
Plates and sheets, not including black plates or sheets for tinning, nail and tack plates, tie-plates, fishplates, or armor plates	36	80,706	2.42
Skelp	5	10,703	0.51
Hoops, bands, and cotton ties	3	4,451	1.31
Blooms, billets, and slabs	6	18,021	0.37
Sheet and tin-plate bars	3	85,123	5.15
Galvanized plates or sheets	5	79,246	18.36
Bolts, nuts, rivets, forged spikes, washers, etc.	4	[2] 6,743	1.09
Cut nails and cut spikes	3	[3] 1,705	3.78
Pipe and tubes, wrought-welded	10	89,377	6.80
Nail and tack plates, axles, rolled or forged steel car and locomotive wheels, armor plates, gun forgings and ordnance, horse and mule shoes, and springs	8	3,488	0.88
Rolled, forged, cast, or other iron and steel products not enumerated	22	7,713	.....

[1] Based on the rolling-mill production, as given in Table 58 or Table 70, and not on the total production, which includes that consumed in the works reporting and that made in "other establishments."
[2] Reported as 75,516 kegs of 200 pounds.
[3] Reported as 38,193 kegs of 100 pounds.

STEEL PRODUCTION.

Summary.—Table 72 gives the production of the different kinds of steel for the census years 1879 to 1909, inclusive. It includes steel made for use as material in the same works as well as that for sale or transfer. Moreover, it includes the small amount of steel made in establishments engaged in shipbuilding, the manufacture of cutlery, the manufacture of electrical machinery, and other industries, as well as in the steel works proper. There has been during each decade a marked increase in both the absolute and the relative amount of open-hearth steel produced. Basic open-hearth steel constituted 1.3 per cent of the total steel production in 1889, as against 56.2 per cent in 1909. Bessemer steel, on the other hand, although the output increased 153.8 per cent during this period, constituted only 39 per cent of the total production in 1909, as compared with 86.6 per cent in 1889.

Table 72

KIND.	STEEL PRODUCTION (TONS).														
	Amount.					Per cent of increase.[1]					Per cent of total.				
	1909	1904	1899	1889	1879	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1909	1904	1899	1889	1879
Total	[2] 23,523,199	[2] 13,070,592	10,685,000	4,174,652	1,027,381	120.2	72.1	27.9	155.9	306.3	100.0	100.0	100.0	100.0	100.0
Open-hearth	14,228,377	5,820,397	3,044,358	480,035	75,269	367.4	144.5	91.2	534.2	537.8	60.5	42.6	28.5	11.5	7.3
Basic	13,221,093	5,064,592	2,153,835	55,511	[3]	513.8	161.0	135.1	3,780.0	.....	56.2	37.0	20.2	1.3	.....
Acid	1,007,284	755,805	890,521	424,524	[3]	13.1	33.3	−15.1	109.8	.....	4.3	5.5	8.3	10.2	.....
Bessemer	9,180,133	7,768,915	7,532,028	3,617,198	879,650	21.9	18.2	3.1	108.2	311.2	39.0	56.8	70.5	86.6	85.6
Crucible	100,203	80,059	104,393	73,882	68,037	−4.0	25.2	−23.3	41.3	8.6	0.4	0.6	1.0	1.8	6.6
Miscellaneous	[4] 14,426	1,221	4,223	3,537	4,425	241.6	1,081.5	−71.1	19.4	−20.1	0.1	[5]	[5]	0.1	0.4

[1] A minus sign (−) denotes decrease.
[2] Includes steel produced by establishments not classified as "steel works and rolling mills," as follows: 1909—Total, 49,481 tons; open-hearth, 36,099; (basic, 10,674; acid, 25,425); Bessemer, 6,066; crucible and miscellaneous, 7,316. 1904—Total, 4,184 tons; open-hearth, 2,440; basic, 2,440; Bessemer, 774; crucible and miscellaneous, 970.
[3] Not reported separately.
[4] Includes electric, 12,577 tons; all other, 1,849 tons.
[5] Less than one-tenth of 1 per cent.

The tonnage of ingots and of castings is shown, according to process of manufacture, in Table 73.

Table 73

KIND.	STEEL PRODUCTION (TONS).							
	Amount.			Per cent of increase.[1]		Per cent of total.		
	1909	1904	1899	1904–1909	1899–1904	1909	1904	1899
Ingots	22,973,964	13,379,083	10,507,344	71.7	27.3	100.0	100.0	100.0
Open-hearth	13,725,783	5,548,396	2,873,827	147.4	92.7	59.7	41.5	27.4
Basic	12,952,840	4,974,921	2,117,311	160.4	135.0	56.4	37.2	20.1
Acid	772,943	573,475	761,516	34.8	−24.7	3.4	4.3	7.2
Bessemer	9,145,608	7,754,488	7,528,267	17.9	3.0	39.8	58.0	71.6
Crucible	90,242	76,199	100,750	18.4	−24.4	0.4	0.6	1.0
Miscellaneous, including electric	12,271	.....	.....	.....	.....		.....	.....
Castings	549,235	291,509	177,156	88.4	64.5	100.0	100.0	100.0
Open-hearth	502,594	272,001	165,529	84.8	64.3	91.5	93.3	93.4
Basic	268,253	89,671	36,524	199.2	145.5	48.8	30.8	20.6
Acid	234,341	182,330	129,005	28.5	41.3	42.7	62.5	72.8
Bessemer	34,465	14,427	3,761	138.9	283.6	6.3	4.9	2.1
Crucible	10,021	3,860	3,643	159.6	6.0	1.8	1.3	2.1
Miscellaneous, including electric	2,155	1,221	4,223	76.5	−71.1	0.4	0.4	2.4

[1] A minus sign (−) denotes decrease.

The tonnage and value of ingots and castings are shown in Table 74.

Table 74

CLASS.	STEEL PRODUCTION. 1909	1904	1899	Per cent of increase. 1904–1909	1899–1904
Total					
Tons	[1] 23,523,199	[1] 13,670,592	10,685,000	72.1	27.9
Value	$482,877,332	$261,231,976	$212,538,875	84.8	22.9
Ingots:					
Tons	22,973,964	13,379,083	10,507,844	71.7	27.3
Value	$440,340,174	$240,284,576	$197,928,982	83.3	21.4
Castings:					
Tons	549,235	291,509	177,156	88.4	64.5
Value	$42,537,158	$20,947,400	$14,609,893	103.1	43.4
Per cent of total.	100.0	100.0	100.0	.....	.....
Ingots:					
Tons	97.7	97.9	98.3	.....	.....
Value	91.2	92.0	93.1	.....	.....
Castings:					
Tons	2.3	2.1	1.7	.....	.....
Value	8.8	8.0	6.9	.....	.....

[1] Includes steel produced by establishments not classified as "steel works and rolling mills," as follows:

	1909 Tons.	1909 Value.	1904 Tons.	1904 Value.
Total	49,481	$4,140,344	4,184	$347,264
Ingots	5,102	465,634	.....	.....
Castings	44,379	3,674,710	4,184	347,264

Production, by states.—The production of steel is shown, by states, for the censuses from 1879 to 1909 in Table 75. States for which the production can not be given without disclosing individual operations are included under "all other states." The most important of these, in 1909, in order of rank, were New York, Colorado, Maryland, Alabama, West Virginia, and Kentucky. The table shows a relative decline since 1899 in the importance of Pennsylvania and Illinois as producers of steel and a relative gain in that of Ohio and Indiana.

Table 75

STATE.	STEEL PRODUCTION (TONS). 1909	1904	1899	1889	1879
Total	23,523,199	13,670,592	10,685,000	4,174,652	1,027,381
Illinois	2,671,087	1,555,198	1,460,710	779,956	227,293
Indiana	779,778	81,589	51,967	1,116	.....
Michigan	10,450	2,500	4,575	4,865	.....
New Jersey	95,851	68,288	62,832	21,149	10,663
Ohio	4,713,869	2,529,997	1,812,829	395,574	96,324
Pennsylvania	12,206,608	7,733,640	6,431,207	2,652,920	586,994
Wisconsin	21,888	9,215	2,207	.....	.....
All other states	3,023,668	1,690,165	858,493	319,082	106,107
Per cent of total.	100.0	100.0	100.0	100.0	100.0
Illinois	11.4	11.4	13.7	18.7	22.1
Indiana	3.3	0.6	0.5	[1]	.....
Michigan	[1]	[1]	[1]	0.1	.....
New Jersey	0.4	0.5	0.6	0.5	1.0
Ohio	20.0	18.5	17.0	9.5	0.4
Pennsylvania	51.9	56.6	60.2	63.5	57.1
Wisconsin	0.1	0.1	[1]	.....	.....
All other states	12.9	12.4	8.0	7.6	10.3

[1] Less than one-tenth of 1 per cent.

Table 76 gives the production, by states, of the different kinds of steel for 1909 and 1904. In Indiana practically all, and in Pennsylvania much the larger part, of the steel produced in 1909 was made by the open-hearth process, but in Illinois and Ohio the Bessemer process still predominated.

Table 76

STATE.	STEEL PRODUCTION (TONS). Open-hearth. 1909	Open-hearth. 1904	Bessemer. 1909	Bessemer. 1904	Crucible and miscellaneous. 1909	Crucible and miscellaneous. 1904
Total	14,228,377	5,820,397	9,180,133	7,768,915	114,689	81,280
Illinois	1,020,208	361,650	1,632,758	1,193,548	18,121	.....
Indiana	779,598	80,799	.....	.....	180	790
Michigan	9,279	.....	.....	2,500	1,171	.....
New Jersey	79,742	57,606	6,660	4,177	9,449	6,505
Ohio	1,383,725	480,844	3,327,850	2,049,153	2,285	.....
Pennsylvania	9,295,459	4,230,657	2,849,112	3,442,312	62,037	60,671
Wisconsin	16,280	5,934	2,859	1,648	2,749	1,633
All other states	1,644,086	602,907	1,360,885	1,075,577	18,697	11,681
Per cent of total.	100.0	100.0	100.0	100.0	100.0	100.0
Illinois	7.2	6.2	17.8	15.4	15.8	.....
Indiana	5.5	1.4	.....	.....	0.2	1.0
Michigan	0.1	.....	.....	[1]	1.0	.....
New Jersey	0.6	1.0	0.1	0.1	8.2	8.0
Ohio	9.7	8.3	36.3	26.4	2.0	.....
Pennsylvania	65.3	72.7	31.0	44.3	54.1	74.6
Wisconsin	0.1	0.1	[1]	[1]	2.4	2.0
All other states	11.6	10.4	14.8	13.8	16.3	14.4

[1] Less than one-tenth of 1 per cent.

Production for consumption and for sale.—In Table 77 is shown the tonnage of steel made for consumption in the works where produced, that transferred to other works of the producing company for consumption, and that produced for sale. The castings were in the main produced for sale.

Table 77

KIND.	STEEL PRODUCTION (TONS): 1909. Total.	For consumption by producing company. Total.	In works where produced.	For transfer to other works of same company.	For sale.
Total	[1] 23,523,199	23,033,040	22,920,739	112,301	490,159
Open-hearth	14,228,377	13,781,534	13,709,101	72,433	446,843
Basic	13,221,093	12,977,845	12,908,030	69,815	243,248
Acid	1,007,284	803,689	801,071	2,618	203,595
Bessemer	9,180,133	9,148,539	9,108,813	39,726	31,594
Crucible	100,263	88,890	88,748	142	11,373
Electric and all other	14,426	14,077	14,077	.....	349
Ingots	22,973,964	22,942,720	22,830,419	112,301	31,244
Open-hearth	13,725,783	13,698,674	13,626,241	72,433	27,109
Basic	12,952,840	12,934,329	12,864,514	69,815	18,511
Acid	772,943	764,345	761,727	2,618	8,598
Bessemer	9,145,668	9,143,668	9,103,942	39,726	2,000
Crucible	90,242	88,107	87,965	142	2,135
Electric	12,271	12,271	12,271	.....	.....
Castings	549,235	90,320	90,320	.....	458,915
Open-hearth	502,594	82,860	82,860	.....	419,734
Basic	268,253	43,516	43,516	.....	224,737
Acid	234,341	39,344	39,344	.....	194,997
Bessemer	34,465	4,871	4,871	.....	29,594
Crucible	10,021	783	783	.....	9,238
Electric and all other	2,155	1,806	1,806	.....	349

[1] Includes 49,481 tons produced by establishments not classified as "steel works and rolling mills."

Practically all steel ingots (99.4 per cent in 1909) are at present used by the works producing them in further processes of manufacture. In 1909 only 31,244 tons of ingots were made for sale and only 112,301 for transfer to other works of the same company.

The Bessemer steel produced in 1909 included 23,447 tons (23,321 tons of castings and 126 tons of ingots) made in converters other than standard Bessemer. Of this production, 14,474 tons were made in Tropenas converters and 8,973 tons in those of other or special types. In 1904 the product of the converters other than standard Bessemer was 11,834 tons—all castings.

A production of 522,682 tons of steel, which was partly purified in Bessemer converters and then finished in open-hearth furnaces, was reported by 4 establishments (1 in Alabama, 1 in New York, and 2 in Pennsylvania), the product being classified as open-hearth steel.

Alloy steel.—The census schedule of 1909 for the first time contained an inquiry in regard to alloy steel. It did not indicate any limitation as to the percentage of alloy metal necessary to constitute an alloy steel. This was left for the manufacturer to decide, and the returns do not show the percentages of alloy metal used. The total amount of alloy steels reported was 158,216 tons, this being produced by 36 establishments distributed by states, as follows: Pennsylvania, 21; New Jersey, 3; New York, 3; Ohio, 2; and Connecticut, Delaware, the District of Columbia, Illinois, Massachusetts, Michigan, and Wisconsin, 1 each. Table 78 gives the production of alloy steels, by kind, for 1909.

Table 78

KIND.	Tons.	KIND.	Tons.
Total alloy steel	**158,216**	Vanadium	8,030
Aluminum	(1)	Chrome-tungsten	600
Chrome	11,269	Chrome-vanadium	4,408
Manganese	5,024	Nickel-chrome	26,929
Molybdenum	6	Nickel-vanadium	620
Nickel	37,607	Nickel-chrome-tungsten	40
Titanium	40,477	Nickel-chrome-vanadium	9,280
Tungsten	1,697	Not specified	12,208

Of the alloy steels, 151,300 tons were ingots and 6,916 tons castings. They were distributed according to process of manufacture as shown in Table 79.

Table 79

KIND.	ALLOY STEEL PRODUCTION (TONS).	
	Amount.	Per cent of total.
Total	**158,216**	**100.0**
Open-hearth	100,335	63.4
Basic	86,242	54.5
Acid	14,093	8.9
Bessemer	45,324	28.6
Crucible and miscellaneous	12,557	7.9

CAPACITY AND EQUIPMENT.

Capacity of steel works.—Table 80 gives the daily capacity, in tons of steel on double turn, of all active steel plants, for 1909 and 1904, and the steel production for the year. Computed from daily capacity on a basis of 300 working days the total yearly capacity was about 33,000,000 tons in 1909 and 23,500,000 tons in 1904; the actual production was approximately 72 per cent of the computed capacity in 1909, 58 per cent in 1904, and 66 per cent in 1899.

Table 80

STATE.	DAILY CAPACITY OF ACTIVE STEEL PLANTS (TONS).		STEEL PRODUCTION (TONS).	
	1909	1904	1909	1904
United States	**109,570**	**78,346**	**23,523,199**	**13,670,592**
Connecticut	348	330	54,410	47,307
Delaware	117	400	7,827	868
Illinois	8,046	9,382	2,671,087	1,555,198
Indiana	5,039	498	779,778	81,589
Kentucky	933	600	162,835	89,610
Massachusetts	835	854	151,791	109,025
Michigan	142	18	10,450	2,500
New Jersey	1,043	922	95,851	68,288
New York	4,942	2,313	1,115,250	474,258
Ohio	21,149	13,780	4,713,869	2,529,997
Pennsylvania	55,632	40,772	12,206,608	7,733,640
West Virginia	1,050	1,200	324,671	214,075
Wisconsin	241	81	21,888	9,215
All other states	8,253	7,096	1,206,884	755,022

Open-hearth steel furnaces.—The statistics in regard to the number of establishments equipped with open-hearth furnaces and the number and capacity of the furnaces are given, by states, in Table 81. The equipment of the few establishments in industries other than the steel-works and rolling-mill industry is included.

Table 81 — OPEN-HEARTH STEEL FURNACES.

STATE AND CENSUS YEAR.	Total.			Basic.			Acid.		
	Number of establishments.	Furnaces.		Number of establishments.	Furnaces.		Number of establishments.	Furnaces.	
		Number.	Daily capacity (tons).		Number.	Daily capacity (tons).		Number.	Daily capacity (tons).
United States:									
1909 [1]	129	706	62,161	82	553	55,392	70	153	6,769
1904 [2]	110	489	34,398	64	341	26,932	65	148	7,466
1899	82	307	18,245	(3)	168	12,151	(3)	139	6,094
Alabama:									
1909	1	6	1,120	1	6	1,120	....	....	....
1904	4	18	1,390	4	18	1,390	....	....	....
1899	2	12	1,120	2	12	1,120	....	....	....
Colorado:									
1909	1	12	1,200	1	12	1,200	....	....	....
1904	1	6	600	1	6	600	....	....	....
1899	....	....	....	....	....	....	....	....	....
Connecticut:									
1909	2	4	270	1	3	250	1	1	20
1904	3	6	370	1	3	230	2	3	140
1899	1	1	10	....	....	....	1	1	10
Delaware:									
1909	1	2	75	....	....	....	1	2	75
1904	1	5	460	1	4	360	1	1	100
1899	....	....	....	....	....	....	....	....	....
Illinois:									
1909	7	48	3,994	7	47	3,934	1	1	60
1904	9	38	2,131	7	33	1,894	3	5	237
1899	5	24	1,498	(3)	20	1,275	(3)	4	223
Indiana:									
1909	5	39	5,638	2	34	5,462	3	5	176
1904	4	9	484	1	4	400	3	5	84
1899	5	8	333	(3)	3	130	(3)	5	203
Kentucky:									
1909	1	4	333	1	3	250	1	1	83
1904	....	....	....	....	....	....	....	....	....
1899	....	....	....	....	....	....	....	....	....
Massachusetts:									
1909	5	15	825	2	6	555	4	9	270
1904	3	12	635	2	5	410	2	7	225
1899	3	10	576	(3)	2	136	(3)	8	440
Missouri:									
1909	1	8	378	1	8	378	....	....	....
1904	1	5	160	1	5	160	....	....	....
1899	1	3	42	1	3	42	....	....	....
New Jersey:									
1909	6	15	769	4	9	499	4	6	270
1904	4	13	825	3	9	558	3	4	267
1899	2	7	310	(3)	2	100	(3)	5	210
New York:									
1909	8	27	1,998	5	20	1,791	3	7	207
1904	6	17	965	4	11	739	2	6	226
1899	4	8	190	(3)	3	104	(3)	5	86
Ohio:									
1909	17	68	6,370	14	60	5,986	6	8	384
1904	12	43	2,942	9	34	2,404	6	9	538
1899	8	27	1,218	(3)	14	740	(3)	13	478
Pennsylvania:									
1909	62	438	38,345	36	332	33,300	40	106	5,045
1904	54	308	23,195	28	205	17,697	38	103	5,598
1899	45	199	12,745	(3)	106	8,404	(3)	93	4,341
All other states:									
1909 [4]	12	20	846	7	13	667	6	7	179
1904	8	9	241	2	4	190	5	5	51
1899	6	8	203	1	3	100	5	5	103

[1] Includes 8 establishments, with 19 furnaces of 560 tons aggregate daily capacity, not classified as "steel works and rolling mills."
[2] Includes 6 establishments, with 8 furnaces of 155 tons aggregate daily capacity, not classified as "steel works and rolling mills."
[3] Figures not available.
[4] All other states embrace: California, 1 establishment; District of Columbia, 1; Georgia, 1; Maryland, 1; Michigan, 2; Rhode Island, 1; West Virginia, 1; Wisconsin, 4.

During the decade 1899–1909 there was an increase of 130 per cent in number of open-hearth furnaces and of 240.7 per cent in their capacity; the increase, however, both in number of furnaces and in capacity, was chiefly in furnaces of the basic type.

In 1879 the open-hearth furnaces ranged from 7 to 10 tons capacity per heat. In 1889 furnaces of 20 to 30 tons capacity were common; and in 1899 a large number of furnaces of 50 tons were in use, with at least one of 75 tons. In 1904, 169 furnaces of 50 tons and 6 of 60 tons capacity per heat were reported. In 1909 approximately one-half of the open-hearth furnaces were rated at 50 tons and over, and there were 2 furnaces of 125 tons capacity per heat or melt. The distribution by size groups of the open-hearth steel furnaces in 1909 was as follows:

Table 82

CAPACITY PER HEAT OR MELT.	Open-hearth steel furnaces: 1909
Total	706
Less than 50 tons	367
50 but less than 60 tons	137
60 but less than 70 tons	105
70 but less than 80 tons	51
80 tons	37
Over 80 tons	9

Of the larger furnaces (50 tons capacity or more), 10 of 50 tons, 1 of 60 tons, and 1 of 75 tons were for acid steel, the remainder being basic.

Converters.—The statistics in regard to the number of establishments equipped with converters and the number, kind, and capacity of converters, are given, by states, for 1909 and 1904, in Table 83. The statistics given include the equipment of a few establishments not classified as "steel works and rolling mills," comprising, for 1909, nine establishments, with 11 converters of 182 tons aggregate daily capacity, and for 1904, eight establishments, with 11 converters of 1,675 tons aggregate daily capacity.

Bessemer steel was produced in 1909 by 54 establishments, with 112 converters of 49,005 tons aggregate daily capacity; in 1904 by 44 establishments, with 92 converters of 43,123 tons aggregate daily capacity; and in 1899 by 33 establishments, having 70 converters of 34,925 tons aggregate daily capacity. The increase for the decade was 60 per cent in number of converters and 40.3 per cent in capacity.

The size of the converters used has not increased in late years. In 1879 the usual capacity of the standard Bessemer converter was 5 tons per heat; in 1889, 10 to 12 ton converters were in use; and in 1899 one establishment had installed 20-ton converters. No larger converters have since been reported. The Tropenas and the miscellaneous converters are in general much smaller than the standard Bessemer converters.

Table 83

STATE AND CENSUS YEAR.	Number of establishments.	BESSEMER CONVERTERS.		TROPENAS CONVERTERS.		OTHER KINDS OF CONVERTERS.	
		Number.	Daily capacity (tons).	Number.	Daily capacity (tons).	Number.	Daily capacity (tons).
United States:							
1909 [1]	54	69	48,377	24	348	[2] 19	[2] 280
1904 [3]	44	61	42,875	13	95	18	353
Alabama:							
1909	1	2	950				
1904	1	1	500				
California:							
1909							
1904	1			1	8		
Colorado:							
1909	1	2	2,000				
1904	1	2	2,000				
Connecticut:							
1909	1			1	8		
1904							
Delaware:							
1909	2			2	10	4	32
1904	1					3	30
Illinois:							
1909	7	8	6,500	3	90	4	77
1904	4	8	7,200	3	27		
Kentucky:							
1909	1	2	600				
1904	1	2	500				
Maryland:							
1909	1	3	2,150				
1904	1	3	2,200				
Massachusetts:							
1909							
1904	1					1	200
Michigan:							
1909	1					2	17
1904	1					2	18
Minnesota:							
1909	1			1	4		
1904	1			1	4		
Missouri:							
1909	1					2	48
1904							
New Jersey:							
1909	3	3	180			3	25
1904	3					6	45
New York:							
1909	2	4	2,780	2	25		
1904	2	4	1,200	2	20		
Ohio:							
1909	11	16	15,317	2	16	2	25
1904	7	12	10,830			1	8
Oregon:							
1909	1					1	6
1904	1					1	4
Pennsylvania:							
1909	15	25	16,515	7	70	1	50
1904	12	25	16,895	3	24	1	10
Rhode Island:							
1909							
1904	1			2	8		
Virginia:							
1909	1			1	6		
1904	1			1	4		
West Virginia:							
1909	2	4	1,385				
1904	2	4	1,260				
Wisconsin:							
1909	2			5	110		
1904	2					3	38

[1] Not including 4 Government institutions located in California, the District of Columbia, Massachusetts, and New York, each of which had 1 Tropenas converter.
[2] Includes the following: Bookwalter, 4 of 32 tons aggregate capacity; Robert-Bessemer, 4 of 41 tons; Schwartz, 2 of 5 tons; Zenges, 2 of 72 tons; side-blown, 3 of 98 tons; and special, 4 of 32 tons.
[3] Not including 2 Government institutions located in the District of Columbia and Massachusetts, each of which had 1 Tropenas converter.

Crucible steel furnaces.—The statistics in regard to crucible-furnace equipment are given in Table 84. The statistics for the last two censuses include the equipment of a few establishments not classed as "steel works and rolling mills," comprising eight establishments, with 21 furnaces and 234 pots of 46 tons daily capacity for 1909, and six establishments, with 14 furnaces and 266 pots of 24 tons capacity for 1904.

Table 84

	CRUCIBLE STEEL FURNACES.			
	Number of establishments reporting.	Number of furnaces.	Number of pots that can be used at a heat.	Daily capacity on double turn (tons).
United States:				
1909	67	278	4,074	886
1904	44	160	2,723	717
1899	37	159	2,528	575
Individual states, 1909:				
California	2	4	108	6
Connecticut	1	2	54	10
Illinois	4	19	210	45
Indiana	1	4	16	1
Massachusetts	3	14	88	10
Michigan	3	23	92	10
Minnesota	2	11	38	3
New Jersey	5	15	310	69
New York	6	21	510	99
Ohio	5	14	100	15
Pennsylvania	24	95	2,314	571
Wisconsin	11	56	234	47

Although there was an increase of 74.8 per cent in the number of crucible furnaces, 61.2 per cent in the number of pots available for use at a heat, and 54.1 per cent in daily capacity, between 1899 and 1909, there was a slight decrease during this time in tonnage of crucible steel produced. (See Table 72.)

Electric and miscellaneous steel furnaces.—The manufacture of steel in electric furnaces of the Heroult type was reported by 4 establishments in 1909—1 in Illinois, 1 in New York, and 2 in Pennsylvania. The aggregate daily capacity of the furnaces of this type was 285 tons of steel, the daily capacity per furnace ranging from 5 to 180 tons. No electric steel furnaces were reported at prior censuses.

Eighteen steel-making furnaces of other types aggregating 73 tons in daily capacity were reported by 4 establishments—1 in Connecticut, 1 in Ohio, and 2 in Pennsylvania. These include 12 McHaffie furnaces with a combined daily capacity of 7 tons, 3 cementation furnaces of 60 tons, and 3 special furnaces of 6 tons.

Metal mixers.—Establishments operating blast furnaces and steel plants in conjunction are equipped with metal mixers or reservoirs which receive the molten blast-furnace metal and from which the molten metal is drawn for the converters and the open-hearth furnaces. In 1909, 59 metal mixers, with an aggregate capacity of 14,343 tons, were reported by 30 establishments, of which 14 were in Pennsylvania, 7 in Ohio, 3 in Illinois, 2 in New York, and 1 each in Colorado, Indiana, West Virginia, and Wisconsin. These ranged in capacity from 100 to 500 tons, 24 of them being of 250 tons capacity, 11 of 300 tons, and 2 of 500 tons each.

Hot rolls.—Of the 446 establishments classified as steel works and rolling mills in 1909, 346, or 77.6 per cent, were equipped with hot rolls, these having a daily

capacity on double turn of 150,403 tons of rolled iron and steel. The daily capacity of the hot rolls was 86,964 tons in 1899, the increase for the decade being 72.9 per cent.

Table 85

STATE.	HOT ROLLS. Total.	Having a daily capacity on double turn of— Less than 100 tons.	100 to 499 tons.	500 to 999 tons.	1,000 to 2,999 tons.	3,000 tons and over.
United States:						
Number of establishments	**346**	**144**	**145**	**26**	**20**	**11**
Aggregate daily capacity	**150,403**	**6,903**	**29,800**	**17,200**	**38,000**	**58,500**
Alabama:						
Number of establishments	6	4	1	.....	1	.....
Daily capacity	2,385	185	200	.....	2,000	.....
California:						
Number of establishments	3	1	2	.....	.....	.....
Daily capacity	265	65	200	.....	.....	.....
Connecticut:						
Number of establishments	4	2	2	.....	.....	.....
Daily capacity	405	85	320	.....	.....	.....
Illinois:						
Number of establishments	19	5	10	2	.....	2
Daily capacity	14,985	285	2,000	1,700	.....	11,000
Indiana:						
Number of establishments	15	5	8	1	.....	1
Daily capacity	7,200	300	1,900	800	.....	4,200
Kentucky:						
Number of establishments	7	4	1	2	.....	.....
Daily capacity	1,470	270	100	1,100	.....	.....
Maryland:						
Number of establishments	5	2	2	.....	1	.....
Daily capacity	2,190	90	300	.....	1,800	.....
Massachusetts:						
Number of establishments	4	2	1	1	.....	.....
Daily capacity	775	175	100	500	.....	.....
Michigan:						
Number of establishments	3	3	.....	.....	.....	.....
Daily capacity	170	170	.....	.....	.....	.....
Missouri:						
Number of establishments	3	1	2	.....	.....	.....
Daily capacity	350	50	300	.....	.....	.....
New Jersey:						
Number of establishments	11	6	3	2	.....	.....
Daily capacity	1,995	245	450	1,300	.....	.....
New York:						
Number of establishments	18	10	7	.....	.....	1
Daily capacity	7,365	335	1,230	.....	.....	5,800
Ohio:						
Number of establishments	60	25	24	4	5	2
Daily capacity	28,000	1,250	5,050	2,500	10,200	9,000
Pennsylvania:						
Number of establishments	156	60	69	11	12	4
Daily capacity	72,895	2,575	15,720	7,300	22,800	24,500
Virginia:						
Number of establishments	3	1	2	.....	.....	.....
Daily capacity	330	50	280	.....	.....	.....
West Virginia:						
Number of establishments	16	8	6	2	.....	.....
Daily capacity	3,045	545	1,100	1,400	.....	.....
All other states:[1]						
Number of establishments	13	5	5	1	1	1
Daily capacity	6,578	228	550	600	1,200	4,000

[1] All other states embrace: Colorado, 1 establishment; Delaware, 2; Georgia, 1; Maine, 1; Oregon, 1; Rhode Island, 2; Tennessee, 1; Texas, 1; Washington, 1; Wisconsin, 1; Wyoming, 1.

The hot-rolling equipment ranges in tonnage capacity per day from a few tons to over 10,000 tons. Table 85 shows statistics for establishments grouped according to daily capacity of hot rolls in 1909. Of the 27 states reporting mills there were only 9 in which any mill was found with a capacity in excess of 1,000 tons; there were, however, 5 mills situated in Illinois, New York, Ohio, and Pennsylvania whose capacity was in excess of 5,000 tons.

In 1909, 63 establishments reported the operation of works, wholly or in part, on triple turn. Of these, 28 were located in Pennsylvania, 21 in Ohio, and 5 in West Virginia. These 63 establishments had an aggregate daily capacity on double turn of 12,115 tons. They constituted 18.2 per cent of the 346 rolling-mill establishments and represented 8.1 per cent of the total capacity.

Natural gas.—Table 86 summarizes the data secured relative to the establishments using natural gas in 1909 and the part of the works in which natural gas was used.

Of the 86 rolling mills using natural gas for heating furnaces, etc., 3 employed it in reverberatory furnaces for puddling pig iron.

Table 86

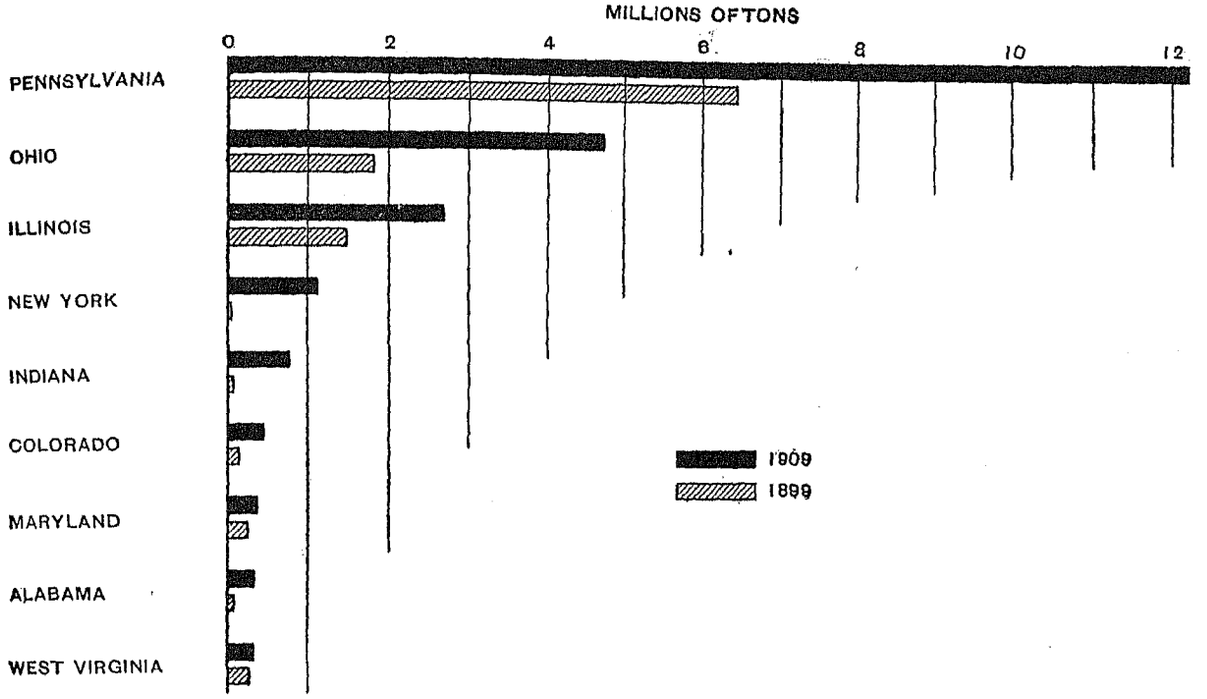
	STEEL WORKS AND ROLLING MILLS—NUMBER OF ESTABLISHMENTS: 1909 United States.	Indiana.	Kentucky.	Maryland.	Ohio.	Pennsylvania.	West Virginia.
Total	**446**	**17**	**7**	**5**	**75**	**189**	**16**
Establishments using natural gas[1]	101	2	2	2	23	63	9
For steel works	37	.....	1	1	9	25	1
Open-hearth furnaces	23	.....	.....	1	5	16	1
Crucible and miscellaneous furnaces	12	.....	.....	.....	.....	12	.....
Bessemer department	6	.....	1	.....	4	1	.....
For rolling mills (heating furnaces, including soaking pits, puddling furnaces, annealing furnaces, and forges)	86	2	2	2	17	54	9
For power department	31	.....	1	.....	6	19	5

[1] Not including establishments using natural gas in secondary departments only, such as pipe mills, galvanizing and tin-plate dipping departments, foundries, laboratories, etc., or for the heating of ladles.

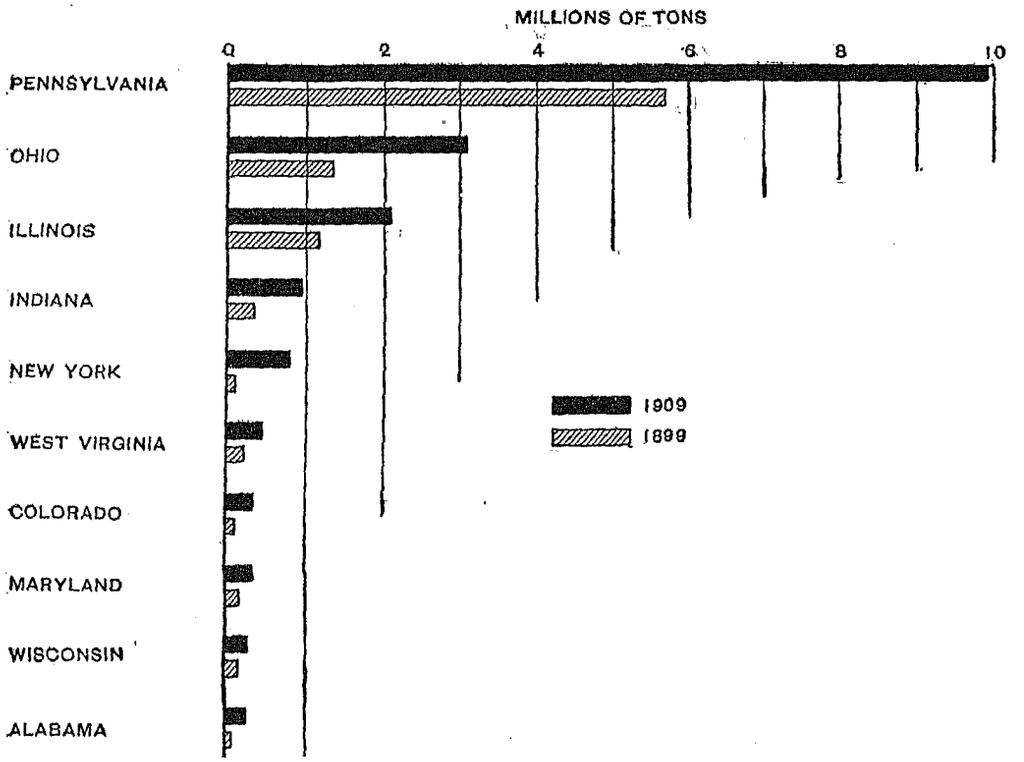
Production of steel and finished rolled products and forgings, by states; 1909 and 1899.—The diagrams on page 51 show the tonnage of steel produced and the tonnage of finished rolled products and forgings for 1909 and 1899, for states having a product in excess of 200,000 tons in 1909. The steel production of all states not shown in the diagrams was 602,670 tons in 1909, and the tonnage of finished rolled products and forgings was 773,511 tons.

STEEL WORKS AND ROLLING MILLS—STEEL PRODUCTION AND FINISHED ROLLED PRODUCTS AND FORGINGS: 1909 AND 1899.

STEEL PRODUCTION.



FINISHED ROLLED PRODUCTS AND FORGINGS.



MATERIALS, PRODUCTS, AND EQUIPMENT IN DETAIL, BY STATES.

The detailed statistics of materials, products, and equipment are given, by states, in Table 87 for 1909, and are presented in six sections. Section I relates to materials; Section II gives the statistics for the direct or primary products of the establishments; Section III gives the statistics of steel production; Section IV, the statistics of manufactures made in the mills producing from direct or primary products; Section V, the tonnage of products sold for export by the mills; and Section VI, the statistics relating to equipment.

STEEL WORKS AND ROLLING MILLS—DETAILED STATISTICS OF

[Tons of 2,240 pounds.]

	Table 87	United States.	California.	Connecticut.	Delaware.	Illinois.	Indiana.
1	Number of establishments	446	5	5	5	24	17
	I. MATERIALS USED.						
2	**Total cost**	**$657,500,856**	**$2,347,778**	**$2,028,870**	**$1,058,995**	**$56,244,463**	**$26,098,759**
	Iron and steel:						
	For furnaces and hot rolls—						
3	Tons	30,388,755	86,237	73,910	25,894	2,993,406	1,238,596
4	Cost	$515,769,588	$1,350,486	$1,078,560	$595,471	$47,040,950	$20,015,796
	Pig iron and ferroalloys—						
5	Tons	19,070,889	12,021	(2)	4,652	2,433,805	488,786
6	Cost	$297,471,122	$262,844	(2)	$93,275	$36,686,448	$7,154,672
	Produced by company reporting—						
7	Tons	15,252,736	.....	.....	.....	2,308,393	476,750
8	Cost	$228,250,824	.....	.....	.....	$34,196,992	$6,736,478
	Purchased—						
9	Tons	3,824,153	12,021	(2)	4,652	125,412	12,036
10	Cost	$69,220,298	$262,844	(2)	$93,275	$2,489,456	$418,194
	Pig iron—						
11	Tons	18,712,304	(2)	(2)	3,943	2,363,548	481,680
12	Produced	15,108,244	.....	.....	.....	2,252,082	476,750
13	Purchased	3,604,060	(2)	(2)	3,943	111,466	4,930
14	Cost	$282,663,740	(2)	(2)	$70,031	$34,770,211	$6,825,463
	Ferroalloys—spiegeleisen, ferromanganese, etc.—						
15	Tons	364,585	(2)	(2)	709	70,257	7,106
16	Produced	144,492	.....	.....	.....	56,311	.....
17	Purchased	220,093	(2)	(2)	709	13,946	7,106
18	Cost	$14,807,382	(2)	(2)	$23,244	$1,916,237	$329,209
	Scrap, including old rails not intended for rerolling—						
	Purchased, or transferred from other works of company reporting—						
19	Tons	4,803,617	64,406	58,618	7,255	278,874	478,094
20	Transferred	773,843	.....	.....	.....	3,844	55,955
21	Purchased	4,029,774	64,406	58,618	7,255	275,030	422,139
22	Cost	$72,722,831	$831,112	$773,741	$133,537	$3,996,891	$6,212,888
23	Produced in works where consumed, tons	5,126,093	.....	9,042	5,811	487,037	196,091
	Ingots, blooms, billets, slabs, muck and scrap bar, rails for rerolling, and sheet and tin-plate bars—						
24	Tons	6,508,249	(2)	(2)	13,987	280,727	271,716
25	Transferred from other works of company reporting	3,080,672	.....	.....	.....	96,840	104,006
26	Purchased	3,427,577	(2)	(2)	13,987	183,887	167,710
27	Cost	$145,575,635	(2)	(2)	$368,659	$6,357,611	$6,648,236
	Rolled forms for further manufacture—						
	Skelp—						
	Purchased, or transferred from other works of company reporting—						
28	Tons	176,717	.....	.....	.....	.....	.....
29	Transferred	35,221	.....	.....	.....	.....	.....
30	Purchased	141,496	.....	.....	.....	.....	.....
31	Cost	$5,704,856	.....	.....	.....	.....	.....
32	Produced in works where consumed, tons	1,401,573	.....	(2)	.....	.....	.....
	Wire rods—						
	Purchased, or transferred from other works of company reporting—						
33	Tons	146,425	.....	.....	.....	.....	.....
34	Transferred	128,291	.....	.....	.....	.....	.....
35	Purchased	18,134	.....	.....	.....	.....	.....
36	Cost	$4,252,695	.....	.....	.....	.....	.....
37	Produced in works where consumed, tons	1,318,796	.....	.....	.....	161,633	128,614
	Iron ore:						
38	Tons	835,338	(2)	(2)	(2)	(2)	43,365
39	Cost	$4,292,903	(2)	(2)	(2)	(2)	$178,943
	Domestic—						
40	Tons	823,306	.....	(2)	(2)	(2)	43,365
41	Cost	$4,224,593	.....	(2)	(2)	(2)	$178,943
	Foreign—						
42	Tons	12,032	(2)	.....	(2)	.....	.....
43	Cost	$68,370	(2)	.....	(2)	.....	.....
	Copper ingots, billets, blooms, bars, scrap, etc.:						
44	Tons	19,545	(2)	.....	.....	(2)	.....
45	Cost	$5,756,018	(2)	.....	.....	(2)	.....
46	Fuel and rent of power	$46,136,725	$159,207	$379,092	$112,535	$3,598,585	$2,339,604
47	All other materials	$75,588,011	$663,077	$571,194	$348,864	$4,487,796	$3,564,416
	II. PRODUCTS.						
48	**Total value**	**$985,722,534**	**$3,519,824**	**$4,070,572**	**$1,715,341**	**$86,608,137**	**$38,651,848**
	Rolled, forged, and other classified steel and iron products:						
49	Tons	26,723,274	61,581	70,392	22,062	2,644,191	1,110,498
50	For sale	18,265,891	55,783	52,792	10,447	2,043,439	806,290
51	For consumption (in same works or in other works of same company)	8,457,383	5,798	17,600	11,615	600,752	304,208
52	Value	$863,342,711	$2,148,598	$3,410,086	$1,371,553	$78,841,720	$35,525,349
	Rails—						
53	Tons	2,858,599	.....	.....	.....	(2)	(2)
54	Value	$81,128,295	.....	.....	.....	(2)	(2)
	Bessemer steel—						
55	Tons	1,643,527	.....	.....	.....	(2)	(2)
56	Value	$44,727,515	.....	.....	.....	(2)	(2)
	Open-hearth steel, basic—						
57	Tons	1,215,072	.....	.....	.....	(2)	(2)
58	Value	$36,400,780	.....	.....	.....	(2)	(2)
	Rerolled or renewed rails—						
59	Tons	106,352	.....	.....	.....	(2)	(2)
60	Value	$2,683,017	.....	.....	.....	(2)	(2)
	Rail fastenings (splice bars, tie-plates, fishplates, etc.)—						
61	Tons	396,911	(2)	.....	.....	145,027	.....
62	Value	$14,488,412	(2)	.....	.....	$5,158,902	.....

[1] All other states embrace: Alabama, 6 establishments; Colorado, 1; District of Columbia, 1; Georgia, 1; Maine, 1; Maryland, 5; Minnesota, 1; Oregon, 2; Rhode Island, 2; Tennessee, 1; Texas, 1; Virginia, 3; Washington, 1; Wyoming, 1.

MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909.

[Tons of 2,240 pounds.]

	Kentucky.	Massachusetts.	Michigan.	Missouri.	New Jersey.	New York.	Ohio.	Pennsylvania.	West Virginia.	Wisconsin.	All other states.[1]
1	7	9	8	4	16	25	75	189	16	14	27
2	$5,560,565	$10,032,273	$1,598,130	$2,858,985	$6,635,040	$25,889,170	$139,243,155	$320,013,421	$15,896,300	$7,906,400	$25,088,552
3	255,274	181,570	46,783	129,998	188,708	1,227,344	6,597,728	15,000,824	704,002	377,508	1,260,964
4	$4,506,012	$3,258,341	$1,165,156	$2,182,435	$4,007,008	$20,202,277	$112,893,389	$256,981,836	$13,832,655	$6,993,001	$19,657,215
5	131,497	63,867	5,929	(2)	48,885	947,541	4,209,149	9,317,903	326,000	75,973	968,156
6	$2,117,463	$1,016,957	$140,159	(2)	$1,072,384	$15,087,647	$64,441,978	$147,135,383	$5,173,052	$1,275,196	$15,071,095
7	.....	.....	.....	.....	.....	792,944	3,182,915	7,274,901	295,859	68,473	852,501
8	.....	.....	.....	.....	.....	$11,947,428	$47,236,015	$109,709,778	$4,630,834	$1,095,568	$12,697,731
9	131,497	63,867	5,929	(2)	48,885	154,597	1,026,234	2,043,002	30,141	7,500	115,655
10	$2,117,463	$1,016,957	$140,159	(2)	$1,072,384	$3,140,219	$17,205,963	$37,425,605	$542,218	$179,628	$2,373,364
11	130,330	62,727	5,467	(2)	46,279	905,716	4,172,114	9,158,200	323,687	75,192	930,514
12	.....	.....	.....	.....	.....	792,944	3,172,453	7,197,182	295,859	68,473	852,501
13	130,330	62,727	5,467	(2)	46,279	112,772	999,661	1,961,078	27,828	6,719	78,013
14	$2,063,703	$954,210	$109,134	(2)	$891,200	$13,933,573	$62,747,851	$139,208,875	$5,060,395	$1,242,227	$13,884,326
15	1,167	1,140	462	(2)	2,606	41,825	37,035	159,643	2,313	781	37,642
16	.....	.....	.....	.....	.....	.....	10,462	77,719	.....	.....	.....
17	1,167	1,140	462	(2)	2,606	41,825	26,573	81,924	2,313	781	37,642
18	$53,760	$62,747	$31,025	(2)	$181,184	$1,154,074	$1,694,127	$7,926,508	$112,657	$32,969	$1,186,269
19	65,465	69,332	7,358	78,480	74,195	183,112	530,408	2,669,778	34,780	13,145	190,322
20	.....	.....	.....	.....	60	28,601	68,925	616,419	.....	39	.....
21	65,465	69,332	7,358	78,480	74,135	154,511	461,483	2,053,354	34,780	13,106	190,322
22	$818,670	$1,005,028	$122,089	$1,222,610	$1,246,358	$3,230,711	$8,093,044	$41,572,010	$816,705	$218,601	$2,618,036
23	1,000	36,146	.....	18,041	24,947	203,234	872,314	3,053,735	32,427	3,391	182,877
24	58,312	48,380	33,496	20,085	65,028	96,691	1,858,171	3,013,148	343,222	288,390	102,486
25	.....	.....	.....	15,473	.....	.....	983,903	1,400,702	149,072	(2)	(2)
26	58,312	48,380	33,496	4,612	65,028	96,691	874,268	1,612,446	194,150	(2)	(2)
27	$1,569,879	$1,235,756	$902,308	$422,075	$1,688,266	$1,874,919	$40,358,367	$68,274,443	$8,042,898	$5,499,204	$1,967,484
28	.....	.....	.....	.....	(2)	(2)	57,144	119,365	.....	.....	.....
29	.....	.....	.....	.....	.....	.....	13,730	21,491	.....	.....	.....
30	.....	.....	.....	.....	(2)	(2)	43,414	97,874	.....	.....	.....
31	.....	.....	.....	.....	(2)	(2)	$1,730,190	$3,959,918	.....	.....	.....
32	.....	.....	.....	.....	.....	(2)	615,817	664,129	(2)	.....	.....
33	.....	.....	.....	.....	(2)	(2)	97,530	43,799	.....	.....	.....
34	.....	.....	.....	.....	.....	.....	96,088	32,203	.....	.....	.....
35	.....	.....	.....	.....	(2)	(2)	1,451	11,596	.....	.....	.....
36	.....	.....	.....	.....	(2)	(2)	$2,705,015	$1,244,260	.....	.....	.....
37	.....	(2)	.....	.....	(2)	(2)	147,056	725,901	.....	.....	82,560
38	2,126	(2)	69	.....	4,589	43,398	75,857	568,716	4,380	(2)	31,898
39	$11,592	(2)	$435	.....	$20,629	$173,898	$384,303	$3,169,203	$21,022	(2)	$71,515
40	2,126	(2)	69	.....	3,927	43,398	75,839	557,494	4,380	(2)	31,898
41	$11,592	(2)	$435	.....	$22,326	$173,898	$384,005	$3,106,170	$21,022	(2)	$71,515
42	.....	.....	.....	.....	662	.....	18	11,222	.....	.....	.....
43	.....	.....	.....	.....	$4,303	.....	$298	$63,033	.....	.....	.....
44	.....	(2)	.....	.....	641	2	402	2,466	.....	.....	10
45	.....	(2)	.....	.....	$214,288	$600	$122,039	$692,585	.....	.....	$2,600
46	$370,770	$760,307	$168,913	$274,802	$837,030	$2,170,165	$7,672,641	$23,615,586	$754,436	$247,610	$2,675,442
47	$672,191	$2,320,105	$263,026	$401,748	$1,234,917	$3,342,230	$13,732,578	$39,350,033	$1,288,187	$665,269	$2,081,780
48	$7,779,320	$13,567,628	$2,669,872	$5,012,627	$12,013,719	$39,532,414	$197,780,043	$500,343,995	$22,435,411	$10,732,989	$39,288,594
49	216,311	158,326	28,973	109,252	172,271	1,055,968	5,898,690	13,167,003	609,022	276,968	1,121,766
50	181,271	41,912	26,834	91,616	92,497	981,183	2,964,610	9,366,342	309,236	276,968	964,671
51	35,040	116,414	2,139	17,636	79,774	74,785	2,934,080	3,800,661	299,786	.....	157,095
52	$7,119,158	$5,229,868	$1,635,519	$4,760,495	$9,091,263	$33,921,048	$172,105,247	$442,737,439	$20,069,576	$9,915,253	$35,460,539
53	.....	.....	.....	.....	.....	(2)	(2)	848,924	.....	.....	713,992
54	.....	.....	.....	.....	.....	(2)	(2)	$24,077,184	.....	.....	$20,304,307
55	.....	.....	.....	.....	.....	(2)	(2)	546,862	.....	.....	283,910
56	.....	.....	.....	.....	.....	(2)	(2)	$14,524,921	.....	.....	$7,841,570
57	.....	.....	.....	.....	.....	(2)	(2)	302,062	.....	.....	430,082
58	.....	.....	.....	.....	.....	(2)	(2)	$9,552,263	.....	.....	$12,462,737
59	.....	.....	.....	.....	.....	.....	(2)	6,393	(2)	.....	19,113
60	.....	.....	.....	.....	.....	.....	(2)	$170,476	(2)	.....	$487,432
61	.....	.....	.....	.....	.....	51,827	27,381	124,049	.....	(2)	(2)
62	.....	.....	.....	.....	.....	$1,923,808	$915,410	$4,669,802	.....	(2)	(2)

[1] Included in total, but amount not shown, in order to avoid disclosure of individual operations.

STEEL WORKS AND ROLLING MILLS—DETAILED STATISTICS OF

[Tons of 2,240 pounds.]

	Table 87—Continued.	United States.	California.	Connecticut.	Delaware.	Illinois.	Indiana.
	II.—PRODUCTS—continued.						
	Rolled, forged, and other classified steel and iron products—Continued.						
	Structural shapes, not including plates used for making girders—						
1	Tons	2,123,630	20,037			(2)	(2)
2	Value	$65,564,593	$663,854			(2)	(2)
	Steel—						
3	Tons	2,102,300				(2)	(2)
4	Value	$64,853,466				(2)	(2)
	Open-hearth—						
5	Tons	1,934,230				(2)	(2)
6	Value	$59,789,948				(2)	(2)
	Bessemer—						
7	Tons	168,070					
8	Value	$5,063,518					
	Iron—						
9	Tons	21,330	20,037				
10	Value	$711,127	$663,854				
	Bars and rods, including merchant, shovel, finger, and horseshoe bars, spike, chain, bolt, and nut rods, etc. (but not including wire rods, sheet and tin-plate bars, splice bars, and bars for reenforced concrete)—						
11	Tons	3,784,248	21,261	9,580		455,209	231,851
12	For sale	3,151,569	15,697	(2)		351,096	231,851
13	For consumption in works where produced	632,679	5,564	(2)		104,113	
14	Value	$121,488,423	$723,768	$398,202		$13,952,608	$7,540,757
	Bars for reenforced concrete—						
15	Tons	191,358	(2)	(2)		9,386	16,600
16	Value	$5,588,983	(2)	(2)		$290,217	$461,933
	Wire rods—						
17	Tons	2,295,279				449,274	164,869
18	For sale	511,322				250,323	(2)
19	For consumption	1,783,957				198,951	(2)
20	In works where produced	1,318,796				161,633	(2)
21	In other works of same company	465,161				37,318	(2)
22	Value	$61,947,958				$12,022,153	$4,475,203
	Plates and sheets, not including black plates or sheets for tinning, nail and tack plates, tie-plates, fishplates, or armor plates—						
23	Tons	3,332,733			14,235	(2)	84,999
24	16 gauge and heavier	2,392,144			1,240	(2)	57,946
25	17 to 24 gauge	328,583			6,826	(2)	6,225
26	25 gauge and lighter	612,006			6,169	(2)	20,828
27	For sale	2,807,114			2,620	(2)	52,811
28	For consumption	525,619			11,615		32,188
29	In works where produced	463,665			11,615		27,380
30	In other works of same company	61,954					4,808
31	Value	$133,272,393			$700,068	(2)	$3,901,422
	Black plates or sheets for tinning—						
32	Tons	631,435				(2)	(2)
33	For sale	56,275				(2)	(2)
34	For consumption in dipping department of same company	575,160				(2)	(2)
35	Value	$30,955,967				(2)	(2)
	Skelp, flue and pipe—						
36	Tons	2,084,286		(2)			
37	For sale	580,686		(2)			
38	For consumption	1,503,600		(2)			
39	In works where produced	1,401,573		(2)			
40	In other works of same company	102,027					
41	Value	$64,514,728		(2)			
	Hoops, bands, and cotton ties—						
42	Tons	341,043					(2)
43	Value	$10,429,681					(2)
	Nail and tack plates—						
44	Tons	68,557	(2)			(2)	(2)
45	For sale	25,867					(2)
46	For consumption in works where produced	42,690	(2)			(2)	
47	Value	$2,540,022	(2)			(2)	(2)
	Axles, car, locomotive, wagon, carriage, etc., rolled or forged—						
48	Tons	102,348	(2)				
49	Value	$3,831,344	(2)				
	Armor plates, gun forgings, and ordnance—						
50	Tons	26,845					
51	Value	$10,649,079					
	Blooms, billets, and slabs—						
52	Tons	4,887,796	(2)			455,076	92,473
53	For sale	1,841,819	(2)			212,829	35,400
54	For transfer to other works of same company	3,045,977				242,247	57,073
55	Value	$108,514,747	(2)			$10,532,996	$2,159,133
	Rolled forging blooms and billets, for sale—						
56	Tons	84,383					
57	Value	$2,247,133					
	Sheet and tin-plate bars—						
58	Tons	1,652,761					
59	For sale	1,625,408					
60	For transfer to other works of same company	27,353					
61	Value	$37,745,269					
	Muck and scrap bar—						
62	Tons	174,496	(2)				23,852
63	For sale	154,431	(2)				23,852
64	For transfer to other works of same company	20,065					
65	Value	$4,986,211	(2)				$542,143
	All other rolled steel or iron—						
66	Tons	566,627	14	13,748		13,220	(2)
67	Value	$39,570,061	$1,079	$1,060,295		$678,993	(2)
	Ingots—						
68	Tons	142,745	(2)	(2)		28,382	(2)
69	For sale	30,444	(2)	(2)			
70	For transfer to other works of same company	112,301				28,382	(2)
71	Value	$3,593,726	(2)	(2)		$466,594	(2)
	Direct steel castings—						
72	Tons	504,856	(2)	(2)	7,827	74,613	13,601
73	Value	$38,862,448	(2)	(2)	$671,485	$5,715,421	$1,074,792
	All other forged steel and iron, not including remanufactures of rolling-mill products—						
74	Tons	365,986		(2)		7,539	(2)
75	Value	$18,740,241		(2)		$183,798	(2)

[1] All other states embrace: Alabama, 6 establishments; Colorado, 1; District of Columbia, 1; Georgia, 1; Maine, 1; Maryland, 5; Minnesota, 1; Oregon, 2; Rhode Island, 2; Tennessee, 1; Texas, 1; Virginia, 3; Washington, 1; Wyoming, 1.

MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909—Continued.

[Tons of 2,240 pounds.]

	Kentucky.	Massachusetts.	Michigan.	Missouri.	New Jersey.	New York.	Ohio.	Pennsylvania.	West Virginia.	Wisconsin.	All other states.[1]
1	.....	.....	.....	.....	(2)	(2)	(2)	1,597,946	.....	(2)	.....
2	.....	.....	.....	.....	(2)	(2)	(2)	$49,512,361	.....	(2)	.....
3	.....	.....	.....	.....	.....	(2)	(2)	1,597,341	.....	(2)	.....
4	.....	.....	.....	.....	.....	(2)	(2)	$49,490,974	.....	(2)	.....
5	.....	.....	.....	.....	.....	(2)	(2)	1,439,137	.....	(2)	.....
6	.....	.....	.....	.....	.....	(2)	(2)	$44,711,367	.....	(2)	.....
7	.....	.....	.....	.....	.....	(2)	(2)	158,204	.....	(2)	.....
8	.....	.....	.....	.....	.....	(2)	(2)	$4,779,607	.....	(2)	.....
9	.....	.....	.....	.....	(2)	.....	.....	605	.....	.....	.....
10	.....	.....	.....	.....	(2)	.....	.....	$21,387	.....	.....	.....
11	17,408	(2)	18,523	68,956	37,344	101,799	704,168	1,749,220	(2)	(2)	175,953
12	17,408	(2)	(2)	(2)	26,694	68,234	638,801	1,400,231	(2)	(2)	132,697
13	.....	(2)	(2)	(2)	10,650	33,565	65,367	348,989	.....	.....	43,256
14	$685,150	(2)	$711,818	$2,208,011	$1,376,303	$4,007,714	$21,168,583	$56,717,882	(2)	(2)	$5,885,709
15	.....	.....	.....	(2)	(2)	46,699	70,978	36,886	.....	.....	5,926
16	.....	.....	.....	(2)	(2)	$1,281,856	$2,063,084	$1,084,652	.....	.....	$227,712
17	(2)	(2)	.....	.....	(2)	(2)	(2)	861,261	.....	.....	98,959
18	(2)	(2)	.....	.....	.....	(2)	(2)	73,972	.....	.....	16,399
19	.....	(2)	.....	.....	(2)	(2)	(2)	787,289	.....	.....	82,560
20	.....	(2)	.....	.....	(2)	(2)	(2)	725,901	.....	.....	82,560
21	.....	(2)	.....	.....	(2)	.....	(2)	61,388	.....	.....	.....
22	(2)	(2)	.....	.....	(2)	(2)	(2)	$23,190,920	.....	.....	$2,779,821
23	38,175	.....	.....	(2)	.....	83,205	755,010	2,057,176	98,322	.....	15,196
24	2,374	.....	.....	(2)	.....	64,744	372,697	1,683,328	20,929	.....	15,196
25	8,003	.....	.....	(2)	.....	8,123	114,459	165,181	15,230	.....	(2)
26	27,798	.....	.....	(2)	.....	10,338	267,854	208,667	62,163	.....	(2)
27	6,095	.....	.....	(2)	.....	83,205	535,472	1,827,293	98,007	.....	15,196
28	32,080	.....	.....	.....	.....	.....	219,538	220,883	315	.....	.....
29	32,080	.....	.....	.....	.....	.....	208,801	183,699	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	10,647	46,184	315	.....	.....
31	$1,852,384	.....	.....	(2)	.....	$3,018,984	$33,800,603	$78,938,359	$4,349,096	.....	$460,042
32	.....	.....	.....	.....	.....	.....	111,150	308,738	111,152	.....	10,406
33	.....	.....	.....	.....	.....	.....	14,739	7,304	8,789	.....	.....
34	.....	.....	.....	.....	.....	.....	96,417	301,434	102,363	.....	10,406
35	.....	.....	.....	.....	.....	.....	$5,868,639	$15,400,384	$4,887,291	.....	$616,000
36	.....	.....	.....	.....	.....	(2)	739,761	1,087,502	201,794	.....	.....
37	.....	.....	.....	.....	.....	(2)	106,868	341,950	107,253	.....	.....
38	.....	.....	.....	.....	.....	(2)	632,893	745,552	94,541	.....	.....
39	.....	.....	.....	.....	.....	(2)	615,817	664,129	91,013	.....	.....
40	.....	.....	.....	.....	.....	.....	17,076	81,423	3,528	.....	.....
41	.....	.....	.....	.....	.....	(2)	$22,198,365	$34,273,085	$6,060,225	.....	.....
42	.....	(2)	.....	.....	.....	.....	(2)	279,172	.....	.....	7,930
43	.....	(2)	.....	.....	.....	.....	(2)	$8,305,448	.....	.....	$302,140
44	(2)	(2)	.....	.....	.....	.....	.....	37,802	(2)	.....	.....
45	(2)	(2)	.....	.....	.....	.....	.....	9,301	(2)	.....	.....
46	(2)	(2)	.....	.....	.....	.....	.....	28,501	(2)	.....	.....
47	(2)	(2)	.....	.....	.....	.....	.....	$1,469,504	(2)	.....	.....
48	.....	.....	.....	.....	.....	(2)	.....	97,333	.....	.....	657
49	.....	.....	.....	.....	.....	(2)	.....	$3,603,695	.....	.....	$29,077
50	.....	.....	.....	.....	(2)	.....	.....	22,568	.....	.....	(2)
51	.....	.....	.....	.....	(2)	.....	.....	$8,833,335	.....	.....	(2)
52	31,122	.....	.....	.....	(2)	52,785	1,975,730	2,099,296	159,075	.....	9,657
53	31,122	.....	.....	.....	(2)	52,785	448,396	971,859	(2)	.....	9,657
54	.....	.....	.....	.....	(2)	.....	1,527,334	1,127,437	(2)	.....	(2)
55	$697,156	.....	.....	.....	(2)	$1,247,222	$42,301,868	$47,413,864	$3,613,811	.....	$233,496
56	(2)	.....	.....	.....	.....	(2)	(2)	37,977	.....	.....	1,866
57	(2)	.....	.....	.....	.....	(2)	(2)	$1,128,594	.....	.....	$55,980
58	(2)	.....	.....	.....	.....	(2)	679,982	778,260	(2)	.....	1,600
59	(2)	.....	.....	.....	.....	(2)	679,982	750,907	(2)	.....	1,600
60	.....	.....	.....	.....	.....	.....	.....	27,353	.....	.....	.....
61	(2)	.....	.....	.....	.....	(2)	$15,611,744	$17,430,702	(2)	.....	$48,000
62	(2)	.....	.....	.....	(2)	.....	15,875	118,759	9,443	.....	104
63	(2)	.....	.....	.....	(2)	.....	(2)	103,908	(2)	.....	104
64	.....	.....	.....	.....	.....	.....	(2)	14,851	(2)	.....	.....
65	(2)	.....	.....	.....	(2)	.....	$415,651	$3,505,236	$308,383	.....	$3,421
66	(2)	.....	.....	(2)	23,281	(2)	21,854	464,286	742	(2)	3,476
67	(2)	.....	.....	(2)	$2,667,667	(2)	$1,417,086	$31,220,885	$34,603	(2)	$190,898
68	(2)	(2)	.....	.....	(2)	1,322	32,223	32,144	.....	.....	22,012
69	(2)	(2)	.....	.....	(2)	1,322	2,327	14,392	.....	.....	1,139
70	.....	.....	.....	.....	(2)	.....	29,896	17,752	.....	.....	20,873
71	(2)	(2)	.....	.....	(2)	$30,666	$613,540	$1,525,021	.....	.....	$415,866
72	(2)	7,031	10,450	(2)	18,661	26,410	93,926	197,405	(2)	16,742	10,325
73	(2)	$635,284	$923,701	(2)	$2,243,005	$2,365,433	$6,343,186	$14,087,422	(2)	$1,723,551	$858,331
74	.....	.....	.....	.....	5,130	2,320	13,008	323,916	.....	.....	7,949
75	.....	.....	.....	.....	$568,645	$522,957	$796,732	$16,179,228	.....	.....	$341,749

[1] Included in total, but amount not shown, in order to avoid disclosure of individual operations.

STEEL WORKS AND ROLLING MILLS—DETAILED STATISTICS OF

[Tons of 2,240 pounds.]

	Table 87—Continued.	United States.	California.	Connecticut.	Delaware.	Illinois.	Indiana.
	II. PRODUCTS—continued.						
	Scrap steel and iron:						
1	Tons	1,238,554	.....	(2)	1,814	151,296	29,933
2	For sale	840,118	.....	(2)	1,814	43,650	29,631
3	For transfer to other works of same company	398,436	.....	.....	.....	107,646	302
4	Value	$18,163,624	.....	(2)	$32,034	$2,296,298	$424,899
5	All other steel and iron products not rolled, including value added to steel and iron rolling-mill products by further manufacture.	$86,534,369	$786,999	$519,931	$271,250	$4,051,408	$2,495,447
6	All products, other than steel and iron, not including custom work and repairing.	$16,356,978	$579,209	$94,770	$7,496	$1,137,965	$206,133
7	Custom work and repairing	$1,324,852	(2)	(2)	$32,408	$280,746	(2)
	III. STEEL PRODUCTION (TONS).						
8	**Total**	**23,473,718**	(2)	**52,827**	**7,827**	**2,667,043**	**777,898**
9	Ingots	22,968,862	(2)	(2)	.....	2,592,430	764,297
10	For consumption in works where produced	22,826,117	.....	(2)	.....	2,564,048	(2)
11	For transfer to other works of same company	112,301	.....	.....	.....	28,382	(2)
12	For sale	30,444	(2)	(2)	.....	.....	.....
13	Direct castings	504,856	(2)	(2)	7,827	74,613	13,601
	Classified according to process:						
14	Open-hearth	14,192,278	(2)	52,260	(2)	1,020,208	777,898
15	Basic	13,210,419	.....	(2)	.....	(2)	(2)
16	Acid	981,859	(2)	(2)	(2)	(2)	(2)
17	Bessemer	9,174,067	.....	(2)	(2)	1,631,164	.....
18	Crucible and miscellaneous, including electric	107,373	(2)	.....	.....	15,671	.....
19	*Duplex process*—Open-hearth steel partly purified in Bessemer converters before finishing in open-hearth furnaces (included with open-hearth above).	522,082	.....	.....	.....	.....	.....
20	*Alloy steel* (included above)	158,216	.....	(2)	(2)	(2)	.....
	Classified according to process—						
21	Open-hearth	100,335	.....	.....	.....	.....	.....
22	Basic	86,242	.....	.....	.....	.....	.....
23	Acid	14,093	.....	.....	.....	.....	.....
24	Bessemer	45,324	.....	(2)	(2)	.....	.....
25	Crucible and miscellaneous	12,557	.....	.....	.....	(2)	.....
	Classified according to form—						
26	Ingots	151,300	.....	.....	.....	(2)	.....
27	Castings	6,916	.....	(2)	(2)	.....	.....
	IV. MANUFACTURES FROM IRON AND STEEL ROLLING MILL PRODUCTS. (Made in mill producing, value previously included under various items of Group II.)						
	Wire and wire products:						
28	Tons (2,000 pounds)	1,634,855	.....	.....	.....	(2)	(2)
29	Value	$71,624,024	.....	.....	.....	(2)	(2)
	Pipe and tubes:						
	Wrought-welded—						
30	Tons	1,314,771	.....	.....	.....	.....	.....
31	Value	$68,471,573	.....	.....	.....	.....	.....
	Seamless, hot-rolled or drawn—						
32	Tons	54,273	.....	.....	.....	.....	.....
33	Value	$5,650,739	.....	.....	.....	.....	.....
	All other, including clinched, riveted, etc., but not including cast—						
34	Tons	17,561	.....	.....	.....	.....	.....
35	Value	$986,699	.....	.....	.....	.....	.....
	Bolts, nuts, rivets, forged spikes, washers, etc.:						
36	Kegs (200 pounds)	4,471,985	55,880	(2)	.....	856,497	.....
37	Value	$20,538,858	$268,316	(2)	.....	$3,165,799	.....
	Cut nails and spikes:						
38	Kegs (100 pounds)	1,009,319	(2)	.....	.....	(2)	.....
39	Value	$2,218,207	(2)	.....	.....	(2)	.....
	Horse and mule shoes:						
40	Kegs (200 pounds)	996,383	.....	.....	.....	(2)	.....
41	Value	$7,202,897	.....	.....	.....	(2)	.....
	Springs, car, furniture, and all other, not including wire springs:						
42	Tons	6,191	.....	(2)	.....	.....	.....
43	Value	$374,924	.....	(2)	.....	.....	.....
	Cast-iron pipe, car and locomotive wheels, gray-iron, malleable-iron, and semisteel castings, and all castings other than steel:						
44	Tons	128,670	16,502	(2)	.....	.....	.....
45	Value	$5,520,399	$497,765	(2)	.....	.....	.....
	Galvanized plates or sheets:						
46	Tons	431,658	.....	.....	(2)	.....	(2)
47	Value	$25,912,056	.....	.....	(2)	.....	(2)
	Stamped ware:						
48	Tons	24,612	.....	(2)	.....	.....	(2)
49	Value	$2,296,707	.....	(2)	.....	.....	(2)
50	Steel cars, machinery, switches, frogs, etc	$7,720,178	(2)	.....	.....	.....	.....
51	Shovels, spades, scoops, etc	$540,321	.....	.....	.....	.....	(2)
	V. PRODUCTS SOLD FOR EXPORT (TONS).[3]						
52	**Total**	**867,646**	.....	**2,497**	.....	**17,128**	(2)
53	Rails	317,455	.....	.....	.....	(2)	.....
54	Rail fastenings	20,118	.....	.....	.....	2,650	.....
55	Pipe and tubes	89,377	.....	(2)	.....	.....	.....
56	Sheet and tin-plate bars	85,123	.....	.....	.....	.....	.....
57	Plates and sheets	80,706	.....	.....	.....	(2)	(2)
58	Galvanized plates or sheets	79,246	.....	.....	.....	.....	.....
59	Structural shapes	69,704	.....	.....	.....	(2)	.....
60	Bars and rods	48,938	.....	.....	.....	(2)	.....
61	Wire rods	18,738	.....	.....	.....	.....	.....
62	Blooms, billets, and slabs	18,021	.....	.....	.....	1,536	.....
63	Skelp	10,703	.....	(2)	.....	.....	.....
64	Miscellaneous	29,457	.....	2,052	.....	3,599	.....

[1] All other states embrace: Alabama, 6 establishments; Colorado, 1; District of Columbia, 1; Georgia, 1; Maine, 1; Maryland, 5; Minnesota, 1; Oregon, 2; Rhode Island, 2; Tennessee, 1; Texas, 1; Virginia, 3; Washington, 1; Wyoming, 1.

MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909—Continued.

[Tons of 2,240 pounds.]

	Kentucky.	Massachusetts.	Michigan.	Missouri.	New Jersey.	New York.	Ohio.	Pennsylvania.	West Virginia.	Wisconsin.	All other states.[1]
1	3,903	.....	6,392	.....	(2)	15,432	212,560	737,376	52,283	20,564	5,140
2	3,903	.....	6,392	.....	(2)	15,432	178,681	502,336	52,283	3,050	1,085
3	.....	.....	.....	.....	.....	.....	33,879	235,040	.....	17,514	4,055
4	$63,981	.....	$65,224	.....	(2)	$307,528	$3,156,713	$10,595,546	$812,350	$316,572	$59,304
5	$468,612	$2,318,056	$934,862	$183,416	$2,281,686	$5,023,499	$21,199,197	$41,859,136	$1,397,213	$192,233	$2,551,424
6	$127,569	$6,018,651	$26,666	$68,916	$546,057	$270,262	$1,243,471	$4,425,950	(2)	(2)	$1,165,971
7	.....	(2)	$7,601	.....	$91,213	(2)	(2)	$725,024	(2)	.....	$51,356
8	162,835	142,472	10,450	(2)	94,751	1,115,250	4,705,337	12,189,953	324,671	16,742	1,179,890
9	162,535	135,441	.....	.....	76,090	1,088,840	4,611,411	11,992,548	324,600	.....	1,166,565
10	(2)	(2)	.....	.....	67,686	1,087,518	4,579,188	11,960,404	324,600	.....	1,147,553
11	(2)	.....	.....	.....	.....	.....	29,896	17,752	.....	.....	20,873
12	(2)	(2)	.....	.....	8,404	1,322	2,327	14,392	.....	.....	1,139
13	(2)	7,031	10,450	(2)	18,661	26,410	93,926	197,405	71	16,742	10,325
14	(2)	141,779	9,270	(2)	79,742	499,718	1,377,216	9,281,936	(2)	11,232	807,831
15	(2)	93,676	(2)	(2)	42,225	491,583	1,306,694	8,536,726	(2)	.....	807,831
16	(2)	48,103	(2)	.....	37,517	8,135	70,522	745,210	.....	11,232	.....
17	(2)	.....	.....	.....	6,660	(2)	3,327,351	2,846,360	(2)	2,859	371,757
18	.....	603	1,171	.....	8,349	(2)	770	61,657	.....	2,651	302
19	.....	.....	.....	.....	.....	2,700	.....	190,520	.....	.....	329,462
20	.....	(2)	(2)	.....	9,000	43,390	5,292	93,519	.....	(2)	6,190
21	.....	(2)	.....	.....	2,014	(2)	5,292	86,386	.....	.....	6,190
22	.....	(2)	.....	.....	(2)	(2)	5,292	(2)	.....	.....	6,190
23	.....	.....	.....	.....	(2)	.....	.....	(2)	.....	.....	.....
24	.....	.....	.....	.....	(2)	(2)	.....	(2)	.....	(2)	.....
25	.....	.....	(2)	.....	(2)	3,038	.....	7,067	.....	.....	.....
26	.....	(2)	.....	.....	4,100	43,328	5,292	91,930	.....	.....	6,190
27	.....	.....	(2)	.....	4,900	8	.....	1,589	.....	(2)	.....
28	.....	(2)	.....	.....	32,418	(2)	(2)	843,071	.....	.....	89,024
29	.....	(2)	.....	.....	$1,876,521	(2)	(2)	$34,307,571	.....	.....	$3,743,797
30	.....	.....	.....	.....	.....	(2)	566,975	654,042	(2)	.....	.....
31	.....	.....	.....	.....	.....	(2)	$26,971,583	$36,929,123	(2)	.....	.....
32	.....	.....	(2)	.....	.....	.....	.....	(2)	.....	.....	.....
33	.....	.....	(2)	.....	.....	.....	.....	(2)	.....	.....	.....
34	.....	.....	.....	.....	.....	.....	(2)	(2)	.....	.....	.....
35	.....	.....	.....	.....	.....	.....	(2)	(2)	.....	.....	.....
36	.....	(2)	.....	(2)	(2)	(2)	523,194	2,489,196	.....	.....	322,462
37	.....	(2)	.....	(2)	(2)	(2)	$2,317,801	$12,298,460	.....	.....	$1,320,443
38	(2)	(2)	.....	.....	.....	.....	.....	540,722	(2)	.....	.....
39	(2)	(2)	.....	.....	.....	.....	.....	$1,246,294	(2)	.....	.....
40	.....	.....	.....	.....	(2)	(2)	(2)	285,492	.....	.....	141,917
41	.....	.....	.....	.....	(2)	(2)	(2)	$2,131,897	.....	.....	$997,176
42	.....	.....	3,575	.....	.....	(2)	.....	1,975	.....	.....	.....
43	.....	.....	$171,487	.....	.....	(2)	.....	$155,840	.....	.....	.....
44	.....	(2)	(2)	.....	.....	27,867	36,477	19,766	(2)	(2)	18,696
45	.....	(2)	(2)	.....	.....	$1,439,609	$1,050,463	$1,044,780	(2)	(2)	$573,471
46	(2)	.....	.....	.....	.....	.....	191,986	173,087	.....	.....	.....
47	(2)	.....	.....	.....	.....	.....	$11,353,662	$10,441,448	.....	.....	.....
48	.....	.....	.....	.....	.....	.....	22,362	.....	.....	(2)	155
49	.....	.....	.....	.....	.....	.....	$1,831,254	.....	.....	(2)	$11,600
50	.....	(2)	.....	.....	.....	.....	(2)	$7,476,650	.....	.....	.....
51	.....	.....	.....	.....	.....	.....	.....	(2)	.....	.....	.....
52	.....	(2)	235	.....	654	60,643	139,919	552,028	814	1,049	92,080
53	.....	.....	.....	.....	.....	41,153	32,810	144,096	.....	.....	(2)
54	.....	.....	.....	.....	.....	4,247	981	12,240	.....	.....	.....
55	.....	.....	(2)	.....	.....	.....	26,265	61,953	(2)	.....	.....
56	.....	.....	.....	.....	.....	(2)	.....	84,483	.....	.....	(2)
57	.....	.....	.....	.....	.....	1,087	8,006	70,549	(2)	.....	.....
58	.....	.....	.....	.....	.....	.....	25,472	53,774	.....	.....	.....
59	.....	.....	.....	.....	.....	4,545	4,322	59,720	.....	(2)	.....
60	.....	.....	(2)	.....	.....	410	16,759	31,933	.....	(2)	(2)
61	.....	(2)	.....	.....	.....	530	14,493	3,153	.....	.....	(2)
62	.....	.....	.....	.....	.....	8,010	289	8,186	.....	.....	.....
63	.....	.....	.....	.....	.....	(2)	10,154	463	.....	.....	.....
64	.....	.....	.....	.....	654	(2)	1,368	21,478	175	.....	(2)

[1] Included in total, but amount not shown, in order to avoid disclosure of individual operations.
[2] Includes only products sold directly for export by establishments producing.

STEEL WORKS AND ROLLING MILLS—DETAILED STATISTICS OF

[Tons of 2,240 pounds.]

	Table 87—Continued.	United States.	California.	Connecticut.	Delaware.	Illinois.	Indiana.
	VI. EQUIPMENT.						
	Steel plants:						
	Steel furnaces and converters—						
1	Number	1,061	5	5	8	77	38
2	Daily capacity, tons of steel, double turn	111,556	14	278	117	10,792	5,608
	Open-hearth furnaces—						
3	Number	687	1	4	2	48	38
4	Daily capacity, tons of steel, double turn	61,601	8	270	75	3,994	5,608
	Basic—						
5	Number	549	.....	3	.....	47	34
6	Daily capacity, tons of steel, double turn	55,273	.....	250	.....	3,934	5,462
	Acid—						
7	Number	138	1	1	2	1	4
8	Daily capacity, tons of steel, double turn	6,328	8	20	75	60	146
	Converters, Bessemer, or modified Bessemer—						
9	Number	101	.....	1	6	11	.....
10	Daily capacity, tons of steel, double turn	48,823	.....	8	42	6,590	.....
	Used for desiliconizing and decarburizing molten metal for open-hearth furnaces—						
11	Number	5	.....	.....	.....	.....	.....
12	Daily capacity, tons of steel, double turn	1,750	.....	.....	.....	.....	.....
	Crucible furnaces—						
13	Number	257	4	.....	.....	17	.....
14	Number of pots that can be used at a heat	3,840	108	.....	.....	144	.....
15	Daily capacity, tons of steel, double turn	840	6	.....	.....	28	.....
	Other steel furnaces, including electric—						
16	Number	16	.....	.....	.....	1	.....
17	Daily capacity, tons of steel, double turn	292	.....	.....	.....	180	.....
	Metal mixers—						
18	Number	59	.....	.....	.....	9	3
19	Capacity, tons	14,343	.....	.....	.....	2,250	900
20	**Rolling mills**, daily capacity of rolled steel and iron, double turn, tons	150,403	265	405	45	14,985	7,200

[1] All other states embrace: Alabama, 6 establishments; Colorado, 1; District of Columbia, 1; Georgia, 1; Maine, 1; Maryland, 5; Minnesota, 1; Oregon, 2; Rhode Island, 2; Tennessee, 1; Texas, 1; Virginia, 3; Washington, 1; Wyoming, 1.

MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909—Continued.

[Tons of 2,240 pounds.]

	Kentucky.	Massachusetts.	Michigan.	Missouri.	New Jersey.	New York.	Ohio.	Pennsylvania.	West Virginia.	Wisconsin.	All other states.[1]
1	6	26	28	8	35	55	97	564	9	59	41
2	933	745	142	378	1,038	4,942	21,684	55,278	1,650	156	7,801
3	4	12	3	8	15	27	66	428	5	.....	26
4	333	735	115	378	769	1,998	6,329	38,030	265	.....	2,694
5	3	6	1	8	9	20	58	332	2	.....	26
6	250	555	45	378	499	1,791	5,945	33,300	170	.....	2,694
7	1	6	2	.....	6	7	8	96	3	.....	.....
8	83	180	70	.....	270	207	384	4,730	95	.....	.....
9	2	.....	2	.....	6	6	19	31	4	5	8
10	600	.....	17	.....	205	2,805	15,340	16,615	1,385	110	5,106
11	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	2
12	.....	.....	.....	.....	.....	.....	.....	800	.....	.....	950
13	.....	14	23	.....	14	21	12	91	.....	54	7
14	.....	88	92	.....	280	510	96	2,268	.....	226	28
15	.....	10	10	.....	64	99	15	561	.....	46	1
16	.....	.....	.....	.....	.....	1	.....	14	.....	.....	.....
17	.....	.....	.....	.....	.....	40	.....	72	.....	.....	.....
18	.....	.....	.....	.....	.....	3	13	26	1	1	3
19	.....	.....	.....	.....	.....	683	3,350	5,660	250	500	750
20	1,470	775	170	350	1,995	7,365	27,922	72,077	3,045	1,150	10,292

DETAILED STATE TABLES.

The principal facts relative to the industry which were derived from the census inquiry—other than details as to materials, products, and equipment—are presented in two general tables, Table 88 showing the more important general statistics of the industry in the United States and in each of 15 important producing states for the years 1909, 1904, and 1899, and Table 89 giving similar statistics for the industry in a somewhat more detailed form for the census year 1909 alone.

STEEL WORKS AND ROLLING MILLS—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 88

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.				Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
			Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).		Expressed in thousands.					
United States	1909	446	260,762	47	20,639	240,076	2,100,978	$1,004,735	$26,191	$163,201	$657,501	$985,723	$328,222
	1904	415	221,956	64	14,330	207,562	1,649,209	700,182	17,860	122,492	441,204	673,965	232,761
	1899	445	190,825	122	7,454	183,249	1,100,801	430,232	9,433	102,336	390,895	597,212	206,317
California	1909	5	1,085	.....	47	1,038	3,945	2,646	81	829	2,348	3,520	1,172
	1904	4	808	.....	35	773	2,618	1,110	53	492	779	1,489	710
	1899	3	573	.....	18	555	2,056	1,499	22	327	507	901	394
Connecticut	1909	5	2,503	.....	151	2,352	14,860	7,377	230	1,292	2,029	4,071	2,042
	1904	7	3,126	.....	137	2,989	17,705	8,889	178	1,587	2,627	5,151	2,524
	1899	7	1,857	.....	72	1,785	8,490	4,793	108	939	2,199	4,067	1,868
Delaware	1909	5	785	.....	75	710	4,912	2,107	92	416	1,059	1,715	656
	1904	5	1,146	.....	91	1,055	10,310	6,280	103	412	940	1,597	657
	1899	6	1,571	.....	81	1,490	4,925	4,207	133	705	1,636	3,160	1,524
Illinois	1909	24	19,437	3	1,850	17,584	152,470	69,682	2,295	12,962	56,244	86,608	30,364
	1904	23	17,718	3	1,267	16,448	111,308	44,276	1,694	10,071	38,650	60,022	21,372
	1899	22	14,205	3	570	13,632	77,616	32,592	632	7,464	30,021	45,149	15,128
Indiana	1909	17	13,206	.....	951	12,255	111,806	47,781	1,104	8,390	26,099	38,652	12,553
	1904	21	7,538	.....	323	7,215	48,504	22,986	370	4,072	10,906	16,920	6,014
	1899	27	7,784	.....	205	7,579	39,950	14,994	267	4,244	12,439	19,338	6,899
Kentucky	1909	7	2,437	.....	65	2,372	29,640	4,178	99	1,273	5,561	7,779	2,218
	1904	8	2,220	.....	71	2,149	26,965	4,716	78	1,272	4,217	6,168	1,951
	1899	6	1,839	.....	73	1,766	17,250	3,134	92	949	3,116	5,005	1,889
Massachusetts	1909	9	3,465	.....	350	3,115	24,500	14,194	375	1,977	10,032	13,568	3,536
	1904	5	4,939	.....	395	4,544	28,210	14,348	365	2,593	6,902	11,948	5,046
	1899	7	6,192	.....	93	6,099	28,965	13,609	155	3,402	7,491	13,412	5,921
Michigan	1909	8	1,273	.....	90	1,183	4,290	2,326	129	661	1,598	2,670	1,072
	1904	5	1,056	.....	38	1,018	4,630	1,698	46	527	1,800	2,712	912
	1899	3	1,487	.....	28	1,459	7,600	1,829	31	725	2,365	3,575	1,210
Missouri	1909	4	2,379	.....	152	2,227	6,255	5,299	211	1,320	2,859	5,013	2,154
	1904	4	1,410	.....	61	1,349	4,692	3,672	89	928	1,588	2,999	1,411
	1899	5	1,656	.....	52	1,604	3,330	1,946	82	882	1,605	3,200	1,595
New Jersey	1909	16	5,228	.....	557	4,671	29,699	28,212	682	2,823	6,635	12,014	5,379
	1904	16	8,901	1	566	8,334	31,626	46,281	805	4,088	12,390	20,066	7,676
	1899	16	7,982	1	282	7,699	29,579	17,717	452	3,601	14,323	21,835	7,512
New York	1909	25	11,089	4	994	10,091	136,456	61,453	1,292	6,323	25,889	39,532	13,643
	1904	20	8,142	7	609	7,526	69,430	48,852	801	4,393	13,260	21,227	7,967
	1899	21	4,593	15	193	4,385	14,234	8,788	297	2,430	4,168	8,812	4,644
Ohio	1909	75	41,912	3	3,323	38,586	515,813	163,384	4,061	28,614	139,243	197,780	58,537
	1904	57	29,500	.....	1,744	27,756	304,162	87,406	1,931	18,658	78,210	111,997	33,787
	1899	64	28,583	.....	945	27,638	211,621	63,181	1,250	16,444	67,786	98,569	30,783
Pennsylvania	1909	189	137,433	34	10,488	126,911	896,440	522,898	13,394	85,113	329,013	500,344	171,331
	1904	186	119,082	49	8,129	110,904	820,823	355,592	10,058	65,306	237,875	363,774	125,899
	1899	214	99,350	102	4,459	94,789	575,030	237,216	5,398	53,870	219,048	332,870	113,822
West Virginia	1909	16	5,445	.....	385	5,060	46,508	16,276	460	3,887	15,896	22,435	6,539
	1904	12	4,516	.....	107	4,409	34,250	8,716	142	2,813	8,742	13,455	4,713
	1899	8	4,056	.....	81	3,975	23,416	7,122	108	2,066	8,729	13,395	4,666
Wisconsin	1909	14	2,285	.....	161	2,124	10,064	6,678	232	1,409	7,906	10,733	2,827
	1904	10	2,048	.....	133	1,915	11,126	3,490	156	1,125	4,501	7,379	2,878
	1899	7	1,435	.....	65	1,370	6,230	3,928	74	909	3,395	6,005	2,610
All other states	1909	27	10,800	3	1,000	9,797	113,320	50,244	1,454	5,912	25,090	39,289	14,199
	1904	32	9,806	4	624	9,178	122,850	41,870	1,001	4,155	17,817	27,061	9,244
	1899	29	7,662	1	237	7,424	50,509	13,677	332	3,379	12,067	17,919	5,852

STEEL WORKS AND ROLLING MILLS—DETAILED STATISTICS, BY STATES: 1909.

Table 89

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States.	**446**	**260,762**	**47**	**4,239**	**14,613**	**1,787**	**240,076**	De 283,629	Mh 215,076	**284,264**	**281,801**	**1,114**	**1,273**	**76**	**2,100,978**
California	5	1,085	.....	15	28	4	1,038	No 1,175	Jy 716	1,176	1,173	3	.....	.....	3,945
Connecticut	5	2,503	.....	41	83	27	2,352	De 2,887	Ja 2,041	2,763	2,677	81	2	3	14,880
Delaware	5	785	.....	29	41	5	710	De 909	Mh 559	909	909	.....	.....	.....	4,912
Illinois	24	19,437	3	290	1,408	152	17,584	De 22,141	Mh 15,381	22,146	22,101	25	20	.....	152,470
Indiana	17	13,206	.....	129	763	59	12,255	De 14,806	Ja 10,268	14,832	14,804	.....	28	.....	111,806
Kentucky	7	2,437	.....	26	31	8	2,372	No 2,594	Mh 2,048	2,486	2,486	.....	.....	.....	29,640
Massachusetts	9	3,465	.....	110	187	53	3,115	De 3,544	Ap 2,820	3,544	3,427	116	1	.....	24,500
Michigan	8	1,273	.....	24	51	15	1,183	No 1,386	Jy 1,050	1,332	1,331	1	.....	.....	4,290
Missouri	4	2,379	.....	29	107	16	2,227	De 3,126	Ja 1,751	3,126	3,114	.....	12	.....	6,255
New Jersey	16	5,228	.....	102	401	54	4,671	De 5,773	My 4,236	5,785	5,749	31	5	.....	29,699
New York	25	11,089	4	175	754	65	10,091	De 11,785	My 8,841	11,856	11,734	108	14	.....	136,456
Ohio	75	41,912	3	792	2,255	276	38,586	De 45,151	Fe 33,845	45,151	44,798	350	3	.....	515,813
Pennsylvania	189	137,433	34	1,969	7,546	973	126,911	De 148,591	Mh 111,954	148,550	146,985	372	1,120	73	896,440
West Virginia	16	5,445	.....	95	265	25	5,060	Se 6,288	Ja 3,469	6,403	6,356	15	32	.....	46,508
Wisconsin	14	2,285	.....	40	112	9	2,124	De 2,604	Ja 1,731	2,574	2,565	.....	9	.....	10,064
All other states[1]	27	10,800	3	373	581	46	9,797	.....	.....	11,631	11,592	12	27	.....	113,320

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States.	**$1,004,735,111**	**$889,501,220**	**$11,026,848**	**$15,164,616**	**$163,200,758**	**$46,136,725**	**$611,364,131**	**$372,540**	**$3,284,774**	**$94,237**	**$38,856,591**	**$985,722,534**	**$328,221,678**
California	2,645,625	3,467,491	44,691	36,029	828,522	159,207	2,188,571	225	6,072	.....	204,174	3,519,824	1,172,046
Connecticut	7,376,852	3,800,745	136,336	93,682	1,292,440	379,092	1,649,778	1,655	17,927	.....	229,835	4,070,572	2,041,702
Delaware	2,107,004	1,651,545	59,247	32,580	415,880	112,535	946,460	.....	2,623	.....	82,220	1,715,341	656,346
Illinois	69,682,495	75,221,710	880,917	1,414,278	12,962,087	3,598,585	52,645,878	5,800	267,590	.....	3,446,575	86,608,137	30,363,674
Indiana	47,781,258	36,910,062	392,133	712,154	8,389,707	2,339,604	23,759,155	.....	84,213	.....	1,233,096	38,651,848	12,553,089
Kentucky	4,177,795	7,236,719	70,760	28,218	1,273,307	370,770	5,189,795	15,000	14,129	.....	274,740	7,779,320	2,218,755
Massachusetts	14,193,549	13,131,864	187,723	187,351	1,976,966	760,307	9,271,966	1,050	85,048	1,271	660,182	13,567,628	3,535,355
Michigan	2,326,255	2,572,193	69,373	59,336	661,435	168,913	1,429,217	4,342	11,938	.....	167,639	2,669,872	1,071,742
Missouri	5,299,135	5,032,446	86,545	124,247	1,320,285	274,802	2,584,183	2,000	15,813	.....	624,571	5,012,827	2,153,842
New Jersey	28,212,208	11,042,405	297,031	385,010	2,823,436	837,030	5,798,010	8,385	54,357	7,671	831,475	12,013,719	5,378,679
New York	61,453,060	34,651,251	539,883	752,194	6,323,190	2,170,165	23,719,005	16,074	119,339	2,746	1,008,655	39,532,414	13,643,244
Ohio	163,383,821	178,093,126	1,792,510	2,268,379	28,614,117	7,672,641	131,570,514	3,050	735,414	58,786	5,377,715	197,780,043	58,536,888
Pennsylvania	522,897,623	451,828,919	5,355,442	8,038,306	85,113,237	23,615,586	305,397,835	243,746	1,566,867	19,558	22,478,342	500,343,995	171,330,574
West Virginia	16,275,615	20,687,832	219,541	240,450	3,387,340	754,436	15,141,864	.....	63,331	.....	380,870	22,435,411	6,539,111
Wisconsin	6,678,082	9,907,980	116,662	115,711	1,408,546	247,610	7,658,790	8,171	37,464	1,789	313,237	10,732,989	2,826,589
All other states[1]	50,244,734	34,264,932	778,054	676,691	5,910,263	2,675,442	22,413,110	63,042	202,649	2,416	1,543,265	39,288,594	14,200,042

[1] All other states embrace: Alabama, 6 establishments; Colorado, 1; District of Columbia, 1; Georgia, 1; Maine, 1; Maryland, 5; Minnesota, 1; Oregon, 2; Rhode Island, 2; Tennessee, 1; Texas 1; Virginia, 3; Washington, 1; and Wyoming, 1.

PART V.—THE WIRE INDUSTRY.

GENERAL STATISTICS FOR THE INDUSTRY AS A WHOLE.

Description of the industry.—The wire industry in its broad sense consists of the drawing of wire from wire rods, the principal metals used being steel and copper.

The manufacture of wire is carried on by three classes of establishments: (1) Establishments whose principal business is the drawing of wire from rods which are either purchased or transferred from independently operated rolling mills of the company, thus including the detached and independently operated wire mills of companies rolling the wire rods; (2) establishments that roll iron and steel, copper or other metals, and maintain wire-drawing departments supplied with rods from the cooperating rolling mills; and (3) establishments whose principal business is the manufacture of some quite different product, but which incidentally draw some wire, usually as material for their own consumption. These three classes are hereafter, for brevity, referred to as (1) wire mills, (2) wire departments of rolling mills, and (3) wire departments of other concerns, and the term "purchased rods," hereinafter employed to distinguish mills of the first class, comprises wire rods brought into the mills from sources outside the plants, whether acquired from independent plants under the same ownership or in the open market.

The establishments falling into the third class—"wire departments of other concerns"—are comparatively unimportant. They include the wire departments of one concern whose principal business is the manufacture of brass ware, one making bronze castings, one making electrical machinery, one making cut and wrought nails independently of rolling-mill operations, one making sewing machines, and one engaged in smelting and refining dross and scrap (falling under the census classification "smelting and refining, not from the ore"). All six of these concerns buy their wire rods.

Rolling mills which roll steel and maintain wire departments are, for general statistical purposes, classed as an entirety in the industry "iron and steel, steel works and rolling mills." Rolling mills which roll copper and brass, including those with wire-drawing departments, are classified by the Census Bureau under the heading "brass and bronze products." Consequently, in the general statistical tables in which all manufacturing industries are listed, only "wire mills"—namely, those whose principal business is the drawing of wire and which purchase their rods or procure them from independently operated rolling mills—are included under the industry designation "wire." In those tables the data for the wire departments of rolling mills or of other classes of establishments are included with the other business of such concerns. This special report, however, deals in the first place with the wire industry in its broader sense, presenting statistics of the total wire business by whatever class of establishments conducted. The statistics thus presented relate chiefly to the quantity and value of materials and products, separate reports relating to these subjects being obtained from the wire departments of rolling mills and other concerns. No attempt was made, however, to segregate the statistics of capital, persons engaged in the industry, and expenses of operation for such wire-drawing departments, as such a segregation was deemed impracticable.

In addition to presenting these statistics for the wire industry as a whole the present section gives statistics regarding capital, labor, expenses, and other subjects for the wire mills using purchased rods, or for the wire industry in the narrower sense. It should be constantly borne in mind in considering these latter statistics that they relate to less than half of the total wire production.

There are many establishments which draw no wire, but which manufacture wire goods (fencing, wire cloth, springs, etc.) from purchased wire. Such establishments are not covered by the statistics for the wire industry. The manufacture of such further elaborated products from wire is, however, often conducted in wire-drawing establishments, and to that extent this branch of business is covered by the statistics here presented.

In expressing quantities the ton of 2,000 pounds is used.

In the present report comparisons are made, so far as is possible, between the statistics for 1909 and those of the two preceding censuses of manufactures, covering the years 1904 and 1899, respectively. Prior to the present census, however, detailed reports regarding materials and products were not obtained from establishments drawing wire from purchased rods, or from copper and brass rolling mills with wire departments, but only from wire departments of iron and steel rolling mills.

Summary for the wire industry as a whole.—Table 90 shows the relative importance, from the standpoint of value of wire products, of the three classes of establishments above described.

The total number of establishments in the wire industry as a whole in 1909 was 93, of which 56 were wire-drawing mills proper, which purchased the wire rods used, 31 were wire departments of rolling mills, and 6 were wire departments of other concerns. The total value of the products of these 93 mills or wire departments was $180,083,522, of which $173,349,614 consisted of wire and products derived therefrom. Of

this latter amount, 45.7 per cent represented the value of products of the wire mills, 50.8 per cent that of the wire departments of rolling mills, and 3.5 per cent that of the wire departments of other concerns. The total value of products involves very little duplication.

Table 90 THE WIRE INDUSTRY: 1909

PRODUCT.	Number of establishments.	Value of products.	Per cent of total. Number of establishments.	Per cent of total. Value of wire products.
Total value of products	.....	$180,083,522	.....	.....
Wire and manufactures of wire, total	93	173,349,614	100.0	100.0
(1) Wire mills	56	79,249,869	60.2	45.7
(2) Wire departments of rolling mills	31	88,048,105	33.3	50.8
Iron and steel rolling mills	23	77,470,814	24.7	44.7
Brass and copper rolling mills	8	10,577,291	8.6	6.1
(3) Wire departments of other concerns	6	6,051,640	6.5	3.5
All other products	.....	6,733,908	.....	.....

Size of establishments.—The returns permit of a grouping of the establishments in the industry as a whole according to the value of their products, and Table 91 shows data for plants with products of less than $1,000,000 in value and for plants with products valued at $1,000,000 and over in 1909.

This table shows the extent to which the large plants predominate, especially among the wire departments of rolling mills. The 24 wire departments of rolling mills whose product exceeded $1,000,000 in value together contributed $89,407,015, or almost one-half, of the total value of products of the industry.

Table 91 THE WIRE INDUSTRY: 1909

VALUE OF PRODUCTS PER ESTABLISHMENT.	Total. Number of establishments.	Total. Value of products.	Wire mills using purchased rods. Number of establishments.	Wire mills using purchased rods. Value of products.	Wire departments of rolling mills and other concerns. Number of establishments.	Wire departments of rolling mills and other concerns. Value of products.
Total	93	$180,083,522	56	$84,486,518	37	$95,597,004
Less than $1,000,000	52	21,260,888	39	15,070,899	13	6,189,989
$1,000,000 and over	41	158,822,634	17	69,415,619	24	89,407,015
Per cent of total.	100.0	100.0	100.0	100.0	100.0	100.0
Less than $1,000,000	55.9	11.8	69.6	17.8	35.1	6.5
$1,000,000 and over	44.1	88.2	30.4	82.2	64.9	93.5
Average per establishment	.....	$1,936,382	.....	$1,508,688	.....	$2,583,703

Distribution of establishments, by states, according to character of business.—Table 92 shows the total number of establishments in the industry as a whole in each state, and also the number of establishments engaged in the manufacture of each of the principal classes of wire products. Of course, many establishments make more than one kind of product, and are therefore listed more than once in the table. It would be impossible to present statistics regarding the quantity and value of individual kinds of products for any considerable number of states separately without disclosing the operations of individual concerns.

Table 92 ESTABLISHMENTS IN THE WIRE INDUSTRY: 1909—

CLASS OF ESTABLISHMENTS.	United States. Wire industry (total).	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.	Colorado.	Connecticut.	Georgia.	Illinois.	Indiana.	Kentucky.	Massachusetts.	Michigan.	New Jersey.	New York.	Ohio.	Pennsylvania.	Rhode Island.	Virginia.	Wisconsin.
Total number	93	56	37	1	12	1	10	4	1	11	1	11	8	11	16	3	1	2
Wire mills using purchased rods	56	56	.....	.....	3	.....	7	2	1	10	1	7	7	6	8	1	1	2
Wire departments of rolling mills and other concerns	37	.....	37	1	9	1	3	2	.....	1	.....	4	1	5	8	2	.....	.....
Manufacturing:																		
Steel and iron wire	74	47	27	1	4	1	10	4	1	11	.....	8	3	11	15	2	1	2
Wire for sale—																		
Plain	59	34	25	1	2	1	6	4	1	10	.....	7	2	11	12	2	.....	.....
Coated	37	19	18	1	1	.....	8	3	.....	5	.....	3	1	7	8	.....	.....	.....
Wire nails and spikes	36	19	17	1	1	1	8	4	1	2	.....	1	1	6	7	1	.....	2
Wire brads, tacks, and staples	24	9	15	1	.....	.....	7	3	.....	1	.....	.....	1	5	5	.....	.....	1
Barbed wire	26	11	15	1	.....	1	7	4	1	1	.....	.....	.....	4	6	.....	.....	1
Woven wire, fencing, and poultry netting	23	10	13	1	1	1	8	4	.....	1	.....	.....	1	1	5	.....	.....	.....
Wire rope and strand	12	8	4	.....	1	.....	2	1	.....	2	.....	2	1	1	2	.....	.....	.....
Other wire products	34	19	15	1	1	.....	7	1	.....	7	.....	3	2	6	5	.....	1	.....
Copper wire	27	17	10	.....	6	.....	2	.....	.....	3	1	6	5	.....	2	2	.....	.....
Wire for sale	25	15	10	.....	5	.....	2	.....	.....	3	1	6	5	.....	1	2	.....	.....
Woven-wire products	2	1	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other wire products	3	2	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	1	.....	.....	.....
Wire of other metals or alloys (brass, etc.)	17	8	9	.....	9	.....	.....	.....	.....	1	.....	2	4	.....	1	.....	.....	.....
Wire for sale	14	6	8	.....	7	.....	.....	.....	.....	.....	.....	2	4	.....	1	.....	.....	.....
Woven-wire products	2	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Other wire products	4	1	3	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....

Of the 93 establishments in the industry in 1909, 59 drew iron and steel wire exclusively, 7 drew copper wire exclusively, 6 drew wire from materials (chiefly brass) other than iron and steel or copper, while 21 drew wire from two or more of the metals. A large proportion of the establishments manufactured wire nails, barbed wire, woven wire, and other products for which plain wire is the principal material.

GENERAL STATISTICS FOR WIRE MILLS (ESTABLISHMENTS ENGAGED PRIMARILY IN DRAWING WIRE FROM PURCHASED RODS).

Importance and growth of the industry.—This section of the report on the wire industry deals exclusively with wire mills as above defined—that is, with concerns whose principal business is the drawing of wire and which acquire their wire rods from other establishments. As already shown, such concerns produced in 1909 less than half of the total wire output, and in 1899 their proportion of the total was about one-fifth. The statistics here presented correspond with those presented under the industry designation "wire" in Volumes VIII and IX of the Thirteenth Census Reports.

Table 93 gives the general statistics for wire-drawing mills at the censuses of 1909, 1904, and 1899.

Table 93 — WIRE MILLS USING PURCHASED RODS.

	Number or amount.		
	1909	1904	1899
Number of establishments	56	25	29
Persons engaged in the industry	19,945	5,325	1,715
Proprietors and firm members	15	7	18
Salaried employees	1,846	581	94
Wage earners (average number)	18,084	4,737	1,603
Primary horsepower	71,959	25,856	9,979
Capital	$60,157,073	$14,898,817	$4,242,173
Expenses	77,434,862	35,108,758	8,223,710
Services	12,515,070	3,651,993	995,972
Salaries	2,199,348	793,250	136,327
Wages	10,315,722	2,858,743	859,645
Materials	60,542,931	30,062,487	7,014,319
Miscellaneous	4,376,861	1,394,278	213,419
Value of products	84,486,518	37,914,419	9,421,238
Value added by manufacture (value of products less cost of materials)	23,943,587	7,851,932	2,406,919

Comparisons between the data for the different years in this table do not give a correct idea of the growth of the wire industry as a whole. The industry has developed rapidly but by no means at such a rate as shown by these figures. The explanation of the extraordinary difference between the figures given for 1899 and those given for 1909 is found in the fact that the great bulk of the wire-drawing business was in the earlier year conducted in the wire departments of rolling mills, while in the later year nearly half of it was conducted in separate plants which bought the wire rods used. Data regarding the wire industry in its broader sense are not available for 1904 and 1899, but an approximate idea of its growth may be gained from the statistics of the production of wire rods of iron and steel already presented in Part IV. The output of such wire rods in 1899 was 916,587 long tons; in 1904, 1,792,704 long tons, and in 1909, 2,295,279 long tons, the increase for the decade being 150.4 per cent.

Of the total expenses reported by wire mills in 1909, salaries represented 2.8 per cent; wages, 13.3 per cent; cost of materials, 78.2 per cent; and miscellaneous expenses, 5.7 per cent.

The cost of materials in 1909 represented 71.7 per cent of the total value of products, and the value added by manufacture 28.3 per cent.

Summary, by states.—Table 94 summarizes the more important statistics for wire mills using purchased rods, by states, for 1909, the states being arranged according to the value of products. Comparisons with previous censuses are not made because, for the reason indicated above, they have no significance as showing the growth of the wire industry. The data reported for 1904 and 1899 are, however, shown in Table 112.

Table 94 — WIRE MILLS USING PURCHASED RODS: 1909

STATE.	Number of establishments.	Wage earners.		Value of products.		Value added by manufacture.	
		Average number.	Per cent of total.	Amount.	Per cent of total.	Amount.	Per cent of total.
United States	**56**	**18,084**	**100.0**	**$84,486,518**	**100.0**	**$23,943,587**	**100.0**
New Jersey	7	5,646	31.2	28,858,428	34.2	6,560,691	27.4
New York	7	1,439	8.0	10,065,431	11.9	2,241,913	9.4
Massachusetts	10	3,718	20.6	9,579,815	11.3	4,041,922	16.9
Pennsylvania	8	946	5.2	2,882,192	3.4	1,132,927	4.7
All other states[1]	24	6,335	35.1	33,100,652	39.2	9,966,134	41.6

[1] All other states embrace: Connecticut, 3 establishments; Illinois, 7; Indiana, 2; Kentucky, 1; Michigan, 1; Ohio, 6; Rhode Island, 1; Virginia, 1; Wisconsin, 2.

The three leading states in the value of products of wire mills (mills using purchased rods) were, in 1909, New Jersey, Illinois, and New York; in 1904, Illinois, New Jersey, and New York; and in 1899, New Jersey, Illinois, and Massachusetts. For the industry as a whole the ranking states in 1909 were Pennsylvania, New Jersey, Illinois, Massachusetts, Ohio, and New York.

Persons engaged in the industry.—Table 95 shows, by classes, for 1909, the number of persons engaged in the wire mills using purchased rods. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction. The total number of persons engaged in such mills in 1909 was 19,945, of whom 18,084, or 90.7 per cent, were wage earners.

Table 95 — PERSONS ENGAGED IN WIRE MILLS USING PURCHASED RODS: 1909

CLASS.	Total.	Male.	Female.
All classes	**19,945**	**18,904**	**1,041**
Proprietors and officials	399	395	4
Proprietors and firm members	15	13	2
Salaried officers of corporations	78	77	1
Superintendents and managers	306	305	1
Clerks[1]	1,462	1,240	222
Wage earners (average number)	18,084	17,269	815
16 years of age and over	17,992	17,190	802
Under 16 years of age	92	79	13

[1] Includes other subordinate salaried employees.

Table 96 shows, for 1909 and 1904, the average number of wage earners, distributed according to age periods, and in the case of those 16 years of age and over,

according to sex. Data for 1899 are not given because the mills which purchased rods were at that time only a very small factor in the wire industry.

Table 96 AVERAGE NUMBER OF WAGE EARNERS IN WIRE MILLS USING PURCHASED RODS.

CLASS.	1909		1904	
	Number.	Per cent of total.	Number.	Per cent of total.
Total	18,084	100.0	4,737	100.0
16 years of age and over	17,992	99.5	4,711	99.5
Male	17,190	95.1	4,513	95.3
Female	802	4.4	198	4.2
Under 16 years of age	92	0.5	26	0.5

Female wage earners 16 years of age and over formed 4.4 per cent of all wage earners in 1909, as compared with 4.2 per cent in 1904, and boys and girls under 16, 0.5 per cent in both 1909 and 1904.

Wage earners employed, by months.—Table 97 gives the number of wage earners employed in the wire mills of the country on the 15th (or the nearest representative day) of each month during the year 1909.

Table 97

MONTH.	WAGE EARNERS IN WIRE MILLS USING PURCHASED RODS: 1909	
	Number.	Per cent of maximum.
January	17,763	90.4
February	18,147	92.4
March	17,604	89.6
April	17,131	87.2
May	17,432	88.8
June	17,862	90.9
July	17,864	91.0
August	17,673	90.0
September	18,206	92.7
October	18,580	94.6
November	19,091	97.2
December	19,641	100.0

The fluctuations in number of wage earners were comparatively small. The month of minimum employment was April, when the number reported was 87.2 per cent of the maximum number, which was reported for December. The increase from April to December apparently reflects the general improvement in business conditions which took place during the year.

Prevailing hours of labor.—Wage earners in wire mills using purchased rods have been classified according to the hours prevailing in the establishment in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment is classified as a total according to the hours prevailing in that establishment, even though a few employees work a greater or less number of hours. There is a marked uniformity in the hours of labor prevailing in this industry. Of the 18,084 wage earners in 1909, 7,626, or 42.2 per cent, were in establishments where the prevailing hours were between 54 and 60 per week; 10,232, or 56.6 per cent, in establishments where they were 60 per week; and only 1.2 per cent in establishments where they were 54 or less or more than 60 per week.

Character of ownership.—Table 98 has for its purpose the presentation of conditions in respect to the character of ownership, or legal organization, of the wire mills using purchased rods.

Table 98 WIRE MILLS USING PURCHASED RODS.

CHARACTER OF OWNERSHIP.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	56	25	$84,486,518	$37,914,419
Individual and firm	7	3	1,683,946	604,678
Corporation	49	22	82,802,572	37,309,741
Per cent of total	100.0	100.0	100.0	100.0
Individual and firm	12.5	12.0	2.0	1.6
Corporation	87.5	88.0	98.0	98.4
Average per establishment:				
Individual and firm			$240,564	$201,559
Corporation			1,689,848	1,695,897

Establishments operated under corporate ownership dominate the industry. Of the establishments under individual and firm ownership in 1909, three were owned by individuals and four by firms; the three reported for 1904 were operated by firms.

Size of establishments.—Table 99 groups the wire mills using purchased rods according to the value of products and shows, for each group, the number of establishments and value of products, together with the percentage of the respective totals represented by each group, for 1909 and 1904.

Table 99 WIRE MILLS USING PURCHASED RODS.

VALUE OF PRODUCTS PER ESTABLISHMENT.	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	56	25	$84,486,518	$37,914,419
Less than $20,000	4	1	36,337	(1)
$20,000 and less than $100,000	5	2	259,017	(1)
$100,000 and less than $1,000,000	30	16	14,775,545	5,738,753
$1,000,000 and over	17	6	69,415,619	32,022,742
Per cent of total	100.0	100.0	100.0	100.0
Less than $20,000	7.1	4.0	(2)	(1)
$20,000 and less than $100,000	8.9	8.0	0.3	(1)
$100,000 and less than $1,000,000	53.6	64.0	17.5	15.1
$1,000,000 and over	30.4	24.0	82.2	84.5
Average per establishment			$1,508,688	$1,516,577

[1] Figures omitted, to avoid disclosure of individual operations.
[2] Less than one-tenth of 1 per cent.

In 1909 establishments with products valued at $1,000,000 or more constituted only 30.4 per cent of the total number of establishments, but employed 73.6 per cent of the wage earners and produced 82.2 per cent of the total value of products.

Table 100 shows, for 1909, the number of wire mills grouped according to the average number of wage earners employed for each group for seven of the leading states.

Table 100 WIRE MILLS USING PURCHASED RODS: 1909

STATE.	Total.		Establishments employing—															
			1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number)	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	**56**	**18,084**	**3**	**5**	**6**	**83**	**5**	**181**	**8**	**591**	**14**	**2,499**	**13**	**4,307**	**4**	**2,579**	**3**	**7,839**
Connecticut	3	643	.....	.....	.....	.....	1	21	.....	.....	.....	.....	2	622	.....	.....	.....	.....
Illinois	7	2,516	.....	.....	.....	.....	.....	.....	1	62	3	439	.....	.....	3	2,015	.....	.....
Massachusetts	10	3,718	2	4	.....	.....	.....	.....	.....	.....	3	428	4	1,162	.....	.....	1	2,124
New Jersey	7	5,646	.....	.....	1	14	.....	.....	2	158	.....	.....	3	1,088	.....	.....	1	4,386
New York	7	1,439	1	1	1	18	.....	.....	1	60	2	387	1	409	1	564	.....	.....
Ohio	6	2,096	.....	.....	.....	.....	.....	.....	2	151	3	616	.....	.....	.....	.....	1	1,329
Pennsylvania	8	946	.....	.....	1	18	3	113	2	160	1	197	1	458	.....	.....	.....	.....

The most numerous group of establishments was that comprising establishments employing from 101 to 250 wage earners, but the group employing the greatest number of wage earners was that comprising the three establishments employing over 1,000 wage earners each.

Engines, power, and fuel.—Table 101 shows, for wire mills using purchased rods, the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower, as reported at the censuses of 1909 and 1904. It also shows separately the number and horespower of all electric motors, including those operated by current generated in the establishments. Data for 1899 are not presented because the wire mills using purchased rods at that time represented only a small part of the wire industry.

This table indicates a decided relative increase in the use of gas engines and in the use of rented electric power between 1904 and 1909. Moreover, a much larger proportion of the primary horsepower generated in the establishments themselves was applied by means of electric motors in the later year than in the earlier.

Table 101 WIRE MILLS USING PURCHASED RODS.

POWER.	Number of engines or motors.		Horsepower.		Per cent distribution of horsepower.	
	1909	1904	1909	1904	1909	1904
Primary power, total	**443**	**114**	**71,959**	**25,856**	**100.0**	**100.0**
Owned	315	114	68,923	25,509	95.7	98.7
Steam	268	91	63,409	23,606	88.0	91.6
Gas	28	9	3,256	759	4.5	2.9
Water wheels	19	14	2,151	1,054	3.0	4.1
Other	.....	.....	107	.....	0.1	.....
Rented	128	(1)	3,036	347	4.2	1.3
Electric	128	(1)	3,031	347	4.2	1.3
Other	.....	.....	5	.....	(2)	.....
Electric motors	**1,019**	**50**	**18,824**	**1,710**	**100.0**	**100.0**
Run by current generated by establishment	891	50	15,793	1,363	83.9	79.7
Run by rented power	128	(1)	3,031	347	16.1	20.3

[1] Not reported. [2] Less than one-tenth of 1 per cent.

Table 102 shows, by states, for 1909, the amount of each of the several kinds of power, as well as of the different kinds of fuel, used in the wire mills which purchased wire rods, by states.

Table 102 WIRE MILLS USING PURCHASED RODS: 1909

STATE.	Primary horsepower								Electric horsepower.		Fuel used.					
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.			Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water wheels.	Other.	Electric.	Other.	Total, rented and generated by establishment.	Generated in the establishment reporting.	Anthracite (long tons).	Bituminous (short tons).				
United States	**56**	**71,959**	**68,923**	**63,409**	**3,256**	**2,151**	**107**	**3,031**	**5**	**18,824**	**15,793**	**84,208**	**518,121**	**22,280**	**818**	**71,663**	**217,620**
Connecticut	3	7,154	7,154	6,585	445	124	.....	.....	.....	1,592	1,592	313	22,821	776	.....	2,104	.....
Illinois	7	12,380	12,380	11,630	.....	750	.....	.....	.....	2,103	2,103	.....	180,052	1,432	.....	.....	5,414
Massachusetts	10	10,498	10,401	9,610	68	723	.....	92	5	4,839	4,747	42,191	52,025	206	697	17,331	2,405
New Jersey	7	17,436	17,428	16,084	1,344	.....	.....	8	.....	5,591	5,583	13,628	113,117	2,614	.....	42,930	.....
New York	7	5,455	4,466	4,195	50	114	107	989	.....	1,719	730	18,356	23,880	7,059	50	4,891	.....
Ohio	6	10,036	8,669	7,545	1,124	.....	.....	1,417	.....	1,607	190	.....	73,347	8,375	.....	1,990	131,010
Pennsylvania	8	2,980	2,930	2,355	225	350	.....	50	.....	890	840	9,720	15,499	773	54	104	33,266
All other states	8	5,970	5,495	5,405	.....	90	.....	475	.....	483	8	.....	37,380	1,045	17	2,313	45,525

SPECIAL STATISTICS RELATING TO MATERIALS, PRODUCTS, AND EQUIPMENT, FOR THE INDUSTRY AS A WHOLE.

The statistics regarding materials, products, and equipment presented in this section cover not only the wire mills using purchased rods, but also the wire departments of rolling mills and of other concerns producing wire. In general, the tables show the totals for the wire industry as a whole and then show separately the data for wire mills primarily engaged in drawing wire from purchased (or transferred) rods and for all other wire-drawing establishments.

Materials.—Table 103 gives, in detail, the statistics for wire rods consumed in 1909, and for wire purchased as such and used by establishments in the industry either for redrawing or in the manufacture of wire goods of various sorts. The cost of fuel and rent of power, as well as of "all other materials," can be given only for the wire mills using purchased rods, but the quantity and cost of the principal materials can be shown for the entire industry. The materials included under the heading "all other materials" consist of zinc, tin, lead, sulphuric and muriatic acids, oil, lime, containers, mill supplies, and the like. Quantities are given in short tons.

Table 103 THE WIRE INDUSTRY—MATERIALS USED: 1909

MATERIAL.	Number or amount.			Per cent of total.	
	Total.	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.	Wire mills.	Wire departments.
Total cost		**$60,542,931**	(1)		
Wire rods	$112,799,516	$50,810,983	$61,988,533	45.0	55.0
Steel—					
Tons	2,514,504	850,729	1,663,775	33.8	66.2
Cost	$67,439,887	$23,021,867	$44,418,020	34.1	65.9
Open-hearth—					
Tons	1,359,256	285,961	1,073,295	21.0	79.0
Cost	$38,532,177	$8,536,361	$29,995,816	22.2	77.8
Basic—					
Tons	1,255,747	233,105	1,022,642	18.6	81.4
Cost	$35,046,106	$6,695,310	$28,350,796	19.1	80.9
Acid—					
Tons	103,509	52,856	50,653	51.1	48.9
Cost	$3,486,071	$1,841,051	$1,645,020	52.8	47.2
Bessemer—					
Tons	1,148,353	558,048	590,305	48.6	51.4
Cost	$28,340,445	$13,936,178	$14,404,267	49.2	50.8
Crucible and other—					
Tons	6,895	6,720	175	97.5	2.5
Cost	$567,265	$549,328	$17,937	96.8	3.2
Iron—					
Tons	4,849	1,055	3,794	21.8	78.2
Cost	$207,846	$62,203	$145,643	29.9	70.1
Copper—					
Tons	151,951	102,394	49,557	67.4	32.6
Cost	$40,916,084	$27,462,312	$13,453,772	67.1	32.9
Other metals or alloys [2]—					
Tons	17,944	935	17,009	5.2	94.8
Cost	$4,235,699	$264,601	$3,971,098	6.2	93.8
Purchased wire—					
Tons	57,922	8,943	48,979	15.4	84.6
Cost	$2,855,911	$429,390	$2,426,521	15.0	85.0
Cost of fuel and rent of power		$1,640,172	(1)		
Cost of all other materials		$7,662,386	(1)		

[1] Figures not available.
[2] Brass, bronze, German silver, zinc, etc., chiefly brass.

For the wire mills using purchased rods the expense for fuel and rent of power and for "all other materials" (that is, materials other than wire rods and wire) was equal to 18.2 per cent of the cost of wire rods and wire. If a like ratio is assumed for the wire departments of rolling mills and other concerns, the total cost of materials for all wire-drawing establishments and departments can be estimated at about $137,000,000.

Of the total quantity of steel rods used in 1909, 54.1 per cent were of open-hearth steel and 45.7 per cent of Bessemer steel, only three-tenths of 1 per cent being of crucible and other steel. In wire mills using purchased rods the consumption of Bessemer steel rods largely exceeded that of open-hearth steel rods, while in wire departments of rolling mills and other concerns the consumption of open-hearth steel rods, chiefly basic, was nearly twice that of Bessemer steel rods. The purchased wire reported as material by some of the establishments includes both plain and coated wire.

Approximately two-thirds of the steel wire rods are used by the wire departments of steel rolling mills. The use of iron wire rods is not large, most of them being used in the wire departments of concerns other than steel works and rolling mills. The greater part of the rods of "other metals or alloys," most of which are of brass, are used in the wire-drawing departments of brass rolling mills, but more than two-thirds of the copper rods are used in wire mills using purchased rods.

The per cent distribution of the total cost of the wire rods used in 1909 according to kind of metal is given in Table 104.

Table 104 PER CENT OF TOTAL COST OF WIRE RODS: 1909

KIND OF METAL.	Wire industry.	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.
Total	100.0	100.0	100.0
Steel and iron	60.0	45.4	71.9
Copper	36.3	54.0	21.7
Other metals or alloys	3.8	0.5	6.4

Of the total cost of wire rods used by the industry as a whole, 60 per cent represented the cost of iron and steel rods, 36.3 per cent that of copper rods, and 3.8 per cent that of rods of other metals or alloys. The percentages by weight are of course very different, copper being much more valuable than iron and steel.

Products.—Table 105 gives, for 1909, the quantity and value of the products in detail for wire mills

using purchased rods and for the wire departments of rolling mills and other concerns, respectively. Comparative data for earlier years are not available. Quantities are given in short tons.

Table 105 THE WIRE INDUSTRY—PRODUCTS: 1909

KIND.	Number or amount.			Per cent of total.	
	Total.	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.	Wire mills.	Wire departments.
Total value of products.	**$180,083,522**	**$84,486,518**	**[1]$95,597,004**	**46.9**	**53.1**
Wire, and manufactures of wire	$173,349,614	$79,249,869	$94,099,745	45.7	54.3
Steel and iron—					
Tons	2,471,858	821,929	1,649,929	33.3	66.7
Value	$120,585,637	$47,934,204	$72,651,433	39.8	60.2
Wire drawn for sale—					
Tons	826,451	343,905	482,546	41.6	58.4
Value	$38,845,081	$18,823,035	$20,022,046	48.5	51.5
Plain—					
Tons	472,046	188,846	283,200	40.0	60.0
Value	$22,632,230	$11,349,868	$11,282,362	50.1	49.9
Coated—					
Tons	354,405	155,059	199,346	43.8	56.2
Value	$16,212,851	$7,473,167	$8,739,684	46.1	53.9
Wire nails and spikes—					
Kegs (100 lbs)	13,926,861	3,449,753	10,477,108	24.8	75.2
Value	$27,575,774	$7,142,047	$20,433,727	25.9	74.1
Wire brads, tacks, and staples—					
Tons	28,125	7,334	20,791	26.1	73.9
Value	$1,324,170	$320,224	$1,003,946	24.2	75.8
Barbed wire—					
Tons	323,565	76,268	247,297	23.6	76.4
Value	$13,881,517	$3,343,856	$10,537,661	24.1	75.9
Woven wire, fencing, and poultry netting—					
Tons	422,127	115,889	306,238	27.5	72.5
Value	$21,419,170	$6,724,077	$14,695,093	31.4	68.6
Wire rope and strand—					
Tons	45,303	34,140	11,163	75.3	24.6
Value	$6,683,771	$5,450,064	$1,233,707	81.5	18.5
Other wire products (springs, bale ties, cold-rolled flat wire, etc.)—					
Tons	129,945	71,906	58,039	55.3	44.7
Value	$10,856,154	$6,130,901	$4,725,253	56.5	43.5
Copper—					
Tons	154,231	102,604	51,627	66.5	33.5
Value	$47,184,164	$30,831,646	$16,352,518	65.3	34.7
Wire drawn for sale [2]—					
Tons	139,482	102,418	37,064	73.4	26.6
Value	$42,336,274	$30,736,728	$11,599,546	72.6	27.4
Wire products—					
Tons	14,749	186	14,563	1.3	98.7
Value	$4,847,890	$94,918	$4,752,972	2.0	98.0
Other metals or alloys [3]—					
Tons	17,407	1,048	16,359	6.0	94.0
Value	$5,579,813	$484,019	$5,095,794	8.7	91.3
Wire drawn for sale—					
Tons	15,583	1,008	14,575	6.5	93.5
Value	$4,993,376	$459,583	$4,533,793	9.2	90.8
Wire products—					
Tons	1,824	40	1,784	2.2	97.8
Value	$586,437	$24,436	$562,001	4.2	95.8
All other products	$6,733,908	$5,236,649	$1,497,259	77.8	22.2

[1] Distributed as follows: Iron and steel rolling mills, $78,894,036; brass and copper rolling mills, $10,580,981; wire departments of other concerns, $6,121,987.
[2] Includes copper wire used for making insulated wire by the establishment producing it.
[3] Brass, bronze, German silver, zinc, etc., chiefly brass.

The wire departments of rolling mills and other concerns produced 66.7 per cent of the total tonnage of steel and iron wire and wire goods reported in 1909, and 94 per cent of the tonnage of wire and wire products of brass and other metals or alloys, but produced only 33.5 per cent of the product from copper.

The per cent distribution of the value of the wire and wire products, according to the metal from which made, is shown in Table 106.

Table 106 PER CENT OF TOTAL VALUE OF WIRE AND WIRE PRODUCTS: 1909

KIND OF METAL.	Wire industry.	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.
Total	**100.0**	**100.0**	**100.0**
Steel and iron	69.7	60.5	77.2
Copper	27.2	38.9	17.4
Other metals or alloys	3.2	0.6	5.4

It will be perceived that the value of steel and iron wire and wire products represented a considerably higher proportion of the value of all wire and wire products than the cost of steel and iron rods represented of the total cost of rods consumed. This is due largely to the fact that the steel and iron products include a much larger proportion of elaborated wire goods than the copper products. In the case of the steel and iron products, two-thirds of the tonnage is represented by wire goods carrying a considerable enhancement in value over plain wire, while in the case of the copper products such wire goods form less than 10 per cent of the total tonnage. Manufactures from purchased wire necessarily enter into the products as reported, but wire purchased is not distributable as a material according to the kind of metal.

The manufacture of insulated wire and cable to the value of $9,806,989 was reported by the establishments in the wire industry in 1909. The quantity and value of the bare wire employed in the manufacture of this insulated wire and cable is included under "copper wire" in the table, the increase in value on account of insulation being included under "all other products." Most insulated wire is made by establishments in the industry "electrical machinery, apparatus, and supplies." The total value of the insulated wire and cable manufactured in 1909 was $51,624,737.

The quantity of wire drawn from the different metals, whether for sale or for use in further manufacture by the producing concern, is shown in Table 107. Steel and iron wire represented 93.6 per cent of the total tonnage in 1909, copper wire 5.8 per cent, and wire of other metals or alloys 0.7 per cent.

Table 107 WIRE DRAWN FOR SALE OR FOR USE IN SAME WORKS (TONS).

KIND OF METAL.	Wire industry.	Wire mills using purchased rods.	Wire departments of rolling mills and other concerns.
Total	**2,553,703**	**890,263**	**1,663,440**
Steel and iron	2,389,136	787,322	1,601,814
Copper	147,156	101,890	45,266
Other metals or alloys	17,411	1,051	16,360
Per cent of total	**100.0**	**100.0**	**100.0**
Steel and iron	93.6	88.4	96.3
Copper	5.8	11.4	2.7
Other metals or alloys	0.7	0.1	1.0

Table 108 shows the quantity of wire drawn from the different metals in 1909, whether for sale or further manufacture, in the states leading in wire production.

Table 108

KIND OF METAL AND STATE.	WIRE DRAWN FOR SALE OR FOR USE AS MATERIAL IN SAME WORKS: 1909	
	Quantity (tons).	Per cent of total.
Steel and iron	2,389,136	100.0
Pennsylvania	851,448	35.6
Illinois	531,235	22.2
Ohio	400,744	16.8
Indiana	179,979	7.5
Massachusetts	133,745	5.6
New Jersey	121,813	5.1
All other states	170,172	7.1
Copper	147,156	100.0
New Jersey	63,452	43.1
Connecticut	22,958	15.6
New York	22,325	15.2
Massachusetts	11,808	8.0
All other states	26,613	18.1
Other metals or alloys	17,411	100.0
Connecticut	16,152	92.8
New Jersey	702	4.0
New York	322	1.8
All other states	235	1.3

In the production of steel and iron wire, Pennsylvania led in 1909 with 851,448 tons, or 35.6 per cent of the total amount drawn. In the production of copper wire New Jersey led with 63,452 tons, or 43.1 per cent of the total; and in the manufacture of wire from brass and other metals or alloys Connecticut was far in advance of any other state, producing 16,152 tons, or 92.8 per cent of the total output.

Equipment—Wire-drawing blocks and nail and fence machines.—Table 109 shows the number and capacity of the wire-drawing blocks, wire-nail machines, and woven-wire fence machines installed in all wire-drawing establishments in 1909.

The number of wire-drawing blocks is the total number reported by the establishments, whether rod, redrawing, or fine wire blocks. "Rod" blocks are those used for drawing the heavier gauges of wire from the rolled wire rod in one or more drafts. "Redrawing" blocks are those used for the reduction of wire to finer sizes, the limit being about No. 20 gauge. "Fine wire" blocks are those used for still further reduction in sizes below the gauge just named.

Table 109

STATE.	THE WIRE INDUSTRY: 1909					
	Wire-drawing blocks.		Wire-nail machines.		Woven-wire fence machines.	
	Number.	Annual capacity (tons).	Number.	Annual capacity (kegs of 100 pounds).	Number	Annual capacity (tons).
United States, total.	43,697	3,214,000	4,428	18,757,000	446	481,000
Wire mills using purchased rods	28,119	1,065,000	1,207	4,694,000	198	135,000
Wire departments of rolling mills and other concerns	15,578	2,149,000	3,221	14,063,000	248	346,000
Individual states, 1909:						
Colorado	317	200,000	280	2,500,000	2	1,800
Connecticut	2,325	90,400	11	22,000	3	1,100
Georgia	48	25,000	47	300,000	1	800
Illinois	4,354	621,400	626	3,389,000	128	185,500
Indiana	390	199,000	320	1,392,000	46	52,800
Kentucky	56	24,000	48	300,000	.....	.....
Massachusetts	9,666	185,300	109	258,000	85	10,000
Michigan	50	2,250	.....	.....	.....	.....
New Jersey	10,897	248,300	39	29,000	.....	.....
New York	4,203	69,500	150	200,000	.....	.....
Ohio	8,852	554,000	1,400	3,570,000	17	37,000
Pennsylvania	2,279	952,400	1,329	6,660,000	164	192,000
Rhode Island	185	28,500	31	75,000	.....	.....
Virginia	50	150	.....	.....	.....	.....
Wisconsin	25	7,800	38	62,000	.....	.....

The inquiry did not ask for specific information as to kinds of blocks, but a number of establishments furnished this and the specific data are summarized in Table 110 for all establishments reporting.

Table 110

CLASS OF MILL.	NUMBER OF WIRE-DRAWING BLOCKS.				Annual capacity (tons).
	Total.	Rod.	Redrawing.	Fine wire.	
Total	43,697	.....	.....	.....	3,214,000
In mills reporting kind of blocks	21,454	3,460	3,230	14,764	1,847,000
Using—					
Rod only	453	453	.....	.....	247,000
Rod and redrawing	2,645	2,024	621	.....	1,123,000
Rod, redrawing, and fine wire	18,356	983	2,609	14,764	477,000
In mills not reporting kind of blocks	22,243	.....	.....	.....	1,367,000

Materials, products, and equipment, in detail, by states.—Table 111 gives, for the United States as a whole, detailed statistics of materials, products, and equipment of the wire industry as a whole, and of the wire mills and wire departments separately. For the wire mills it also presents figures for leading states.

THE WIRE INDUSTRY—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT: 1909.

[Tons of 2,000 pounds.]

Table 111

	The wire industry as a whole.	WIRE MILLS USING PURCHASED RODS.						Wire departments of rolling mills and other concerns.
		Total.	Massachusetts.	New Jersey.	New York.	Pennsylvania.	All other states.[1]	
Number of establishments	93	56	10	7	7	8	24	[2]37
MATERIALS USED.								
Total cost		**$60,542,931**	**$5,537,893**	**$22,297,737**	**$7,823,518**	**$1,749,265**	**$23,134,518**	
Wire rods	$112,799,516	$50,810,983	$4,004,247	$20,026,428	$6,908,977	$1,304,748	$18,566,583	$61,988,533
Steel—								
Tons	2,514,504	850,729	106,501	92,026	14,850	22,867	614,485	1,663,775
Cost	$67,439,887	$23,021,867	$2,887,743	$3,318,324	$561,362	$902,886	$15,351,552	$44,418,026
Open-hearth—								
Tons	1,359,256	285,961	63,886	86,880	14,390	13,028	107,777	1,073,295
Cost	$38,532,177	$8,536,361	$1,673,885	$3,116,432	$523,062	$402,802	$2,820,180	$29,995,816
Basic—								
Tons	1,255,747	233,105	44,254	61,102	13,040	12,954	101,755	1,022,642
Cost	$35,046,106	$6,695,310	$1,186,088	$1,994,920	$448,262	$399,657	$2,666,383	$28,350,796
Acid—								
Tons	103,509	52,856	19,632	25,778	1,350	74	6,022	50,653
Cost	$3,486,071	$1,841,051	$487,797	$1,121,512	$74,800	$3,145	$153,797	$1,645,020
Bessemer—								
Tons	1,148,353	558,048	40,049	4,826	345	6,123	506,705	590,305
Cost	$28,340,445	$13,956,178	$1,061,074	$133,635	$25,700	$185,185	$12,530,584	$14,404,267
Crucible and other—								
Tons	6,895	6,720	2,566	320	115	3,716	3	175
Cost	$567,265	$549,328	$152,784	$68,257	$12,600	$314,899	$788	$17,937
Iron—								
Tons	4,849	1,055	355	(3)	(3)	(3)	44	3,794
Cost	$207,846	$62,203	$20,107	(3)	(3)	(3)	$2,188	$145,643
Copper—								
Tons	151,951	102,394	(3)	62,915	22,195	(3)	11,850	49,557
Cost	$40,916,084	$27,462,312	(3)	$16,502,669	$6,285,465	(3)	$3,209,806	$13,453,772
Other metals or alloys[4]—								
Tons	17,944	935	(3)	(3)	(3)	.....	10	17,009
Cost	$4,235,699	$264,601	(3)	(3)	(3)	.....	$3,037	$3,971,098
Purchased wire:								
Tons	57,922	8,943	7,769	112	249	.....	813	48,979
Cost	$2,855,911	$429,390	$303,985	$8,291	$77,875	.....	$39,239	$2,426,521
Fuel and rent of power	.....	$1,640,172	$323,955	$424,705	$185,851	$46,242	$659,419	.....
All other materials	.....	$7,662,386	$905,706	$1,838,313	$650,815	$398,275	$3,869,277	.....
PRODUCTS.								
Total value	**$180,083,522**	**$84,486,518**	**$9,579,815**	**$28,858,428**	**$10,065,431**	**$2,882,192**	**$33,100,652**	**$95,597,004**
Wire, and manufactures of wire	$173,349,614	$79,249,869	$9,517,514	$26,085,989	$9,722,797	$2,611,421	$31,312,148	$94,099,745
Steel and iron—								
Tons	2,471,858	821,929	101,077	83,636	14,632	23,205	599,379	1,649,929
Value	$120,585,637	$47,934,204	$8,400,173	$8,017,520	$1,893,995	$1,963,116	$27,659,400	$72,651,433
Wire drawn for sale—								
Tons	826,451	343,905	69,081	39,058	12,151	9,078	214,537	482,546
Value	$38,845,081	$18,823,035	$4,967,941	$2,550,661	$1,338,220	$710,909	$9,255,304	$20,022,046
Plain—								
Tons	472,046	188,846	56,995	19,204	12,150	8,753	91,744	283,200
Value	$22,632,230	$11,349,868	$4,006,981	$1,341,601	$1,336,413	$694,334	$3,970,539	$11,282,362
Coated—								
Tons	354,405	155,059	12,086	19,854	1	325	122,793	199,346
Value	$16,212,851	$7,473,167	$960,960	$1,209,060	$1,807	$16,575	$5,284,765	$8,739,684
Wire nails and spikes—								
Kegs (100 pounds)	13,926,861	3,449,753	(3)	(3)	.....	131,826	3,154,795	10,477,108
Value	$27,575,774	$7,142,047	(3)	(3)	.....	$384,599	$6,413,196	$20,433,727
Wire brads, tacks, and staples—								
Tons	28,125	7,334	(3)	(3)	.....	.....	6,426	20,791
Value	$1,324,170	$320,224	(3)	(3)	.....	.....	$253,717	$1,003,946
Barbed wire—								
Tons	323,565	76,268	.....	.....	.....	.....	76,268	247,297
Value	$13,881,517	$3,343,856	.....	.....	.....	.....	$3,343,856	$10,537,661
Woven wire, fencing, and poultry netting—								
Tons	422,127	115,889	(3)	(3)	.....	.....	110,360	306,238
Value	$21,419,170	$6,724,077	(3)	(3)	.....	.....	$6,002,809	$14,695,093
Wire rope and strand—								
Tons	45,303	34,140	(3)	25,311	(3)	(3)	1,624	11,163
Value	$6,683,771	$5,450,064	(3)	$3,893,419	(3)	(3)	$246,823	$1,233,707
Other wire products (springs, bale ties, cold-rolled flat wire, etc.)—								
Tons	129,945	71,906	17,587	17,832	(3)	(3)	32,424	58,039
Value	$10,856,154	$6,130,901	$2,102,001	$1,512,865	(3)	(3)	$2,143,695	$4,725,253
Copper—								
Tons	154,231	102,604	(3)	62,686	22,375	(3)	11,707	51,627
Value	$47,184,164	$30,831,646	(3)	$17,777,115	$7,653,209	(3)	$3,646,576	$16,352,518
Wire drawn for sale—								
Tons	139,482	102,418	(3)	62,686	22,375	(3)	11,613	37,064
Value	$42,336,274	$30,736,728	(3)	$17,777,115	$7,653,209	(3)	$3,581,494	$11,599,546
Wire products—								
Tons	14,749	186	(3)	.....	.....	(3)	94	14,563
Value	$4,847,890	$94,918	(3)	.....	.....	(3)	$65,082	$4,752,972
Other metals or alloys[4]—								
Tons	17,407	1,048	(3)	702	319	.....	(3)	16,359
Value	$5,579,813	$484,019	(3)	$291,354	$175,593	.....	(3)	$5,095,794
Wire drawn for sale—								
Tons	15,583	1,008	.....	702	(3)	.....	(3)	14,575
Value	$4,993,376	$459,583	.....	$291,354	(3)	.....	(3)	$4,533,793
Wire products—								
Tons	1,824	40	(3)	.....	(3)	.....	(3)	1,784
Value	$586,437	$24,436	(3)	.....	(3)	.....	(3)	$562,001

[1] All other states embrace: Connecticut, 3 establishments; Illinois, 7; Indiana, 2; Kentucky, 1; Michigan, 1; Ohio, 6; Rhode Island, 1; Virginia, 1; Wisconsin, 2.
[2] Distributed by states as follows: Colorado, 1 establishment; Connecticut, 9; Georgia, 1; Illinois 3; Indiana, 2; Massachusetts, 1; New Jersey, 4; New York, 1; Ohio, 5; Pennsylvania, 8; Rhode Island, 2.
[3] Included in total, but amount not shown, in order to avoid disclosure of individual operations.
[4] Brass, bronze, German silver, zinc, etc., chiefly brass.

THE WIRE INDUSTRY—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT, 1909—Continued.

[Tons of 2,000 pounds.]

Table 111—Continued.	The wire industry as a whole.	WIRE MILLS USING PURCHASED RODS.						Wire departments of rolling mills and other concerns.
		Total.	Massachusetts.	New Jersey.	New York.	Pennsylvania.	All other states.[1]	
PRODUCTS—continued.								
All other products, including scrap, dross, etc...	$6,501,069	$5,083,899	$54,303	$2,650,348	$339,897	$270,771	$1,768,580	$1,417,170
Amount received for custom work and repairing.	$232,839	$152,750	$7,998	$122,091	$2,737	.....	$19,924	$80,089
Wire drawn, whether for consumption or for sale (tons):								
Steel and iron	2,389,136	787,322	88,755	83,647	14,631	22,948	577,341	1,601,814
Copper	147,156	101,890	(2)	62,686	22,325	(2)	(2)	45,266
Other metals or alloys	17,411	1,051	(2)	702	322	.....	(2)	16,360
EQUIPMENT.								
Wire-drawing blocks: [3]								
Number	43,697	28,119	9,450	10,286	703	387	7,293	15,578
Annual capacity, tons	3,214,000	1,065,000	124,000	168,000	39,000	31,000	703,000	2,149,000
Wire-nail machines:								
Number	4,428	1,207	109	39	.....	120	939	3,221
Annual capacity, kegs of 100 pounds	18,757,000	4,694,000	258,000	29,000	.....	132,000	4,275,000	14,063,000
Woven-wire fence machines:								
Number	446	198	85	.....	.....	.....	113	248
Annual capacity, tons	481,000	135,000	10,000	.....	.....	.....	125,000	346,000

[1] All other states embrace: Connecticut, 3 establishments; Illinois, 7; Indiana, 2; Kentucky, 2; Michigan, 1; Ohio, 6; Rhode Island, 1; Virginia, 1; Wisconsin, 2.
[2] Included in total, but amount not shown, in order to avoid disclosure of individual operations.
[3] Includes rod, redrawing, and fine-wire blocks.

DETAILED STATE TABLES FOR WIRE MILLS USING PURCHASED RODS.

Tables 112 and 113, which follow, relate exclusively to mills drawing wire from purchased rods, and it should be constantly borne in mind that such mills in 1909 represented less than half of the wire industry and in 1904 and 1899 a very much smaller proportion (about one-fifth in 1899).

Table 112 gives comparative statistics for 1909, 1904, and 1899 as to the number of establishments, persons engaged in the industry, primary horsepower, capital, salaries, wages, cost of materials, value of products, and value added to materials by manufacture. For the reason stated above, the progress of the wire industry in general can not be judged at all by the changes which took place between 1899 and 1909, as shown in this table.

Table 113 shows, for 1909, more detailed statistics, by states, with reference to the same subjects that are covered by Table 112.

WIRE MILLS USING PURCHASED RODS—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 112			PERSONS ENGAGED IN INDUSTRY.									
STATE.	Census.	Number of establishments.	Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	1909	56	19,945	15	1,846	18,084	71,959	$60,157	$2,199	$10,316	$60,543	$84,487	$23,944
	1904	25	5,325	7	581	4,737	25,856	14,899	793	2,859	30,062	37,914	7,852
	1899	29	1,715	18	94	1,603	9,979	4,242	136	860	7,014	9,421	2,407
Massachusetts	1909	10	4,092	6	368	3,718	10,498	8,011	404	2,218	5,538	9,580	4,042
	1904	5	645	3	37	605	2,985	1,215	54	329	1,039	1,617	578
	1899	6	302	4	19	279	.....	669	33	161	776	1,122	346
New Jersey	1909	7	6,255	.....	609	5,646	17,436	21,829	624	2,767	22,298	28,858	6,560
	1904	4	678	.....	59	619	4,150	2,047	86	316	9,889	11,104	1,215
	1899	3	192	1	15	176	.....	1,105	29	122	2,899	3,375	476
New York	1909	7	1,521	1	81	1,439	5,455	5,477	218	758	7,824	10,065	2,241
	1904	6	1,249	2	68	1,179	4,576	4,788	176	637	8,005	9,431	1,396
	1899	3	55	3	7	45	.....	96	5	19	149	194	45
Pennsylvania	1909	8	1,056	7	103	946	2,980	3,935	141	493	1,749	2,882	1,133
	1904	3	118	2	13	103	280	273	19	56	115	246	131
	1899	9	303	6	23	274	.....	762	27	122	378	607	229
All other states	1909	24	7,021	1	685	6,335	35,590	20,905	812	4,080	23,134	33,102	9,968
	1904	7	2,635	.....	404	2,231	13,865	6,576	458	1,521	11,014	15,546	4,532
	1899	8	863	4	30	829	.....	1,610	42	436	2,812	4,123	1,311

WIRE MILLS USING PURCHASED RODS—DETAILED STATISTICS, BY STATES: 1909.

Table 113

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15 OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States	**56**	**19,945**	**15**	**384**	**1,240**	**222**	**18,084**	De 19,641	Ap 17,131	**19,929**	**18,944**	**884**	**87**	**14**	**71,959**
Massachusetts	10	4,092	6	111	207	50	3,718	De 4,232	Ap 3,400	4,132	3,973	99	48	12	10,498
New Jersey	7	6,255	.....	49	462	98	5,646	De 6,077	Mh 5,392	6,077	5,581	467	29	.....	17,436
New York	7	1,521	1	21	53	7	1,439	De 1,593	Ja 1,320	1,594	1,447	140	5	2	5,455
Pennsylvania	8	1,056	7	31	59	13	946	Ja 1,032	No 844	1,001	940	56	5	.....	2,980
All other states[1]	24	7,021	1	172	459	54	6,335	.....	.....	7,125	7,003	122	.....	.....	35,590

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States	**$60,157,073**	**$77,434,882**	**$916,497**	**$1,282,851**	**$10,315,722**	**$1,640,172**	**$58,902,759**	**$37,120**	**$204,538**	**$6,510**	**$4,128,693**	**$84,486,518**	**$23,943,587**
Massachusetts	8,011,366	8,724,594	184,246	220,174	2,218,267	323,955	5,213,938	16,642	41,230	444	505,698	9,579,815	4,041,922
New Jersey	21,828,514	27,352,436	148,741	474,838	2,766,951	424,705	21,873,032	.....	36,669	.....	1,627,500	28,858,428	6,560,691
New York	5,477,199	9,321,121	155,552	62,469	758,079	185,851	7,637,667	14,818	18,028	.....	488,057	10,065,431	2,241,913
Pennsylvania	3,934,527	2,662,450	70,950	70,240	493,241	46,242	1,703,023	.....	11,507	.....	267,247	2,882,192	1,132,927
All other states[1]	20,905,467	29,374,261	357,008	455,130	4,079,184	659,419	22,475,099	5,660	97,104	6,066	1,239,591	33,100,652	9,966,134

[1] All other states embrace: Connecticut, 3 establishments; Illinois, 7; Indiana, 2; Kentucky, 1; Michigan, 1; Ohio, 6; Rhode Island, 1; Virginia, 1; Wisconsin, 2.

PART VI.—THE TIN-PLATE AND TERNPLATE INDUSTRY.

GENERAL STATISTICS FOR THE INDUSTRY.

Description of the industry.—Tin plates are thin plates or sheets of steel or iron, known as black plates, coated by dipping in a bath of molten tin. Terneplates are black plates coated, in like manner, with an alloy of tin and lead known as terne mixture, the proportion of tin varying from 10 to 35 per cent. The term "terne" is taken from the French, and means dull or tarnished. On account of the lead in the mixture terneplates are much duller in appearance than tin plates, which latter are sometimes known as bright plates. There will be found in the Census Reports for the Twelfth Census, Manufactures, Part IV, page 109, a history of the tin and terne plate industry in foreign countries and in the United States, and a description of the processes of manufacture.

Tin-plate manufacture involves two radically different processes—the rolling of the black plates and the dipping of them in tin or terne mixture. The manufacture of black plate is a rolling-mill operation and the bulk of the dipping is performed by dipping departments of such rolling mills. Separate reports were, however, obtained for these dipping departments, as well as for the establishments which were engaged exclusively in the dipping branch of the industry and which bought their black plates.

In the general statistical tables in Volumes VIII and IX of the reports of the Thirteenth Census the dipping of tin plate (including the dipping departments of rolling mills) is shown as a separate industry, the manufacture of the black plates being covered by the statistics for steel works and rolling mills. The statistics of mills rolling black plates are also included with those for other rolling mills in Part IV of this report. In the present report on tin and terne plate manufacture, however, statistics for the black-plate mills are also shown. The first section of this report presents the combined statistics for the black-plate mills and for the tin and terne dipping departments or establishments, the second section gives statistics for the black-plate branch of the industry separately, and the third gives the statistics for the tin-plate and terneplate dipping business. The last section is more detailed than the others, since it presents an analysis of that branch of the business which is treated by the Census Bureau as constituting in itself a distinctive industry.

BLACK-PLATE AND DIPPING INDUSTRIES COMBINED.

Table 114 gives the most important figures relative to the tin-plate industry as a whole, including black-plate manufacture and tin-plate and terneplate dipping. It may be noted that some rolling mills which roll black plates for tinning also produce other plates

and sheets and still other rolled products, the data for which are included in the statistics in this table.

Table 114 BLACK-PLATE AND DIPPING INDUSTRY AS A WHOLE.

	Number or amount.			Per cent of increase.[1]		
	1909	1904	1899	1899–1909	1904–1909	1899–1904
Number of establishments	34	44	66	−48.5	−22.7	−33.3
Rolling black plates and dipping	27	27	35	.....	.....	.....
Rolling black plates but not dipping	3	8	9	.....	.....	.....
Doing tin-plate and terne-plate dipping only	4	9	22	.....	.....	.....
Persons engaged in the industry	20,397	(2)	(2)	.....	.....	.....
Proprietors and firm members	7	(2)	(2)	.....	.....	.....
Salaried employees	1,434	861	726	97.5	66.6	18.6
Wage earners (average number)	18,956	17,164	14,826	27.9	10.4	15.8
Primary horsepower	80,764	(2)	(2)	.....	.....	.....
Capital	$42,098,409	$31,984,487	$27,323,302	54.1	31.6	17.1
Expenses	61,078,213	39,330,943	36,025,354	69.5	55.3	9.2
Services	16,352,427	11,496,405	11,106,076	47.2	42.2	3.5
Salaries	1,027,814	936,682	818,015	99.0	73.8	14.5
Wages	14,724,613	10,559,723	10,288,061	43.1	39.4	2.6
Materials[3]	42,430,430	26,028,250	24,414,150	73.8	63.0	6.6
Miscellaneous	2,295,356	1,815,288	505,128	312.0	26.4	259.4
Value of products[3]	65,378,580	42,690,880	41,322,053	58.2	53.1	3.3
Tin and terne plates	45,815,146	34,549,543	31,284,145	46.4	32.6	10.4
All other products	19,563,434	8,141,337	10,037,908	94.9	140.3	−18.9
Value added by manufacture (value of products less cost of materials)	22,948,150	16,662,630	16,907,903	35.7	37.7	−1.5

[1] A minus sign (−) denotes decrease.
[2] Figures not available.
[3] Excluding duplication in the value of black plates reported among the products of the black-plate industry and among the materials of the tin and terne dipping industry. The value of the black plates thus duplicated was in 1909, $28,981,151; in 1904, $22,988,237; in 1899, $20,590,566.

Of the 34 establishments in the combined industry in 1909, 27 both rolled black plates and dipped them, 3 rolled black plates but had no dipping departments, while 4 were engaged in tin and terne dipping only. The number of each of these groups of establishments was smaller in 1909 than in 1899, but the decrease was greatest in the number doing a dipping business only and the number making black plates with no dipping departments. There has been a growing tendency to consolidate the two branches of the business.

The net value of all products in 1909 (excluding duplication on account of the black plates figuring both as products of the black-plate rolling mills and as materials for the dipping establishments) was $65,378,580, of which amount the value of tin and terne plates represented 70.1 per cent. In 1904 the value of the tin and terne plate product formed 80. 9 per cent of the net value of all products of these establishments, and in 1899, 75.7 per cent. The item "all other products" for the respective years comprises chiefly rolling-mill products other than black plates made in the rolling departments of the mills. The value of products of the industry in 1909 was 58.2 per cent greater than in 1899. The value added by manufacture—that is, value of products less cost of materials—was $22,948,150 in 1909, and the number of wage earners 18,956.

BLACK-PLATE MILLS.

Table 115 shows the general statistics of the black-plate mills, exclusive of the dipping departments, for the years 1909, 1904, and 1899. The 30 establishments rolling black plate include 3 equipped both for the manufacture of steel and for rolling the steel into plates, and 27 equipped for rolling only. The 3 establishments comprising the first group reported products in 1909 valued at $4,285,683 and the 27 in the second group, products valued at $42,104,403. The value of the plates turned over to dipping departments is sometimes fixed in a more or less arbitrary manner and may differ from the market value.

Table 115 BLACK-PLATE MILLS, EXCLUDING DIPPING DEPARTMENTS.

	Number or amount.			Per cent of increase.[1]		
	1909	1904	1899	1899–1909	1904–1909	1899–1904
Number of establishments	30	35	44	−31.8	−14.3	−20.5
Persons engaged in the industry	14,551	(2)	(2)	.....	.....	.....
Proprietors and firm members	3	(2)	(2)	.....	.....	.....
Salaried employees	944	577	393	140.2	63.6	46.8
Wage earners (average number)	13,604	12,317	11,155	22.0	10.4	10.4
Primary horsepower	72,610	(2)	(2)	.....	.....	.....
Capital	$31,103,596	$21,171,248	$20,673,255	50.5	46.9	2.4
Expenses	43,264,084	27,869,969	27,470,074	57.5	55.2	1.5
Services	12,417,633	8,803,781	8,924,836	39.1	41.0	−1.4
Salaries	1,007,894	627,128	526,692	91.4	60.7	19.1
Wages	11,409,739	8,176,653	8,398,144	35.9	39.5	−2.6
Materials	29,522,147	17,640,773	18,276,566	61.5	67.4	−3.5
Miscellaneous	1,324,304	1,425,415	268,672	392.9	− 7.1	430.5
Value of products	46,390,086	30,395,757	30,020,608	54.5	52.6	1.2
Value added by manufacture (value of products less cost of materials)	16,867,939	12,754,984	11,744,042	43.6	32.2	8.6

[1] A minus sign (−) denotes decrease. [2] Figures not available.

The equipment of the black-plate departments of tin-plate and ternep late mills is shown in Table 116.

Table 116 BLACK-PLATE DEPARTMENTS OF TIN-PLATE AND TERNEPLATE MILLS.

	Number of establishments reporting.	Hot-rolling mills.		Cold-rolling mills (number).
		Number.	Annual capacity on triple turn (long tons).	
United States:				
1909	24	335	1,042,000	268
1904	26	315	707,000	272
1899[1]	(2)	332	641,000	294
Pennsylvania:				
1909	14	164	681,000	163
1904	15	196	462,000	164
1899[1]	(2)	160	314,000	157
All other states:				
1909	10	171	361,000	105
1904	11	119	245,000	108
1899[1]	(2)	172	327,000	137

[1] Includes idle establishments. [2] Figures not available.

TIN-PLATE AND TERNEPLATE DIPPING.

The remainder of this section of the report deals exclusively with the dipping of tin and terne plate. It covers the dipping departments of establishments

which also roll black plates, and the establishments which do dipping only.

Summary and comparison with earlier censuses.—Table 117 summarizes the statistics of the tin and terne dipping industry for 1909, 1904, and 1899.

Table 117

	TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.					
	Number or amount.			Per cent of increase.[1]		
	1909	1904	1899	1899–1909	1904–1909	1899–1904
Number of establishments	31	36	57	−45.6	−13.9	−36.8
Persons engaged in the industry	5,846	5,132	4,019	45.5	13.9	27.7
Proprietors and firm members	4	1	15	−73.3	300.0	−93.3
Salaried employees	490	284	333	47.1	72.5	−14.7
Wage earners (average number)	5,352	4,847	3,671	45.8	10.4	32.0
Primary horsepower	8,154	8,990	3,515	132.0	−9.3	155.8
Capital	$10,994,813	$10,813,239	$6,650,047	65.3	1.7	62.6
Expenses	46,795,280	34,458,211	29,145,846	60.6	35.8	18.2
Services	3,934,794	2,692,624	2,181,240	80.4	46.2	23.4
Salaries	619,920	309,554	291,323	112.8	100.3	6.3
Wages	3,314,874	2,383,070	1,889,917	75.4	39.1	26.1
Materials	41,889,434	31,375,714	26,728,150	56.7	33.5	17.4
Miscellaneous	971,052	389,873	236,456	310.7	149.1	64.9
Value of products	47,969,645	35,283,360	31,892,011	50.4	36.0	10.6
Value added by manufacture (value of products less cost of materials)	6,080,211	3,907,646	5,163,861	17.7	55.6	−24.3

[1] A minus sign (−) denotes a decrease.

The bulk of the capital reported as invested in the industry represents capital assigned to the dipping departments of rolling mills manufacturing tin-plate and terneplate, and the basis on which this assignment was made may not have been the same for all establishments for all years.

The number of establishments in the industry decreased from 1899 to 1909, while the number of wage earners increased 45.8 per cent and the value of products 50.4 per cent.

The dipping of tin-plate and terneplate is a comparatively simple process and is carried on principally by machinery. As a result, wages formed but 7.1 per cent of the total expenses of the industry in 1909, as compared with 89.5 per cent for materials. The value added by manufacture represented only 12.7 per cent of the value of products in 1909. The number of wage earners in 1909, 5,352, was less than two-fifths as great as the number employed in the black-plate mills.

At the censuses of 1904 and 1899 Pennsylvania was the only state for which statistics for tin-plate and terneplate dipping were given separately. As shown by the figures in Table 132, the average number of wage earners employed in the dipping industry in Pennsylvania increased 843, or 53.4 per cent, during the period 1899–1904, but decreased 75, or 3.1 per cent, during the period 1904–1909. The value of products increased $6,811,000, or 54.4 per cent, during the earlier period and $5,892,000, or 30.5 per cent, during the later, while the value added by manufacture decreased $415,000, or 19.2 per cent, during the earlier period and increased $584,000, or 33.3 per cent, during the later. In 1909, 52.6 per cent of the total value of products of the industry was reported from Pennsylvania and 19.3 per cent from West Virginia.

Persons engaged in the industry.—Table 118 shows, by classes, for 1909, the number of persons engaged in the industry.

Table 118

CLASS.	PERSONS ENGAGED IN THE TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY: 1909		
	Total.	Male.	Female.
All classes	5,846	5,275	571
Proprietors and officials	98	98	.....
Proprietors and firm members	4	4	.....
Salaried officers of corporations	20	20	.....
Superintendents and managers	74	74	.....
Clerks[1]	396	320	76
Wage earners (average number)	5,352	4,857	495
16 years of age and over	5,322	4,827	495
Under 16 years of age	30	30	.....

[1] Includes other subordinate salaried employees.

The average number of persons engaged in the tin-plate and terneplate dipping industry during 1909 was 5,846, of whom 5,352, or 91.5 per cent, were wage earners. A considerable number of women, and a few boys under 16 years of age, were employed.

In order to compare the distribution of persons engaged in the industry in 1909 according to occupational status with that in 1904, it is necessary to use the classification employed at the earlier census (see Introduction). Such a comparison is made in Table 119. Comparable figures for 1899 are not available.

Table 119

CLASS.	PERSONS ENGAGED IN THE TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.				
	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent of total.	Number.	Per cent of total.	
Total	5,846	100.0	5,132	100.0	13.9
Proprietors and firm members	4	0.1	1	(1)	300.0
Salaried employees	490	8.4	284	5.5	72.5
Wage earners (average number)	5,352	91.5	4,847	94.4	10.4

[1] Less than one-tenth of 1 per cent.

The table shows a relatively large increase in salaried employees and a small increase in wage earners.

Table 120 shows the average number of wage earners, distributed according to age periods, and in the case of those 16 years of age and over, according to sex, for 1909, 1904, and 1899. The table indicates a material decrease in the number of women employed.

Table 120

CLASS.	AVERAGE NUMBER OF WAGE EARNERS IN THE TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.					
	1909		1904		1899	
	Number.	Per cent of total.	Number.	Per cent of total.	Number.	Per cent of total.
Total	5,352	100.0	4,847	100.0	3,671	100.0
16 years of age and over	5,322	99.4	4,791	98.8	3,639	99.1
Male	4,827	90.2	4,212	86.9	3,014	82.1
Female	495	9.2	579	11.9	625	17.0
Under 16 years of age	30	0.6	56	1.2	32	0.9

Wage earners employed, by months.—Table 121 gives the number of wage earners employed on the 15th (or the nearest representative day) of each month, during the year 1909, for Ohio, Pennsylvania, and West Virginia.

Table 121

MONTH.	WAGE EARNERS IN THE TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY: 1909			
	United States.	Ohio.	Pennsylvania.	West Virginia.
January	4,924	871	2,021	1,159
February	5,187	884	2,010	1,239
March	5,215	896	1,963	1,256
April	5,568	891	2,273	1,422
May	5,621	893	2,290	1,433
June	5,775	899	2,386	1,444
July	4,771	555	2,261	1,356
August	5,079	438	2,308	1,353
September	5,215	443	2,406	1,324
October	5,494	448	2,688	1,337
November	5,692	448	2,705	1,360
December	5,686	446	2,751	1,337

Starting with a low number in January the number of wage earners in the industry in the country as a whole increased steadily to the maximum in June, then dropped to the minimum—82.6 per cent of the maximum—in July, and increased again steadily until November. Of the three states reported separately, Ohio shows the greatest fluctuations in number of wage earners and West Virginia the least.

Prevailing hours of labor.—In Table 122 the wage earners in the tin-plate and terneplate dipping industry for the three leading states have been classified according to the hours of labor prevailing in the establishments in which they are employed. In making this classification the average number of wage earners employed during the year in each establishment is classified as a total according to the hours prevailing in that establishment, even though some employees work a greater or less number of hours.

Table 122

STATE.	AVERAGE NUMBER OF WAGE EARNERS IN THE TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY: 1909					
	Total.	In establishments with prevailing hours—				
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.
United States	**5,352**	**729**	.....	**2,841**	**1,503**	**279**
Ohio	676	.....	.....	461	137	78
Pennsylvania	2,346	206	.....	1,539	400	201
West Virginia	1,335	523	.....	456	356	.....

More than four-fifths of the wage earners employed in the industry in 1909 were in establishments where the prevailing hours of labor were 54 or from 54 to 60 per week. Only 5.2 per cent of the total were employed in establishments where the prevailing hours were as high as 60 per week.

Character of ownership.—Of the 31 establishments in the industry, 2 were owned by individuals, 1 by a firm, and 28 by corporations.

Size of establishments.—The tendency toward concentration in large establishments, which prevails in the iron and steel industry, is very marked in the tin and terne plate industry. This is plainly shown in Table 123, which groups the establishments according to the value of their products for 1909 and 1904.

Table 123

VALUE OF PRODUCTS PER ESTABLISHMENT.	TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.			
	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	**31**	**36**	**$47,969,645**	**$35,283,360**
Less than $100,000	3	3	175,689	219,398
$100,000 and less than $1,000,000	10	21	5,623,373	9,940,551
$1,000,000 and over	18	12	42,170,583	25,123,411
Per cent of total	**100.0**	**100.0**	**100.0**	**100.0**
Less than $100,000	9.7	8.3	0.4	0.6
$100,000 and less than $1,000,000	32.3	58.3	11.7	28.2
$1,000,000 and over	58.1	33.3	87.9	71.2
Average per establishment	.....	.....	$1,547,408	$980,093

In 1909 there were 18 establishments which reported products valued at $1,000,000 and over each, as compared with 12 such establishments in 1904. The value of products of this group increased over $17,000,000, while the value of products for each of the smaller groups decreased. The average value of products per establishment increased from $980,093 in 1904 to $1,547,408 in 1909.

A classification of the establishments according to the number of wage earners employed is presented in Table 124.

Table 124

CLASS.	TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY: 1909		
	Number of establishments.	Wage earners.	
		Average number.	Per cent of total.
Total	**31**	**5,352**	**100.0**
Establishments employing—			
6 to 20 wage earners	4	47	0.9
21 to 50 wage earners	2	88	1.6
51 to 100 wage earners	6	469	8.8
101 to 250 wage earners	12	2,035	38.0
251 to 500 wage earners	5	1,604	30.0
Over 500 wage earners	2	1,109	20.7

The largest number of establishments and the largest number of wage earners are found in the group employing from 101 to 250 wage earners each. The average number of wage earners per establishment increased from 135 in 1904 to 173 in 1909.

Expenses.—Table 125 gives, in percentages, the distribution of the total reported expenses of tin-plate and terneplate dipping plants in 1909 among the several classes of expenses.

The cost of materials constitutes a larger proportion of the total expenses in the tin-plate and terneplate dipping industry than in most other manufacturing industries.

Table 125 TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY—PER CENT OF TOTAL REPORTED EXPENSES REPRESENTED BY—

STATE.	Salaries.	Wages.	Materials.	Miscellaneous expenses.
United States:				
1909	1.3	7.1	89.5	2.1
1904	0.9	6.9	91.1	1.1
1899	1.0	6.5	91.7	0.8
Individual states: 1909:				
Ohio	1.0	5.8	92.5	0.7
Pennsylvania	1.1	5.4	92.2	1.3
West Virginia	1.6	9.7	84.2	4.6

Engines and power.—Power is not used largely in the tin and terne dipping industry. The majority of the establishments are departments of rolling mills, and in many such cases there is no separate power plant for the dipping department and the quantity of power supplied from the general power plant can not be segregated accurately. In 1909 only 15 of the 31 establishments, and in 1904, 20 of the 36 establishments, reported concerning power. Table 126 gives the statistics as far as reported for 1909, 1904, and 1899. The amount of primary power more than doubled between 1899 and 1904, but decreased somewhat between 1904 and 1909.

Table 126 TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.

POWER.	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	32	43	71	8,154	8,990	3,515	100.0	100.0	100.0
Owned	29	40	71	8,137	8,928	3,505	99.8	99.3	99.7
Steam	27	39	71	7,937	8,878	3,505	97.3	98.8	99.7
Gas	2	1	.....	200	50	.....	2.5	0.6	.....
Rented	3	3	.....	17	62	10	0.2	0.7	0.3
Electric	3	3	.....	17	12	.....	0.2	0.1	.....
Other	.....	.....	.....	.....	50	10	.....	0.6	0.3
Electric motors.	102	21	16	1,147	253	398	100.0	100.0	100.0
Run by current generated by establishment	99	18	16	1,130	241	398	98.5	95.3	100.0
Run by rented power	3	3	.....	17	12	.....	1.5	4.7	.....

SPECIAL DATA AS TO MATERIALS, PRODUCTS, AND EQUIPMENT OF TIN-PLATE AND TERNEPLATE DIPPING ESTABLISHMENTS.

Materials.—Statistics as to the quantity and cost of the materials used in the tin-plate and terneplate dipping industry in 1909, 1904, and 1899 are given in Table 127.

The quantity of black plates dipped increased during the period 1904–1909 a little over 300,000,000 pounds, or 29.6 per cent, and their cost $5,989,145, or 26 per cent, as compared with increases of nearly 192,000,000 pounds, or 23.2 per cent, in quantity and $2,323,158, or 11.2 per cent, in cost during the period 1899–1904. No black plates of foreign manufacture were reported as used in 1909, while in 1899, 2,358,607 pounds of foreign plates were used. In 1909, 97.7 per cent of the black plates used were produced by the rolling-mill departments of the concerns doing the dipping, and in 1904, 92.6 per cent.

Of the 1,321,071,691 pounds of black plates used in 1909, only 8,726,538 pounds were iron plates, the remainder being steel; the kind of steel, however, was not reported. In 1904 the plates of domestic manufacture used were distributed as follows: Bessemer steel, 89.4 per cent; open-hearth steel, 10.5 per cent (1.9 per cent acid and 8.6 per cent basic); and iron, one-tenth of 1 per cent.

The cost of black plates formed 77.3 per cent of the cost of all materials in 1899, 73.3 per cent in 1904, and 69.2 per cent in 1909, while the percentage of the total cost represented by coating metals increased from 18.4 per cent in 1899 to 22.6 per cent in 1904 and 23.1 per cent in 1909. The statistics indicate a decrease in the average cost of black plates per pound and an increase in the average cost of coating metals used per pound of black plates. This increase in the cost of coating metal is due entirely to an advance in the price of tin, lead showing a decrease in average cost per pound.

Table 127 TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY—MATERIALS USED.

MATERIAL.	Number or amount.			Per cent of increase.[1]		
	1909	1904	1899	1899–1909	1904–1909	1899–1904
Total cost	[2] $41,889,434	$31,375,714	$26,728,150	56.7	33.5	17.4
Black plates or sheets:						
Pounds	1,321,071,691	1,019,608,657	827,915,599	59.6	29.6	23.2
Cost	$28,981,151	$22,992,006	$20,668,848	40.2	26.0	11.2
Produced by the establishment reporting—						
Pounds	1,291,048,109	943,798,583	[3]	.....	36.8	.....
Cost	$28,245,234	$21,154,388	[3]	.....	33.5	.....
Purchased—						
Pounds	30,023,582	[4] 75,810,074	[3]	.....	−60.4	.....
Cost	$735,917	$1,837,618	[3]	.....	−60.0	.....
Coating metals:						
Pounds	40,927,759	32,445,104	27,154,258	50.7	26.1	19.5
Cost	$9,670,037	$7,075,722	$4,927,090	96.3	36.7	43.6
Tin, including tin contents of terne mixture purchased—						
Pounds	31,077,651	24,243,851	20,282,778	53.2	28.2	19.5
Cost	$9,235,718	$6,709,164	$4,528,473	103.9	37.7	48.2
Lead, including lead contents of terne mixture purchased—						
Pounds	9,850,108	8,201,253	6,871,480	43.3	20.1	19.4
Cost	$434,319	$366,558	$398,617	9.0	18.5	−8.0
In condition purchased (included above)—						
Pig tin—						
Pounds	28,586,267	[3]	[3]	.....	.....	.....
Cost	$8,490,794	[3]	[3]	.....	.....	.....
Pig lead—						
Pounds	2,708,496	[3]	[3]	.....	.....	.....
Cost	$117,650	[3]	[3]	.....	.....	.....
Terne mixture—						
Pounds	9,632,996	[5]	[5]	.....	.....	.....
Cost	$1,061,587	[5]	[5]	.....	.....	.....
Fuel and rent of power	$289,675	$159,786	$93,456	210.0	81.3	71.0
All other materials	$2,948,571	$1,148,100	$1,038,756	183.9	156.8	10.5

[1] A minus sign (−) denotes decrease.

[2] In addition, the following materials were used in the *manufacture* of tin-plate and terneplate by 3 establishments classified as engaged in the manufacture of babbitt metal and solder, stamped and enameled ware, and tinware, respectively:

MATERIAL.	Pounds.	Cost.
Total cost	.....	$271,955
Black plates or sheets (domestic)	8,031,938	204,555
Coating metals	388,227	07,400
Pig tin	154,837	44,795
Terne mixture	233,390	22,605

[3] Figures not available.

[4] Black plates used by establishments not equipped for the manufacture of black plates.

[5] Terne mixture purchased not reported separately; contents reported as tin and lead.

The chief materials included under "all other materials" are boxes, which constitute a large item of expense, palm oil, sulphuric acid, tinning flux, bran, and pink meal.

Products.—Table 128 gives comparative statistics of the quantity and value of the various classes of products of the tin-plate and terneplate dipping establishments for the United States as a whole and for the state of Pennsylvania separately.

Table 128 TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY—PRODUCTS.

PRODUCT.	Number or amount.			Per cent of increase.[1]		
	1909	1904	1899	1899–1909	1904–1909	1899–1904
UNITED STATES.						
Total value	[2] $47,969,045	$35,283,360	$31,892,011	50.4	36.0	10.6
Tin-plate and terneplate:						
Pounds	1,315,313,132	1,026,384,851	849,004,022	54.9	28.2	20.9
Value	$45,815,146	$34,540,543	$31,284,145	46.5	32.6	10.4
Tin plate—						
Pounds	1,123,068,875	867,520,985	707,718,239	58.8	29.6	22.6
Value	$38,259,885	$28,429,971	$25,553,021	49.7	34.6	11.3
Terneplate—						
Pounds	191,344,257	158,857,866	141,285,783	35.4	20.4	12.4
Value	$7,555,261	$6,119,572	$5,731,124	31.8	23.5	6.8
Other sheet iron or sheet steel tinned or terneplated, taggers' tin, etc.:						
Pounds	19,400,934	6,555,855	1,000,473	1,839.2	195.9	555.3
Value	$520,465	$217,476	$86,492	501.7	139.3	151.4
All other products	$1,634,034	$516,341	$521,374	213.4	216.5	−1.0
PENNSYLVANIA.						
Total value	$25,234,066	$19,341,961	$12,530,991	101.4	30.5	54.4
Tin-plate and terneplate:						
Pounds	695,377,287	583,599,140	334,008,080	108.2	19.2	74.7
Value	$23,750,750	$18,928,397	$12,401,252	91.5	25.5	52.6
Tin plate—						
Pounds	648,502,133	524,905,922	256,870,332	152.5	23.5	104.3
Value	$21,687,492	$16,547,120	$9,137,483	137.3	31.1	81.1
Terneplate—						
Pounds	46,875,154	58,693,218	77,129,648	−39.2	−20.1	−23.9
Value	$2,063,258	$2,381,277	$3,263,769	−36.8	−13.4	−27.0
Other sheet iron or sheet steel tinned or terneplated, taggers' tin, etc.:						
Pounds	18,067,567	6,555,855	200,473	8,912.5	175.6	3,170.2
Value	$484,211	$217,476	$6,492	7,358.6	122.7	3,249.9
All other products	$999,105	$196,088	$123,247	710.7	409.5	59.1
ALL OTHER STATES.						
Total value	$22,735,579	$15,941,399	$19,361,020	17.4	42.6	−17.7
Tin-plate and terneplate:						
Pounds	619,935,845	442,785,711	514,995,942	20.4	40.0	−14.0
Value	$22,064,396	$15,621,146	$18,882,893	16.8	41.2	−17.3
Tin plate—						
Pounds	475,466,742	342,621,063	450,838,907	5.5	38.8	−24.
Value	$16,572,393	$11,882,851	$16,415,538	1.0	39.5	−27.6
Terneplate—						
Pounds	144,469,103	100,164,648	64,156,135	125.2	44.2	56.1
Value	$5,492,003	$3,738,295	$2,467,355	122.6	46.9	51.5
Other sheet iron or sheet steel tinned or terneplated, taggers' tin, etc.:						
Pounds	1,333,367	.....	800,000	66.7	.....	.....
Value	$36,254	.....	$80,000	−54.7	.....	.....
All other products	$634,929	$320,253	$398,127	59.5	98.3	−19.6

[1] A minus sign (−) denotes decrease.

[2] In addition, the following products were manufactured for use in the same establishment or for sale by 3 establishments classified as engaged in the manufacture of babbitt metal and solder, stamped and enameled ware, and tinware, respectively:

PRODUCT.	Pounds.	Value.
Total	**8,389,200**	**$398,143**
Tin-plate and terneplate	7,495,200	350,471
Tin plate	4,958,400	214,761
Terneplate	2,536,800	135,710
Other sheet iron or sheet steel tinned or terneplated, taggers' tin, etc	894,000	47,672

The total production of tin plate and terneplate and taggers' tin (including other sheets, etc.) by establishments engaged in tin-plate and terneplate dipping in 1909 was 1,334,714,066 pounds, valued at $46,335,611, as compared with 1,032,940,706 pounds, valued at $34,767,019, in 1904, and 850,004,495 pounds, valued at $31,370,637, in 1899. The increase in output between 1899 and 1909 was 57 per cent, and in value, 47.7 per cent.

In addition to the production of tin plate and terneplate by establishments in the dipping industry, a small production was reported in 1909 by three establishments which were engaged primarily in other branches of manufacture but which incidentally made some tin plate and terneplate, chiefly for use in their own further processes. The total output of tin plate and terneplate and taggers' tin made by these three establishments amounted to 8,389,200 pounds, making an aggregate production in all classes of establishments of 1,343,103,266 pounds. The output and value of tin plate and terneplate made by establishments not classified as in the tin-plate and terneplate dipping industry was not reported separately in 1904 or 1899.

Of the combined output of tin plate and terneplate and taggers' tin in 1909, tin plate formed 84.1 per cent, terneplate 14.4 per cent, and taggers' tin and other tin or terne plated sheets 1.5 per cent. The proportion represented by the several classes was substantially the same in 1904 and 1899, except that the proportion of taggers' tin, etc., was somewhat smaller.

The state of Pennsylvania produced 57.7 per cent of the total tin plate product of the country in 1909, West Virginia 16.8 per cent, Ohio 14 per cent, and all other states only 11.5 per cent. In 1904 Pennsylvania produced 60.5 per cent of the total and in 1899, 36.3 per cent. Of the total terneplate product Pennsylvania produced 24.5 per cent in 1909, West Virginia 35.8 per cent, and Ohio 28.8 per cent. In 1904 Pennsylvania produced 36.9 per cent of this product and in 1899, 54.6 per cent.

Production compared with imports and exports.—There has been a great change in the relative importance of imports, as compared with the domestic production of tin plate and taggers' tin. This change is shown by Table 129, which gives the domestic production in each of the census years since 1889, together with the exports and imports during the same year.

The establishment of the tinplate industry in the United States dates from 1891, practically the entire domestic market previous to that date being supplied by imports. By 1899 the domestic production had become over six times as great as the imports, while in 1909 it was over nine times as great as the imports, and there was a considerable exportation of the domestic product. The larger part of the tin plate which is now imported is manufactured into tin cans which are subsequently exported, a drawback of the duty paid upon the imported tin plate being secured.

Table 129 TIN PLATE, TERNEPLATE, AND TAGGERS' TIN.

	Quantity (pounds).				Per cent of increase.[1]			
	1909	1904	1899	1889	1899–1909	1904–1909	1899–1904	1889–1899
Retained for consumption, total	1,462,387,579	1,173,329,667	981,297,455	740,155,040	49.0	24.6	19.6	3.4
Domestic production	1,343,103,266	1,032,940,706	850,004,495	(2)	58.0	30.0	21.5	.....
Exports of domestic product	20,893,368	17,691,351	298,615	.....	6,896.8	18.1	5,824.4	.....
Retained for consumption	1,322,209,898	1,015,249,355	849,705,880	.....	55.6	30.2	19.5	.....
Imports	140,208,441	158,260,762	131,970,441	742,135,787	6.2	−11.4	19.9	−82.2
Reexports	30,760	180,450	378,866	1,979,747	−91.9	−83.0	−52.4	−80.9
Retained for consumption	140,177,681	158,080,312	131,591,575	740,155,040	6.5	−11.4	20.1	−82.2
Per cent of total retained for consumption:								
Domestic	90.4	86.5	86.6	.....	.....	.....	.....	.....
Foreign	9.6	13.5	13.4	.....	.....	.....	.....	.....

[1] A minus sign (−) denotes decrease.

[2] Not reported separately.

Dipping sets.—Table 130 shows the equipment and daily capacity of the tin-plate and terneplate dipping establishments in operation in 1909, 1904, and 1899.

Table 130 TIN-PLATE AND TERNEPLATE DIPPING INDUSTRY.

	Number of establishments.	Number of dipping sets.			Daily capacity of sets, single turn (pounds, expressed in thousands).		
		Total.	Employed on—		Total.	Tin plates.	Terneplates.
			Tin plates.	Terneplates.			
United States:							
1909	[1] 34	573	455	118	2,840	2,076	764
1904	[2] 38	619	499	120	3,454	2,887	567
1899	57	583	(3)	(3)	2,733	2,004	729
Ohio:							
1909	4	74	55	19	487	360	127
1904	5	95	60	35	558	447	111
1899	13	103	(3)	(3)	495	358	137
Pennsylvania:							
1909	18	318	265	53	1,570	1,184	386
1904	19	321	266	55	1,889	1,554	335
1899	25	285	(3)	(3)	1,198	792	406
West Virginia:							
1909	6	99	72	27	472	332	140
1904	4	54	40	14	345	273	72
1899	2	23	(3)	(3)	154	75	79
All other states:							
1909	6	82	63	19	311	200	111
1904	10	149	133	16	662	613	49
1899	17	172	(3)	(3)	886	779	107

[1] Includes 3 establishments; 1 each in Illinois, Michigan, and Pennsylvania, not classified as engaged in the tin plate and terneplate industry.

[2] Includes 2 establishments in Illinois not classified as engaged in the tin plate and terneplate industry.

[3] Not reported separately.

The table includes also for 1904 and 1909 the equipment of the few establishments in other industries that made tin plate as an intermediate or secondary product.

The tin-plate and terneplate product for 1909 was equal to 77.6 per cent of the full capacity of all active establishments on double turn on the basis of 300 working days for the year; the output of tin plate alone was 90.6 per cent of the annual capacity of tinning sets on double turn, and the terneplate product 42.3 per cent of the capacity of terne dipping sets. In 1904 the tin-plate and terneplate product was 49.5 per cent of the capacity of all active establishments on double turn.

The majority of the establishments operate on double or triple turn. Of the 31 establishments in the tin-plate and terneplate dipping industry proper, 5 operated on single turn in 1909, 10 on double turn, and 16 on triple turn. The aggregate daily capacity of these plants as operated was 7,016,000 pounds, and their actual output in 1909 was 62.5 per cent of their total capacity, on the basis of 300 working days for the year. There were, in 1909, 14 establishments engaged in the manufacture of tin plate exclusively and 4 in the manufacture of terneplate exclusively, while 13 establishments made both tin plate and terneplate. Five establishments reported 49 tin-plate or terneplate sets as being in course of construction.

Materials, products, and equipment, by states.—The detailed statistics of materials, products, and equipment for the tin-plate and terneplate dipping industry in 1909 are given in Table 131.

TIN PLATE AND TERNEPLATE—DETAILED STATISTICS OF NUMBER OF ESTABLISHMENTS, MATERIALS, PRODUCTS, AND EQUIPMENT, BY STATES: 1909.

Table 131	United States.	Ohio.	Pennsylvania.	West Virginia.	All other states.[1]
Number of establishments	31	4	17	6	4
MATERIALS USED.					
Total cost	**$41,889,434**	**$7,155,144**	**$22,898,352**	**$7,367,266**	**$4,468,672**
Black plates or sheets:					
Pounds	1,321,071,691	213,764,915	705,748,494	254,685,445	146,872,837
Produced by establishment reporting	1,291,048,109	213,764,915	703,854,394	228,857,602	144,571,198
Purchased	30,023,582	----------	1,894,100	25,827,843	2,301,639
Cost	$28,981,151	$5,143,579	$15,801,297	$5,039,683	$2,996,592
Coating metals:					
Pounds	40,927,759	8,064,988	20,269,205	7,927,714	4,665,852
Tin, including tin contents of terne mixture purchased	31,077,651	4,897,600	17,348,711	5,269,178	3,562,162
Lead, including lead contents of terne mixture purchased	9,850,108	3,167,388	2,920,494	2,658,536	1,103,690
Cost	$9,670,037	$1,587,798	$5,305,175	$1,669,975	$1,107,089
In condition purchased—					
Pig tin—					
Pounds	28,586,267	3,872,221	16,858,292	4,663,663	3,192,091
Cost	$8,490,794	$1,142,704	$5,032,023	$1,370,502	$945,565
Pig lead—					
Pounds	2,708,496	249,000	1,421,219	935,148	103,129
Cost	$117,656	$10,612	$62,338	$40,248	$4,458
Terne mixture—					
Pounds	9,632,996	3,943,767	1,989,694	2,328,903	1,370,632
Cost	$1,061,587	$434,482	$210,814	$259,225	$157,066
All other materials	$3,238,246	$423,767	$1,791,880	$657,608	$364,991
PRODUCTS.					
Total value	**$47,969,645**	**$7,889,367**	**$25,234,066**	**$9,257,524**	**$5,588,688**
Tin plate and terneplate:					
Pounds	1,315,313,132	212,737,039	695,377,287	257,807,156	149,391,650
Value	$45,815,146	$7,669,423	$23,750,750	$8,922,099	$5,472,874
Tin plate—					
Pounds	1,123,968,875	157,584,871	648,502,133	189,239,233	128,642,638
Value	$38,259,885	$5,500,501	$21,687,492	$6,360,880	$4,711,012
Terneplate—					
Pounds	191,344,257	55,152,168	46,875,154	68,567,923	20,749,012
Value	$7,555,261	$2,168,922	$2,063,258	$2,561,219	$761,862
Other sheet iron or sheet steel tinned or terneplated, taggers' tin, etc.:					
Pounds	19,400,934	----------	18,067,567		
Value	$520,465	----------	$484,211	$335,425	$115,814
All other products	$1,634,034	$219,944	$999,105		
EQUIPMENT.					
Tin-plate or terneplate dipping sets at end of year:					
Completed—					
Number	563	74	311	99	79
Usually employed on tin plate	450	55	263	72	60
Usually employed on terneplate	113	19	48	27	19
Daily capacity, single turn, pounds	2,795,972	487,164	1,533,872	471,931	303,005
Tin plate	2,055,915	359,924	1,172,311	332,019	191,661
Terneplate	740,057	127,240	361,561	139,912	111,344
Building, number	49	----------	28	15	6
Number of establishments operating on—					
Single turn	5	----------	3	----------	2
Double turn	10	2	6	2	----------
Triple turn	16	2	8	4	2
Daily capacity as operated, whether on single, double, or triple turn, pounds	7,016,293	1,301,399	3,618,303	1,293,793	802,793
Hot black-plate mills at end of year:					
Completed—					
Number	335	98	164	45	28
Annual capacity on triple turn, long tons	1,042,088	143,795	681,398	141,631	75,264
Building—					
Number	20	----------	10	10	----------
Annual capacity on triple turn, long tons	36,600	----------	3,600	33,000	----------
Cold mills, completed	268	37	163	46	22

[1] All other states embrace: Illinois, 1 establishment; Indiana, 1; and New York, 2.

DETAILED STATE TABLES.

The principal facts derived from the census inquiry concerning tin-plate and terneplate dipping are presented in two general tables.

Table 132 gives the more important general statistics of the industry in the United States and in the state of Pennsylvania for the years 1909, 1904, and 1899.

Table 133 gives similar statistics in a somewhat more detailed form than Table 132 for 1909 only.

TIN PLATE AND TERNEPLATE—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 132

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	**1909**	**31**	**5,846**	**4**	**490**	**5,352**	**8,154**	**$10,995**	**$620**	**$3,315**	**$41,889**	**$47,970**	**$6,081**
	1904	**36**	**5,132**	**1**	**284**	**4,847**	**8,990**	**10,813**	**310**	**2,383**	**31,376**	**35,283**	**3,907**
	1899	**57**	**4,019**	**15**	**333**	**3,671**	**3,515**	**6,650**	**291**	**1,890**	**26,728**	**31,892**	**5,164**
Pennsylvania	1909	17	2,548	3	199	2,346	1,565	5,520	275	1,339	22,898	25,234	2,336
	1904	19	2,613	1	191	2,421	5,805	4,692	219	1,207	17,590	19,342	1,752
	1899	25	1,778	11	189	1,578	1,426	3,027	147	814	10,364	12,531	2,167
All other states	1909	14	3,298	1	291	3,006	6,589	5,475	345	1,976	18,991	22,736	3,745
	1904	17	2,519	.....	93	2,426	3,185	6,121	91	1,176	13,786	15,041	2,155
	1899	32	2,241	4	144	2,093	2,089	3,623	144	1,076	16,364	19,361	2,997

TIN PLATE AND TERNEPLATE—DETAILED STATISTICS, BY STATES: 1909.

Table 133

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States	**31**	**5,846**	**4**	**94**	**320**	**76**	**5,352**	**Je 5,775**	**Jy 4,771**	**6,307**	**5,689**	**583**	**35**	.....	**8,154**
Ohio	4	742	.....	10	48	8	676	Je 899	Au 438	896	767	129	.....	.....	1,849
Pennsylvania	17	2,548	3	43	109	47	2,346	No 2,795	Mh 1,963	2,751	2,448	278	25	.....	1,565
West Virginia	6	1,465	.....	31	86	13	1,335	Je 1,444	Ja 1,159	1,476	1,341	125	10	.....	890
All other states [1]	4	1,091	1	10	77	8	995	.....	.....	1,184	1,133	51	.....	.....	3,850

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States	**$10,994,813**	**$46,795,280**	**$225,583**	**$394,337**	**$3,314,874**	**$289,675**	**$41,599,750**	**$1,900**	**$52,720**	.....	**$916,432**	**$47,969,645**	**$6,080,211**
Ohio	1,063,491	7,733,673	18,473	57,083	449,242	29,835	7,125,309	.....	7,036	.....	46,695	7,889,367	734,223
Pennsylvania	5,520,066	24,844,283	110,560	164,838	1,338,637	113,270	22,785,082	1,900	24,366	.....	305,630	25,234,066	2,335,714
West Virginia	2,497,863	8,752,686	50,253	87,532	847,192	42,375	7,324,891	.....	10,553	.....	389,890	9,257,524	1,890,258
All other states [1]	1,913,393	5,464,638	46,297	84,884	679,803	104,195	4,364,477	.....	10,765	.....	174,217	5,588,688	1,120,016

[1] All other states embrace: Illinois, 1 establishment; Indiana, 1; New York, 2.

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES

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ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES.

GENERAL STATISTICS.

This industry includes the manufacture of the machines and appliances used in the generation, transmission, and utilization of electric energy, together with most of the parts, accessories, and supplies for them. It does not include, however, the production of poles, whether of wood, iron, or steel; nor does it include the manufacture of glass and porcelain ware made expressly for electrical purposes, that of bare iron and copper wire, or any of the group of electrochemical and electrometallurgical products.

Comparison with earlier censuses.—Table 1 summarizes the statistics of the manufacture of electrical machinery, apparatus, and supplies for each census from 1879 to 1909, inclusive.

Table 1

	NUMBER OR AMOUNT.					PER CENT OF INCREASE.[1]				
	1909	1904	1899	1889	1879	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889
Number of establishments	1,009	784	581	189	76	73.7	28.7	34.9	207.4	148.7
Persons engaged in the industry	105,600	71,485	(2)	(2)	(2)	.....	47.7	.....	.....	.....
Proprietors and firm members	439	400	(2)	(2)	(2)	.....	9.8	.....	.....	.....
Salaried employees	17,995	10,619	5,067	(2)	(2)	253.4	68.6	109.6	.....	.....
Wage earners (average number)	87,256	60,466	42,013	8,802	1,271	107.7	44.3	43.9	377.3	.....
Primary horsepower	158,768	105,376	43,074	7,494	(2)	263.5	50.7	141.3	.....	.....
Capital	$267,844,432	$174,066,026	$83,059,924	$18,997,337	$1,509,758	220.2	53.9	108.1	340.4	1,158.3
Expenses	201,771,157	127,718,040	81,473,822	15,340,148	(2)	147.7	58.0	56.8	431.1	.....
Services	69,574,540	42,932,406	25,210,917	5,366,188	683,104	176.0	62.1	70.3	369.8	685.5
Salaries	20,193,395	11,090,885	4,031,723	(2)	(2)	336.0	82.1	139.5	.....	.....
Wages	49,381,145	31,841,521	20,579,194	(2)	(2)	140.0	55.1	54.7	.....	.....
Materials	108,566,404	66,836,926	49,458,272	8,819,493	1,116,470	119.5	62.4	35.1	460.8	689.9
Miscellaneous	23,630,213	17,948,708	6,804,633	1,154,462	(2)	247.3	31.7	163.8	489.4	.....
Value of products	221,308,563	140,809,369	92,434,435	19,114,714	2,655,036	139.4	57.2	52.3	383.6	619.9
Value added by manufacture (value of products less cost of materials)	112,742,159	73,972,443	42,976,163	10,295,216	1,538,566	162.3	52.4	72.1	317.4	569.1

[1] Where percentages are omitted, comparable figures are not available.

[2] Comparable figures not available.

The manufacture of electrical machinery, apparatus, and supplies is of comparatively recent origin, having been first reported as a separate industry at the census of 1879, and detailed statistics of products for the United States as a whole were not published until the census of 1899. The industry has developed rapidly, the value of the products reported for 1909 being more than eighty-three times as great as the value for 1879. During the last decade the industry increased $128,874,128, or 139.4 per cent, in value of products; 45,243, or 107.7 per cent, in the average number of wage earners; and $69,765,996, or 162.3 per cent, in the value added by manufacture. These relative increases, however, are less than those reported for the two decades 1879–1889 and 1889–1899.

Summary, by states.—Table 2 summarizes, by states, the more important statistics of the industry, the states being arranged according to the value of products reported for 1909. The rank of each state as shown in the table is its rank among all states in the industry. The figures for one state are omitted, to avoid disclosing individual operations, although this state ranked higher than several of the others for which figures are given.

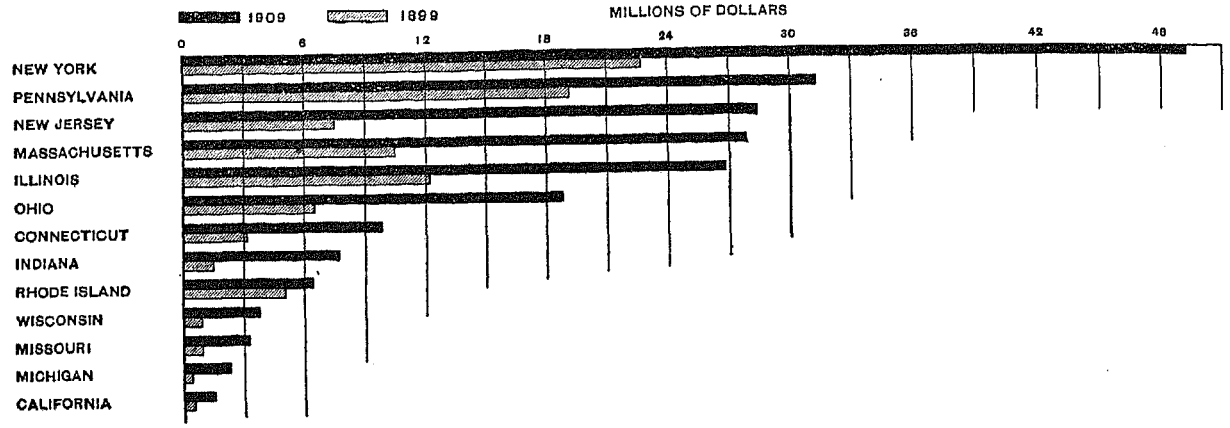
The diagram on the next page shows graphically the value of products for the most important states in the industry in 1909 and 1899.

Although establishments engaged in the manufacture of one or more of the various classes of products embraced in this industry were reported from 38 states and the District of Columbia in 1909, the industry was largely centralized in the six states of New York, Pennsylvania, New Jersey, Massachusetts, Illinois, and Ohio. These states, together, reported 84 per cent of the total average number of wage earners, 82.6 per cent of the total value of products, and 83.1 per cent of the total value added by manufacture.

New York was the leading state in the industry, ranking first at the censuses of 1909 and 1904. During 1909 the state produced electrical machinery, apparatus, and supplies to the value of $49,289,815, or more than one-fifth of the total for the United States. The number of wage earners employed in the state increased 83 per cent during the decade ending with 1909, while the value of products and the value added by manufacture more than doubled. Pennsylvania ranked second among the states in 1909 and 1904 in value of products and in value added by manufacture, though in the average number of wage earners employed it dropped from second place in 1904 to fourth place in 1909. In 1909 New Jersey, which showed the most rapid development of any of the six leading states in the industry, ranked third in

number of wage earners employed and value of products, advancing from fourth place in number of wage earners and from fifth place in value of products during the preceding five years. Michigan, which occupies a position of minor importance among the states in the industry, shows the largest percentages of increase in all three items, while Connecticut, Indiana, and Wisconsin also show large relative gains.

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES—VALUE OF PRODUCTS, FOR LEADING STATES: 1909 AND 1899.



SUMMARY, BY STATES.

Table 2

STATE.	Number of establishments: 1909	WAGE EARNERS. Average number: 1909	Per cent of total: 1909	Rank. 1909	Rank. 1904	VALUE OF PRODUCTS. Amount: 1909	Per cent of total: 1909	Rank. 1909	Rank. 1904	VALUE ADDED BY MANUFACTURE. Amount: 1909	Per cent of total: 1909	Rank. 1909	Rank. 1904	PER CENT OF INCREASE.[1] Wage earners. 1899–1909	1904–1909	1899–1904	Value of products. 1899–1909	1904–1909	1899–1904	Value added by manufacture. 1899–1909	1904–1909	1899–1904
United States.	1,009	87,256	100.0	.....	.....	$221,308,563	100.0	.....	.....	$112,742,159	100.0	.....	.....	107.7	44.3	43.9	130.4	57.2	52.3	162.3	52.4	72.1
New York	217	18,072	21.7	1	1	49,289,815	22.3	1	1	21,807,204	19.3	1	1	83.0	16.4	57.2	117.2	39.4	55.8	114.7	24.6	72.3
Pennsylvania	84	11,025	12.6	4	2	31,351,312	14.2	2	2	17,816,414	15.8	2	2	41.0	17.2	20.3	64.0	19.4	37.4	130.2	19.6	92.4
New Jersey	69	11,099	12.7	3	4	28,365,377	12.8	3	5	13,939,852	12.4	4	5	183.4	77.1	60.1	270.5	105.5	83.2	249.0	101.1	73.5
Massachusetts	83	14,507	16.6	2	3	28,142,889	12.7	4	4	15,408,069	13.7	3	4	178.9	64.9	69.1	168.3	77.2	51.4	194.0	80.0	63.3
Illinois	143	9,641	11.0	5	5	26,826,177	12.1	5	3	13,197,729	11.7	5	3	59.4	57.2	1.4	120.4	60.6	37.2	76.1	45.8	20.8
Ohio	115	8,073	9.3	6	6	18,776,769	8.5	6	6	11,550,891	10.2	6	6	114.0	57.9	35.5	188.7	70.4	69.4	264.8	82.8	99.6
Connecticut	41	3,505	4.0	7	7	9,824,373	4.4	7	8	4,613,069	4.1	7	7	264.7	105.3	77.6	210.1	98.9	55.9	286.3	111.0	83.1
Indiana	42	3,073	3.5	8	8	7,717,642	3.5	8	10	4,024,258	3.6	8	9	248.8	117.0	60.7	386.6	170.1	80.1	401.9	124.9	123.2
Rhode Island	12	1,601	1.8	9	9	6,410,020	2.9	9	7	1,814,684	1.6	11	10	85.3	13.6	63.1	25.4	17.9	6.3	85.6	28.0	45.0
Wisconsin	30	1,409	1.6	10	10	3,835,800	1.7	10	9	2,385,221	2.1	9	8	167.4	17.0	128.5	315.2	20.1	245.7	322.1	9.7	284.8
Missouri	20	1,060	1.2	12	11	3,250,535	1.5	11	11	2,146,245	1.9	10	11	98.9	33.3	49.2	256.9	86.7	91.1	286.2	89.2	104.1
Michigan	40	1,218	1.4	11	12	2,326,999	1.1	12	13	1,296,511	1.1	12	13	562.0	130.2	187.5	431.3	231.5	60.3	406.6	217.9	59.4
California	27	435	0.5	13	13	1,612,983	0.7	13	12	684,867	0.6	13	12	82.8	7.9	69.3	190.1	60.7	80.6	247.7	20.2	189.3
Delaware	4	162	0.2	16	22	606,651	0.3	14	22	313,475	0.3	14	22	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minnesota	13	187	0.2	15	14	526,101	0.2	15	14	305,918	0.3	15	14	.....	10.0	.....	130.7	24.1	86.0	188.7	29.1	123.6
West Virginia	5	137	0.2	18	24	398,331	0.2	16	30	263,136	0.2	16	29	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Hampshire	6	193	0.2	14	19	387,843	0.2	17	19	233,236	0.2	17	20	.....	.....	.....	113.2	158.7	−17.6	133.0	.....	.....
Kentucky	4	117	0.1	21	20	228,927	0.1	18	18	127,836	0.1	18	17	.....	.....	.....	94.1	34.7	44.1	.....	.....	.....
Iowa	9	64	0.1	23	25	199,851	0.1	19	23	125,353	0.1	19	23	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	5	99	0.1	22	28	174,306	0.1	21	25	122,478	0.1	20	25	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Carolina	3	120	0.1	20	.....	149,591	0.1	22	.....	53,033	(2)	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland	7	121	0.1	19	15	147,098	0.1	23	15	93,483	0.1	22	15	−21.9	−24.8	3.9	−44.9	−34.7	−15.7	−40.0	−29.5	−14.8
Washington	4	51	0.1	24	29	126,044	0.1	24	31	67,916	0.1	23	31	.....	.....	.....	.....	.....	.....	.....	.....	.....
All other states	26	387	0.4	.....	.....	633,129	0.3	.....	.....	351,281	0.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Percentages are based on figures in Table 28. A minus sign (−) denotes decrease. Percentage not shown where base is less than 100 for wage earners or less than $100,000 for value of products or value added by manufacture, or where comparative figures can not be given without disclosing individual operations.
[2] Less than one-tenth of 1 per cent.

Persons engaged in the industry.—Table 3 shows, for 1909, the number of persons engaged in the industry, classified according to occupational status and sex, and in the case of wage earners, according to age also. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

The average number of persons engaged in the industry during 1909 was 105,600, of whom 87,256, or 82.6 per cent, were wage earners; 4,121, or 3.9 per cent, proprietors and officials; and 14,223, or 13.5 per cent, clerks, this class including other subordinate salaried employees. Of the total number of persons engaged in the industry, 23,984, or 22.7 per cent, were females. The average number of children

under 16 years of age employed as wage earners was only 803.

Table 3

CLASS.	PERSONS ENGAGED IN THE INDUSTRY: 1909		
	Total.	Male.	Female.
All classes	105,600	81,616	23,984
Proprietors and officials	4,121	4,055	66
Proprietors and firm members	439	428	11
Salaried officers of corporations	997	979	18
Superintendents and managers	2,685	2,648	37
Clerks	14,223	10,431	3,792
Wage earners (average number)	87,256	67,130	20,126
16 years of age and over	86,453	66,622	19,831
Under 16 years of age	803	508	295

The average number of wage earners in each state for 1909, 1904, and 1899 is given in Table 28. The distribution of the average number by sex and age is not shown for the individual states, but Table 29 gives, for 1909, such a distribution of the number employed on December 15, or the nearest representative day. Female wage earners were reported in 21 of the states for which separate figures are shown, the largest number, 4,890, being reported in New Jersey, and the next largest number, 3,492, in Massachusetts. Most of the wage earners under 16 years of age were reported from Connecticut, Massachusetts, New Jersey, and Pennsylvania.

In order to compare the distribution of the persons engaged in the industry in 1909 according to occupational status with that in 1904, it is necessary to use the classification employed at the earlier census. (See Introduction.) Such a comparison is made in Table 4.

Table 5 shows the average number of wage earners in the industry distributed according to age and in the case of those 16 years of age and over according to sex, for 1909, 1904, and 1899.

Table 4

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.				
	1909		1904		Per cent of increase: 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	105,600	100.0	71,485	100.0	47.7
Proprietors and firm members	439	0.4	400	0.6	9.8
Salaried employees	17,905	17.0	10,619	14.9	68.6
Wage earners (average number)	87,256	82.6	60,466	84.6	44.3

Table 5

CLASS.	AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY.					
	1909		1904		1899	
	Number.	Per cent distribution.	Number.	Per cent distribution.	Number.	Per cent distribution.
Total	87,256	100.0	60,466	100.0	42,013	100.0
16 years of age and over	86,453	99.1	59,878	99.0	41,418	98.6
Male	66,622	76.4	48,976	81.0	34,462	82.0
Female	19,831	22.7	10,902	18.0	6,956	16.6
Under 16 years of age	803	0.9	588	1.0	595	1.4

The proportion of women employed as wage earners increased from 16.6 per cent of the total in 1899 to 22.7 per cent in 1909. The proportion of males over 16 years of age decreased during the same period from 82 per cent to 76.4 per cent and the proportion of children from 1.4 per cent to nine-tenths of 1 per cent.

Wage earners employed, by months.—Table 6 gives the number of wage earners employed in the industry on the 15th (or the nearest representative day) of each month during the year 1909 for the 12 states in which an average of 500 or more wage earners were employed during the year.

Table 6

STATE.	WAGE EARNERS EMPLOYED IN THE INDUSTRY: 1909 [1]											
	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	87,256	77,444	79,193	80,779	81,699	83,229	85,117	86,080	88,133	91,822	95,496	99,239	98,868
Connecticut	3,505	3,517	3,544	3,483	3,268	*3,215*	3,220	3,272	3,376	3,567	3,656	3,877	4,062
Illinois	9,641	*8,112*	8,649	9,336	9,473	9,615	9,864	9,714	10,022	10,393	10,814	**11,273**	8,427
Indiana	3,073	*2,691*	2,735	2,769	2,795	2,841	2,854	2,999	3,138	3,483	3,598	3,526	3,447
Massachusetts	14,507	*12,239*	12,636	12,996	13,444	13,855	14,394	14,910	15,245	15,387	15,754	16,302	**16,926**
Michigan	1,218	1,207	1,300	1,255	1,269	1,345	1,340	1,058	*1,051*	1,086	1,201	1,212	1,297
Missouri	1,060	957	*941*	953	999	1,036	1,097	1,094	1,071	1,121	1,111	1,149	1,193
New Jersey	11,099	*10,295*	10,673	10,535	10,462	10,612	10,878	11,075	11,303	11,286	11,618	12,034	**12,418**
New York	18,972	*16,653*	16,991	17,482	17,900	18,231	18,550	18,799	18,890	19,792	20,725	21,728	**21,912**
Ohio	8,073	*6,967*	7,264	7,450	7,491	7,592	7,698	7,790	7,967	8,758	9,158	9,285	**9,456**
Pennsylvania	11,025	10,079	*9,692*	9,717	9,755	9,993	10,238	10,486	10,979	11,746	12,430	13,236	**13,940**
Rhode Island	1,601	1,505	1,511	1,510	1,509	1,532	1,576	*1,497*	1,618	1,658	1,737	1,767	**1,796**
Wisconsin	1,409	1,296	*1,287*	1,293	1,309	1,292	1,288	1,411	1,453	1,464	1,522	1,620	**1,674**

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

The largest number of wage earners employed in the industry as a whole during any month of 1909 was 99,239 in November, and the smallest number, 77,444, in January, the minimum number being equal to 78 per cent of the maximum. In 1904 the maximum number, 62,181, was shown for January, and the minimum number, 59,265, for August, the latter number being equal to 95.3 per cent of the former. There was a continuous gain from month to month in the number of wage earners employed in 1909 from January to November, inclusive, followed by a slight decrease in December. In 9 of the 12 states shown in the table the month of maximum employment was December.

The months of maximum and minimum employment for 1909, and the number of wage earners reported for such months, are given for a larger number of states in Table 29.

Prevailing hours of labor.—In Table 7 the wage earners in the industry in 1909 have been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or smaller number of hours.

Table 7 AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY: 1909

STATE.	Total.	In establishments with prevailing hours—						
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.	72 and over.
United States	**87,256**	**1,114**	**13,909**	**20,781**	**45,538**	**5,874**	.....	**40**
Connecticut	3,505	7	.....	592	2,633	273	.....	.....
Illinois	9,641	186	8,172	734	453	90	.....	6
Indiana	3,073	17	164	184	1,772	936	.....	.....
Massachusetts	14,507	266	305	902	12,851	93	.....	.....
Michigan	1,218	4	26	236	310	642	.....	.....
Missouri	1,060	27	239	636	150	8	.....	.....
New Jersey	11,099	147	107	4,160	6,561	104	.....	20
New York	18,972	164	2,769	2,170	13,048	821	.....	.....
Ohio	8,073	20	1,086	2,430	3,071	1,452	.....	14
Pennsylvania	11,025	12	705	7,853	1,772	683	.....	.....
Rhode Island	1,601	1	6	158	1,409	27	.....	.....
Wisconsin	1,409	7	41	351	939	71	.....	.....

More than three-fourths (76 per cent) of the wage earners employed in the industry in 1909 were in establishments where the prevailing number of hours per week was either 54, or between 54 and 60. Of the remainder 17.2 per cent were in establishments where the prevailing hours of employment were less than 54 per week, and 6.8 per cent in establishments where the prevailing hours were 60 or more per week.

By far the largest number of the wage earners in the industry, 45,538, or 52.2 per cent of the total number, were employed in establishments where the prevailing hours per week were between 54 and 60. This was also the most prevalent working time in all but four of the individual states for which figures are given. In Illinois the group working between 48 and 54 hours per week was the most important; in Missouri and Pennsylvania the group working 54 hours; and in Michigan that working 60 hours.

Character of ownership.—Table 8 presents statistics for 1909 and 1904 with respect to the character of ownership of establishments manufacturing electrical machinery, apparatus, and supplies in the United States.

Table 8

CHARACTER OF OWNERSHIP.	NUMBER OF ESTABLISHMENTS.		VALUE OF PRODUCTS.	
	1909	1904	1909	1904
Total	**1,009**	**784**	**$221,308,563**	**$140,809,369**
Individual	178	153	4,808,989	4,738,594
Firm	111	107	3,411,521	2,293,436
Corporation	720	524	213,088,053	133,777,339
Per cent of total	**100.0**	**100.0**	**100.0**	**100.0**
Individual	17.6	19.5	2.2	3.4
Firm	11.0	13.6	1.5	1.6
Corporation	71.4	66.8	96.3	95.0

Establishments owned by corporations constituted more than two-thirds of the total number of establishments reported, and the value of their products represented 96.3 per cent of the total value in 1909 and 95 per cent in 1904.

Table 9 gives statistics for establishments under each form of ownership for the 12 leading states.

Table 9

STATE.	NUMBER OF ESTABLISHMENTS OWNED BY—			WAGE EARNERS IN ESTABLISHMENTS OWNED BY—			VALUE OF PRODUCTS OF ESTABLISHMENTS OWNED BY—			VALUE ADDED BY MANUFACTURE IN ESTABLISHMENTS OWNED BY—		
	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.
United States	**178**	**111**	**720**	**1,692**	**1,167**	**84,397**	**$4,808,989**	**$3,411,521**	**$213,088,053**	**$2,577,833**	**$1,857,250**	**$108,307,076**
Connecticut	5	1	35	*22*	(X)	3,483	*49,504*	(X)	9,774,869	*30,093*	(X)	4,582,976
Illinois	22	16	105	162	92	9,387	516,291	458,848	25,851,038	360,184	232,430	12,605,115
Indiana	4	5	33	6	26	3,041	9,635	54,515	7,653,492	5,879	32,923	3,085,456
Massachusetts	16	8	59	203	233	14,071	464,517	441,672	27,236,700	245,905	237,304	14,924,860
Michigan	10	6	24	28	26	1,164	79,833	111,185	2,135,981	46,061	57,034	1,193,416
Missouri	4	2	14	*123*	(X)	937	*200,423*	(X)	3,050,112	*120,575*	(X)	2,025,670
New Jersey	10	5	54	76	55	10,968	113,430	391,821	27,860,126	60,038	233,038	13,646,776
New York	52	20	145	428	284	18,260	1,338,210	625,570	47,326,035	945,587	391,644	20,469,973
Ohio	18	13	84	109	109	7,855	231,352	340,941	18,204,476	120,989	193,926	11,235,976
Pennsylvania	10	13	61	314	153	10,558	1,342,734	557,667	29,450,911	370,416	236,148	17,209,850
Rhode Island	1	2	9	(X)	*28*	1,573	(X)	*46,146*	6,363,874	(X)	*22,309*	1,792,375
Wisconsin	5	5	20	21	23	1,365	54,915	55,272	3,725,613	30,379	30,770	2,324,072

NOTE.—In some states, in order to avoid disclosing the returns for individual establishments, the figures for one group have been consolidated with those for establishments under some other form of ownership. In such cases an (X) is placed in the column from which the figures have been omitted, and the figures for the group with which they have been combined are printed in italics.

In 1909, 1,692 wage earners, or 1.9 per cent of the total, were employed in establishments under individual ownership; 1,167, or 1.3 per cent, in those under firm ownership; and 84,397, or 96.7 per cent, in those owned by corporations.

Size of establishments.—Table 10 presents statistics for 1909 and 1904 for establishments manufacturing electrical machinery, apparatus, and supplies, the establishments in the industry being grouped according to the value of their products.

Of the 1,009 establishments reported for 1909, 31 manufactured products valued at $1,000,000 or over. In 1904 there were 22 establishments of this class out of a total of 784. While such establishments represented but a comparatively small proportion of the total number at both censuses, they reported 57.1 per cent of the total value of products in 1909, and 60.5 per cent in 1904.

Table 10
VALUE OF PRODUCTS PER ESTABLISHMENT.

	NUMBER OF ESTABLISHMENTS.		VALUE OF PRODUCTS.	
	1909	1904	1909	1904
Total	1,009	784	$221,308,563	$140,809,369
Less than $5,000	150	94	395,175	247,750
$5,000 and less than $20,000	287	240	3,209,873	2,747,791
$20,000 and less than $100,000	309	278	14,715,392	13,231,592
$100,000 and less than $1,000,000	232	144	76,612,783	39,427,942
$1,000,000 and over	31	22	126,375,340	85,154,294
Per cent of total	100.0	100.0	100.0	100.0
Less than $5,000	14.9	12.0	0.2	0.2
$5,000 and less than $20,000	28.4	31.4	1.5	2.0
$20,000 and less than $100,000	30.6	35.5	6.6	9.4
$100,000 and less than $1,000,000	23.0	18.4	34.6	28.0
$1,000,000 and over	3.1	2.8	57.1	60.5

The average value of products per establishment increased from $179,604 in 1904 to $219,335 in 1909, and the average value added by manufacture, as computed from the figures in Table 1, from $94,353 to $111,737. The average number of wage earners per establishment increased from 77 in 1904 to 86 in 1909.

Table 11 gives a classification of establishments, according to the number of wage earners employed, for the leading states in the industry.

In 1909, 2.2 per cent of the establishments reported employed no wage earners; 33 per cent employed from 1 to 5; 27.2 per cent from 6 to 20; 24.1 per cent from 21 to 100; 11.6 per cent from 101 to 500; and only 2 per cent more than 500. Of the total number of wage earners, 4.6 per cent worked in establishments which employed 20 or less; 13 per cent in establishments employing 21 to 100; 27.4 per cent in those employing 101 to 500; and 55 per cent in establishments employing over 500 each. The 11 establishments in which more than 1,000 wage earners were employed reported 48 per cent of the total number of wage earners.

Table 11

STATE.	TOTAL.		ESTABLISHMENTS EMPLOYING IN 1909—															
			No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number)	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States.	1,009	87,256	22	333	893	274	3,095	152	4,867	91	6,490	90	14,212	27	9,673	9	6,119	11	41,907
Connecticut	41	3,505	1	11	39	5	53	5	158	4	339	13	1,975	1	371	1	570	.....	.....
Illinois	143	9,641	5	55	145	42	469	17	529	14	966	6	699	1	437	1	665	2	5,731
Indiana	42	3,073	.....	13	24	9	87	7	225	7	534	3	480	2	854	1	869	.....	.....
Massachusetts	83	14,507	2	14	40	22	271	19	664	11	841	10	1,754	3	1,070	.....	.....	2	9,867
Michigan	40	1,218	2	14	31	12	117	7	238	1	51	3	431	1	350	.....	.....	.....	.....
Missouri	20	1,060	.....	7	22	7	76	.....	.....	1	54	4	563	1	340	.....	.....	.....	.....
New Jersey	69	11,099	.....	11	34	23	293	14	479	3	226	7	1,213	6	2,161	2	1,297	3	5,396
New York	217	18,972	4	86	224	64	677	28	848	16	1,147	15	2,327	1	457	1	638	2	12,654
Ohio	115	8,073	1	35	79	29	337	15	448	12	834	15	2,446	6	1,944	1	809	1	1,176
Pennsylvania	84	11,025	4	20	59	24	293	14	444	10	678	8	1,294	2	637	1	537	1	7,083
Rhode Island	12	1,601	.....	4	10	1	6	2	53	.....	.....	3	500	1	298	1	734	.....	.....
Wisconsin	30	1,409	.....	13	41	7	79	5	189	2	124	1	222	2	754	.....	.....	.....	.....

Expenses.—As stated in the Introduction, the census figures for expenses do not purport to show the total cost of manufacture, since they take no account of interest or depreciation; hence they can not properly be used for determining profits. Facts of interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 1 shows the total expenses in 1909 to have been $201,771,157, distributed as follows: Cost of materials, $108,566,404, or 53.8 per cent; wages, $49,381,145, or 24.5 per cent; salaries, $20,193,395, or 10 per cent; and miscellaneous expenses, made up of expenditures for advertising, ordinary repairs of buildings and machinery, insurance, traveling expenses, and other sundry expenses, $23,630,213, or 11.7 per cent. These proportions, as may be seen by comparing the items in Table 29, vary somewhat in the several states.

Engines and power.—The amount of power used in the industry was first reported at the census of 1889. Table 1 shows that the total horsepower used increased from 7,494 in 1889 to 158,768 in 1909. Table 12 shows statistics of power as reported at the censuses of 1909, 1904, and 1899.

The total primary power used in the industry increased from 43,674 horsepower in 1899 to 158,768 horsepower in 1909, or 263.5 per cent. Steam engines still supply the greater part of the power used in the industry, although such power represented a smaller proportion of the total primary power in 1909 than in 1899. Some part of this decrease in the proportion of steam power is due to the great increase that took place during the decade in rented electric power.

The horsepower of electric motors used for distributing power by means of current generated in the establishments in the industry shows an increase from

20,182 horsepower in 1899 to 114,495 horsepower in 1909.

Table 12

POWER.	NUMBER OF ENGINES OR MOTORS.			HORSEPOWER.			PER CENT DISTRIBUTION OF HORSEPOWER.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	**6,596**	**2,896**	**332**	**158,768**	**105,376**	**43,674**	**100.0**	**100.0**	**100.0**
Owned	601	565	332	107,764	81,180	36,608	67.9	77.0	83.8
Steam	410	395	263	99,883	77,009	34,018	62.9	73.1	77.9
Gas	166	111	52	6,753	2,940	1,695	4.3	2.8	3.9
Water wheels	22	52	17	1,078	1,155	835	0.7	1.1	1.9
Water motors	3	7	(1)	36	26	(1)	(2)	(2)	.....
Other	.....	.....	.....	14	50	60	(2)	(2)	0.1
Rented	5,995	2,331	(1)	51,004	24,196	7,066	32.1	23.0	16.2
Electric	5,995	2,331	(1)	50,045	21,313	4,074	31.5	20.2	9.3
Other	.....	.....	.....	959	2,883	2,992	0.6	2.7	6.9
Electric motors	**22,650**	**8,472**	**1,643**	**164,540**	**61,753**	**24,256**	**100.0**	**100.0**	**100.0**
Run by current generated by establishment	16,655	6,141	1,643	114,495	40,440	20,182	69.6	65.5	83.2
Run by rented power	5,995	2,331	(1)	50,045	21,313	4,074	30.4	34.5	16.8

[1] Not reported. [2] Less than one-tenth of 1 per cent.

Table 13 shows statistics of power used during 1909 by the establishments in the 12 leading states.

New York and Pennsylvania together reported 87,642 horsepower, or 55.2 per cent of the aggregate for the industry. Steam power was the most important form of primary power used in 9 of the 12 states shown separately, rented electric power ranking second. In Michigan, Missouri, and Pennsylvania rented electric power ranked first and steam power second. The largest amount of steam power used by any state was 33,854 horsepower, by New York, which state also reported the greatest amount of rented electric power. Gas and other internal-combustion engines were used to some extent by 11 of the 12 states named in the table, Ohio leading with 2,306 horsepower, or 34.1 per cent of the total.

Fuel consumed.—Bituminous coal was the principal class of fuel used, 632,870 short tons being consumed during 1909. Gas and oil were also used to a considerable extent, the largest quantity of the former being reported for Ohio, and of the latter for New York.

Table 13

STATE.	PRIMARY HORSEPOWER.									ELECTRIC HORSEPOWER.		FUEL USED.					
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.		Total, rented and generated by establishment.	Generated in the establishment reporting.	Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water wheels and motors.	Other.	Electric.	Other.			Anthracite (long tons).	Bituminous (short tons).				
United States	**913**	**158,768**	**107,764**	**99,883**	**6,753**	**1,114**	**14**	**50,045**	**959**	**164,540**	**114,495**	**87,096**	**632,870**	**20,123**	**2,013**	**104,467**	**1,761,969**
Connecticut	39	4,457	3,385	3,040	27	318	.....	1,032	40	2,117	1,085	485	18,771	.....	119	257	3,229
Illinois	115	11,636	9,535	9,268	277	.....	.....	2,018	83	10,656	8,638	166	71,903	5,720	1	1,100	235,983
Indiana	37	5,285	4,705	4,407	284	.....	14	580	.....	2,388	1,808	702	21,296	32	.....	4,086	61,160
Massachusetts	80	14,835	12,939	12,545	214	180	.....	1,820	76	29,188	27,368	7,946	103,916	4,154	40	27,066	241,011
Michigan	37	1,365	651	500	151	.....	.....	704	.....	888	184	67	3,492	185	.....	623	13,292
Missouri	20	1,180	531	500	31	.....	.....	642	7	1,432	790	.....	5,977	16	1	610	6,156
New Jersey	62	11,326	9,679	9,341	133	205	.....	1,544	103	8,691	7,147	26,633	45,919	549	30	3,248	74,505
New York	196	53,813	34,105	33,854	233	18	.....	19,485	223	71,599	52,114	44,898	139,883	5,303	36	34,605	80,966
Ohio	105	11,959	8,627	6,306	2,306	15	.....	3,200	132	10,829	7,629	1,063	65,015	2,443	.....	6,452	615,288
Pennsylvania	80	33,829	16,196	14,332	1,844	20	.....	17,576	57	19,853	2,277	3,876	116,955	946	.....	10,222	131,782
Rhode Island	11	2,837	2,798	2,728	.....	70	.....	31	8	414	383	470	16,932	30	.....	5,223	807
Wisconsin	29	2,333	2,067	1,910	157	.....	.....	261	5	4,023	3,762	345	14,467	729	14	6,282	3,974
All other states	102	3,923	2,546	1,162	1,096	288	.....	1,152	225	2,462	1,310	445	8,344	16	1,772	4,688	293,816

SPECIAL STATISTICS RELATING TO PRODUCTS.

So many different kinds of machines, apparatus, supplies, and fixtures are manufactured for use in the generation and utilization of electricity that it was impracticable to secure separate statistics of the number and value of each class of articles produced, and the inquiries were therefore confined to the most important and distinctive articles or groups of articles.

Table 14 shows in some detail the statistics for 1909, 1904, and 1899 relative to the manufacture of the different kinds or groups of electrical machinery, apparatus, and supplies for which separate totals were compiled at the census of 1909. The figures given represent not only the manufacture of such products by establishments in the industry, but also that reported by establishments in other industries.

In reporting the totals for the several groups shown in this table, it is improbable that all establishments classified their products in exactly the same way. For example, some establishments probably reported various articles as "sockets, receptacles, bases, etc.," which other establishments reported as "circuit fittings of all kinds," etc. While these variations in the reports do not affect the statistics for the more important and well-defined products, such as dynamos, transformers, and motors, they probably do, in a measure, destroy the comparability of the figures

for some of the less distinctive products. The percentages of increase from census to census in the various products are, therefore, not shown in Table 14.

Table 14

PRODUCT.	1909	1904	1899
Total value	[1] $243,965,093	[1] $159,551,402	[1] $105,831,865
Dynamos:			
Number	16,791	15,080	10,527
Kilowatt capacity	1,405,950	996,182	578,124
Value	$13,081,048	$11,084,234	$10,472,576
Dynamotors, motor generators, boosters, rotary converters, and double-current generators	$3,154,733	$1,740,534	$379,747
Transformers	$8,801,019	$4,468,567	$2,062,871
Switchboards, panel boards, and cut-out cabinets	$5,971,804	$3,766,044	$1,846,624
Motors:			
Total number	504,030	206,343	159,780
Horsepower	2,733,418	1,493,012	1,221,482
Value	$32,087,482	$22,370,626	$19,505,504
For industrial power—			
Number	243,423	79,877	35,604
Horsepower	1,683,677	678,910	515,705
Value	$18,306,451	$13,120,948	$7,551,480
For automobiles—			
Number	2,796	1,819	3,017
Horsepower	12,471	19,907	8,220
Value	$294,152	$152,685	$192,030
For fans—			
Number	199,113	102,535	97,577
Horsepower	178,033	30,796	12,766
Value	$2,450,739	$1,168,254	$1,055,369
For elevators—			
Number	4,988	1,333	385
Horsepower	63,585	13,398	6,730
Value	$1,188,653	$638,473	$2,523,901
For railways, and miscellaneous services, including value of parts and supplies—			
Number	53,710	20,779	23,107
Horsepower	795,652	750,001	678,061
Value	$9,847,487	$7,290,266	$8,182,724
Storage batteries, including value of parts and supplies:			
Weight of plates in pounds	23,119,331	16,113,073	[2]
Value	$4,678,209	$2,645,749	$2,559,601
Primary batteries, including value of parts and supplies:			
Number	34,333,531	6,623,162	2,654,765
Value	$5,034,261	$1,598,144	$1,119,444
Arc lamps:			
Number	123,985	105,157	158,187
Value	$1,706,959	$1,574,422	$1,827,771
Searchlights, projectors, and focusing lamps	$935,874	$114,795	$225,635
Incandescent lamps	$15,714,809	$6,953,205	$3,515,118
Carbon filament	$6,157,066		
Tungsten	$6,241,133	$6,703,454	$3,442,183
Gem, tantalum, glower, and vacuum and vapor lamps	$2,715,991		
Decorative and miniature lamps, X-ray bulbs, vacuum tubes, etc.	$600,619	$249,751	$72,935
Sockets, receptacles, bases, etc	$4,521,729	$2,010,860	$593,929
Electric-lighting fixtures of all kinds	$6,128,282	$3,294,606	$3,750,670
Telegraph apparatus	$1,957,432	$1,111,194	$1,642,266
Telephone apparatus	$14,259,357	$15,863,698	$10,512,412
Insulated wires and cables	$51,624,737	$34,519,609	$21,292,001
Electric conduits	$5,098,264	$2,416,245	$1,066,163
Annunciators—domestic, hotel, and office	$235,567	$185,870	$224,885
Electric clocks and time mechanisms	$352,513	$373,926	$132,149
Fuses	$1,001,719	$868,079	$595,497
Lightning arresters	$940,171	$587,124	
Rheostats and resistances	$2,674,963	$932,925	
Heating, cooking, and welding apparatus	$1,003,038	$395,827	$1,186,878
Electric flatirons	$951,074		
Electric measuring instruments	$7,800,010	$5,004,763	$1,842,135
Electrical therapeutic apparatus	$1,107,858	$1,036,962	[2]
Magneto-ignition apparatus, sparks, coils, etc	$6,092,343	$678,077	[2]
Electric switches, signals, and attachments	$5,377,843	$1,451,337	$1,129,891
Circuit fittings of all kinds	$1,080,287	$3,525,446	[2]
All other products	$39,091,708	$28,978,444	$17,448,098

[1] Figures for 1909 include electrical machinery, apparatus, and supplies to the value of $22,656,530, made by establishments engaged primarily in the manufacture of wire; foundry and machine-shop products; gas and electric fixtures, and lamps and reflectors; rubber boots and shoes; brass and bronze products; rubber goods, "not elsewhere specified," and by establishments in 26 other industries. Figures for 1904 include products to the value of $18,742,033, and figures for 1899 include products valued at $13,397,430 made by establishments not engaged primarily in the manufacture of electrical machinery, apparatus, and supplies.

[2] Not reported separately.

Table 15 shows, so far as possible, the value of the different electrical machines and appliances manufactured in 1909 as subsidiary products by establishments in other industries. These figures are included in the totals shown in Table 14.

Table 15

SUBSIDIARY PRODUCTS: 1909	Value.
Total	$22,656,530
Dynamos, dynamotors, generators, boosters, rotary converters, and double-current generators, and parts and supplies	2,111,542
Switchboards, for light and power	224,452
Motors and parts and supplies	1,213,761
Electric-lighting fixtures	4,097,226
Insulated wires and cables	11,374,165
Rheostats and resistances	17,425
Magneto-ignition apparatus	79,183
All other electrical machinery, apparatus, and supplies and "all other products"	3,504,416
Custom work and repairing	34,360

Dynamos.—Dynamos are, in one sense, the most important single class of apparatus for which separate statistics are shown, in that they are necessary to generate the electrical energy which other classes of electrical machinery and apparatus are designed to distribute and utilize.

Table 16 shows the number, capacity, and value of the total production of direct and of alternating current dynamos manufactured in 1909, 1904, and 1899.

Table 16

	Census.	Number.	Capacity (kilowatts).	Value.
Dynamos, total	**1909**	**16,791**	**1,405,950**	**$13,081,048**
	1904	**15,080**	**996,182**	**11,084,234**
	1899	**10,527**	**578,124**	**10,472,576**
Direct current	1909	13,882	414,222	4,710,524
	1904	13,756	640,350	6,973,130
	1899	9,182	321,451	6,297,925
Alternating current	1909	2,909	991,728	8,370,524
	1904	1,324	355,832	4,111,104
	1899	1,345	256,673	4,174,651

During the decade ending with 1909 there was an increase of 59.5 per cent in the number, and of 143.2 per cent in the total capacity, of dynamos produced. The average capacity per machine increased from 55 kilowatts in 1899 to 84 kilowatts in 1909. The increase in average capacity is confined to alternating-current machines, as there was a decrease for the decade in that of the direct-current machines. Alternating-current dynamos more than doubled in number, value, and aggregate kilowatt capacity during the five years from 1904 to 1909, and the average capacity per machine increased from 269 kilowatts in 1904 to 341 kilowatts in 1909. During the same period the average capacity of direct-current machines decreased from 47 to 30 kilowatts.

Transformers.—Roughly speaking, a transformer consists essentially of an induction coil in which the primary wire is long and thin, with many turns, as compared with the secondary wire, which is short and thick and has few turns; or these conditions may be reversed, making the primary wire thick and the secondary wire thin. This winding varies in accordance with the particular uses for which the transformer is required. They are used both for stepping-up the electromotive force to a voltage suitable for economical transmission, and for stepping it down again to safe pressures at the point of consumption. Table 17 shows the total production of transformers in 1909, 1904, and 1899, and separate statistics of apparatus

having a capacity of less than 50 kilowatts, and for those having a capacity of 50 kilowatts and over for the years 1909 and 1904. The figures showing the capacity of individual transformers were not reported for 1899.

Table 17	Census.	Number.	Capacity (kilowatts).	Value.
Transformers, total	1909	76,729	1,635,429	$8,801,019
	1904	66,698	728,181	4,468,567
	1899	36,513	305,588	[1] 2,962,871
Under 50 kilowatts	1909	72,776	577,408	4,184,832
	1904	63,311	350,174	3,292,207
50 kilowatts and over	1909	3,953	1,058,021	4,616,187
	1904	3,387	378,007	1,176,360

[1] Includes transformers to the value of $2,700 for which number and capacity were not reported.

Table 17 includes the large transformers used in central stations as well as those used on electric lines. There was a decided increase in the number and value of the transformers manufactured and a much greater increase in their capacity in 1909 as compared with those produced in 1899. The number increased 110.1 per cent, the capacity 435.2 per cent, and the value 197 per cent. More than nine-tenths (94.8 per cent) of the transformers in 1909 were of comparatively small size, having a capacity of less than 50 kilowatts. While the 3,953 transformers with a capacity of 50 kilowatts and over manufactured during 1909 formed only 5.2 per cent of the total number, their total capacity amounted to 1,058,021 kilowatts, or 64.7 per cent of the total kilowatt capacity of all transformers produced during the year. Some idea of increasing size of transformers may be had from the fact that in 1909 the average capacity of the transformers of 50 kilowatts and over was 267.7 kilowatts, as compared with an average of 111.6 kilowatts in 1904.

Switchboards.—Table 18 shows the value of the switchboards, panel boards, and cut-out cabinets for light and power work manufactured during 1909, 1904, and 1899 in eight of the leading states for which comparable figures are available.

Table 18	1909	1904	1899
Switchboards, panel boards, and cut-out cabinets, total	$5,971,804	$3,766,044	$1,846,624
California	90,594	27,749	10,000
Connecticut	151,385	(1)	3,700
Illinois	448,185	244,590	75,367
Massachusetts	304,502	468,689	230,602
Missouri	137,581	127,500	67,500
New York	2,789,297	1,373,366	1,055,288
Ohio	236,930	54,056	21,660
Pennsylvania	1,243,356	1,157,027	353,043
All other states	569,974	313,067	29,464

[1] Included in "all other states."

Each system of centralized electrical supply requires a switchboard for the manipulation of its circuits and to connect the sources of supply with the consumer. The switchboards shown in the table are those used for light and power work and differ distinctly from the switchboards used in telegraphic and telephonic work, which are included in the total shown in Tables 24 and 25 for telegraph and telephone instruments, supplies, etc.

At one time the manufacture of switchboards for light and power stations was carried on by a large number of establishments, and their production required little else than skillful working in hardwood. At present switchboards of the above type are made of slate or marble slabs with framework of copper, iron, and steel, and involve many problems of apparatus adjustment. For this reason the large electrical manufacturing companies have virtually taken over the construction of the larger switchboards for the plants which they equip, and have made a business also of supplying many of the indicating and recording instruments used in connection with the boards. The value of these appurtenances of light and power work increased 103.9 per cent from 1899 to 1904, and 223.4 per cent during the decade 1899–1909. New York and Pennsylvania were the leading states in this branch of manufacture, reporting 67.5 per cent of the total value of these products in 1909, as compared with 76.3 per cent in 1899.

Motors.—Table 19 shows the number, capacity, and value of electric motors manufactured in 1909, 1904, and 1899.

Table 19	Census.	Number.	Capacity (horsepower).	Value.
Motors, total	1909	504,030	2,733,418	$32,087,482
	1904	206,343	1,493,012	22,370,626
	1899	159,780	1,221,482	19,505,504
For industrial power	1909	243,423	1,683,677	18,306,451
	1904	79,877	678,910	13,120,948
	1899	35,604	515,705	7,551,480
Direct current	1909	100,714	676,682	7,787,043
	1904	54,242	382,997	10,254,854
	1899	29,615	378,329	5,786,052
Alternating current	1909	142,709	1,006,995	10,519,408
	1904	25,635	295,913	2,866,094
	1899	5,989	137,376	1,765,428
For automobiles	1909	2,796	12,471	294,152
	1904	1,819	19,907	152,685
	1899	3,017	8,220	192,030
For fans	1909	199,113	178,033	2,450,739
	1904	102,535	30,706	1,168,254
	1899	97,577	12,766	1,055,369
For elevators	1909	4,988	63,585	1,188,653
	1904	1,333	13,398	638,473
	1899	385	6,730	2,523,901
For railways and miscellaneous uses, including value of parts and supplies for all motors.	1909	53,710	795,652	[1] 9,847,487
	1904	20,779	750,001	7,290,266
	1899	23,197	678,061	[2] 8,182,724

[1] Includes motor parts and supplies valued at $2,794,779. To what extent such values were included at prior censuses is unknown, since no data bearing upon the point were collected.

[2] Includes motors valued at $2,008,455 for which the number and horsepower were not reported; and 60 motors valued at $261,722 for which the horsepower was not reported.

The number, capacity, and value of motors for transforming electric current into mechanical power were very much larger in 1909 than in 1899. The number of motors of all kinds produced increased 215.5 per cent during the decade, their capacity 123.8 per cent, and their value 64.5 per cent. The largest increases are shown in the case of the motors for

operating stationary machinery, which are designated in the table as motors for industrial power. During the decade ending with 1909 the number of these motors for distributing power to be used industrially increased 583.7 per cent, their capacity 226.5 per cent, and their value 142.4 per cent. The average capacity of these motors decreased from 14 horsepower in 1899 to 7 horsepower in 1909. Of the motors designated to be used for industrial purposes the largest increases are shown in the case of those operated by alternating current. The total capacity of such motors increased from 137,376 horsepower in 1899 to 1,006,995 in 1909, though the average capacity per machine decreased from 23 horsepower in 1899 to 7 horsepower in 1909. At the census of 1899 only the largest motors were of the alternating current type, but at the census of 1909 alternating current was so generally used that the average capacity of motors of both types was about the same. In sections where electric power is available, new manufacturing establishments generally use it in preference to steam or water. The general report on manufactures shows a large increase in the use of electric power. In 1909 there were 388,854 electric motors with a capacity of 4,817,140 horsepower installed in manufacturing establishments. In 1899 there were only 16,891 motors reported with a capacity of 492,936 horsepower.

The production of motors intended for other purposes did not increase so rapidly as those built for furnishing power for industrial purposes. Of the three designated varieties of motors embraced in this group, those used for the operation of fans predominate in number, capacity, and value, and during the decade 1899–1909 they increased 104.1 per cent in number, 1,294.6 per cent in capacity, and 132.2 per cent in value. The average capacity of these motors was nearly seven times as great in 1909 as in 1899, while the total horsepower was nearly fourteen times as great. The improved methods of ventilation in theaters, halls, hotels, factories, etc., have called for electric fans or blowers of larger size, so that the average capacity of fan motors increased approximately from one-tenth of 1 horsepower in 1899 to nine-tenths of 1 horsepower in 1909. In this connection it should be stated that a few of the largest manufacturers of fan motors were unable to definitely state their total capacity, and in such cases the capacity was estimated. The figures, however, are presented subject to these restrictions.

The statistics for the manufacture of electric railway motors for 1909 can not be shown separately without disclosing the operations of individual establishments, and for this reason they are combined in Table 19 with those for motors for miscellaneous uses. It may be stated, however, that the number of electric railway motors manufactured in 1909 was considerably greater than that in 1904, when 12,298 motors, with a capacity of 713,181 horsepower, were reported, valued at $4,949,795.

Batteries.—Table 20 shows the number and value of primary batteries, and the value of storage batteries and of parts and supplies, produced in 1909, 1904, and 1899.

Table 20

PRODUCT.	Census.	Number.	Value.
Batteries, total	**1909**	.....	**$10,612,470**
	1904	.....	**4,243,893**
	1899	.....	**3,679,045**
Primary batteries	1909	34,333,531	5,312,595
	1904	6,623,162	1,028,556
	1899	2,654,765	887,383
Dry	1909	33,988,881	4,583,082
	1904	4,888,361	513,026
	1899	1,946,688	316,013
Liquid [1]	1909	344,650	729,513
	1904	1,734,801	515,530
	1899	708,077	[2] 571,370
Storage batteries	1909	.....	4,243,984
	1904	.....	1,569,371
	1899	.....	2,559,601
Parts and supplies	1909	.....	1,055,891
	1904	.....	1,645,966
	1899	.....	232,061
For primary batteries	1909	.....	621,666
	1904	.....	569,588
	1899	.....	232,061
For storage batteries	1909	.....	434,225
	1904	.....	1,076,378
	1899	.....	[3]

[1] Includes testing batteries.
[2] Includes batteries to the value of $1,500 for which number was not reported.
[3] Not reported separately.

Both storage and primary batteries consist of various elements which are not always sold together as a unit by the same manufacturer, and yet it is not until these are brought together that a complete cell is constituted. In fact, many of the parts and supplies lie outside the electrical field. For example, the primary battery consists of various elements, such as the jars, zinc, copper, carbon, sulphuric acid, caustic soda, bichromate of potassium, according to the nature of the cell, on the constant renewals of which the efficiency and life of the cell depend.

The value of storage and primary batteries manufactured and of parts and supplies for the same increased 188.5 per cent during the decade. The value of primary batteries manufactured in 1909 showed an increase of 498.7 per cent over the value of those turned out in 1899, while the value of storage batteries increased but 65.8 per cent during the decade, the larger part of this increase being for the five-year period 1904–1909. Of the total value of batteries and parts and supplies produced in 1909, primary batteries represented 50.1 per cent, storage batteries 40 per cent, and parts and supplies 9.9 per cent. In 1899 the proportions were 24.1 per cent, 69.6 per cent, and 6.3 per cent, respectively.

The number of "dry" primary batteries reported in 1909 was more than seventeen times the number reported in 1899, while their total value was over fourteen times as great. The large increase in these batteries is chiefly due to the demand for such batteries for automobiles and for motor boats.

The number of "liquid" batteries reported decreased 51.3 per cent from 1899 to 1909, but their total value increased 27.7 per cent during the same period.

The most extensive use of storage batteries is in connection with central station lighting plants and electric railways.

Electric lamps and lighting fixtures.—Table 21 shows the number and value of arc lamps manufactured in 1909, 1904, and 1899.

Table 21	Census.	Number.	Value.
Arc lamps, total	1909	123,985	$1,706,959
	1904	195,157	1,574,422
	1899	158,187	1,827,771
Inclosed	1909	118,981	1,623,299
	1904	193,409	1,544,433
	1899	134,531	1,551,290
Open	1909	5,004	83,660
	1904	1,748	29,989
	1899	23,656	276,481

From 1899 to 1909 there was a decrease of 34,202, or 21.6 per cent, in the number of arc lamps manufactured and a decrease of $120,812, or 6.6 per cent, in their total value. The decrease is accounted for by the fact that, while formerly arc lamps were used almost exclusively for street lighting and other purposes, the incandescent lamps have now replaced them to an appreciable extent. The value of arc lamps was slightly greater in 1909 than in 1904, owing to the introduction of more costly types, such as the flaming arc, etc.

Arc lamps are of two kinds, open and inclosed, either of which may be of the direct or of the alternating current type. The inclosed lamps comprised by far the more important group, 96 per cent of the total number in 1909 being of this kind. Although the number of such lamps declined during the decade, the total value increased. The principal element in the superiority of the inclosed over the open type of arc lamp consists in the relation of the inner globe to the arc, whereby with a suitably restricted air inlet a long arc may be steadily maintained by a comparatively small current. In the ordinary open arc lamp the carbon sticks burn away in 10 or 12 hours, but in an inclosed lamp the cored carbons used will last from 60 to 125 hours. The small inner globe inclosing the carbon is of elongated oval shape, and is made of refractory glass, so as to resist successfully the intense heat of the arc.

There was a marked decrease from 1899 to 1909 in both the number and value of the open arc lamps, although there was an increase in both respects from 1904 to 1909.

The value of the output of searchlights, projectors, and focusing lamps (see Table 14) increased $710,239, or 314.8 per cent, during the decade ending with 1909. The statistics for 1909 include a large number of focusing lamps used for theatrical purposes and for automobile searchlights.

One of the largest special departments of electrical production is that of incandescent lamps. The schedule of inquiry used at the census of 1909 called for statistics concerning incandescent lamps classified according to kind of filament used, while at previous censuses the classification of these lamps was according to their candlepower.

Table 22 shows the value of the different kinds of incandescent lamps so far as available, manufactured in 1909, 1904, and 1899.

Table 22 KIND.	Census.	Number.	Value.
Incandescent lamps, total	1909	.....	$15,714,809
	1904	.....	6,953,205
	1899	.....	3,515,118
Carbon filament [1]	1909	55,038,378	6,157,066
	1904	112,711,558	6,308,299
	1899	25,320,198	3,442,183
Tungsten	1909	11,738,619	6,241,133
	1904	(2)	(2)
	1899	.....	.....
Gem, tantalum, glower, vacuum, and vapor lamps.[1]	1909	.....	2,715,991
	1904	.....	395,155
	1899	.....	.....
Decorative and miniature lamps, X-ray bulbs, vacuum tubes, etc.	1909	.....	600,619
	1904	.....	249,751
	1899	.....	72,935

[1] "Carbon filament" lamps were first reported as such in 1909. Incandescent lamps—"16 candlepower," "below 16 candlepower," and "over 16 candlepower"—reported for 1899 and 1904. It is therefore probable that the 1904 figures, shown for comparison as "carbon filament," include a considerable number of tungsten, gem, and tantalum lamps manufactured in 1904, but not reported separately.

[2] Not reported separately. See Note 1.

All filament incandescent lamps reported in 1904 and 1899 have been combined in Table 22 for comparison with the "carbon filament" lamps reported for 1909, but it is probable that the group of lamps classified as "above 16 candlepower" in 1904 contained a number of high-power lamps of the tungsten, tantalum, and gem types.

"Glower lamps and parts" and "vacuum and vapor lamps" were reported separately in 1904, but for 1909 the figures for such lamps are combined with those for gem and tantalum lamps. The development of electric lamps of new forms and characteristics, requiring special fixtures for their most efficient use, has greatly stimulated this branch of manufacture, especially during the five-year period 1904–1909.

Table 23 shows the total value of electric lighting fixtures manufactured in the United States during the years 1909, 1904, and 1899, and the value produced in the individual states during 1909 and 1904.

The total value of the production of electric lighting fixtures of all kinds increased 86 per cent from 1904 to 1909, and 63.4 per cent from 1899 to 1909. The total value of electric lighting fixtures as shown in Table 23 represents only the value of those definitely reported as such, and is no doubt far less than the actual value of such products. Large quantities of electric fixtures are manufactured in connection with the production of gas and other fixtures. In some instances these are combination fixtures. The total value of products for

"gas and electric fixtures" reported at the census of 1909 was $29,844,303. The total reported value of electric lighting fixtures in 1909 was $6,128,282, made up of $2,031,056 reported by establishments engaged primarily in manufacturing electrical machinery, apparatus, and supplies; $3,927,614 by those making gas and electric fixtures, and $169,612 reported as subsidiary products of other industries. It is probable that the total value of electric lighting fixtures produced by establishments manufacturing gas and electric fixtures was much larger than the figure reported, since many of such establishments failed fully to segregate their products.

New York was the leading state in the manufacture of electric lighting fixtures, the value of such products shown for the state in 1909 representing 42.2 per cent of the total for the country.

Table 23	Census.	Value.
Lighting fixtures, total	1909	$6,128,282
	1904	3,294,606
	1899	3,750,670
California	1909	581,768
	1904	447,109
Connecticut	1909	205,323
	1904	397,498
Illinois	1909	797,579
	1904	639,405
Indiana	1909	173,352
	1904	.....
Massachusetts	1909	217,268
	1904	(1)
Michigan	1909	62,401
	1904	.....
New Jersey	1909	234,797
	1904	(1)
New York	1909	2,585,307
	1904	1,663,945
Ohio	1909	57,358
	1904	150,500
Pennsylvania	1909	312,395
	1904	406,610
Wisconsin	1909	199,685
	1904	.....
All other states	1909	641,049
	1904	189,539

[1] Included in "all other states."

The value of sockets, receptacles, bases, etc., shown separate from lighting fixtures in Table 14 was more than seven times as great in 1909 as in 1899.

Telegraph apparatus.—Table 24 shows statistics of telegraph apparatus manufactured in 1909, 1904, and 1899.

Table 24	1909	1904	1899
Telegraph apparatus, total	$1,957,432	$1,111,194	$1,642,266
Intelligence (key, sounder, etc.):			
Number	83,539	76,826	199,410
Value	$197,669	$187,744	$354,212
Police, fire, district and miscellaneous	$1,126,658	$592,070	$1,231,167
Wireless telegraph apparatus	448,262	114,050	(1)
Switchboards and telegraph parts and supplies	184,843	217,330	56,887

[1] Not reported separately.

During the decade 1899–1909 there was an increase of $315,166, or 19.2 per cent, in the total value of the output of telegraph apparatus.

Commercial wire telegraph apparatus decreased 44.2 per cent in value during the decade. A large proportion of telegraphic apparatus was comprised under the heading of "police, fire, district, and miscellaneous" at each census—57.6 per cent in 1909, 53.3 per cent in 1904, and 75 per cent in 1899. The value of apparatus of this kind shows a large gain during the five years 1904–1909, the total in the latter year being nearly equal to that in 1899. Wireless telegraph apparatus, which was not reported separately for 1899, shows a large increase (293 per cent) during the period 1904–1909.

Telephone apparatus.—Table 25 shows the statistics of the telephone apparatus produced in 1909 and 1904. Comparable figures for 1899 are not available.

Table 25	Census.	Number.	Value.
Telephones, total	1909	.....	$14,259,357
	1904	.....	15,863,698
Transmitters	1909	1,116,403	1,376,762
	1904	850,815	824,204
Receivers	1909	1,063,309	1,134,929
	1904	831,195	696,113
Complete sets of instruments not included in transmitters and receivers	1909	732,697	5,103,849
	1904	887,447	6,483,418
Interior systems complete, without instruments	1909	16,238	123,085
	1904	4,560	68,826
Central switchboards	1909	.....	2,398,909
	1904	.....	5,154,447
Private exchange boards	1909	2,252	369,915
	1904	3,917	564,795
Telephone parts and supplies	1909	.....	3,751,908
	1904	.....	2,071,895

There was a decrease from 1904 to 1909 in the total value of telephone apparatus produced of $1,604,341, or 10.1 per cent. A very large proportion of other electrical apparatus, such as dynamos, motors, motor-generator sets, insulated wires and cables, conduits, etc., was required for the equipment of telephone exchanges and in connecting the stations of individual telephone subscribers with central stations. Only when due allowance is made for the value of these other classes of products used in connection with the telephone systems can an idea be formed of the total value of telephone equipment manufactured. Substantial increases were shown in the value of telephone transmitters and receivers and telephone parts and supplies produced, but for central switchboards there was a decrease of $2,755,538, or 53.5 per cent, during the five years. Decreases were also shown in the value of complete sets of telephone instruments and of private exchange boards turned out in 1909 as compared with the value of those produced in 1904—21.3 per cent for the former and 34.5 per cent for the latter.

The products for Illinois show a decrease of more than a million dollars during the five-year period, and there were only 16 establishments in this state that reported the manufacture of telephone apparatus and supplies in 1909, as compared with 29 engaged in such manufacture at the previous census.

A considerable proportion of the total value of telephone equipment produced was that of parts and supplies. This designation embraces a wide variety of parts, such as the signaling apparatus in magneto-telephone sets, main switchboards, the apparatus in use at the subscribers' stations, and a large amount of miscellaneous apparatus.

Insulated wire and cables.—Table 26 shows the value of the production of insulated wire and cables in the different states during 1909 and 1904 and the total value only for 1899.

Table 26	Census.	Value.
Insulated wire and cables, total	1909	$51,624,737
	1904	34,519,699
	1899	21,292,001
Connecticut	1909	4,205,509
	1904	2,156,369
Illinois	1909	9,487,006
	1904	3,666,313
Massachusetts	1909	2,194,474
	1904	1,001,522
New Jersey	1909	13,945,425
	1904	8,234,885
New York	1909	9,485,282
	1904	10,911,897
Pennsylvania	1909	2,796,825
	1904	2,885,052
Rhode Island	1909	7,741,411
	1904	5,122,464
All other states	1909	1,768,805
	1904	541,197

The value of insulated wire and cables manufactured in 1909, 1904, and 1899 constituted the largest single item in the total value of electrical machinery, apparatus, and supplies reported, representing more than one-fifth of the total value of products for the industry at each census.

Of the $51,624,737 reported as the total value of insulated wire and cables, $40,250,572 was reported by establishments in the industry proper, and $11,374,165 by establishments engaged primarily in other industries. Only a small number of the establishments in the industry proper drew the wire which they insulated, while of the establishments outside the industry reporting this product the greater number were engaged primarily in wire drawing.

New Jersey, Illinois, and New York were the three states leading in this branch of the industry in 1909, reporting 63.8 per cent of the total value in that year and 66.1 per cent in 1904.

Electric measuring instruments.—Table 27 shows the value of the various kinds of electric measuring instruments for 1909 and 1904, and the total value of the production only for 1899.

Table 27	Census.	Value.
Electric measuring instruments, total	1909	$7,800,010
	1904	5,004,763
	1899	1,842,135
Meters for consumers' circuits	1909	5,613,838
	1904	3,585,080
Central station apparatus	1909	1,639,202
	1904	418,998
Testing and scientific	1909	546,970
	1904	1,000,685

The value of the output of electric measuring instruments increased $5,957,875, or 323.4 per cent, during the decade. The value of meters manufactured for consumers' circuits increased 56.6 per cent from 1904 to 1909, and central station apparatus, 291.2 per cent during the same period.

The indicating apparatus for central stations is practically uniform throughout the country, the leading types being voltmeters, ammeters, wattmeters, and watt-hour meters; but although one or two types are predominant among the consumers' meters considerable variety exists, the kind used depending somewhat upon the system used in charging for the service.

The testing and scientific apparatus constitutes a large group of appliances, including numerous types with hundreds of varieties, employed not only in practical work, but in laboratories and in physical and scientific research as well. The value of the production of this apparatus decreased 45.3 per cent from 1904 to 1909.

Miscellaneous electrical appliances.—Referring to Table 14, it will be seen that during the decade 1899–1909 there was a gain of only $10,682, or 4.7 per cent, in the value of annunciators turned out, although their manufacture increased 26.7 per cent during the later five-year period. The value of the output of electric clocks and time mechanisms, on the other hand, increased 166.8 per cent during the decade, and the combined value of rheostats and resistances, heating, cooking, and welding apparatus, and electric flatirons, 290 per cent.

Rheostats and resistances are a necessary adjunct to the use of heavy current for producing light and power, and large numbers are called for particularly in connection with the starting and regulation of electric motors, electric elevators, etc. Many small resistances, however, are now used in connection with delicate electrical instruments, as balance coils in telegraph service, or as shunting and ringing resistances in telephone circuits and relay signaling systems.

The production of apparatus for electric heating, cooking, and welding, and electric flatirons has increased rapidly during the past few years and has now become an important department in this industry.

Therapeutic apparatus was not reported separately in 1899, but the increase in the production from 1904 to 1909 was $70,896, or 6.8 per cent. A large number of medical men now employ electricity almost exclu-

sively in their work, and there are numerous clinics dealing solely with the application of electricity in the treatment of disease. The equipments of some physicians are of the most elaborate and costly character, arranged in numerous separate compartments, each fitted up with its specific or distinctive devices for X-ray work, electric light baths, charged liquid baths, the application of frictional or static electricity, and for the treatment of diseases requiring the direct internal or external application of current.

Wires for the transmission of electric current, either within buildings or underground, are now almost invariably inclosed in conduits. The value of these electric conduits produced in 1909 was $5,098,264 (see Table 14).

Underground conduits are usually of porcelain or terra cotta and are manufactured almost entirely by establishments assigned by the Bureau of the Census to the classification "pottery, terra-cotta, and fire-clay products." The value of the conduits manufactured by establishments engaged chiefly in the electrical apparatus industry given in Table 14 does not include those made in the pottery industry.

The growth in the combined value of fuses and lightning arresters during the decade was $1,346,393, or 226.1 per cent. This increase is due not only to the general increase in the use of electricity but also to the increasing recognition of the fact that it is a policy of economy to protect all classes of apparatus against lightning or other sudden or dangerous increases of the electrical energy flowing through the circuit.

There are no figures showing production of magneto-ignition apparatus, spark coils, etc., in 1899. From 1904 to 1909 the output of such apparatus, as shown by Table 14, increased in value $5,414,266, or nearly 800 per cent. The rapid development of the gasoline automobile has created an enormous demand for ignition apparatus to ignite the explosive mixture of the air and gasoline vapor in the cylinder.

The value of electric switches, signaling devices, and attachments increased $4,247,952, or 376 per cent, during the decade. These appliances are auxiliary portions of telegraphic devices for conveying intelligence as to the movements of trains, cars, elevators, and other transportation mechanisms.

Circuit fittings were not reported separately in 1899. It is probable that in 1909 some of these were included among "all other products," thus explaining the decrease of $2,445,159, or 69.4 per cent, from 1904 to 1909, shown in Table 14. The general and increasing utilization of electricity for a variety of purposes has necessitated the invention and manufacture of a class of appliances to which the general name "circuit fittings" has been given to designate that which is not part of the appliance itself, or part of the generating plant, or part of the distributing circuits and pole lines, but which at the same time is required in order to enable contractors and the public to install such apparatus advantageously.

The value of "all other products" in 1909, $39,691,708 (see Table 14), formed 16.3 per cent of the total value of products of the entire industry. Under this heading are included dynamo parts and supplies to the value of almost a million dollars; custom work and repairing to the value of $5,692,543; and also carbons of all kinds, the value of which can not be shown separately. By far the largest item entering into the total for 1909, however, was one of $18,995,176, representing the value of miscellaneous or unclassified forms of electrical machinery, apparatus, and supplies. These included electric mining machinery, automatic electric pumps, products based on late electrical inventions, and the making of special electrical apparatus to order; various devices and appliances for electrical use not designated on the schedule; panel and switch boxes, electric signs and flashers, electric flashlights; overhead trolley line material, trolley wheels, retrievers, gears, and pinions; various repair parts; insulating materials, such as mica, fiber, tape, etc.; and electrical supplies of various kinds. In addition to the products described above, there were others, to the value of $12,073,102, which were not electrical in their nature and which are ordinarily the product of other industries. The most important of these products are wire, iron and steel, foundry and machine-shop products, and moving-picture apparatus.

DETAILED STATE TABLES.

The principal statistics secured by the census inquiry concerning establishments engaged in the manufacture of electrical machinery, apparatus, and supplies are presented, by states, in Tables 28 and 29.

Table 28 shows for 1909, 1904, and 1899 the number of establishments, number of persons engaged in the industry, primary horsepower, capital invested, salaries, wages, cost of materials, value of products, and value added by manufacture, while Table 29 gives more detailed statistics for the industry for 1909 only.

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 28

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	**1909**	**1,009**	**105,600**	**439**	**17,905**	**87,256**	**158,768**	**$267,844**	**$20,193**	**$49,381**	**$108,566**	**$221,309**	**$112,743**
	1904	**784**	**71,485**	**400**	**10,619**	**60,466**	**105,376**	**174,066**	**11,091**	**31,842**	**66,837**	**140,809**	**73,972**
	1899	**581**	.....	.....	**5,067**	**42,013**	**43,674**	**83,660**	**4,632**	**20,579**	**49,458**	**92,434**	**42,976**
California	1909	27	540	11	94	435	442	779	102	240	928	1,613	685
	1904	24	521	6	112	403	278	716	113	244	434	1,004	570
	1899	11	272	5	29	238	406	181	29	130	359	556	197
Connecticut	1909	41	4,120	7	608	3,505	4,457	9,852	813	1,603	5,211	9,824	4,613
	1904	32	1,942	10	225	1,707	2,505	4,184	278	724	2,754	4,940	2,186
	1899	17	1,111	8	142	961	987	2,514	170	406	1,974	3,168	1,194
Illinois	1909	143	11,854	55	2,158	9,641	11,636	24,202	2,124	6,413	13,628	26,826	13,198
	1904	104	7,808	46	1,631	6,131	6,253	21,645	1,407	3,203	7,649	16,700	9,051
	1899	82	7,251	61	1,142	6,048	6,274	11,641	638	2,818	4,676	12,169	7,493
Indiana	1909	42	3,723	25	625	3,073	5,285	6,857	616	1,361	3,693	7,718	4,025
	1904	34	1,813	13	384	1,416	3,042	3,175	382	664	1,067	2,857	1,790
	1899	24	1,028	13	134	881	1,479	1,453	134	340	784	1,586	802
Kentucky	1909	4	146	1	28	117	161	221	23	54	101	229	128
	1904	3	83	1	9	73	160	204	8	35	84	170	86
	1899	4	.....	.....	7	56	82	76	6	24	66	118	52
Maryland	1909	7	142	2	19	121	266	216	21	41	54	147	93
	1904	6	100	6	23	161	329	191	26	66	93	225	132
	1899	6	.....	.....	26	155	298	237	27	54	112	267	155
Massachusetts	1909	83	16,725	34	2,184	14,507	14,835	32,961	2,458	8,209	12,735	28,143	15,408
	1904	72	9,706	37	871	8,798	9,341	12,735	963	5,003	7,324	15,882	8,558
	1899	54	5,801	34	565	5,202	3,068	8,200	557	2,714	5,250	10,490	5,240
Michigan	1909	40	1,496	26	252	1,218	1,355	2,244	257	494	1,030	2,327	1,297
	1904	14	597	8	60	529	379	414	59	177	294	702	408
	1899	12	222	9	29	184	309	547	29	86	182	438	256
Minnesota	1909	13	232	3	42	187	205	427	54	101	220	526	306
	1904	15	213	11	32	170	140	389	36	103	187	424	237
	1899	12	110	11	13	86	39	80	8	45	122	228	106
Missouri	1909	20	1,419	8	351	1,060	1,180	3,883	405	627	1,104	3,251	2,147
	1904	20	983	5	183	795	824	1,644	193	412	606	1,741	1,135
	1899	17	603	11	59	533	421	982	69	186	355	911	556
New Hampshire	1909	6	218	2	23	193	422	378	24	87	155	388	233
	1904	5	100	3	14	83	172	162	12	32	88	150	62
	1899	5	108	3	11	94	293	183	7	33	82	182	100
New Jersey	1909	69	13,024	22	1,903	11,099	11,326	30,229	2,234	5,615	14,426	28,365	13,939
	1904	42	7,291	11	1,012	6,268	6,547	18,458	1,003	2,894	6,873	13,803	6,930
	1899	36	.....	.....	623	3,916	2,921	7,909	667	1,903	3,539	7,533	3,994
New York	1909	217	22,819	95	3,752	18,972	53,813	60,427	4,552	12,479	27,483	49,290	21,807
	1904	175	18,064	95	1,668	16,301	33,059	30,643	1,730	9,287	17,846	35,348	17,502
	1899	134	11,594	111	1,113	10,370	11,049	17,697	904	5,667	12,539	22,695	10,156
Ohio	1909	115	9,605	40	1,483	8,073	11,959	23,706	1,529	3,847	7,226	18,777	11,551
	1904	92	6,187	50	1,023	5,114	7,138	10,408	1,079	2,268	4,699	11,019	6,320
	1899	64	4,196	29	394	3,773	5,123	7,036	399	1,502	3,339	6,505	3,166
Pennsylvania	1909	84	14,641	42	3,574	11,025	33,829	59,974	4,058	6,237	13,535	31,351	17,816
	1904	80	12,206	56	2,746	9,404	29,238	58,393	3,090	5,300	11,365	26,258	14,893
	1899	63	8,511	48	646	7,817	8,137	20,968	837	4,003	11,373	19,113	7,740
Rhode Island	1909	12	1,730	5	124	1,601	2,837	4,315	179	678	4,595	6,410	1,815
	1904	11	1,531	3	119	1,409	3,223	3,608	153	557	4,017	5,435	1,418
	1899	13	.....	.....	50	864	1,388	2,652	65	329	4,135	5,113	978
Wisconsin	1909	30	1,904	16	479	1,409	2,333	4,686	532	820	1,451	3,836	2,385
	1904	23	1,614	14	396	1,204	2,173	6,329	451	673	1,020	3,194	2,174
	1899	7	584	1	56	527	430	982	64	222	359	924	565
All other states	1909	56	1,262	36	206	1,020	2,427	2,487	212	475	991	2,288	1,297
	1904	32	636	25	111	500	575	768	108	200	437	957	520
	1899	20	.....	.....	28	308	370	262	22	117	212	438	226

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES—DETAILED STATISTICS, BY STATES: 1909.

Table 29

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States	**1,009**	**105,600**	**439**	**3,682**	**10,431**	**3,792**	**87,256**	**No 99,239**	**Ja 77,444**	**102,950**	**78,605**	**23,398**	**600**	**347**	**158,768**
California	27	540	11	32	37	25	435	No 487	Se 407	489	366	121	2	.....	442
Connecticut	41	4,120	7	161	294	153	3,505	De 4,062	My 3,215	4,149	2,659	1,290	102	98	4,457
Delaware	4	183	3	7	11	.....	162	My 210	Au 115	227	145	.....	82	.....	450
Illinois	143	11,854	55	367	1,262	529	9,641	No 11,273	Ja 8,112	11,382	8,566	2,763	44	9	11,636
Indiana	42	3,723	25	135	347	143	3,073	Oc 3,598	Ja 2,691	3,490	2,413	1,045	20	12	5,285
Iowa	9	96	4	18	4	6	64	Ap 74	Ja 42	72	64	7	1	.....	84
Kentucky	4	146	1	11	13	4	117	Se 132	My [1] 96	131	100	31	.....	.....	161
Maryland	7	142	2	9	6	4	121	De 134	Au [1] 111	134	110	16	8	.....	266
Massachusetts	83	16,725	34	544	1,149	491	14,507	De 16,926	Ja 12,239	17,020	13,414	3,451	114	41	14,835
Michigan	40	1,496	26	85	102	65	1,218	My 1,345	Au 1,051	1,302	975	327	.....	.....	1,355
Minnesota	13	232	3	20	14	8	187	Oc 198	Fe 175	201	194	4	3	.....	205
Missouri	20	1,419	8	65	221	65	1,060	De 1,193	Fe 941	1,196	937	225	2	32	1,180
New Hampshire	6	218	2	9	5	9	193	My 211	Ja 167	206	146	60	.....	.....	422
New Jersey	69	13,024	22	304	1,189	410	11,099	De 12,418	Ja 10,295	12,354	7,405	4,860	59	30	11,326
New York	217	22,819	95	875	2,090	787	18,972	De 21,912	Ja 16,653	22,503	19,345	3,102	55	1	53,813
North Carolina	3	134	2	6	3	3	120	De 157	Ja 92	157	53	104	.....	.....	38
Ohio	115	9,605	49	317	745	421	8,073	De 9,456	Ja 6,967	9,471	6,406	2,983	4	78	11,959
Pennsylvania	84	14,641	42	520	2,530	524	11,025	De 13,940	Fe 9,692	14,145	12,006	2,055	70	14	33,829
Rhode Island	12	1,730	5	34	45	45	1,601	De 1,796	Jy 1,497	1,796	1,055	702	7	32	2,837
Tennessee	5	118	.....	12	2	5	99	De 119	Je 88	119	90	28	1	.....	94
Washington	4	74	5	3	15	.....	51	De 63	Fe 41	63	63	.....	.....	.....	26
West Virginia	5	182	.....	14	17	14	137	De 188	My 102	188	184	2	2	.....	1,116
Wisconsin	30	1,904	16	110	308	61	1,409	De 1,674	Fe 1,287	1,679	1,570	98	11	.....	2,333
All other states [2]	26	475	22	24	22	20	387	.....	.....	476	339	124	13	.....	620

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States	**$267,844,432**	**$201,771,157**	**$8,284,575**	**$11,908,820**	**$49,381,145**	**$3,056,088**	**$105,510,338**	**$996,073**	**$966,649**	**$368,049**	**$21,299,442**	**$221,308,563**	**$112,742,159**
California	779,137	1,407,142	54,422	47,810	240,320	13,254	914,862	20,800	2,583	900	112,191	1,612,983	684,867
Connecticut	9,852,232	8,578,600	446,061	367,246	1,602,987	100,469	5,110,835	32,181	23,318	1,278	894,225	9,824,373	4,613,009
Delaware	764,402	442,339	12,450	5,384	88,603	17,453	275,723	1,500	1,140	.....	40,086	606,651	313,475
Illinois	24,201,532	24,937,852	762,884	1,360,742	6,412,671	233,368	13,395,080	260,876	159,782	37,172	2,315,277	26,826,177	13,197,729
Indiana	6,856,728	6,439,218	229,650	386,537	1,360,940	89,769	3,603,615	10,947	25,644	40,805	691,311	7,717,642	4,024,258
Iowa	225,561	163,855	18,538	5,301	31,181	2,376	72,122	3,040	733	.....	30,564	199,851	125,353
Kentucky	220,726	204,249	15,136	7,808	53,921	2,467	93,624	1,080	1,301	.....	23,912	228,927	127,836
Maryland	216,225	129,023	15,833	5,339	40,725	2,857	50,758	1,434	974	1,895	9,208	147,098	93,483
Massachusetts	32,961,277	26,182,536	1,183,180	1,275,078	8,209,174	461,831	12,272,989	86,786	120,781	122,552	2,450,165	28,142,889	15,408,069
Michigan	2,244,049	2,057,924	151,941	104,747	494,325	42,926	987,562	13,988	10,462	8,085	243,888	2,326,999	1,296,511
Minnesota	427,208	435,797	36,650	17,491	100,751	7,132	213,051	4,428	1,877	.....	54,417	526,101	305,918
Missouri	3,883,357	2,483,933	176,866	227,873	626,627	29,273	1,075,017	36,202	12,125	.....	299,950	3,250,535	2,146,245
New Hampshire	378,355	309,852	14,844	9,213	87,338	4,236	150,371	1,500	1,121	.....	41,229	387,843	233,236
New Jersey	30,228,611	25,551,853	833,767	1,400,610	5,614,592	374,059	14,050,866	68,204	88,812	78,224	3,042,124	28,365,377	13,939,852
New York	60,426,560	48,840,704	1,986,273	2,566,202	12,479,418	935,713	26,546,898	233,990	166,413	39,569	3,886,228	49,289,815	21,807,204
North Carolina	77,163	148,886	12,600	3,600	31,000	1,025	95,533	1,200	338	.....	3,590	149,591	53,033
Ohio	23,706,297	15,497,820	662,674	866,607	3,846,906	317,650	6,908,228	73,975	153,008	18,892	2,649,880	18,776,769	11,550,891
Pennsylvania	59,973,875	27,802,380	1,286,971	2,770,794	6,237,040	253,946	13,280,952	98,742	151,533	16,605	3,705,797	31,351,312	17,816,414
Rhode Island	4,314,783	5,787,657	89,621	89,727	677,593	64,051	4,530,685	13,113	17,710	.....	304,557	6,410,020	1,814,684
Tennessee	117,568	131,814	23,038	3,500	32,764	2,040	49,788	840	548	.....	19,296	174,306	122,478
Washington	104,448	111,257	5,860	4,543	35,214	1,101	57,027	2,630	387	.....	4,495	126,044	67,916
West Virginia	562,508	301,848	31,532	18,547	77,263	12,804	122,391	3,516	1,910	.....	33,885	398,331	263,136
Wisconsin	4,086,083	3,235,659	194,762	337,529	819,998	75,368	1,375,211	14,449	20,541	2,072	395,729	3,835,800	2,335,221
All other states [2]	635,747	588,954	39,022	26,592	179,794	9,698	272,150	10,652	3,608	.....	47,438	633,129	351,281

[1] Same number reported for one or more other months.
[2] All other states embrace: Alabama, 1 establishment; Arizona, 1; Arkansas, 1; Colorado, 4; District of Columbia, 2; Georgia, 2; Kansas, 1; Louisiana, 2; Maine, 2; Nebraska, 2; Oklahoma, 1; Oregon, 1; South Carolina, 1; Texas, 1; Vermont, 2; Virginia, 2.

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SHIPBUILDING

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SHIPBUILDING, INCLUDING BOAT BUILDING.

GENERAL STATISTICS OF THE INDUSTRY.

Scope and character of the industry.—The shipbuilding and boat-building industry includes all establishments engaged primarily in the construction or repair of ships and boats. Data for shipyards owned by the Federal Government were also collected, but these are shown separately and not included with the general totals for the industry or in those for all manufacturing industries combined. Aside from establishments assigned to the shipbuilding industry, there are a number of establishments assigned to other industries which incidentally build or repair ships or boats, and statistics as to the number and tonnage of the vessels launched by such establishments are presented in connection with the tables giving similar statistics for establishments in the shipbuilding industry.

In the statistics for the shipbuilding industry in the United States, the Bureau of the Census has distinguished between iron and steel shipbuilding and wooden shipbuilding and boat building. The former branch is further subdivided so as to distinguish (1) establishments doing chiefly new construction work on vessels of 5 tons or over and (2) establishments doing repair work exclusively. Establishments in the wooden-shipbuilding business are subdivided into four groups: (1) Establishments engaged primarily in new construction work on vessels of 5 tons or over; (2) establishments doing repair work only; (3) establishments engaged primarily in building boats of less than 5 tons; and (4) establishments making masts, spars, and oars, and those engaged in rigging vessels. These branches and subbranches of the industry are not, however, distinguished in the tables giving statistics by states, as to do so might result in the disclosure of individual operations. There is some overlapping between the different branches and subbranches.

Summary for the United States: 1909.—Table 1 presents a summary of the statistics for establishments assigned to the shipbuilding industry, by branches and subbranches. The table does not include data for establishments operated by the Federal Government or for establishments engaged primarily in other industries, and the same is true of all tables unless otherwise expressly stated.

Table 1

	Aggregate.	ESTABLISHMENTS ENGAGED PRIMARILY IN—							
		Iron and steel shipbuilding.			Wooden shipbuilding and boat building.				
		Total.	New construction.[1]	Repair work only.[2]	Total.	New construction.[1]	Repair work only.	Making boats under 5 tons.	Making masts, spars, and oars, and rigging vessels.
Number of establishments	1,353	53	38	15	1,300	369	134	767	30
Persons engaged in the industry	44,949	30,041	25,940	4,101	14,908	7,486	3,507	3,742	173
Proprietors and firm members	1,463	21	14	7	1,442	422	110	875	35
Salaried employees	2,980	1,877	1,684	193	1,103	451	332	313	7
Wage earners (average number)	40,506	28,143	24,242	3,901	12,363	6,613	3,065	2,554	131
Primary horsepower	88,063	57,697	[3]	[3]	30,366	[3]	[3]	[3]	[3]
Capital	$126,118,489	$100,171,936	$88,710,172	$11,461,764	$25,946,553	$12,789,297	$7,356,816	$5,563,121	$237,319
Expenses	67,521,967	46,928,188	41,144,060	5,784,128	20,593,779	12,017,624	3,819,108	4,497,698	259,349
Services	29,303,132	20,128,803	17,430,889	2,697,914	9,174,329	5,229,843	2,043,180	1,813,110	88,196
Salaries	4,035,446	2,913,627	2,674,808	238,819	1,121,819	565,351	284,078	263,277	8,213
Wages	25,267,686	17,215,176	14,756,081	2,459,095	8,052,510	4,664,492	1,758,202	1,549,833	79,983
Materials	31,214,358	21,716,410	19,583,525	2,132,885	9,497,948	5,817,434	1,417,506	2,118,462	144,546
Miscellaneous	7,004,477	5,082,975	4,129,646	953,329	1,921,502	970,347	358,422	566,126	26,607
Value of products	73,360,315	49,617,278	42,722,549	6,894,729	23,743,037	13,494,947	4,458,128	5,457,763	332,199
Value added by manufacture (value of products less cost of materials)	42,145,957	27,900,868	23,139,024	4,761,844	14,245,089	7,677,513	3,040,622	3,339,301	187,653

[1] On vessels of 5 tons or more. [2] Includes 1 establishment making boats under 5 tons. [3] Not tabulated separately.

In 1909 there were 1,353 establishments engaged in the shipbuilding industry as a whole, which gave employment to 40,506 wage earners, to whom $25,267,686 was paid in wages. The value of products (value of work done) was $73,360,315, while the cost of materials was $31,214,358, equal to 42.5 per cent of the value of products. The value added by manufacture was $42,145,957.

It may be noted that a considerable part of the value of products for the shipbuilding industry represents the receipts for repair work. The amount of such receipts for 1909, together with other statistics as to the products of the industry, is shown in Table 27.

While the number of establishments engaged in iron and steel shipbuilding is comparatively small, these establishments in 1909 gave employment to 69.5 per

cent of the total number of wage earners in the industry as a whole and contributed 67.6 per cent of the total value of products. The average value of products per establishment for the industry as a whole in 1909 was $54,220; but for iron and steel shipbuilding the average was $936,175, as against $18,264 for wooden shipbuilding and boat building. In this connection it should be noted that many small establishments engaged chiefly in building small boats or in the making of masts, spars, and oars and in rigging vessels are included in the total for wooden shipbuilding.

In the iron and steel shipbuilding industry the establishments engaged in new construction reported 86.1 per cent of the total value of products in 1909, 13.9 per cent being reported by yards doing repair work only. In the wooden shipbuilding and boat building industry the proportions of the total value of products contributed by the establishments in the four subbranches were as follows: Establishments engaged in new construction on vessels of 5 tons or over, 56.8 per cent; those doing repair work only, 18.8 per cent; those constructing only boats of less than 5 tons, 23 per cent; and establishments making masts, spars, and oars and rigging vessels, 1.4 per cent. It may be noted that both in iron and steel shipbuilding and in wooden shipbuilding the value of repair work done in establishments engaged principally in new construction was greater than that done by establishments engaged exclusively in repair work.[1]

Comparison with earlier censuses.—Table 2 summarizes the statistics of the shipbuilding industry as a whole (exclusive of Government establishments and establishments assigned to other industries) for each census from 1869 to 1909, inclusive.

[1] This can be seen by a comparison of the figures in Table 1 with the statistics of the total value of repairs to iron and steel and wooden vessels, as given in Table 28.

Table 2

	SHIPBUILDING, INCLUDING BOAT BUILDING.											
	Number or amount.						Per cent of increase.[1]					
	1909	1904	1899	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	1,353	1,097	1,107	1,006	2,188	964	22.2	23.3	−0.9	10.0	−54.0	127.0
Persons engaged in the industry	44,949	54,424	(2)	(2)	(2)	(2)	.....	−17.4	.....	.....	.....	.....
Proprietors and firm members	1,463	1,190	(2)	(2)	(2)	(2)	.....	22.9	.....	.....	.....	.....
Salaried employees	2,980	2,480	1,405	(2)	(2)	(2)	112.1	20.2	76.5	.....	.....	.....
Wage earners (average number)	40,506	50,754	46,747	22,143	21,345	13,915	−13.4	−20.2	8.6	111.1	(3)	(3)
Primary horsepower	88,063	78,127	61,797	18,192	(2)	5,136	42.5	12.7	26.4	239.7	.....	.....
Capital	$126,118,489	$121,623,700	$77,341,001	$27,262,892	$20,979,874	$11,463,076	63.1	3.7	57.3	183.7	29.9	83.0
Expenses	67,521,967	75,299,513	63,991,682	32,192,616	(2)	(2)	5.5	−10.3	17.7	98.8	.....	.....
Services	29,303,132	32,580,828	26,831,975	14,278,819	12,713,813	7,073,400	9.2	−10.1	21.4	87.9	12.3	29.7
Salaries	4,035,446	3,339,741	2,007,237	(2)	(2)	(2)	101.0	20.8	66.4	.....	.....	.....
Wages	25,267,686	29,241,087	24,824,738	(2)	(2)	(2)	1.8	−13.6	17.8	89.7	2.9	79.7
Materials	31,214,358	37,463,179	33,474,896	16,521,246	19,736,358	9,379,980	−6.8	−16.7	11.9	102.6	−16.3	110.4
Miscellaneous	7,004,477	5,255,506	3,684,811	1,392,551	(2)	(2)	90.1	33.3	42.6	164.6	.....	.....
Value of products	73,360,315	82,769,239	74,532,277	38,065,410	36,800,327	21,483,967	−1.6	−11.4	11.1	95.8	3.4	71.3
Value added by manufacture (value of products less cost of materials)	42,145,957	45,306,060	41,057,381	21,544,164	17,063,969	12,103,987	2.7	−7.0	10.3	90.6	26.3	41.0

[1] A minus sign (−) denotes decrease. Where percentages are omitted comparable figures are not available.
[2] Comparable figures not available.
[3] Percentage omitted because figures are not strictly comparable.

The financial figures for 1869 are given in currency, which at that time was worth only about 80 cents, gold, to the dollar. For strict comparison, therefore, these figures should be reduced about 20 per cent.

The number of establishments in the industry in 1909, 1,353, was greater than the number shown for any prior census, with the exception of that for 1879, when 2,188 were reported. While the number of establishments showed a decided increase from 1904 to 1909, most of the other important items showed decreases for this period. Between 1899 and 1909 the average number of wage earners decreased 13.4 per cent and the value of products 1.6 per cent, but there was an increase of 2.7 per cent in the value added to materials by manufacture. This decrease in number of wage earners and value of products is due largely to the dismantling of a large shipyard in Connecticut after the completion of the steamships *Minnesota* and *Dakota*, to a decrease in construction in certain establishments in Pennsylvania, and to a reduction in the output of one large establishment in California.

Government establishments.—Table 3 presents a comparative summary for the census years 1909 and 1904 of the general statistics of shipbuilding establishments operated by the Federal Government, so far as these statistics are comparable with corresponding figures for privately operated establishments.

Table 3

	GOVERNMENT SHIPYARDS.		
	Number or amount.		Per cent of increase: 1904–1909.
	1909	1904	
Number of establishments	12	9	33.3
Persons engaged in the industry	16,425	13,932	17.9
Salaried employees	1,888	[1] 1,728	9.3
Wage earners (average number)	14,537	12,204	19.1
Primary horsepower	32,525	13,933	133.4
Amount paid for services	$15,317,330	$11,853,230	29.2
Salaries	2,646,806	[1] 2,130,475	24.2
Wages	12,670,524	9,722,764	30.3
Cost of materials	9,526,109	6,731,931	41.5
Value of products	25,872,033	17,265,469	49.8

[1] The figures do not agree with those contained in the report for 1904, as the statistics for that year were revised after the publication of that report.

The increases shown in the above table are accounted for by the growth of the Navy, which has resulted in an

increasing expenditure for repairs and other work in the navy yards of the country.

Summary, by states.—Table 4 summarizes the most important statistics of the shipbuilding industry, by states, the states being arranged according to the value of products reported for 1909. Data for Government shipyards are not included.

In determining the rank of the states, all states are considered, whether or not they are shown separately in the table; hence some omissions occur in the several series of numbers indicating rank, as certain states included under "all other states" held a higher rank than some of the states for which separate figures are given.

Table 4

SHIPBUILDING, INCLUDING BOAT BUILDING.

STATE.	Number of establishments: 1909	Wage earners.				Value of products.				Value added by manufacture.				Per cent of increase.[1]								
		Average number: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Wage earners (average number).			Value of products.			Value added by manufacture.		
				1909	1904			1909	1904			1909	1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904
United States	1,353	40,506	100.0	....	....	$73,360,315	100.0	....	....	$42,145,957	100.0	....	....	−13.4	−20.2	8.6	−1.6	−11.4	11.1	−2.7	7.0	10.3
New York	255	5,644	13.9	1	3	11,417,189	15.6	1	1	7,492,523	17.8	1	1	1.3	−12.2	15.4	32.0	1.3	30.3	35.5	3.0	31.5
New Jersey	97	4,869	12.0	3	4	8,840,515	12.1	2	4	4,591,239	10.9	2	4	69.4	0.1	69.2	83.8	14.3	60.8	60.6	7.5	49.4
Massachusetts	115	3,604	8.9	4	6	6,995,847	9.5	4	6	4,265,154	10.1	3	6	124.4	.....	.....	128.9	.....	.....	150.9	.....	.....
Pennsylvania	31	3,558	8.8	5	2	6,178,145	8.4	5	2	3,468,501	8.2	5	2	−49.7	−45.4	−8.0	−57.4	−40.2	−28.7	−52.6	−32.6	−29.7
Ohio	39	3,200	7.9	6	9	5,676,416	7.7	6	10	3,214,574	7.6	6	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	91	2,344	5.8	7	10	5,033,836	6.9	7	11	2,544,064	6.0	8	10	−19.6	17.3	−31.5	13.6	69.3	−32.9	13.9	34.3	−15.2
California	43	1,844	4.6	8	5	4,132,176	5.6	8	5	2,895,127	6.9	7	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland	46	1,793	4.4	9	7	3,534,575	4.8	9	8	1,685,446	4.0	10	7	−30.5	−35.3	7.4	−14.1	−22.2	10.3	−27.6	−38.8	18.3
Maine	156	1,755	4.3	10	8	3,061,635	4.2	10	9	1,892,542	4.5	9	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Delaware	10	1,239	3.1	11	12	1,990,240	2.7	11	13	1,009,587	2.4	12	13	498.6	10.4	442.0	452.8	11.7	.....	387.4	13.9	.....
Wisconsin	52	906	2.3	12	14	1,899,622	2.6	12	16	1,081,084	2.6	11	15	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	60	744	1.8	13	11	1,550,187	2.1	13	12	987,829	2.4	13	12	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island	13	535	1.3	14	13	817,281	1.1	14	14	512,953	1.2	14	14	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut	43	427	1.1	16	10	742,254	1.0	15	7	427,047	1.0	16	11	−53.3	−78.6	118.4	−39.5	−83.7	271.6	−21.9	−75.6	220.5
Florida	52	482	1.2	15	16	696,644	1.0	16	19	464,087	1.1	15	18	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	23	413	1.0	17	15	583,783	0.8	17	15	385,028	0.9	18	16	.....	.....	.....	.....	.....	.....	.....	.....	.....
Louisiana	25	374	0.9	18	18	572,602	0.8	18	18	418,389	1.0	17	17	51.4	.....	.....	129.2	.....	.....	135.4	.....	.....
Oregon	24	212	0.5	20	21	477,116	0.7	19	21	272,976	0.7	19	21	.....	25.4	.....	.....	60.6	.....	−21.3	56.9	.....
Minnesota	33	209	0.5	21	19	377,423	0.5	20	20	219,828	0.5	20	20	.....	−6.7	.....	.....	10.2	.....	.....	−8.8	72.7
Indiana	15	253	0.6	19	17	374,511	0.5	21	17	131,355	0.3	21	19	.....	−16.2	.....	.....	−21.5	.....	.....	−49.0	4.1
Kentucky	10	157	0.4	22	24	271,067	0.4	22	26	115,903	0.3	23	26	51.0	36.5	10.6	.....	79.5	.....	.....	12.6	.....
Iowa	17	76	0.2	26	25	182,036	0.2	23	24	96,665	0.2	24	25	.....	−30.3	.....	.....	6.4	.....	.....	−10.2	.....
Mississippi	15	91	0.2	25	23	161,416	0.2	24	22	95,845	0.2	25	23	.....	−32.6	.....	38.8	−34.0	110.3	.....	−34.5	.....
Alabama	4	128	0.3	23	20	159,961	0.2	25	23	117,679	0.3	22	22	−56.3	−26.4	−40.6	−33.3	−26.4	−9.2	−27.6	−22.4	−6.7
West Virginia	3	107	0.3	24	26	151,156	0.2	26	27	91,070	0.2	26	27	.....	.....	.....	.....	30.2	.....	.....	.....	.....
North Carolina	10	53	0.1	27	27	100,254	0.1	27	28	52,968	0.1	27	28	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	6	36	0.1	28	29	75,662	0.1	28	30	41,284	0.1	28	29	.....	.....	.....	−69.7	.....	−59.5	.....	.....	.....
Tennessee	3	15	(2)	30	31	26,424	(2)	29	34	17,245	(2)	29	32	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Hampshire	8	9	(2)	32	33	17,175	(2)	31	33	12,650	(2)	31	33	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vermont	7	11	(2)	31	....	14,010	(2)	32	....	9,660	(2)	32	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	3	1	(2)	35	33	8,420	(2)	34	31	6,329	(2)	34	31	.....	.....	.....	.....	.....	.....	.....	.....	.....
All other states	44	5,417	13.4	....	....	7,240,737	9.9	....	....	3,529,236	8.4	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Percentages are based on figures in Table 32; a minus sign (−) denotes decrease. Percentage not shown where base is less than 100 for wage earners or less than $100,000 for value of products or value added by manufacture, or where comparable figures can not be given without disclosing individual operations.
[2] Less than one-tenth of 1 per cent.

Establishments in the shipbuilding industry were reported for 37 of the states and the District of Columbia in 1909. New York was the most important state in the industry, ranking first in number of wage earners, value of products, and value added by manufacture. In 1909 the industry in this state gave employment to 5,644 wage earners, or 13.9 per cent of the total for the United States, and reported products valued at $11,417,189, or 15.6 per cent of the total, while the value added by manufacture amounted to $7,492,523, or 17.8 per cent of the total. The figures for Virginia, the second state in rank as to number of wage earners, the third as to value of products, and the fourth as to value added by manufacture, can not be shown without disclosing the operations of individual establishments. New Jersey was the third state in respect to number of wage earners and the second in respect to value of products and value added by manufacture. Massachusetts held fourth rank in number of wage earners and value of products, but ranked third in value added by manufacture, while Pennsylvania ranked fifth in all three respects.

The rank of the leading states, according to value of products, differed considerably in 1904 from their rank in 1909. Pennsylvania, which was second in rank in 1904, had dropped to fifth in 1909, and Massachusetts, which ranked sixth in 1904, was fourth in 1909 in two of the items and third in the other.

In value of products Ohio shows a greater percentage of gain for the decade than any other state, namely, 1,067.9. Among the other states prominent in the shipbuilding industry, Delaware, Wisconsin, California, and Massachusetts each made gains of over 100 per cent in value of products for the decade. In New York, the leading state, the increase in value of products was 32 per cent. In Pennsylvania, Maryland,

Connecticut, and several other states the value of products was less in 1909 than in 1899.

Persons engaged in the industry.—Table 5 shows, for the industry as a whole and for each of its two main branches separately, the number of persons engaged in 1909, classified according to occupational status and sex, and, in the case of wage earners, according to age. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

Table 5

BRANCH OF INDUSTRY AND CLASS OF PERSONS.	PERSONS ENGAGED IN THE INDUSTRY: 1909		
	Total.	Male.	Female.
SHIPBUILDING, INCLUDING BOAT BUILDING.			
All classes	**44,949**	**44,597**	**352**
Proprietors and officials	2,471	2,447	24
Proprietors and firm members	1,463	1,440	23
Salaried officers of corporations	307	306	1
Superintendents and managers	641	641	.....
Clerks	1,972	1,706	266
Wage earners (average number)	40,506	40,444	62
16 years of age and over	40,135	40,073	62
Under 16 years of age	371	371	.....
SHIPBUILDING, IRON AND STEEL.			
All classes	**30,041**	**29,890**	**151**
Proprietors and officials	491	491	.....
Proprietors and firm members	21	21	.....
Salaried officers of corporations	122	122	.....
Superintendents and managers	348	348	.....
Clerks	1,407	1,302	105
Wage earners (average number)	28,143	28,097	46
16 years of age and over	27,794	27,748	46
Under 16 years of age	349	349	.....
SHIPBUILDING, WOODEN, INCLUDING BOAT BUILDING.			
All classes	**14,908**	**14,707**	**201**
Proprietors and officials	1,980	1,956	24
Proprietors and firm members	1,442	1,419	23
Salaried officers of corporations	245	244	1
Superintendents and managers	293	293	.....
Clerks	565	404	161
Wage earners (average number)	12,363	12,347	16
16 years of age and over	12,341	12,325	16
Under 16 years of age	22	22	.....

The average number of persons engaged in the industry as a whole during 1909 was 44,949, of whom 40,506, or 90.1 per cent, were wage earners; 2,471, or 5.5 per cent, proprietors and officials; and 1,972, or 4.4 per cent, clerks—a class which includes other subordinate salaried employees. Of the total number employed in the industry, 44,597, or 99.2 per cent, were males, and 352, or eight-tenths of 1 per cent, were females. Most of the females were clerks, only 62 being wage earners. The average number of boys under 16 years of age was 371, or eight-tenths of 1 per cent of the total.

In iron and steel shipbuilding 93.7 per cent of all persons engaged were wage earners, 1.6 per cent proprietors and officials, and 4.7 per cent clerks.

In wooden shipbuilding 82.9 per cent of all persons engaged were wage earners, the greater prevalence of individual ownership in this branch of the industry being shown by the fact that 9.7 per cent were proprietors and firm members.

The average number of wage earners for each state, as reported at the censuses of 1909, 1904, and 1899, is given in Table 32. The distribution of the average number by sex and age is not shown for the individual states, but Table 33 gives such a distribution of the number employed on December 15, or the nearest representative day.

In order to compare the distribution of persons engaged in the industry according to occupational status in 1909 with that in 1904, it is necessary to use the classification employed at the earlier census (see Introduction). Such a comparison is made in Table 6.

Table 6

CLASS.	PERSONS ENGAGED IN THE INDUSTRY—ALL BRANCHES COMBINED.				
	1909		1904		Per cent of increase:[1] 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	**44,949**	**100.0**	**54,424**	**100.0**	**−17.4**
Proprietors and firm members	1,463	3.3	1,190	2.2	22.9
Salaried employees	2,980	6.6	2,480	4.6	20.2
Wage earners (average number)	40,506	90.1	50,754	93.3	−20.2

[1] A minus sign (−) denotes decrease.

Table 7 shows the average number of wage earners in the industry, distributed according to age, and, in the case of those 16 years of age and over, according to sex, for 1909, 1904, and 1899. There was a marked reduction between 1899 and 1909 in the number of children employed.

Table 7

CLASS.	AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY—ALL BRANCHES COMBINED.					
	1909		1904		1899	
	Number.	Per cent distribution.	Number.	Per cent distribution.	Number.	Per cent distribution.
Total	**40,506**	**100.0**	**50,754**	**100.0**	**46,747**	**100.0**
16 years of age and over	40,135	99.1	49,980	98.5	45,745	97.9
Male	40,073	98.9	49,915	98.3	45,711	97.8
Female	62	0.2	65	0.1	34	0.1
Under 16 years of age	371	0.9	774	1.5	1,002	2.1

Wage earners employed, by months.—Table 8 gives the number of wage earners employed in the industry on the 15th (or the nearest representative day) of each month during the year 1909 for the 14 states in which an average of more than 500 wage earners were employed during the year.

The largest number of wage earners reported for any month of 1909 was 42,256 for April, and the smallest number 37,565 for February, the latter number forming 88.9 per cent of the former. Employment throughout the year in the different states was fairly uniform. In 1904 the maximum number, 53,975, was reported

for April, and the minimum, 47,476, or 88 per cent of the maximum, for January.

Table 8 shows further that the month of maximum employment varied considerably among the states. In Massachusetts January was the month of maximum employment; in Ohio, March; in Maine, Maryland, and New Jersey, April; in Michigan, New York, Rhode Island, and Washington, May; in Virginia, September; in California and Pennsylvania, November; and in Delaware and Wisconsin, December.

The month of maximum and of minimum employment for 1909 and the number of wage earners reported for these months are given in Table 33 for each state for which separate statistics can be presented.

Table 8

STATE.	WAGE EARNERS EMPLOYED IN THE SHIPBUILDING INDUSTRY: 1909[1]												
	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	**40,506**	**38,516**	**37,565**	**39,922**	**42,256**	**42,244**	**41,690**	**40,190**	**39,149**	**40,283**	**41,151**	**41,023**	**42,075**
California	1,844	1,596	1,607	1,549	1,713	*1,512*	1,580	1,668	1,844	1,958	2,188	**2,553**	2,357
Delaware	1,239	1,351	1,230	1,207	**1,293**	1,077	1,090	1,128	*996*	1,216	1,308	1,433	**1,541**
Maine	1,755	1,666	1,736	1,910	**1,975**	1,964	1,755	1,704	1,741	1,741	1,701	1,642	*1,580*
Maryland	1,793	*1,583*	1,662	1,843	**1,925**	1,849	1,887	1,882	1,657	1,924	1,804	1,637	1,920
Massachusetts	3,604	**4,180**	3,608	3,552	3,522	3,533	3,440	3,467	*3,415*	3,522	3,722	3,531	3,756
Michigan	2,344	1,660	2,016	2,588	3,190	**3,492**	2,871	2,687	2,454	2,237	1,836	*1,536*	1,560
New Jersey	4,869	4,901	*4,481*	4,764	**5,223**	5,138	4,600	4,736	4,872	5,047	5,085	4,832	4,802
New York	5,644	5,169	*4,868*	5,881	6,346	**6,437**	6,194	5,294	4,960	5,016	5,526	5,824	5,605
Ohio	3,200	4,108	4,172	**4,231**	4,049	3,638	3,257	2,487	2,176	*1,945*	2,445	2,514	3,318
Pennsylvania	3,558	3,249	*3,144*	3,201	3,156	3,214	3,635	3,722	3,502	3,657	4,011	**4,148**	4,057
Rhode Island	535	561	543	634	642	**677**	534	500	410	*407*	445	520	542
Virginia	5,382	4,140	4,021	*3,931*	4,133	4,669	5,753	6,064	6,343	**6,568**	6,554	6,370	6,040
Washington	744	*619*	668	806	925	**952**	797	753	682	649	642	711	716
Wisconsin	906	892	952	*795*	858	931	952	898	928	861	886	820	**1,105**

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

Prevailing hours of labor.—In Table 9 the wage earners in the shipbuilding industry in 1909 have been classified according to the number of hours of labor prevailing in the establishments in which they were employed. The average number of wage earners employed during the year in each establishment has been classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or less number of hours.

Table 9

STATE.	AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY—ALL BRANCHES COMBINED: 1909							
	Total.	In establishments with prevailing hours—						
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.	72 and over.
United States	**40,506**	**3,865**	**2,674**	**9,883**	**10,045**	**14,038**	**1**	.....
California	1,844	228	1,144	400	.....	72	.....	.....
Delaware	1,239	.....	.....	1,159	50	30	.....	.....
Maine	1,755	26	3	179	1,265	282	.....	.....
Maryland	1,793	74	32	464	1,056	167	.....	.....
Massachusetts	3,604	94	170	658	2,673	9	.....	.....
Michigan	2,344	2	3	85	1,093	1,161	.....	.....
New Jersey	4,869	150	191	1,278	340	2,910	.....	.....
New York	5,644	2,271	882	2,000	160	331	.....	.....
Ohio	3,200	3	16	131	375	2,675	.....	.....
Pennsylvania	3,558	378	156	143	2,842	39	.....	.....
Rhode Island	535	1	.....	512	.....	22	.....	.....
Virginia	5,382	13	4	259	11	5,095	.....	.....
Washington	744	272	2	452	.....	18	.....	.....
Wisconsin	906	4	.....	501	33	368	.....	.....

More than four-fifths (83.9 per cent) of the wage earners employed in the industry in 1909 worked in establishments where the prevailing number of hours was from 54 to 60, inclusive, per week. Of the seven groups shown in Table 9, the largest was that made up of wage earners in establishments where the prevailing hours were 60 per week. In four of the states shown in the table, 54 hours per week was the most common time of employment reported, and in four others more than 54 but less than 60, while in four states 60 hours per week was the most common working time.

Character of ownership.—Table 10 presents statistics with respect to the character of ownership of establishments in the industry.

Table 10

CHARACTER OF OWNERSHIP.	SHIPBUILDING, INCLUDING BOAT BUILDING.			
	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	**1,353**	**1,097**	**$73,360,315**	**$82,769,239**
Individual	824	673	6,796,334	8,932,284
Firm	282	224	4,917,433	5,945,180
Corporation	[1] 247	200	61,646,548	67,891,775
Per cent of total	**100.0**	**100.0**	**100.0**	**100.0**
Individual	60.9	61.3	9.3	10.8
Firm	20.8	20.4	6.7	7.2
Corporation	[1] 18.3	18.2	84.0	82.0

[1] Includes 1 small establishment under "other" ownership, to avoid disclosure of individual operations.

The most important distinction shown is that between corporate and all other forms of ownership. Of the total number of plants reported for 1909, 247 (including one under "other" ownership), or 18.3 per cent, were under corporate ownership, as compared with 18.2 per cent in 1904. While corporations thus controlled less than one-fifth of the total number of establishments in 1909, the value of the products of these establishments represented 84 per cent of the total value of products for all establishments engaged in the industry. But little change took place from 1904 to 1909 in the relative importance of the several forms of ownership.

Table 11 shows, for 13 of the leading states, statistics for establishments under each of the three forms of ownership in 1909.

In 1909, of the total number of wage earners in the industry, 3,660, or 9 per cent, were employed in establishments under individual ownership; 2,371, or 5.9 per cent, in those under firm ownership; and 34,475, or 85.1 per cent, in those owned by corporations.

Table 11

SHIPBUILDING, INCLUDING BOAT BUILDING: 1909

STATE.	Number of establishments owned by—			Wage earners in establishments owned by—			Value of products of establishments owned by—			Value added by manufacture in establishments owned by—		
	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.
United States	**824**	**282**	**247**	**3,660**	**2,371**	**34,475**	**$6,796,334**	**$4,917,433**	**$61,646,548**	**$4,011,175**	**$2,941,958**	**$35,192,824**
California	19	10	14	80	78	1,686	242,994	223,530	3,065,652	134,348	141,749	2,619,030
Delaware	4	2	4	(X)	(X)	1,239	(X)	(X)	1,990,240	(X)	(X)	1,009,587
Maine	116	24	16	220	244	1,291	506,087	556,424	1,999,124	281,053	287,014	1,324,475
Maryland	28	9	9	212	142	1,439	331,736	222,158	2,980,681	187,583	123,099	1,374,764
Massachusetts	78	22	15	278	105	3,221	578,803	218,005	6,199,039	325,916	134,530	3,804,708
Michigan	59	19	13	422	166	1,756	446,136	360,539	4,227,161	261,150	210,042	2,072,872
New Jersey	60	16	21	294	210	4,365	457,006	363,116	8,020,393	288,561	216,478	4,086,200
New York	169	42	44	981	510	4,153	2,049,969	1,163,113	8,204,107	1,220,127	725,812	5,546,584
Ohio	20	8	11	177	58	2,965	238,880	114,253	5,323,283	125,050	59,051	3,030,473
Pennsylvania	15	7	9	62	76	3,420	136,267	206,748	5,835,130	80,028	107,921	3,280,642
Rhode Island	6	3	4	42	8	485	75,240	27,430	714,611	49,042	14,746	449,165
Washington	30	23	7	120	187	437	282,060	424,007	844,120	177,532	279,990	530,307
Wisconsin	27	11	14	50	76	780	107,163	121,136	1,671,323	67,975	69,049	944,060

NOTE.—In Delaware, in order to avoid disclosing the returns for the establishments under individual and firm ownership, the figures for these groups have been consolidated with those for establishments under corporate ownership and an (X) is placed in the columns from which the figures have been omitted. The figures for establishments under corporate ownership include those for one small establishment under an unclassified form of ownership.

There is considerable variation among the states as to the relative importance of the establishments operated by individuals, firms, and corporations. Thus in Pennsylvania establishments operated by corporations constituted 29 per cent of all establishments in the industry, reported 94.4 per cent of the total value of products, and gave employment to 96.1 per cent of all the wage earners; while in Washington such establishments constituted only 11.7 per cent of the total number of establishments, reported 54.5 per cent of the value of products, and gave employment to 58.7 per cent of the wage earners.

Size of establishments.—Table 12 shows, for the shipbuilding industry as a whole and for each of its branches and subbranches, the average number of wage earners per establishment in 1909, together with the average value of products and average value added by manufacture.

Table 12

BRANCH OF INDUSTRY.	AVERAGE PER ESTABLISHMENT: 1909		
	Number of wage earners.	Value of products.	Value added by manufacture.
All branches	**29.9**	**$54,220**	**$31,150**
Iron and steel shipbuilding	531.0	936,175	526,431
New construction on vessels of 5 tons and over	637.9	1,124,278	608,922
Repair work only	260.1	459,649	317,456
Wooden shipbuilding and boat building	9.5	18,264	10,958
New construction on vessels of 5 tons and over	17.9	36,572	20,806
Repair work only	22.9	33,270	22,691
Making boats under 5 tons	3.3	7,116	4,354
Making masts, spars, and oars, and rigging vessels	4.4	11,073	6,255

This table brings out the great differences among the several branches and subbranches with respect to average size of establishments. For all branches combined the average value of products per establishment decreased from $75,451 in 1904 to $54,220 in 1909, and the average value added by manufacture from $41,300 to $31,150. The average number of wage earners per establishment likewise shows a decrease from 46 in 1904 to 30 in 1909. The decrease in the average number of wage earners and in the average value of products per establishment is due to two things—a decline in that branch of the shipbuilding industry represented chiefly by the large establishments building vessels of over 5 tons, and an increase in that branch of the industry represented by the small establishments building boats of less than 5 tons. There was an absolute decrease in the number of establishments and value of products for the former class and an increase in the number and value of products of the establishments of the latter class.

Table 13 classifies the establishments in the shipbuilding industry as a whole according to the value of their products for each group for 1909 and 1904. It is evident from the statistics presented in Table 12 that such a classification of establishments, if made for each of the two main branches of the industry, would show great differences between them, the proportion of large establishments being much greater in iron and steel shipbuilding than in wooden shipbuilding. The number of establishments engaged in iron and steel shipbuilding is, however, so small (only 53) that it was not considered worth while to classify them separately.

Table 13

VALUE OF PRODUCTS PER ESTABLISHMENT.	SHIPBUILDING, INCLUDING BOAT BUILDING.			
	Number of establishments.		Value of products.	
	1909	1904	1909	1904
Total	1,353	1,097	$73,360,315	$82,769,239
Less than $5,000	682	486	1,534,941	1,065,751
$5,000 and less than $20,000	361	296	3,688,013	2,986,779
$20,000 and less than $100,000	218	209	9,388,497	9,144,370
$100,000 and less than $1,000,000	78	90	21,143,086	21,484,372
$1,000,000 and over	14	16	37,605,778	48,087,967
Per cent of total	100.0	100.0	100.0	100.0
Less than $5,000	50.4	44.3	2.1	1.3
$5,000 and less than $20,000	26.7	27.0	5.0	3.6
$20,000 and less than $100,000	16.1	19.1	12.8	11.0
$100,000 and less than $1,000,000	5.8	8.2	28.8	26.0
$1,000,000 and over	1.0	1.5	51.3	58.1

Of the 1,353 establishments reported for 1909, 14, or 1 per cent, reported products valued at $1,000,000 or over. In 1904 there were 16 establishments of this class out of a total of 1,097. While such establishments represented a comparatively small proportion of the total number at both censuses, they reported 51.3 per cent of the value of products in 1909 and 58.1 per cent in 1904.

The increase between 1904 and 1909 in the number of establishments with products valued at less than $5,000 is doubtless attributable largely to the increase in the number of small concerns engaged in building motor boats and other small craft.

Table 14 presents a classification of the establishments in the shipbuilding industry according to the number of wage earners employed, for the United States and for each state in which an average of more than 500 wage earners were employed in 1909.

Table 14

STATE.	SHIPBUILDING, INCLUDING BOAT BUILDING: 1909																	
	Total.		Establishments employing—															
			No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number)	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States.	**1,353**	**40,506**	**192**	**711**	**1,456**	**257**	**2,841**	**94**	**3,089**	**52**	**3,632**	**23**	**3,978**	**10**	**3,355**	**6**	**4,311**	**8**	**17,844**
California	43	1,844	3	19	46	11	124	5	133	1	73	3	502	.....	.....	1	966	.....	.....
Delaware	10	1,239	.....	3	12	3	24	2	53	.....	.....	.....	.....	1	484	1	666	.....	.....
Maine	156	1,755	33	93	125	21	237	6	227	2	117	.....	.....	.....	.....	.....	.....	1	1,049
Maryland	46	1,793	3	22	43	7	68	10	321	2	132	1	228	.....	.....	.....	.....	1	1,001
Massachusetts	115	3,604	10	80	184	15	171	5	148	2	120	2	329	.....	.....	.....	.....	1	2,652
Michigan	91	2,344	23	45	95	11	118	2	65	4	312	4	774	1	314	1	666	.....	.....
New Jersey	97	4,869	8	57	116	13	124	6	206	8	588	3	523	1	453	.....	.....	1	2,859
New York	255	5,644	37	121	264	61	724	17	600	13	934	2	348	2	584	1	548	1	1,642
Ohio	39	3,200	8	13	27	8	90	4	154	2	108	.....	.....	1	282	2	1,465	1	1,074
Pennsylvania	31	3,558	2	12	26	7	70	2	61	3	199	3	366	1	334	.....	.....	1	2,502
Rhode Island	13	535	.....	7	18	3	47	1	36	1	91	.....	.....	1	343	.....	.....	.....	.....
Virginia	36	5,382	2	25	68	4	81	1	21	3	197	.....	.....	.....	.....	.....	.....	1	5,065
Washington	60	744	8	28	57	18	201	4	124	1	75	.....	.....	1	287	.....	.....	.....	.....
Wisconsin	52	906	5	33	59	8	85	3	82	.....	.....	2	406	1	274	.....	.....	.....	.....

Of the 1,353 establishments reported in 1909, 14.2 per cent employed no wage earners, 52.5 per cent employed from 1 to 5, and 19 per cent from 6 to 20. There were 99 establishments that employed an average of more than 50 wage earners, and of these, 47 employed over 100 and 14 over 500. These 14 large establishments were distributed among 11 states.

Of the total number of wage earners reported, 10.6 per cent were reported by establishments employing from 1 to 20; 7.6 per cent by establishments employing from 21 to 50; 9 per cent by establishments employing from 51 to 100; 18.1 per cent by establishments employing from 101 to 500; and 54.7 per cent in establishments employing over 500.

Expenses.—As stated in the Introduction, the census figures for expenses do not purport to represent the total cost of manufacture, since they take no account of interest or depreciation. Facts of interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 1 shows the total expenses in the shipbuilding industry in 1909 to have been $67,521,967, distributed as follows: Cost of materials, $31,214,358, or 46.2 per cent; wages, $25,267,686, or 37.4 per cent; salaries $4,035,446, or 6 per cent; and miscellaneous expenses, $7,004,477, or 10.4 per cent. Of the total miscellaneous expenses, $404,206 was for rent of yards or shops, $431,450 for taxes, $1,185,579 for contract work, and $4,983,242 for all other objects, including rent of offices, insurance, ordinary repairs of buildings and machinery, etc.

Table 15 shows, in percentages, the distribution of the total expenses reported in 1909 for each branch of the shipbuilding industry among the four classes just named. There is comparatively little difference between iron and steel shipbuilding and wooden ship and boat building with respect to the relative importance of the several classes of expenses. Cost of materials formed a considerably larger proportion of the total expenses in the case of establishments doing new

work than in the case of those doing repair work only, while in the case of establishments making masts, spars, etc., the proportion for cost of materials was higher than in any other branch.

Table 15

BRANCH OF INDUSTRY.	PER CENT OF TOTAL EXPENSES IN 1909 CONSISTING OF—			
	Salaries.	Wages.	Cost of materials.	Miscellaneous expenses.
All branches	6.0	37.4	46.2	10.4
Iron and steel shipbuilding	6.2	36.7	46.3	10.8
New construction on vessels of 5 tons and over	6.5	35.9	47.6	10.0
Repair work only	4.1	42.5	36.9	16.5
Wooden shipbuilding and boat building	5.4	39.1	46.1	9.3
New construction on vessels of 5 tons and over	4.7	38.8	48.4	8.1
Repair work only	7.5	46.0	37.1	9.4
Making boats under 5 tons	5.9	34.5	47.1	12.6
Making masts, spars, and oars, and rigging vessels	3.2	30.8	55.7	10.3

Table 16 shows in percentages, for all states for which separate figures can be given, for 1909, the distribution of the total expenses reported for the shipbuilding industry as a whole among the several classes.

Table 16

STATE.	PER CENT OF TOTAL EXPENSES REPORTED FOR SHIPBUILDING, INCLUDING BOAT BUILDING: 1909			
	Salaries.	Wages.	Materials.	Miscellaneous expenses.
United States	6.0	37.4	46.2	10.4
Alabama	9.0	46.4	31.5	13.1
California	5.5	40.3	31.3	22.9
Connecticut	5.1	37.9	47.1	9.9
Delaware	9.3	35.7	50.2	4.8
Florida	5.8	47.6	38.3	8.3
Idaho	.....	25.6	67.1	7.4
Illinois	6.4	47.3	37.3	9.0
Indiana	5.2	27.4	62.7	4.7
Iowa	5.0	30.8	53.9	10.3
Kentucky	2.6	36.5	58.1	2.8
Louisiana	8.5	50.3	32.9	8.4
Maine	4.4	39.3	46.3	10.0
Maryland	4.9	33.3	56.1	5.7
Massachusetts	8.8	34.4	41.1	15.8
Michigan	6.5	29.2	52.7	11.6
Minnesota	2.4	43.1	48.8	5.7
Mississippi	2.2	41.1	52.7	4.0
New Hampshire	.....	41.3	41.8	16.8
New Jersey	7.0	38.3	49.4	5.3
New York	5.6	38.8	40.3	15.3
North Carolina	0.8	31.5	59.4	8.4
Ohio	5.4	35.5	51.3	7.8
Oregon	2.5	45.3	48.6	3.6
Pennsylvania	6.9	35.3	45.2	12.6
Rhode Island	7.7	48.9	40.3	3.1
Tennessee	.....	46.5	46.0	7.4
Texas	0.8	44.8	52.2	2.1
Vermont	4.3	42.5	47.8	5.3
Washington	7.1	44.8	39.2	9.0
West Virginia	4.6	44.4	46.6	4.3
Wisconsin	4.5	35.0	53.1	7.4

In 12 of the states shown in Table 16 the cost of materials represented over 50 per cent of the total expenses reported, and in Idaho and Indiana over 60 per cent, while in Alabama, California, and Louisiana they represented but little over 30 per cent. The proportion represented by wages was more uniform; in only 1 state (Louisiana) was the proportion above 50 per cent, and in only 3—Idaho, Indiana, and Michigan—was it below 30 per cent.

Engines and power.—The amount of power used in the shipbuilding industry was first reported at the census of 1869. Table 2 shows that the total horsepower used in the industry increased from 5,136 in 1869 to 88,063 in 1909. Table 17 shows the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower as reported at the censuses of 1909, 1904, and 1899. It also shows separately the number and horsepower of electric motors, including those operated by current generated in the establishments.

Table 17

POWER.	SHIPBUILDING, INCLUDING BOAT BUILDING.								
	Number of engines or motors.			Horsepower.			Per cent distribution of horsepower.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	1,960	1,359	862	88,063	78,127	61,797	100.0	100.0	100.0
Owned	1,416	1,206	862	78,769	75,529	60,519	89.4	96.7	97.9
Steam	991	1,015	804	73,149	69,253	55,899	83.1	88.6	90.5
Gas	420	182	48	3,503	1,785	645	4.0	2.3	1.0
Water wheels	3	4	10	63	67	1,700	0.1	0.1	2.8
Water motors	2	5	(1)	23	20	(1)	(2)	(2)	.....
Other	.....	.....	.....	2,031	4,404	2,275	2.3	5.6	3.7
Rented	544	153	(1)	9,294	2,598	1,278	10.6	3.3	2.1
Electric	544	153	(1)	9,264	2,367	975	10.5	3.0	1.6
Other	.....	.....	.....	30	231	303	(2)	0.3	0.5
Electric motors.	2,266	1,290	428	35,334	17,630	7,177	100.0	100.0	100.0
Run by current generated by establishment	1,722	1,137	428	26,070	15,263	6,202	73.8	86.6	86.4
Run by rented power	544	153	(1)	9,264	2,367	975	26.2	13.4	13.6

[1] Not reported. [2] Less than one-tenth of 1 per cent.

The total primary power used in the shipbuilding industry increased from 61,797 horsepower in 1899 to 88,063 in 1909. Most of this increase was in the power of steam engines and electric motors run by purchased current. At each census steam was the principal source of power employed in the industry, but its relative importance has decreased since 1899. In that year steam power formed 90.5 per cent of the total primary power, as against only 83.1 per cent in 1909. There has been a marked increase, both absolutely and relatively, in the horsepower of gas and other internal combustion engines and of electric motors run by rented power. The horsepower of electric motors run by current generated in the establishment increased from 6,202 in 1899 to 26,070 in 1909.

Table 18 shows, for 1909, the amount of each of the several kinds of power and of the different kinds of fuel used in each of 14 selected states.

The states which in 1909 ranked highest with respect to the amount of power used in the shipbuilding industry were New York, New Jersey, Ohio, Pennsylvania, Virginia, Maryland, and Michigan in the order named. The total horsepower reported for these seven states in 1909 was 60,448, or 68.6 per cent of the total for the United States. Steam was by far the most important power in all of the states shown except Maine, which reported a larger amount of rented electric power than of any other kind. The largest amount of steam power is shown for New Jersey, and the largest amount of gas-engine power, as well as of rented electric power, for New York.

Table 18 SHIPBUILDING, INCLUDING BOAT BUILDING: 1909

STATE.	Number of establishments reporting.	Total horsepower.	Primary horsepower: Owned by establishments reporting. Total.	Steam engines.	Gas engines.	Water wheels and motors.	Other.	Rented. Electric.	Other.	Electric horsepower. Total, rented and generated by establishment.	Generated in the establishment reporting.	Fuel used. Coal. Anthracite (long tons).	Bituminous (short tons).	Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
United States	**914**	**88,063**	**78,769**	**73,149**	**3,503**	**86**	**2,031**	**9,264**	**30**	**35,334**	**26,070**	**12,080**	**301,501**	**10,725**	**12,652**	**89,916**	**274,071**
California	39	3,129	2,995	2,900	95	.....	.....	134	.....	1,098	964	6	1,113	67	150	60,511	15
Delaware	8	3,582	2,808	2,798	10	.....	.....	774	.....	3,226	2,452	49	9,912	984	.....	1,702	178
Maine	86	2,447	1,201	901	285	.....	15	1,246	.....	1,246	.....	317	5,103	104	270	206	203
Maryland	27	6,795	6,686	6,032	157	.....	497	109	.....	1,284	1,175	323	24,776	466	671	5,557	.....
Massachusetts	81	3,783	3,471	3,174	297	.....	.....	282	30	1,285	1,003	870	33,042	164	222	567	263
Michigan	58	6,485	6,165	5,976	174	15	.....	320	.....	1,898	1,578	13	26,933	636	279	2,346	14
New Jersey	66	9,904	9,590	9,149	441	.....	.....	314	.....	5,225	4,911	3,526	33,460	1,543	83	380	506
New York	164	13,835	9,754	8,921	778	55	.....	4,081	.....	4,471	390	6,247	30,881	100	272	1,626	3,782
Ohio	29	8,125	7,940	7,867	73	.....	.....	185	.....	3,272	3,087	172	28,588	1,513	5	3,607	266,428
Pennsylvania	20	7,771	7,621	6,086	35	.....	1,500	150	.....	4,210	4,060	50	44,633	976	325	222	924
Rhode Island	10	1,030	996	966	30	.....	.....	34	.....	34	.....	6	4,109	.....	.....	16	.....
Virginia	29	7,533	7,170	7,067	103	.....	.....	363	.....	5,613	5,250	8	35,745	3,200	9	5,087	1,506
Washington	45	2,105	1,769	1,639	111	.....	19	336	.....	616	280	.....	1,696	529	8,682	5,196	.....
Wisconsin	41	3,506	3,393	3,281	112	.....	.....	113	.....	668	555	206	9,477	265	53	555	.....
All other states	211	8,033	7,210	6,392	802	16	.....	823	.....	1,188	365	287	12,033	178	1,631	2,188	252

Fuel consumed.—Closely related to the question of kind of power employed is that of fuel consumed in generating this power or otherwise used in the industry. The amount reported as expended for fuel and rent of power in 1909 was $1,191,654 (see Table 33). As shown by Table 18, bituminous coal is the principal class of fuel used by shipyards, 301,501 tons being consumed in 1909. California reported 60,511 barrels of oil, or 67.3 per cent of the total quantity of that kind of fuel consumed in the industry, while Ohio reported 97.2 per cent of all the gas reported. The largest amount of anthracite coal, 6,247 long tons, or more than one-half the total for the industry, was reported by New York.

SPECIAL DATA AS TO VESSELS LAUNCHED, VALUE OF WORK DONE, AND EQUIPMENT.

THE UNITED STATES AS A WHOLE.

Number of vessels launched.—The special schedule used in collecting the statistics for shipbuilding required a detailed statement of the number, kind, and tonnage of vessels launched during the year, and a statement of the value of the different kinds of work done during the year, together with special information regarding the equipment of the shipyards.

Table 19 shows the number and gross tonnage of all vessels launched during the census years 1909, 1904, and 1899, distinguishing three classes of establishments reporting. In many cases, a large part of the work on vessels launched during the census year was performed during prior years and, conversely, much work was done during each census year on vessels not yet ready for launching at the end of the year.

The decline in shipbuilding during the five-year period between 1904 and 1909 is clearly brought out by the fact that for all classes of vessels of 5 tons and over there was a decrease, with the exception of motor boats, which formed a very small part of the total number reported. The decline in the iron and steel branch of the industry is no doubt due to the decrease in Government work done in private shipyards. The increase in the number of small boats constructed is perhaps the most noteworthy fact brought out by the table. Motor boats of more than 5 tons increased 189.9 per cent in gross tonnage from 1904 to 1909. The number of small power boats of less than 5 tons launched by private establishments in the shipbuilding industry was 8,577 in 1909, as against 1,687 in 1899, an increase for the decade of 408.4 per cent. Practically all the boats of this tonnage are fitted with internal-combustion engines.

The statistics show strikingly the continued decline in the building of sailing vessels for the water transportation of the United States. The number of sail vessels launched decreased from 648 in 1899 to 119 in 1909, and the gross tonnage from 80,294 to 17,459, or 78.3 per cent.

In explanation of a number of the tables wherein tonnage is shown, it should be stated that the gross tonnage of a ship is the total internal capacity, expressed in "tons" of 100 cubic feet, while the net tonnage is the portion available for cargo and passengers—in other words, the earning capacity of the ship—expressed on a similar basis. By methods defined by law, now practically uniform for the leading maritime nations, measurements are made to ascertain the capacity of the vessel in cubic feet and the result is divided by 100, the quotient being the gross tonnage of the vessel. Net tonnage is ascertained in the case of sailing vessels by deducting from the gross tonnage the space set apart for the quarters of the

master and crew and for minor purposes of navigation, and in the case of steam vessels, by deducting from the gross tonnage the space required for the quarters of the officers and crew, and for the boilers, machinery, and coal bunkers. Differing from either of these is the displacement tonnage of a vessel, which is merely the weight of the volume of water displaced, or the weight of the vessel and its load. The tonnage of war vessels of the United States Navy as given is always displacement tonnage and is the weight of the vessels in ordinary cruising condition. While gross tonnage and displacement tonnage are not by any means the same, it was necessary to combine the tonnage of vessels whose capacity is reckoned in one way with that of vessels whose capacity is reckoned by the other method in order to obtain a total which should represent approximately the total tonnage launched during the year.

Table 19

CLASS.	VESSELS LAUNCHED DURING THE YEAR BY—							
	All establishments.		Private establishments in shipbuilding industry.		Private establishments in other industries.		Government shipyards.	
	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Displacement.
Vessels of 5 gross tons and over, total:								
1909	1,637	481,813	1,584	467,219	22	12,535	31	2,059
1904	2,279	728,104	2,114	678,525	134	22,327	31	27,252
1899	2,081	687,159	2,081	687,159	.....	.....	.....	.....
Classified by material—								
Iron and steel—								
1909	169	260,765	158	254,986	8	5,429	3	350
1904	172	352,669	152	328,411	3	408	17	23,850
1899	134	262,516	134	262,516	.....	.....	.....	.....
Wooden—								
1909	1,468	221,048	1,426	212,233	14	7,106	28	1,709
1904	2,107	375,435	1,962	350,114	131	21,919	14	3,402
1899	1,947	424,643	1,947	424,643	.....	.....	.....	.....
Classified by power—								
Steam—								
1909	194	235,315	181	234,633	3	429	10	253
1904	320	368,117	308	349,600	6	467	6	18,050
1899	519	286,311	519	286,311	.....	.....	.....	.....
Motor—								
1909	447	9,413	445	9,389	2	24	.....	.....
1904	311	3,247	307	3,157	4	90	.....	.....
1899	.....	.....	.....	.....	.....	.....	.....	.....
Sail—								
1909	119	17,459	119	17,459	.....	.....	.....	.....
1904	352	68,615	349	64,615	.....	.....	3	4,000
1899	648	80,294	648	80,294	.....	.....	.....	.....
Unrigged—								
1909	877	219,626	839	205,738	17	12,082	21	1,806
1904	1,296	288,125	1,150	261,153	124	21,770	22	5,202
1899	914	320,554	914	320,554	.....	.....	.....	.....
Boats of less than 5 gross tons:								
1909	9,042	.....	8,577	.....	412	.....	53	.....
1904	3,916	.....	3,499	.....	365	.....	52	.....
1899	2,364	.....	1,687	.....	.....	.....	677	.....

In the tables which follow, gross tonnage is shown for 1909 unless otherwise specified. It is impossible to indicate for censuses previous to 1904 the proportion of displacement tonnage included in the figures, but owing to the fact that the building of Government warships has only recently become prominent in the industry, it is probable that for censuses prior to 1899 displacement tonnage formed a comparatively small proportion of the totals shown in the tables.

Table 20 gives, by states, the total number and gross tonnage of all vessels of 5 tons and over launched in 1909 by private establishments in the shipbuilding industry.

Table 20

STATE.	VESSELS OF 5 TONS AND OVER LAUNCHED IN 1909 (EXCLUSIVE OF THOSE LAUNCHED IN GOVERNMENT SHIPYARDS).	
	Number.	Tonnage (gross).
United States	[1] 1,584	[1] 467,219
California	59	8,563
Connecticut	45	5,447
Delaware	16	10,871
Florida	35	3,215
Illinois	9	991
Kentucky	90	41,240
Louisiana	69	7,012
Maine	44	12,654
Maryland	52	34,160
Massachusetts	82	17,703
Michigan	53	41,847
Minnesota	6	231
Mississippi	31	8,086
New Jersey	90	53,261
New York	309	60,152
North Carolina	17	858
Ohio	88	81,803
Oregon	34	4,718
Pennsylvania	205	12,775
Texas	19	1,680
Virginia	38	44,388
Washington	137	5,256
Wisconsin	29	6,453
All other states	27	3,855

[1] In addition, 22 vessels, with a gross tonnage of 12,535, were launched by establishments in other industries.

Of the total number of vessels of over 5 tons launched in 1909, New York built 19.5 per cent and Pennsylvania 12.9 per cent. Washington ranked third in number of vessels launched. Ohio, however, led all other states in aggregate tonnage, with New York, New Jersey, and Virginia following in the order named.

Table 21 shows, by states, for 1909, the number and the gross and net tonnage of steam vessels of 5 tons and over launched in private shipyards.

Table 21

STATE.	STEAM VESSELS OF 5 TONS AND OVER LAUNCHED IN PRIVATE SHIPYARDS IN 1909.		
	Number.	Tonnage.	
		Gross.	Net.
United States	181	234,633	168,959
California	9	4,993	3,264
Maine	8	3,888	2,983
Maryland	7	17,733	10,007
Massachusetts	20	12,381	8,232
Michigan	15	41,231	31,073
New Jersey	10	27,395	26,322
New York	30	7,528	5,185
Ohio	16	57,764	44,171
Oregon	8	1,522	1,154
Pennsylvania	9	2,841	2,680
Washington	5	800	574
Wisconsin	7	4,694	3,121
All other states	37	51,863	30,193

Of the states for which totals are presented, Ohio, Michigan, and New Jersey led in the order named, and combined reported 126,390 gross tons, or 53.9 per cent of the total for steam vessels of 5 tons and over launched in private yards in 1909. The steam vessels launched in these three states also showed

the largest average tonnage per vessel. Ohio, the leading state in total tonnage, also led in respect to average gross tonnage per vessel with an average for the 16 steamships launched in 1909 of 3,610 tons per vessel. "All other states" include several which had a gross tonnage greater than that shown for some of the states for which totals could be shown without the disclosure of individual operations, and of these Virginia was the most important.

The number and the gross and net tonnage of motor vessels of 5 tons and over, launched in private shipyards in 1904 and 1909, are shown, by states, in the following table:

Table 22 — MOTOR VESSELS OF 5 TONS AND OVER LAUNCHED IN PRIVATE SHIPYARDS.

STATE.	Census.	Number.	Tonnage. Gross.	Tonnage. Net.
United States	1909	[1]445	9,389	7,224
	1904	[2]307	3,157	2,333
California	1909	19	337	264
	1904	76	464	362
Connecticut	1909	26	547	487
	1904	(3)	(3)	(3)
Florida	1909	10	270	188
	1904	.....	.....	.....
Louisiana	1909	6	51	36
	1904	(3)	(3)	(3)
Maine	1909	15	221	164
	1904	(3)	(3)	(3)
Massachusetts	1909	40	2,664	2,227
	1904	13	110	90
Michigan	1909	33	398	321
	1904	(3)	(3)	(3)
Minnesota	1909	(3)	(3)	(3)
	1904	13	485	263
Mississippi	1909	(3)	(3)	(3)
	1904	5	72	49
New Jersey	1909	23	348	261
	1904	6	41	34
New York	1909	78	1,290	951
	1904	64	706	532
Ohio	1909	16	432	336
	1904	(3)	(3)	(3)
Oregon	1909	20	358	272
	1904	.....	.....	.....
Virginia	1909	6	118	70
	1904	24	180	140
Washington	1909	83	1,382	973
	1904	(3)	(3)	(3)
Wisconsin	1909	19	259	204
	1904	49	347	313
All other states	1909	42	714	470
	1904	57	752	550

[1] Exclusive of 2 vessels with an aggregate gross tonnage of 24 and an aggregate net tonnage of 18, launched by establishments in other industries.
[2] Exclusive of 4 vessels with an aggregate gross tonnage of 90 and aggregate net tonnage of 50, launched by establishments in other industries.
[3] Included in "all other states."

Vessels fitted with internal-combustion engines, which now form such a large and distinct class, were reported separately for the first time in 1904. At that census the number of such vessels reported was 307, their average gross capacity being slightly over 10 tons. In 1909 their average capacity was over 21 tons gross. Washington reported the largest number of boats of this class launched in 1909, with New York second and Massachusetts third, but Massachusetts led in tonnage.

Table 23 gives, by states, the number and the gross and net tonnage of sailing vessels of 5 tons and over launched in private shipyards in 1909, 1904, and 1899.

Table 23 — SAIL VESSELS OF 5 TONS AND OVER LAUNCHED IN PRIVATE SHIPYARDS.

STATE.	Census.	Number.	Tonnage. Gross.	Tonnage. Net.
United States	1909	119	17,459	14,690
	1904	349	64,615	55,074
	1899	648	80,294	70,120
California	1909	(1)	(1)	(1)
	1904	16	1,116	1,021
	1899	22	8,256	7,530
Connecticut	1909	6	41	29
	1904	9	3,106	2,589
	1899	14	188	180
Florida	1909	8	136	83
	1904	(1)	(1)	(1)
	1899	(1)	(1)	(1)
Maine	1909	21	8,545	6,985
	1904	77	38,692	32,461
	1899	76	32,651	28,100
Maryland	1909	9	1,698	1,634
	1904	4	384	268
	1899	20	374	220
Massachusetts	1909	20	1,950	1,477
	1904	49	4,280	2,994
	1899	128	3,889	2,910
Mississippi	1909	(1)	(1)	(1)
	1904	14	280	197
	1899	14	193	140
New Jersey	1909	12	251	175
	1904	26	880	761
	1899	80	357	240
New York	1909	15	678	551
	1904	34	5,146	4,924
	1899	85	1,400	1,150
North Carolina	1909	(1)	(1)	(1)
	1904	4	70	55
	1899	9	142	109
Washington	1909	5	144	102
	1904	(1)	(1)	(1)
	1899	(1)	(1)	(1)
All other states	1909	23	4,016	3,654
	1904	116	10,661	9,804
	1899	200	32,844	29,541

[1] Included in "all other states."

During each intercensal period covered by this table a great decrease took place in the number and tonnage of sailing vessels launched. The aggregate gross tonnage decreased from 80,294 in 1899 to 17,459 in 1909, or 78.3 per cent. With the exception of Florida and Washington, which were reported separately in 1909 for the first time, and Maryland, every state showed a decrease during the decade in number and tonnage of this type of vessel launched.

The state of Maine, which reported 59.9 per cent of the total tonnage in 1904, was still in 1909 the leading state, with 48.9 per cent of the total tonnage of this type of vessel launched. The gross tonnage for Maine in 1909 was more than four times that shown for the second state, Massachusetts.

Table 24 is a comparative statement of the number and tonnage of iron and steel and of wooden sail vessels of 5 tons and over launched by private shipyards in 1909, 1904, 1899, and 1889.

Table 24 — SAIL VESSELS OF 5 TONS AND OVER LAUNCHED BY PRIVATE SHIPYARDS.

YEAR.	Total.		Iron and steel.		Wooden.	
	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.
1909	119	17,459	3	2,046	116	15,413
1904	349	64,615	8	4,779	341	59,836
1899	648	80,294	6	21,085	642	59,209
1889	314	103,710	8	4,224	306	99,486

Both classes of vessels show large decreases in tonnage from 1904 to 1909, the decrease shown by wooden vessels being the greater, so that iron and steel vessels, which represented 7.4 per cent of the total tonnage in 1904, represented 11.7 per cent in 1909.

Table 25 gives, by states, the number and the gross and net tonnage of unrigged vessels launched by private shipyards in 1909, 1904, and 1899.

Table 25 — UNRIGGED VESSELS OF 5 TONS AND OVER LAUNCHED BY PRIVATE SHIPYARDS.

STATE.	Census.	Number.	Tonnage.	
			Gross.	Net.
United States	1909	[1] 839	205,738	190,325
	1904	[2] 1,150	261,153	250,571
	1899	914	320,554	275,046
California	1909	29	3,016	2,971
	1904	48	5,777	5,562
	1899	35	6,726	5,890
Florida	1909	[3]	[3]	[3]
	1904	43	2,095	2,063
	1899	26	1,888	1,708
Illinois	1909	[3]	[3]	[3]
	1904	9	2,251	2,211
	1899	3	160	127
Kentucky	1909	[3]	[3]	[3]
	1904	17	4,898	4,898
	1899	2	560	500
Louisiana	1909	58	6,830	6,816
	1904	73	11,480	10,055
	1899	20	3,210	2,686
Maryland	1909	33	14,684	9,864
	1904	49	20,133	19,104
	1899	33	12,507	11,391
Mississippi	1909	20	5,081	5,016
	1904	13	1,955	1,570
	1899	8	1,150	946
New Jersey	1909	45	25,267	24,488
	1904	35	19,605	19,481
	1899	65	52,802	47,583
New York	1909	186	50,656	44,903
	1904	211	84,311	80,694
	1899	207	72,511	56,695
Ohio	1909	55	23,094	20,304
	1904	41	3,434	3,245
	1899	38	9,790	8,760
Pennsylvania	1909	195	9,929	9,763
	1904	472	66,002	65,650
	1899	177	66,180	65,588
Virginia	1909	23	3,531	3,478
	1904	12	2,280	2,215
	1899	4	400	360
Washington	1909	44	2,930	2,930
	1904	34	4,437	3,816
	1899	116	2,478	2,183
All other states	1909	151	60,720	59,792
	1904	93	32,525	30,007
	1899	180	90,192	70,629

[1] Exclusive of 17 vessels, with an aggregate gross tonnage of 12,082, launched by establishments in other industries.
[2] Exclusive of 124 vessels, with an aggregate gross tonnage of 21,770, launched by establishments in other industries.
[3] Included in "all other states."

Both the number and the tonnage of unrigged vessels built show a decrease for the five-year period 1904–1909 and for the decade 1899–1909. New York was the leading state in the construction of this class of vessels in 1909 as in 1904. Only four states—Mississippi, New Jersey, Ohio, and Virginia—reported an increase in number and tonnage from 1904 to 1909, while Maryland shows an increase in number only.

Table 26 shows, by states, for 1909, 1904, and 1899, the number of power boats built of less than 5 tons gross, and for 1904 and 1899 the number of rowboats, canoes, and small sailboats.

Table 26 — BOATS OF LESS THAN 5 TONS LAUNCHED BY PRIVATE SHIPYARDS.

STATE.	Census.	Small power boats.	Rowboats, canoes, and small sailboats.
United States	1909	[1] 8,577	[2]
	1904	[3] 3,499	22,774
	1899	1,687	13,739
California	1909	138	[2]
	1904	72	600
	1899	14	583
Connecticut	1909	209	[2]
	1904	156	231
	1899	159	159
Florida	1909	215	[2]
	1904	45	72
	1899	1	96
Illinois	1909	305	[2]
	1904	101	191
	1899	5	356
Iowa	1909	76	[2]
	1904	139	109
	1899	2	38
Maine	1909	529	[2]
	1904	289	3,076
	1899	8	1,892
Maryland	1909	77	[2]
	1904	39	144
	1899	15	237
Massachusetts	1909	668	[2]
	1904	342	3,817
	1899	41	3,760
Michigan	1909	2,583	[2]
	1904	646	4,447
	1899	327	669
Minnesota	1909	304	[2]
	1904	308	1,604
	1899	37	488
New Jersey	1909	338	[2]
	1904	237	499
	1899	82	219
New York	1909	790	[2]
	1904	453	2,302
	1899	552	2,093
Ohio	1909	1,194	[2]
	1904	214	382
	1899	78	292
Pennsylvania	1909	45	[2]
	1904	39	544
	1899	15	380
Rhode Island	1909	27	[3]
	1904	12	187
	1899	2	131
Virginia	1909	59	[2]
	1904	77	191
	1899	1	76
Washington	1909	161	[2]
	1904	30	658
	1899	10	384
Wisconsin	1909	522	[2]
	1904	123	1,163
	1899	241	639
All other states	1909	337	[2]
	1904	177	1,657
	1899	97	1,247

[1] Exclusive of 412 boats launched by establishments in other industries.
[2] Not reported.
[3] Exclusive of 365 boats launched by establishments in other industries.

Michigan was by far the leading state in 1909 in the manufacture of small power boats. The number of such boats built in that state increased from 327 in 1899 to 2,583 in 1909, or nearly 700 per cent. Ohio was second in the number of power boats. All but three of the states named in the table—Iowa, Minnesota, and Virginia—showed increases from 1904 to 1909 in the number of small power boats constructed.

Value of work done during census year.—The construction of a vessel of the larger type frequently requires more than one year to complete. In a number of instances work on vessels that were finished during the census year had been started in previous years, and in some cases vessels upon which work was started during the census year were not finished during that year. For this reason the office did not require the shipbuilders to report the value of the vessels launched, but only the value of the work done during the census year and the amount received for repair work.

For the smaller vessels—motor boats and those having a capacity of less than 5 tons—the value of work done during the year corresponds very closely with the value of the craft launched. Thus the value of the work done on boats of less than 5 gross tons in 1909, which is shown in Table 27 as amounting to $4,891,408, corresponds very closely with the value of the craft of this type.

Table 27 shows the value of the construction work done, the amount received for repair work, and the value of all other work done by establishments assigned to the shipbuilding industry, for those that built vessels in connection with some other industry, and for the Government shipyards.

Table 27

KIND OF WORK.	Census.	VALUE OF WORK DONE DURING YEAR BY— All establishments.	Private establishments in shipbuilding industry.	Private establishments in other industries.	Government shipyards.
Total	**1909**	**$100,009,054**	**$73,360,315**	**$776,706**	**$25,872,033**
	1904	**100,692,050**	**82,769,239**	**657,342**	**17,265,469**
Work on new vessels and boats:					
All kinds	1909	45,036,492	42,310,925	594,244	2,131,323
	1904	60,718,307	56,121,227	610,560	3,986,520
Vessels of 5 gross tons and over	1909	40,145,084	37,718,018	449,089	1,977,977
	1904	57,193,223	53,119,935	463,018	3,610,270
Boats of less than 5 gross tons	1909	4,891,408	4,592,907	145,155	153,346
	1904	3,525,084	3,001,292	147,542	376,250
Repair work	1909	38,304,658	26,678,643	80,461	11,545,554
	1904	32,513,533	22,829,040	46,782	9,637,711
All other work done	1909	16,667,904	4,370,747	102,001	12,195,156
	1904	7,460,210	3,818,972	(1)	3,641,238

[1] Included with repair work.

Table 28 shows the value of the work done in the privately operated shipbuilding establishments in 1909, 1904, and 1899, the total being subdivided so as to show the value of work on new vessels of each of the several main types, the amount received for repair work, and the value of all other work done during the year.

Table 28

KIND OF WORK.	VALUE OF WORK DONE DURING THE YEAR BY PRIVATE ESTABLISHMENTS IN SHIPBUILDING INDUSTRY. 1909	1904	1899
Total	**$73,360,315**	**$82,769,239**	**$74,532,277**
Work during the year on new vessels and boats	42,310,925	56,121,227	37,719,308
Vessels of 5 gross tons and over	37,718,018	53,119,935	35,750,473
Iron and steel construction	30,038,672	43,395,704	25,454,043
Wooden construction	7,679,346	9,724,231	10,295,530
Boats of less than 5 gross tons	4,592,907	3,001,292	1,968,835
Steam	20,800		
Motor (gasoline, electric, other)	3,155,375	1,879,288	1,059,365
Sailboats, rowboats, canoes, scows, etc.	1,416,732	1,122,004	909,470
Repair work	26,678,643	22,829,040	23,134,436
Iron and steel	15,862,659	12,191,854	12,302,960
Wooden	10,815,984	10,637,186	10,831,476
All other work done	4,370,747	3,818,972	13,678,533

The value of repair work in private yards, both on iron and steel and on wooden vessels, decreased from 1899 to 1904. From 1904 to 1909, on the other hand, there was an increase of 30.1 per cent in the value of repair work on iron and steel vessels in such yards, and of 1.7 per cent in that on wooden vessels.

Table 29 shows, by states, the value of the repair work done in the private establishments in the shipbuilding industry for the last three census years.

Table 29

STATE.	VALUE OF REPAIR WORK REPORTED BY PRIVATE ESTABLISHMENTS IN THE SHIP BUILDING INDUSTRY. 1909	1904	1899
United States	**$26,678,643**	**$22,829,040**	**$23,134,436**
California	2,529,188	2,180,542	2,348,017
Connecticut	319,591	356,032	310,616
Delaware	348,539	154,780	386,841
Florida	536,584	116,360	208,984
Illinois	411,230	439,509	484,541
Indiana	70,663	(1)	(1)
Iowa	42,474	31,075	23,366
Kentucky	85,902	(1)	(1)
Louisiana	364,738	(1)	(1)
Maine	346,635	297,855	642,195
Maryland	985,112	1,010,622	1,138,420
Massachusetts	874,433	854,036	1,003,716
Michigan	1,126,544	688,482	1,027,923
Minnesota	136,053	55,900	78,597
Mississippi	50,484	125,951	42,417
New Jersey	3,123,032	2,254,794	2,229,481
New York	6,931,117	6,726,959	4,857,916
North Carolina	36,569	63,300	65,935
Ohio	1,324,166	1,229,123	1,241,122
Oregon	100,788	184,276	382,662
Pennsylvania	2,531,364	1,762,243	2,716,209
Rhode Island	617,064	660,303	874,065
Virginia	1,324,045	1,157,595	752,971
Washington	880,618	712,851	534,759
West Virginia	136,156	86,595	45,670
Wisconsin	1,172,543	571,746	531,792
All other states	243,011	808,111	606,221

[1] Included in "all other states."

New York was the leading state in value of repair work done in each of the census years shown, and New Jersey was second in 1904 and 1909. The value of repair work in 15 of the states shows an increase over the amount reported for 1904, while 14 states show increases for the decade 1899–1909. The value of repair work formed 36.4 per cent of the total value of products of the shipbuilding industry in 1909, 27.6 per cent in 1904, and 31 per cent in 1899.

Dry docks and marine railways.—When the repair work of shipyards is considered, the question of the

equipment of the various plants naturally arises. Table 30 shows the number and kind of dry docks in private and Government shipyards, classified according to dimensions, for 1909 and 1904.

Table 30

CLASS.	DRY DOCKS. 1909	1904
Total number	216	160
Stationary:		
Wooden	57	74
Masonry, concrete, or steel	23	
Floating	136	86
With floor length of:		
Over 300 feet	53	53
201 to 300 feet	20	18
101 to 200 feet	70	75
100 feet or less	73	14
With entrance width of:		
Over 75 feet	37	22
51 to 75 feet	54	53
26 to 50 feet	89	62
25 feet or less	36	23
With sill depth of:		
Over 20 feet	30	25
10 to 20 feet	98	101
Less than 10 feet	88	34

Table 31 shows statistics relative to the number, dimensions, and lifting capacity of marine railways in operation in 1909 and 1904.

Table 31

	MARINE RAILWAYS. 1909	1904
Total number	676	413
Total lifting capacity, tons	147,031	147,047
With cradle length of:		
Over 200 feet	38	44
101 to 200 feet	110	133
50 to 100 feet	178	107
Less than 50 feet	370	129
With cradle breadth of:		
Over 50 feet	5	16
25 to 50 feet	126	140
Less than 25 feet	554	257
With maximum cradle draft submerged of:		
Over 15 feet	47	51
11 to 15 feet	86	99
5 to 10 feet	410	221
Less than 5 feet	153	42
With lifting capacity of:		
Over 1,000 tons	22	34
501 to 1,000 tons	56	54
100 to 500 tons	172	141
Less than 100 tons	446	184

DETAILED STATE TABLES.

The principal data secured by the census inquiry concerning the shipbuilding industry, other than those regarding vessels launched, value of different kinds of work done, and equipment, are presented, by states, in Tables 32 and 33.

Table 32 shows, for 1909, 1904, and 1899, the number of establishments, number of persons engaged in the industry, primary horsepower, capital invested, salaries, wages, cost of materials, value of products, and value added by manufacture.

Table 33 gives similar statistics in somewhat greater detail for 1909 only.

SHIPBUILDING, INCLUDING BOATBUILDING—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 32

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	1909	1,353	44,949	1,463	2,980	40,506	88,063	$126,118	$4,035	$25,268	$31,214	$73,360	$42,146
	1904	1,097	54,424	1,190	2,480	50,754	78,127	121,624	3,340	29,241	37,463	82,769	45,306
	1899	1,107	.....	.....	1,405	46,747	61,797	77,341	2,007	24,825	33,475	74,532	41,057
Alabama	1909	4	136	3	5	128	322	429	12	62	42	160	118
	1904	7	187	7	6	174	250	309	12	92	66	218	152
	1899	6	300	4	3	293	156	147	4	102	77	240	163
California	1909	43	2,006	39	123	1,844	3,129	8,329	216	1,592	1,237	4,132	2,895
	1904	[1] 38	709	39	31	639	4,297	693	48	537	500	1,414	914
	1899	[2] 39	957	51	21	885	918	299	23	539	702	1,054	952
Connecticut	1909	43	502	37	38	427	1,454	1,468	34	254	315	742	427
	1904	46	2,123	45	80	1,998	1,950	1,705	105	987	2,807	4,560	1,753
	1899	35	964	37	12	915	788	602	14	451	680	1,227	547
Delaware	1909	10	1,411	8	164	1,239	3,582	2,888	181	697	981	1,990	1,009
	1904	10	1,193	11	60	1,122	1,512	2,630	92	563	895	1,781	886
	1899	[2] 9	223	9	7	207	176	225	9	111	153	360	207
Florida	1909	52	568	65	21	482	873	1,032	36	289	233	697	464
	1904	[3] 13	111	14	5	92	52	64	5	40	37	115	78
	1899	[3] 15	159	15	3	141	845	149	3	74	111	255	144
Idaho	1909	3	5	4	.....	1	26	9	.....	1	2	8	6
	1904	3	9	4	.....	5	6	17	.....	4	9	19	10
	[4] 1899	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	1909	23	470	24	33	413	1,113	2,061	34	252	199	584	385
	1904	[3] 21	322	20	14	288	1,191	1,094	17	179	118	414	296
	1899	[3] 17	343	19	13	311	221	363	47	159	83	322	239
Indiana	1909	15	283	13	17	253	785	484	20	106	243	375	132
	1904	10	326	7	17	302	649	254	18	124	219	478	259
	1899	[3] 14	368	16	9	343	328	351	8	160	195	465	270

[1] Excluding statistics for three establishments, to avoid disclosure of individual operations.
[2] Excluding statistics for two establishments, to avoid disclosure of individual operations.
[3] Excluding statistics for one establishment, to avoid disclosure of individual operations.
[4] Figures can not be shown without disclosing individual operations.

SHIPBUILDING, INCLUDING BOAT BUILDING—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899—Continued.

Table 32—Continued.

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
Iowa	1909	17	109	22	11	76	229	$282	$8	$49	$85	$182	$97
	1904	9	136	8	19	109	248	170	13	58	63	171	108
	1899	[1] 10	54	9	7	38	116	29	5	13	13	43	30
Kentucky	1909	10	179	12	10	157	524	271	7	97	155	271	116
	1904	9	131	9	7	115	108	73	7	71	48	151	103
	1899	10	124	14	6	104	206	60	4	48	21	97	76
Louisiana	1909	25	431	27	30	374	1,301	629	40	236	154	573	419
	1904	[2] 18	241	22	8	211	432	83	11	123	94	323	229
	1899	15	280	10	23	247	427	213	15	105	72	250	178
Maine	1909	156	2,014	173	86	1,755	2,447	2,304	112	992	1,169	3,062	1,893
	1904	[1] 138	1,528	173	33	1,322	1,719	1,222	34	759	1,715	3,038	1,323
	1899	[2] 115	1,547	150	28	1,369	604	1,316	23	750	1,378	2,492	1,114
Maryland	1909	46	1,908	47	128	1,793	6,795	4,413	160	1,098	1,849	3,535	1,686
	1904	35	2,959	47	140	2,772	5,215	4,226	173	1,340	1,785	4,541	2,756
	1899	38	.....	.....	93	2,581	2,170	4,424	104	1,503	1,787	4,116	2,329
Massachusetts	1909	115	4,059	124	331	3,604	3,783	7,399	583	2,283	2,731	6,996	4,265
	1904	[3] 122	983	135	50	798	842	1,068	45	534	669	1,582	913
	1899	125	1,829	143	80	1,606	1,105	2,140	79	1,036	1,357	3,057	1,700
Michigan	1909	91	2,758	103	311	2,344	6,485	6,972	308	1,380	2,490	5,034	2,544
	1904	57	2,207	59	150	1,998	4,104	3,912	135	1,068	1,079	2,973	1,894
	1899	54	3,042	53	73	2,916	3,457	3,893	76	1,344	2,198	4,432	2,234
Minnesota	1909	33	257	36	12	209	419	380	8	139	158	377	219
	1904	28	270	30	16	224	302	319	15	133	102	342	240
	1899	25	172	28	7	137	176	162	8	74	85	224	139
Mississippi	1909	15	111	16	4	91	301	58	3	51	66	161	95
	1904	13	139	14	.....	125	289	40	.....	85	99	244	145
	1899	13	91	13	5	73	197	55	5	46	46	116	70
New Hampshire	1909	8	18	9	.....	9	41	11	.....	4	5	17	12
	1904	5	11	6	.....	5	17	6	.....	3	4	12	8
	1899	6	11	6	.....	5	15	11	.....	4	3	10	7
New Jersey	1909	97	5,533	97	567	4,869	9,904	19,176	603	3,300	4,249	8,841	4,592
	1904	78	5,258	79	316	4,863	7,761	10,891	488	3,033	3,462	7,735	4,273
	1899	68	3,058	61	123	2,874	2,839	3,686	158	1,792	1,950	4,810	2,860
New York	1909	255	6,230	262	324	5,644	13,835	14,084	543	3,780	3,925	11,417	7,492
	1904	210	7,001	236	337	6,428	10,988	11,744	471	4,387	3,989	11,265	7,276
	1899	227	6,044	275	197	5,572	10,374	9,675	265	3,182	3,116	8,647	5,531
North Carolina	1909	10	66	12	1	53	60	74	1	25	47	100	53
	1904	12	89	14	2	73	77	72	1	37	23	83	60
	1899	14	92	17	2	73	156	74	1	35	21	78	57
Ohio	1909	39	3,408	43	165	3,200	8,125	13,625	259	1,705	2,462	5,676	3,214
	1904	[3] 19	281	23	12	246	916	251	12	122	163	374	211
	1899	[2] 31	419	37	14	368	553	284	9	161	203	486	283
Oregon	1909	24	250	29	9	212	287	240	10	190	204	477	273
	1904	11	181	8	4	169	70	120	7	122	123	297	174
	1899	[1] 16	361	15	8	338	90	127	10	187	307	654	347
Pennsylvania	1909	31	3,833	34	241	3,558	7,771	15,203	415	2,120	2,710	6,178	3,468
	1904	33	6,860	28	321	6,511	8,583	18,007	482	3,473	5,180	10,327	5,147
	1899	38	7,279	41	161	7,077	19,366	14,141	254	3,545	7,173	14,493	7,320
Rhode Island	1909	13	596	12	49	535	1,030	877	58	369	304	817	513
	1904	[1] 15	259	15	16	228	420	696	32	157	152	424	272
	1899	[1] 20	326	19	8	299	437	541	20	210	229	556	327
Texas	1909	6	45	8	1	36	21	23	1	30	34	76	42
	1904	8	41	11	.....	30	7	11	.....	23	16	51	35
	1899	7	43	10	.....	33	.....	11	.....	20	91	126	35
Washington	1909	60	900	84	72	744	2,105	2,039	101	643	562	1,550	938
	1904	[1] 39	574	46	27	501	877	691	20	312	559	1,077	518
	1899	[1] 36	802	29	22	741	1,378	548	28	510	735	1,506	771
West Virginia	1909	3	117	4	6	107	128	158	6	57	60	151	91
	1904	3	93	.....	8	85	96	126	8	38	48	116	68
	1899	4	61	4	4	53	72	46	2	20	19	51	32
Wisconsin	1909	52	1,023	52	65	906	3,506	3,025	69	540	819	1,900	1,081
	1904	[1] 32	520	34	27	459	934	822	28	255	174	600	426
	1899	[1] 29	613	31	20	562	1,146	832	20	283	213	708	495
All other states	1909	54	5,663	64	156	5,443	7,682	18,175	207	2,927	3,724	7,281	3,557
	1904	55	10,682	46	774	18,862	24,155	60,308	1,061	10,582	13,265	28,044	14,779
	1899	71	.....	.....	456	16,586	13,481	32,928	813	8,361	10,457	23,057	12,600

[1] Excluding statistics for one establishment, to avoid disclosure of individual operations.
[2] Excluding statistics for two establishments, to avoid disclosure of individual operations.
[3] Excluding statistics for three establishments, to avoid disclosure of individual operations.

SHIPBUILDING, INCLUDING BOAT BUILDING—

Table 33

	STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY.									WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY.					Primary horsepower.
			Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks.		Wage earners.				Total.	16 and over.		Under 16.		
						Male.	Female.	Average number.	Number, 15th day of—				Male.	Female.	Male.	Female.	
									Maximum month.		Minimum month.						
1	**United States**	1,353	44,949	1,463	1,008	1,706	266	40,506	Ap	42,256	Fe 37,565	44,034	43,564	67	403	.....	88,063
2	Alabama	4	136	3	5	.....	.....	128	Ja	162	Se 100	152	151	.....	1	.....	322
3	California	43	2,006	39	48	67	8	1,844	No	2,553	My 1,512	2,386	2,378	2	6	.....	3,129
4	Connecticut	43	502	37	15	18	5	427	Je	550	Fe 347	428	428	.....	.....	.....	1,454
5	Delaware	10	1,411	8	51	94	19	1,239	De	1,541	Au 996	1,560	1,551	.....	9	.....	3,582
6	Florida	52	568	65	15	5	1	482	Oc	597	Mh 376	525	524	.....	1	.....	873
7	Idaho	3	5	4	.....	.....	.....	1	Je	3	Ja[1] 0	3	3	.....	.....	.....	26
8	Illinois	23	470	24	16	13	4	413	Ap	696	No 297	554	553	1	.....	.....	1,113
9	Indiana	15	283	13	10	5	2	253	Au	308	Ja 174	259	259	.....	.....	.....	785
10	Iowa	17	109	22	4	5	2	76	No	113	Fe 44	114	114	.....	.....	.....	229
11	Kentucky	10	179	12	6	4	.....	157	Au	278	Ja 13	108	108	.....	.....	.....	524
12	Louisiana	25	431	27	18	11	1	374	Au	433	My 319	301	301	.....	.....	.....	1,301
13	Maine	156	2,014	173	38	28	20	1,755	Ap	1,975	De 1,530	1,738	1,736	2	.....	.....	2,447
14	Maryland	46	1,968	47	77	43	8	1,793	Ap	1,925	Ja 1,533	1,956	1,925	.....	31	.....	6,795
15	Massachusetts	115	4,059	124	128	176	27	3,604	Ja	4,180	Au 3,415	3,845	3,685	8	152	.....	3,783
16	Michigan	91	2,758	103	46	193	72	2,344	My	3,492	No 1,536	2,206	2,200	6	.....	.....	6,486
17	Minnesota	33	257	36	5	4	3	209	Ap	259	Oc 158	191	191	.....	.....	.....	419
18	Mississippi	15	111	16	2	2	.....	91	Ja	106	Oc 71	96	96	.....	.....	.....	301
19	New Hampshire	8	18	9	.....	.....	.....	9	Jy	12	Ja 6	9	9	.....	.....	.....	41
20	New Jersey	97	5,533	97	190	368	9	4,869	Ap	5,223	Fe 4,431	4,881	4,879	2	.....	.....	9,904
21	New York	255	6,230	262	119	183	22	5,644	My	6,437	Fe 4,868	5,878	5,868	4	6	.....	13,835
22	North Carolina	10	66	12	1	.....	.....	53	Mh	63	De 44	47	47	.....	.....	.....	60
23	Ohio	39	3,408	43	51	92	22	3,200	Mh	4,231	Se 1,945	3,485	3,485	.....	.....	.....	8,125
24	Oregon	24	250	29	7	1	1	212	Jy	271	Se 153	188	188	.....	.....	.....	287
25	Pennsylvania	31	3,833	34	59	178	4	3,558	No	4,148	Fe 3,144	4,097	4,036	7	54	.....	7,771
26	Rhode Island	13	596	12	7	40	2	535	My	677	Se 407	551	541	10	.....	.....	1,030
27	Tennessee	3	20	5	.....	.....	.....	15	De	21	Jy 11	21	21	.....	.....	.....	20
28	Texas	6	45	8	1	.....	.....	36	Fe	46	De 26	43	43	.....	.....	.....	21
29	Vermont	7	20	8	.....	.....	1	11	Je	14	Ja[1] 9	10	10	.....	.....	.....	28
30	Washington	60	900	84	39	28	5	744	My	952	Ja 619	852	851	1	.....	.....	2,105
31	West Virginia	3	117	4	3	3	.....	107	No	153	Ja 81	149	149	.....	.....	.....	128
32	Wisconsin	52	1,023	52	22	33	10	906	De	1,105	Mh 795	1,150	1,146	2	2	.....	3,506
33	All other states[1]	44	5,623	51	25	112	18	5,417	.....		.....	6,101	5,938	22	141	.....	7,634

[1]Same number reported for one or more other months.

DETAILED STATISTICS, BY STATES: 1909.

	Capital.	EXPENSES.										Value of products.	Value added by manufacture (value of products less cost of materials).
		Total.	Services.			Materials.		Miscellaneous.					
			Officials.	Clerks.	Wage earners.	Fuel and rent of power.	Other.	Rent of factory.	Taxes, including internal revenue.	Contract work.	Other.		
1	$126,118,489	$67,521,967	$2,292,819	$1,742,627	$25,267,686	$1,191,654	$30,022,704	$404,206	$431,450	$1,185,579	$4,983,242	$73,360,315	$42,145,957
2	428,844	134,250	12,072	.....	62,292	72	42,210	800	2,149	.....	14,655	159,961	117,679
3	8,329,206	3,948,413	122,450	93,167	1,592,211	73,460	1,163,589	23,662	24,315	273,169	582,390	4,132,176	2,895,127
4	1,467,617	669,723	22,576	11,799	253,664	12,856	302,351	2,791	2,600	1,012	60,074	742,254	427,047
5	2,887,565	1,953,836	103,119	78,198	697,477	41,318	939,335	590	12,365	.....	81,434	1,990,240	1,009,587
6	1,031,592	607,685	30,500	5,015	289,467	9,241	223,316	2,553	5,153	118	42,322	696,644	464,087
7	9,380	3,118	.....	.....	797	30	2,061	.....	47	.....	183	8,420	6,329
8	2,060,884	532,277	22,772	11,079	251,594	21,423	177,332	3,179	12,505	268	32,015	583,783	385,028
9	484,159	387,997	15,016	5,210	106,295	4,780	238,376	192	2,636	.....	15,492	374,511	131,355
10	282,302	158,296	3,160	4,080	48,804	2,813	82,558	800	433	8,550	6,498	182,036	96,065
11	271,390	267,004	5,590	1,300	97,483	393	154,771	901	719	.....	5,847	271,067	115,903
12	629,027	468,948	32,904	6,742	235,699	5,183	149,030	4,923	4,461	.....	30,006	572,602	418,389
13	2,303,770	2,527,170	80,458	31,299	992,328	47,464	1,121,629	6,792	9,395	104,872	132,933	3,061,635	1,892,542
14	4,413,069	3,295,118	122,847	37,233	1,097,846	80,852	1,768,277	12,540	24,353	450	150,720	3,534,575	1,685,446
15	7,399,176	6,643,468	384,444	198,632	2,283,250	95,141	2,635,552	46,939	37,547	614,861	347,102	6,995,847	4,265,154
16	6,971,919	4,725,309	128,729	179,767	1,380,081	84,807	2,404,965	12,836	40,359	1,049	492,716	5,033,836	2,544,064
17	380,011	322,923	4,450	3,432	139,049	5,146	152,449	1,221	1,624	.....	15,552	377,423	219,828
18	57,960	124,529	1,200	1,530	51,223	506	65,065	932	433	.....	3,640	161,416	95,845
19	11,495	10,814	.....	.....	4,471	362	4,103	131	60	1,300	327	17,175	12,650
20	19,175,516	8,607,459	247,907	355,316	3,299,035	125,026	4,124,250	52,029	38,845	54,462	309,989	8,840,515	4,591,239
21	14,084,102	9,733,787	304,759	238,171	3,779,531	166,035	3,758,631	138,607	71,868	89,907	1,186,188	11,417,189	7,492,523
22	73,693	79,659	624	.....	25,058	100	47,186	548	329	4,200	1,614	100,254	52,968
23	13,625,199	4,799,707	153,380	105,776	1,704,530	98,317	2,363,525	8,032	49,821	800	315,466	5,076,416	3,214,574
24	240,120	419,974	8,404	1,980	190,203	1,761	202,379	5,674	1,216	275	8,082	477,116	272,976
25	15,203,209	6,001,185	231,688	183,114	2,120,424	108,622	2,600,932	50,520	32,504	24,150	649,141	6,178,145	3,468,591
26	877,443	755,166	21,953	36,426	369,309	16,220	288,108	4,865	2,104	800	15,381	817,281	512,953
27	23,042	19,934	.....	.....	9,278	322	8,857	420	101	.....	956	26,424	17,245
28	23,050	65,842	550	.....	20,524	160	34,218	200	25	.....	1,165	75,662	41,284
29	40,884	9,093	.....	400	3,861	337	4,013	82	119	45	236	14,010	9,660
30	2,038,706	1,435,384	73,760	27,560	642,582	35,903	526,455	11,407	10,844	3,359	103,514	1,550,187	987,829
31	158,467	128,854	4,000	1,988	57,248	235	59,851	30	731	.....	4,771	151,156	91,070
32	3,024,759	1,542,103	41,015	27,435	540,181	36,288	782,250	2,456	18,587	1,872	91,484	1,899,622	1,081,084
33	18,110,873	7,142,877	111,892	95,378	2,912,291	116,481	3,595,020	7,404	23,022	40	281,349	7,240,737	3,529,236

[2] "All other states" embrace: Arkansas, 1 establishment; District of Columbia, 2; Georgia, 2; Missouri, 1; South Carolina, 1; South Dakota, 1; Virginia, 36.

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AGRICULTURAL IMPLEMENTS

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THE AGRICULTURAL IMPLEMENT INDUSTRY.

GENERAL STATISTICS.

Scope of the industry.—This industry includes establishments whose products of chief value are machinery or implements designed for use in agriculture. Agricultural implements in general are divided into four groups, namely, implements of cultivation, seeders and planters, harvesting implements, and seed separators. These groups in turn are subdivided into numerous classes. The implements of cultivation include chiefly cultivators, harrows, and plows; seeders and planters include seeders, listers, planters, and drills; harvesting implements include harvesters, hay rakes, forks, stackers, tedders, mowers, and reapers; and seed separators include thrashers, corn huskers, corn shellers, and fanning mills. There are also certain miscellaneous types of agricultural implements which can not be assigned to any one of the four general groups.

The increasing acreage under cultivation and the difficulty of procuring farm hands in the United States, together with the demand for agricultural implements in foreign markets, have not only brought about a vast growth in the industry but have no doubt been influential factors in the development of more expensive and intricate agricultural machinery.

Comparison with earlier censuses.—At the census of 1849, 1,333 establishments were reported as engaged in the manufacture of agricultural implements, the average number of hands employed in these establishments being 7,220 and the value of their products amounting to $6,842,611. At the census of 1859, 1,982 establishments, giving employment to an average of 14,814 hands, were reported, the value of their products amounting to $17,597,960. Table 1 summarizes the statistics of the industry for each census from 1869 to 1909, inclusive. The financial figures for 1869 are given in currency, which at that time was worth only about 80 cents, gold, to the dollar. For strict comparison, therefore, these figures should be reduced about 20 per cent.

Table 1

	NUMBER OR AMOUNT.						PER CENT OF INCREASE.[1]					
	1909	1904	1899	1889	1879	1869	1899–1909	1904–1909	1899–1904	1889–1899	1879–1889	1869–1879
Number of establishments	640	648	715	910	1,943	2,076	−10.5	−1.2	−9.4	−21.4	−53.2	−6.4
Persons engaged in the industry	60,229	55,089	57,254	(2)	(2)	(2)	5.2	9.3	−3.8			
Proprietors and firm members	465	496	626	(2)	(2)	(2)	−25.7	−6.2	−20.8			
Salaried employees	9,213	7,199	10,046	(2)	(2)	(2)	−8.3	28.0	−28.3			
Wage earners (average number)	50,551	47,394	46,582	38,827	39,580	25,249	8.5	6.7	1.7	(3)	(3)	(3)
Primary horsepower	100,601	89,738	70,646	50,395	44,731	26,082	42.4	12.1	27.0	40.2	12.7	71.5
Capital	$256,281,086	$196,740,700	$157,707,951	$145,313,997	$62,109,668	$34,834,600	62.5	30.3	24.8	8.5	134.0	78.3
Expenses	117,940,357	96,034,800	86,153,374	64,544,574	(2)	(2)	36.9	22.8	11.5	33.5		
Services	38,748,613	32,575,296	30,814,090	21,811,761	15,359,610	12,151,504	25.7	19.0	5.7	41.3	42.0	26.4
Salaries	10,139,998	7,572,646	8,363,210	(2)	(2)	(2)	21.2	33.9	−9.5			
Wages	28,608,615	25,002,650	22,450,880	(2)	(2)	(2)	27.4	14.4	11.4			
Materials	60,306,519	48,281,406	43,944,628	31,603,265	31,631,170	21,473,925	37.2	24.9	9.9	39.0	0.2	46.8
Miscellaneous	18,885,225	15,178,098	11,394,656	11,129,543	(2)	(2)	65.7	24.4	33.2	2.4		
Value of products	146,329,268	112,007,344	101,207,428	81,271,651	68,640,486	52,066,875	44.6	30.6	10.7	24.5	18.4	31.8
Value added by manufacture (value of products less cost of materials)	86,022,749	63,725,938	57,262,800	49,668,386	37,109,316	30,592,950	50.2	35.0	11.3	15.3	33.8	21.3

[1] A minus sign (−) denotes decrease. Where percentages are omitted, comparable figures are not available.
[2] Comparable figures not available. [3] Figures not strictly comparable.

An increase in value of products is shown for each census, the percentage of increase varying from 18.4 for the decade 1879–1889 to 44.6 for the decade 1899–1909. The absolute increase for this latter period was $45,121,840, of which $34,321,924 represents the increase from 1904 to 1909. The value of products in 1909 was almost three times as great as that in 1869.

A considerable part of the total value of products represents the value of products other than agricultural implements. So far as these products could be identified, their value in 1909 amounted to $11,477,829, this figure covering products primarily manufactured in other industries, as follows: Foundry and machine-shop products, $8,431,868; carriages and wagons, $1,921,096; cutlery and edge tools, $250,824; dairymen's, poulterers', and apiarists' supplies, $158,185; pumps, not including steam pumps, $157,892; children's carriages and sleds, $127,689; windmills, $90,311; and other miscellaneous products, $339,964.

On the other hand, agricultural implements were reported in 1909 to the value of $2,989,276 by establishments engaged primarily in the manufacture of other products.

A noticeable feature of Table 1 is the steady decrease in the number of establishments from 2,076 in 1869 to 640 in 1909.

Salaried employees were included to some extent with wage earners at the earlier censuses. This fact explains, at least in part, the decrease in the number of wage earners shown for the decade 1879–1889. The statistics for 1899 are more nearly comparable with the figures for 1909 than are those for the earlier censuses. Between these two years the average number of wage earners increased 3,969, or 8.5 per cent.

Summary, by states.—Table 2 summarizes the more important statistics of the industry by states, the states being arranged according to the value of products reported for 1909. Some states for which data can not be shown separately rank higher than some named in the table.

Although the manufacture of agricultural implements in 1909 was reported from 39 states, 82.7 per cent of the total value of products for the industry was reported by the 6 leading states. Illinois, with a value of products in 1909 representing 39.1 per cent of the total, is by far the most important state in the industry, ranking first at the censuses of 1909 and 1904, not only in value of products, but also in the average number of wage earners employed and in value added by manufacture. New York ranked second among the states in value of products in 1909, reporting 10.2 per cent of the total, and third in average number of wage earners, with 11.3 per cent of the total, while Ohio was third in value of products and second in number of wage earners. Among the leading states in the industry, Indiana shows the most decided gain in rank, having advanced from sixth place in 1904, as determined by value of products, to fourth place in 1909, from fifth place to fourth in average number of wage earners, and from sixth to second in value added by manufacture. Wisconsin and Michigan each fell back one place in rank in average number of wage earners, value of products, and value added by manufacture.

In general, the states had in 1909 the same, or practically the same, rank in the number of wage earners employed and in the value added by manufacture as in the value of products.

Table 2

STATE.	Number of establishments 1909	WAGE EARNERS.				VALUE OF PRODUCTS.				VALUE ADDED BY MANUFACTURE.				PER CENT OF INCREASE.[1]								
		Average number: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Amount: 1909	Per cent of total: 1909	Rank.		Wage earners (average number).			Value of products.			Value added by manufacture.		
				1909	1904			1909	1904			1909	1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904	1899–1909	1904–1909	1899–1904
United States	640	50,551	100.0	....	....	$146,329,268	100.0	....	....	$86,022,749	100.0	....	....	8.5	6.7	1.7	44.6	30.6	10.7	50.2	35.0	11.3
Illinois	79	19,240	38.1	1	1	57,268,325	39.1	1	1	32,444,218	37.7	1	1	5.5	25.3	−15.8	36.2	49.1	−8.6	40.0	57.0	−10.8
New York	57	5,717	11.3	3	2	14,970,980	10.2	2	2	8,556,330	9.9	3	2	3.0	−9.0	13.1	42.1	14.8	23.8	49.8	16.1	29.0
Ohio	55	5,997	11.9	2	3	14,440,461	9.9	3	3	8,121,942	9.5	4	3	−12.5	6.0	−17.4	3.3	12.0	−7.8	2.6	12.8	−9.0
Indiana	39	4,749	9.4	4	5	13,669,824	9.3	4	6	8,806,009	10.2	2	6	38.9	34.0	3.6	113.1	69.6	25.7	132.0	73.1	34.0
Wisconsin	45	2,704	5.3	5	4	11,411,303	7.8	5	4	7,473,967	8.7	5	4	−17.8	−24.2	8.5	44.7	13.2	27.8	62.7	14.0	42.7
Michigan	32	2,359	4.7	7	6	9,272,787	6.3	6	5	6,382,634	7.4	6	5	21.3	−25.4	62.8	46.3	6.3	37.5	65.4	22.2	35.4
Pennsylvania	36	2,401	4.7	6	7	4,804,521	3.3	7	7	2,722,299	3.2	7	7	53.5	0.3	53.1	50.2	−4.2	56.9	38.5	−7.4	49.6
Iowa	42	1,318	2.6	8	9	4,757,089	3.2	8	9	2,585,973	3.0	8	9	104.7	28.3	59.5	215.2	76.7	78.4	208.2	93.7	59.1
Minnesota	17	1,014	2.0	9	8	3,013,595	2.1	9	8	1,923,149	2.2	9	8	9.3	−13.8	26.7	70.9	4.5	63.5	84.1	7.2	71.8
California	25	622	1.2	11	14	2,669,651	1.8	10	11	1,228,473	1.4	11	11	10.7	29.9	−14.8	96.6	79.9	9.3	50.1	61.7	−7.2
Georgia	17	552	1.1	12	12	1,116,700	0.8	12	13	533,763	0.6	13	14	53.3	−5.5	62.2	51.4	7.4	40.9	78.0	21.9	46.0
Tennessee	16	645	1.3	10	11	1,003,747	0.7	13	14	590,857	0.7	12	13	72.9	5.2	64.3	116.8	30.6	66.1	126.4	29.9	74.3
Missouri	25	438	0.9	14	13	981,458	0.7	14	12	476,967	0.6	14	12	−11.2	−16.6	6.5	2.8	−8.1	11.9	−12.8	−22.6	12.6
New Jersey	10	224	0.4	18	18	754,909	0.5	15	19	423,224	0.5	15	16	52.4	9.8	38.8	202.0	92.6	56.8	219.4	56.2	104.5
Massachusetts	5	346	0.7	16	15	646,534	0.4	16	15	359,803	0.4	16	15	10.9	−17.2	34.0	20.9	−1.1	22.2	12.9	−10.4	26.0
Vermont	11	360	0.7	15	17	581,949	0.4	17	16	310,314	0.4	17	17	70.6	45.7	17.1	57.3	31.7	19.5	50.5	19.2	26.2
Virginia	16	272	0.5	17	16	516,358	0.4	18	17	272,554	0.3	18	18	−2.2	−13.4	12.9	50.4	27.7	17.8	26.5	22.5	6.1
Kansas	18	126	0.2	21	22	368,779	0.3	20	18	206,859	0.2	20	19	.....	20.0	.....	.....	−6.6	.....	.....	8.9	.....
Connecticut	4	191	0.4	19	19	331,542	0.2	21	20	195,527	0.2	21	20	24.0	5.5	17.5	70.3	23.0	38.5	64.7	28.1	28.6
North Carolina	22	132	0.3	20	21	261,819	0.2	22	24	171,850	0.2	22	24	.....	23.4	.....	.....	106.3	.....	.....	.....	.....
Maine	10	121	0.2	22	20	226,308	0.2	23	21	142,036	0.2	23	21	−44.5	−20.9	−29.8	−22.1	9.7	−29.0	−26.0	9.2	−32.3
Nebraska	11	63	0.1	26	27	152,343	0.1	26	27	68,870	0.1	26	27	.....	.....	.....	−13.6	.....	−73.9	.....	.....	.....
New Hampshire	5	24	0.1	29	26	43,280	(1)	30	26	29,040	(1)	29	25	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina	4	15	(1)	30	30	36,300	(1)	31	29	23,910	(1)	30	29	.....	.....	.....	.....	.....	.....	.....	.....	.....
All other states	39	921	1.8	....	....	3,028,706	2.1	....	....	1,967,091	2.3	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Percentages are based on figures in Table 17. A minus sign (−) denotes decrease. Percentage not shown where base is less than 100 for wage earners or less than $100,000 for value of products or value added by manufacture.

Persons engaged in the industry.—Table 3 shows, for 1909, the number of persons engaged in the industry, classified according to occupational status and sex, and in the case of wage earners, according to age also. It should be borne in mind that the sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the Introduction.

The average number of persons engaged in the industry during 1909 was 60,229, of whom 50,551, or 83.9 per cent, were wage earners, 2,489, or 4.1 per cent, proprietors and officials, and 7,189, or 11.9 per cent, were clerks, this class including other subordinate salaried employees. Of the total number of persons engaged in the industry, 58,517, or 97.2 per cent, were males, and 1,712, or 2.8 per cent, females. Of the total number of females, 61.4 per cent were clerks. The average number of female wage earners (616) formed only 1.2 per cent of the total number of wage earners employed, and the average number of chil-

dren under 16 years of age employed as wage earners was only 206.

Table 3

CLASS.	PERSONS ENGAGED IN THE INDUSTRY: 1909		
	Total.	Male.	Female.
All classes	**60,229**	**58,517**	**1,712**
Proprietors and officials	2,489	2,445	44
Proprietors and firm members	465	448	17
Salaried officers of corporations	569	564	5
Superintendents and managers	1,455	1,433	22
Clerks	7,189	6,137	1,052
Wage earners (average number)	50,551	49,935	616
16 years of age and over	50,345	49,730	615
Under 16 years of age	206	205	1

The average number of wage earners in each state, for 1909, 1904, and 1899, is given in Table 17. The average number distributed by sex and age is not shown for the individual states, but Table 18 gives such a distribution of the number employed on December 15, or the nearest representative day. Female wage earners 16 years of age and over were reported from only 15 states; the largest number, 264, was reported for the state of Illinois, and the next largest number, 142, for Indiana. These 2 states combined reported 60.2 per cent of all the wage earners of this class in the industry. The few wage earners under 16 years of age were fairly well distributed among the states.

In order to compare the distribution of the persons engaged in the industry in 1909 according to occupational status with that in 1904, it is necessary to use the classification employed at the earlier census. (See Introduction.) Such a comparison is made in Table 4.

Table 4

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.				
	1909		1904		Per cent of increase:[1] 1904–1909
	Number.	Per cent distribution.	Number.	Per cent distribution.	
Total	**60,229**	**100.0**	**55,089**	**100.0**	**9.3**
Proprietors and firm members	465	0.8	496	0.9	−6.3
Salaried employees	9,213	15.3	7,199	13.1	28.0
Wage earners (average number)	50,551	83.9	47,394	86.0	6.7

[1] A minus sign (−) denotes decrease.

Table 5 shows the average number of wage earners in the industry distributed according to age, and in the case of those 16 years of age and over, according to sex, for 1909, 1904, and 1899. The number of women and children employed was so small that the increase from 1899 to 1909 has little significance.

Table 5

CLASS.	AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY.					
	1909		1904		1899	
	Number.	Per cent distribution.	Number.	Per cent distribution	Number.	Per cent distribution.
Total	**50,551**	**100.0**	**47,394**	**100.0**	**46,582**	**100.0**
16 years of age and over	50,345	99.6	47,210	99.6	46,388	99.6
Male	49,730	98.4	46,631	98.4	46,174	99.1
Female	615	1.2	579	1.2	214	0.5
Under 16 years of age	206	0.4	184	0.4	194	0.4

Wage earners employed, by months.—Table 6 gives the number of wage earners employed in the industry on the 15th (or the nearest representative day) of each month during the year 1909 for the 13 states in which an average of 500 or more wage earners were employed during the year.

Table 6

STATE.	WAGE EARNERS EMPLOYED IN THE INDUSTRY: 1909 [1]											
	Average number during the year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
United States	**50,551**	**51,540**	**53,673**	**54,759**	**53,165**	**50,990**	**48,727**	**45,027**	**44,906**	**46,484**	**49,477**	**52,410**	**55,465**
California	622	677	662	679	**702**	650	573	526	*513*	553	612	652	668
Georgia	552	655	662	619	512	387	*286*	316	502	577	632	707	**774**
Illinois	19,240	19,767	19,959	20,168	19,682	19,597	18,596	*16,591*	16,855	17,952	19,544	20,513	**21,855**
Indiana	4,749	*4,580*	4,680	4,897	4,816	4,567	4,564	4,552	4,732	4,637	4,882	5,024	**5,310**
Iowa	1,318	1,234	1,331	1,468	**1,509**	1,392	1,349	1,350	1,263	*1,188*	1,196	1,225	1,310
Kentucky	551	704	**733**	612	490	239	*183*	489	530	599	627	693	713
Michigan	2,359	2,366	2,498	2,543	2,477	2,373	2,270	2,232	2,251	*2,088*	2,224	2,454	**2,593**
Minnesota	1,014	983	1,031	1,116	1,107	1,017	1,039	**948**	919	*910*	918	1,016	**1,169**
New York	5,717	6,239	6,794	**6,916**	6,455	6,109	5,551	4,781	*3,958*	4,440	5,149	5,936	6,278
Ohio	5,997	5,682	6,173	6,608	**6,721**	6,346	6,121	*5,547*	5,675	5,831	5,719	5,697	5,844
Pennsylvania	2,401	2,401	2,400	2,443	**2,445**	2,421	2,413	2,387	2,414	2,340	*2,337*	2,382	2,429
Tennessee	645	660	682	657	568	*567*	593	586	623	627	699	730	**743**
W sconsin	2,704	3,023	**3,149**	3,088	2,824	2,573	2,515	2,426	*2,304*	2,335	2,423	2,763	3,025

[1] The month of maximum employment for each state is indicated by boldface figures and that of minimum employment by italic figures.

The largest number of wage earners employed in the industry during any month of 1909 was 55,465, in December, and the smallest number, 44,906, in August, the minimum number being equal to 81 per cent of the maximum. In 1904 the maximum number, 54,697, was shown for March, and the minimum, 39,656, for September, the latter number being equal to 72.5 per cent of the former.

In the industry as a whole, as well as for the individual states, the greatest activity occurred during the winter and spring months, and for most of the states shown in the table the least number of wage earners was reported for some month of the summer or early fall. For Indiana, the fourth state in respect to value of products, however, the least number of wage earners was reported for January.

The months of maximum and minimum employment for 1909, and the number of wage earners reported for these months, are given for a larger number of states in Table 18.

Prevailing hours of labor.—In Table 7 the wage earners in the industry have been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. In making this classification the average number of wage earners employed during the year in each establishment was classified as a total according to the hours prevailing in that establishment, even though a few employees worked a greater or less number of hours.

Table 7 AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY: 1909

STATE.	Total.	In establishments with prevailing hours—						
		48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.	72 and over.
United States	50,551	453	2,029	4,081	27,549	16,307	131	1
California	622	2	.....	584	.....	20	16	.....
Georgia	552	.....	3	.....	106	443	.....	.....
Illinois	19,240	.....	.....	386	13,664	5,077	113	.....
Indiana	4,749	.....	*539*	459	2,879	872	.....	.....
Iowa	1,318	.....	.....	86	493	739	.....	.....
Kentucky	551	.....	.....	53	.....	498	.....	.....
Michigan	2,359	.....	.....	1,119	787	453	.....	.....
Minnesota	1,014	1	.....	6	39	968	.....	.....
New York	5,717	20	.....	132	3,549	2,016	.....	.....
Ohio	5,997	195	1,294	387	2,354	1,767	.....	.....
Pennsylvania	2,401	1	.....	452	850	1,097	.....	1
Tennessee	645	1	.....	154	.....	490	.....	.....
Wisconsin	2,704	.....	.....	.....	1,906	798	.....	.....

Practically all (94.8 per cent) of the wage earners employed in the industry in 1909 were in establishments embraced in the three groups where the prevailing hours were from 54 to 60, inclusive, per week. Only 4.9 per cent were employed in establishments where the prevailing hours were less than 54 per week, and three-tenths of 1 per cent of the total in establishments where the prevailing hours were more than 60 per week. Of the seven groups shown in Table 7, the largest was that made up of the wage earners in establishments where the prevailing hours were between 54 and 60 per week, such wage earners constituting 54.5 per cent of the total number. This group was the most important, likewise, in each of the five leading states in the industry as measured by value of products—Illinois, New York, Ohio, Indiana, and Wisconsin. In California and Michigan, however, the wage earners in establishments where the prevailing hours of labor per week were 54 formed the largest group, and in the remaining states the largest group was that made up of the wage earners in establishments where the prevailing hours were 60 per week.

Character of ownership.—Table 8 presents statistics with respect to the character of ownership of the establishments engaged in the industry in the United States.

Table 8

CHARACTER OF OWNERSHIP.	NUMBER OF ESTABLISHMENTS.		VALUE OF PRODUCTS.	
	1909	1904	1909	1904
Total	640	648	$146,329,268	$112,007,344
Individual	184	200	2,174,866	2,584,031
Firm	[1] 107	121	3,490,827	4,097,433
Corporation	349	327	140,663,575	105,325,880
Per cent of total	100.0	100.0	100.0	100.0
Individual	28.8	30.9	1.5	2.3
Firm	[1] 16.7	18.7	2.4	3.7
Corporation	54.5	50.5	96.1	94.0

[1] Includes one establishment under cooperative ownership, to avoid disclosure of individual operations.

In 1909, of the total number of establishments reported for the industry, 54.5 per cent were under corporate ownership, as compared with 50.5 per cent in 1904. In 1909 the value of products of these establishments represented 96.1 per cent of the total, and in 1904, 94 per cent.

Table 9 gives statistics for establishments classified according to form of ownership for each state, with the exception of Kentucky, for which more than 500 wage earners were reported. Kentucky is omitted in order to avoid the disclosure of individual operations.

Table 9

STATE.	NUMBER OF ESTABLISHMENTS OWNED BY—			WAGE EARNERS IN ESTABLISHMENTS OWNED BY—			VALUE OF PRODUCTS OF ESTABLISHMENTS OWNED BY—			VALUE ADDED BY MANUFACTURE IN ESTABLISHMENTS OWNED BY—		
	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.	Individuals.	Firms.	Corporations.
United States	184	107	349	965	1,445	48,141	$2,174,866	$3,490,827	$140,663,575	$1,146,060	$1,987,099	$82,889,590
California	12	3	10	33	5	584	106,779	27,718	2,535,154	61,104	19,211	1,148,158
Georgia	1	9	7	(X)	*49*	503	(X)	*99,060*	1,017,640	(X)	*49,325*	484,438
Illinois	17	12	*50*	62	183	18,995	175,644	354,759	56,737,922	92,927	217,155	32,134,136
Indiana	9	4	26	70	9	4,670	193,814	26,895	13,449,115	105,580	12,105	3,688,324
Iowa	8	8	26	38	26	1,254	102,783	32,155	4,572,151	44,019	37,005	2,504,949
Michigan	8	6	18	45	21	2,293	172,670	52,704	9,047,413	78,872	32,206	6,271,556
Minnesota	2	2	13	(X)	*10*	1,004	(X)	*40,465*	2,973,130	(X)	*28,370*	1,894,770
New York	19	10	28	145	53	5,519	271,450	245,308	14,454,222	160,578	158,821	8,236,931
Ohio	10	4	41	51	148	5,798	122,107	525,896	13,792,458	62,906	267,763	7,791,273
Pennsylvania	15	8	13	132	688	1,581	185,171	1,541,739	3,077,611	89,668	897,965	1,734,666
Tennessee	4	2	10	*65*	(X)	580	*102,189*	(X)	901,558	*54,436*	(X)	536,421
Wisconsin	13	5	27	41	*35*	2,628	124,187	78,916	11,208,200	68,772	37,558	7,367,637

NOTE.—In some states, in order to avoid disclosing the returns for individual establishments, the figures for one group have been consolidated with those for establishments under some other form of ownership. In such cases an (X) is placed in the column from which the figures have been omitted and the figures for the group with which they have been combined are printed in italics. The figures for establishments under firm ownership include those for one establishment under cooperative ownership.

In 1909, 965 wage earners, or 1.9 per cent of the total for the industry, were employed in establishments under individual ownership; 1,445, or 2.9 per cent, in those under firm ownership (including one under cooperative ownership); and 48,141, or 95.2 per cent, in those owned by corporations.

There are considerable variations among the different states in the relative importance of the establishments operated by individuals, firms, and corporations, respectively. Thus in Illinois the establishments controlled by corporations constituted 63.3 per cent of the total number of establishments, gave employment to 99.3 per cent of the wage earners, and reported 98.7 per cent of the total value of products. In Pennsylvania, on the other hand, establishments under corporate ownership controlled only 36.1 per cent of the establishments, gave employment to 65.8 per cent of the wage earners, and contributed 64.1 per cent of the total value of products.

Size of establishments.—Table 10 presents statistics for 1909 and 1904 for establishments grouped according to the value of their products.

In 1909, 5.3 per cent of the establishments manufactured products valued at $1,000,000 or over, as against 4.2 per cent in 1904. While such establishments represented a comparatively small proportion of the total number at both censuses, they reported 64.3 per cent of the total value of products in 1909 and 52.2 per cent in 1904.

On the other hand, the small establishments—that is, those manufacturing products valued at less than $20,000—constituted more than one-half (51.3 per cent) of the total number of establishments in 1909, but the value of their products amounted to only 1.5 per cent of the total. The corresponding proportions for these establishments at the census of 1904 were 47.1 per cent and 1.7 per cent, respectively. More than nine-tenths of the output of all establishments in the industry, as measured by value, was turned out in both years by those having products valued at $100,000 or over, such establishments reporting 93.8 per cent of the total value of products in 1909 and 90.8 per cent in 1904.

Table 10

VALUE OF PRODUCTS PER ESTABLISHMENT.	NUMBER OF ESTABLISHMENTS.		VALUE OF PRODUCTS.	
	1909	1904	1909	1904
Total	**640**	**648**	**$146,329,268**	**$112,007,344**
Less than $5,000	156	153	359,971	369,294
$5,000 and less than $20,000	172	152	1,827,822	1,537,789
$20,000 and less than $100,000	142	175	6,927,862	8,423,972
$100,000 and less than $1,000,000	136	141	43,075,407	43,196,469
$1,000,000 and over	34	27	94,138,206	58,479,820
Per cent of total	**100.0**	**100.0**	**100.0**	**100.0**
Less than $5,000	24.4	23.6	0.2	0.3
$5,000 and less than $20,000	26.9	23.5	1.3	1.4
$20,000 and less than $100,000	22.2	27.0	4.7	7.5
$100,000 and less than $1,000,000	21.2	21.8	29.4	38.6
$1,000,000 and over	5.3	4.2	64.3	52.2

The average value of products per establishment increased from $172,851 in 1904 to $228,639 in 1909, and the average value added by manufacture, as computed from the figures in Table 1, from $98,342 to $134,411. The average number of wage earners per establishment shows an increase from 73.1 in 1904 to 79 in 1909.

Classification by number of wage earners.—Table 11 classifies the establishments in the 13 leading states according to the number of wage earners employed.

Table 11

STATE.	TOTAL.		ESTABLISHMENTS EMPLOYING IN 1909—															
			No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
	Establishments.	Wage earners (average number).	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	**640**	**50,551**	**40**	**246**	**589**	**126**	**1,478**	**84**	**2,724**	**49**	**3,682**	**49**	**7,911**	**28**	**9,991**	**11**	**7,994**	**7**	**16,182**
California	25	622	.....	15	38	4	43	2	48	1	52	3	441	.....	.....	.....	.....	.....	.....
Georgia	17	552	1	6	11	5	48	2	54	1	74	2	365	.....	.....	.....	.....	.....	.....
Illinois	79	19,240	5	16	35	17	186	5	172	9	618	13	1,889	6	2,108	4	3,067	4	11,165
Indiana	39	4,749	2	12	25	9	119	6	147	3	276	2	352	3	1,397	1	523	1	1,910
Iowa	42	1,318	1	19	45	7	75	9	277	3	224	2	403	1	294	.....	.....	.....	.....
Kentucky	6	551	.....	2	6	1	13	2	76	.....	.....	.....	.....	1	456	.....	.....	.....	.....
Michigan	32	2,359	2	12	31	4	67	6	207	2	146	1	170	5	1,738	.....	.....	.....	.....
Minnesota	17	1,014	1	3	7	8	94	.....	.....	3	219	.....	.....	2	694	.....	.....	.....	.....
New York	57	5,717	2	22	53	9	125	13	485	4	321	1	150	2	688	3	2,130	1	1,765
Ohio	55	5,997	3	12	33	8	90	10	318	3	227	13	2,170	4	1,287	1	530	1	1,342
Pennsylvania	36	2,401	5	13	23	4	53	4	139	4	327	4	650	1	405	1	804	.....	.....
Tennessee	10	645	.....	8	14	2	16	2	81	3	207	.....	.....	1	327	.....	.....	.....	.....
Wisconsin	45	2,704	5	17	42	10	135	4	127	2	179	4	684	2	597	1	940	.....	.....

Of the 640 establishments reported in 1909, 6.3 per cent employed no wage earners, 38.4 per cent employed from 1 to 5, 19.7 per cent from 6 to 20, and 13.1 per cent from 21 to 50. There were 144 establishments that employed an average of more than 50 wage earners, and of these, 18 employed over 500.

Of the total number of wage earners, 16.8 per cent were reported by establishments employing from 1 to

100, 15.6 per cent by establishments employing from 101 to 250, and 19.8 per cent by establishments employing from 251 to 500. Almost one-half of the total number of wage earners (24,176, or 47.8 per cent), worked in establishments employing over 500 each.

Expenses.—As stated in the Introduction, the census figures representing expenses do not purport to show the total cost of manufacture, since they take no account of interest or depreciation; hence they can not properly be used for determining profits. Facts of interest can be brought out, however, concerning the relative importance of the different classes of expenses which were reported. Table 1 shows the total expenses in 1909 to have been $117,940,357, distributed as follows: Cost of materials, $60,306,519, or 51.1 per cent; wages, $28,608,615, or 24.3 per cent; salaries, $10,139,998, or 8.6 per cent; and miscellaneous expenses, made up of advertising, traveling expenses, ordinary repairs of buildings and machinery, taxes, insurance, and other sundry expenses, $18,885,225, or 16 per cent. These proportions, as may be seen by comparing the items in Table 18, vary somewhat in the several states.

Engines and power.—Table 12 shows statistics of power as reported at the censuses of 1909, 1904, and 1899.

The total primary power used in establishments manufacturing agricultural implements increased from 70,646 horsepower in 1899 to 100,601 horsepower in 1909, or 42.4 per cent. Although power generated by steam engines decreased slightly between 1904 and 1909, it retained its position as the principal kind of power, representing 71 per cent in 1909, 83.6 per cent in 1904, and 86.6 per cent of the total in 1899. Water power, which in 1899 formed 9.6 per cent of the total primary power, constituted only 8.3 per cent in 1909, but there was an increase in the relative importance of power generated by gas and other internal-combustion engines. The most noticeable gain, however, was in rented electric power, which increased from 1,100 horsepower in 1899 to 15,684 horsepower, or more than fourteen times as much, in 1909. Rented electric power formed 15.6 per cent of the total primary power in 1909, as compared with 4.3 per cent in 1904, and 1.6 per cent in 1899.

The number and horsepower of electric motors used for distributing power by means of current generated in the establishments in the industry also show a very decided increase.

Table 12

POWER.	NUMBER OF ENGINES OR MOTORS.			HORSEPOWER.			PER CENT DISTRIBUTION OF HORSEPOWER.		
	1909	1904	1899	1909	1904	1899	1909	1904	1899
Primary power, total	**1,794**	**1,177**	**912**	**100,601**	**89,738**	**70,646**	**100.0**	**100.0**	**100.0**
Owned	862	995	912	84,717	85,835	69,280	84.2	95.6	98.1
Steam	504	698	678	71,394	75,018	61,147	71.0	83.6	86.6
Gas	261	165	75	4,433	2,360	1,055	4.4	2.6	1.5
Water wheels	96	128	159	8,387	6,288	6,758	8.3	7.0	9.6
Water motors	1	4	(1)	3	12	(1)	(2)	(2)	
Other				500	2,157	320	0.5	2.4	0.5
Rented	932	182	(1)	15,884	3,903	1,366	15.8	4.3	1.9
Electric	932	182	(1)	15,684	3,828	1,100	15.6	4.3	1.6
Other				200	75	266	0.2	0.1	0.4
Electric motors	**2,057**	**872**	**193**	**38,905**	**20,713**	**7,643**	**100.0**	**100.0**	**100.0**
Run by current generated by establishment	1,125	690	193	23,221	16,885	6,543	59.7	81.5	85.6
Run by rented power	932	182	(1)	15,684	3,828	1,100	40.3	18.5	14.4

[1] Not reported. [2] Less than one-tenth of 1 per cent.

Table 13 shows, for 1909, the amount of each of the several kinds of power and of the different kinds of fuel used in the industry in the 13 leading states.

Table 13

STATE.	PRIMARY HORSEPOWER.								ELECTRIC HORSEPOWER.		FUEL USED.					
	Number of establishments reporting.	Total horsepower.	Owned by establishments reporting.					Rented.			Coal.		Coke (short tons).	Wood (cords).	Oil, including gasoline (barrels).	Gas (1,000 feet).
			Total.	Steam engines.	Gas engines.	Water-wheels and motors.	Other.	Electric.	Other.	Total, rented and generated by establishment.	Generated in the establishment reporting.	Anthracite (long tons).	Bituminous (short tons).				
United States	**600**	**100,601**	**84,717**	**71,394**	**4,433**	**8,390**	**500**	**15,684**	**200**	**38,905**	**23,221**	**15,114**	**550,085**	**98,819**	**14,528**	**244,759**	**313,412**
California	25	1,186	507	335	172			679		711	32	174	266	294	10	8,962	16
Georgia	14	1,307	1,127	1,079	48			180		855	675		4,900	1,357		76	180
Illinois	75	38,040	32,317	31,575	222	520		5,535	188	18,698	13,163	800	287,554	38,363	8,643	135,401	2,890
Indiana	36	9,254	8,221	5,002	119	3,100		1,033		2,480	1,447	195	44,643	14,588	225	3,555	3,611
Iowa	42	2,554	1,897	1,589	278	30		657		753	96	28	16,139	1,154	24	1,026	166
Kentucky	5	772	734	710	24			38		501	463		3,033	1,000		3,255	200
Michigan	30	5,195	3,705	3,540	115	50		1,490		2,243	753	45	23,895	3,543	221	10,456	
Minnesota	16	1,468	1,380	1,355	25			88		508	420	22	10,443	1,485	2,179	1,145	
New York	56	10,744	9,298	6,612	266	2,420		1,436	10	2,869	1,433	5,651	58,963	10,745	1,595	43,191	27,910
Ohio	50	9,867	9,010	7,360	1,562	88		857		3,406	2,549		44,510	8,967	13	11,896	240,768
Pennsylvania	31	3,842	2,821	2,706	115			1,021		1,638	617	2,622	12,589	3,045	584	9,490	2,062
Tennessee	15	1,236	1,236	1,172	64					567	567	11	4,976	4,437	200	87	
Wisconsin	41	7,301	5,780	5,069	211		500	1,521		2,006	485	841	19,896	5,482	73	9,201	898
All other states	164	7,835	6,684	3,290	1,212	2,182		1,149	2	1,670	521	4,725	18,278	4,359	761	7,018	34,711

In 1909 Illinois, New York, Ohio, Indiana, and Wisconsin together reported 75,206 horsepower, or 74.8 per cent of the aggregate for the industry. Steam was the most important form of power in all of the states shown separately except California, where rented electric power was used to a greater extent

than any other form of power. The largest amount of steam power, 31,575 horsepower, representing 44.2 per cent of the total, was reported by Illinois, and the largest amount of water power, 3,100 horsepower, by Indiana. Illinois reported by far the largest amount of rented electric power, 5,535 horsepower, or more than one-third of the total for the United States. Of the power generated by gas and other internal-combustion engines, the greatest amount, 1,562 horsepower, was reported for Ohio.

Fuel consumed.—Bituminous coal was the principal class of fuel used in the industry, 550,085 short tons being consumed during 1909, of which amount 287,554 tons, or 52.3 per cent, were used in Illinois. The largest quantity of anthracite coal, 5,651 long tons, or more than one-third of the total for the industry, was reported for New York. Gas and oil were used to a considerable extent, by far the largest quantity of gas being reported for Ohio, and of oil for Illinois.

SPECIAL STATISTICS RELATING TO PRODUCTS.

Table 14 shows statistics of the products of the establishments in the industry for 1909, 1904, and 1899.

Table 14

PRODUCT.	1909	1904	1899
Total value	[1] $146,329,268	[1] $112,007,344	$101,207,428
Implements of cultivation	35,246,030	30,607,960	
Seeders and planters	13,679,921	11,225,122	
Harvesting implements	34,568,131	30,862,435	98,010,506
Seed separators	11,030,412	6,639,883	
All other products	48,690,082	30,703,648	
Amount received for repair work	3,114,692	1,968,296	3,196,922
Principal kinds of implements.			
Implements of cultivation:			
Cultivators—	*Number.*	*Number.*	*Number.*
Beet	3,172	3,459	2,008
Small	469,696	239,173	207,171
Wheeled	435,429	313,088	295,799
Cotton scrapers	20,180	22,519	15,230
Harrows—			
Disk	193,000	104,323	97,261
Spring-tooth	112,832	86,408	380,259
Spike-tooth	394,988	262,442	
Plows—			
Disk	22,132	39,146	17,345
Gang	91,686	[2]	[2]
Shovel	254,737	121,899	102,320
Steam	2,355	1,599	207
Sulky or wheel	134,936	138,899	136,105
Walking	1,110,006	956,898	819,022
Seeders and planters:			
Seeders—			
Broadcast	38,007	33,546	36,862
Combination	23,963		
Corn planters—			
Hand	96,465	86,553	129,515
Horse	122,780	90,929	78,335
Listers	44,840	23,012	26,995
Cotton planters	79,271	127,052	45,575
Potato planters	23,092	35,756	25,338
Drills—			
Corn	20,137	28,228	21,940
Disk	21,292	[2]	[2]
Grain	68,611	76,929	91,635
All other	32,507	606	5,302
Seed sowers	7,847	59,910	83,283
Harvesting implements:			
Grain cradles	22,635	30,056	36,163
Harvesters—			
Bean	1,409	665	1,425
Corn	19,693	6,924	20,707
Grain	129,274	108,810	233,542
Harvesters and thrashers combined	543	[2]	[2]
Other	1,707	3,161	6,283
Hay carriers	45,064	85,121	54,303
Hayforks, horse	43,675	62,801	51,770
Hay loaders	34,705	27,174	7,273
Hayrakes, horse	266,260	236,297	216,345
Haystackers	17,212	8,670	12,069
Hay tedders	34,396	35,745	14,510
Mowers	359,264	273,385	398,616
Potato diggers, horse	25,632	11,703	[2]
Reapers	58,294	60,996	35,945
Seed separators:			
Clover hullers	437	351	661
Corn huskers	372	1,327	10,726
Corn huskers and shredders	1,240	.....	.....
Corn shellers—			
Hand	74,223	47,189	106,381
Power	9,049	6,082	8,135
Fanning mills	33,805	22,994	30,369
Thrashers—			
Horse power	822	2,237	1,314
Steam power	23,586	7,950	3,651

[1] In addition, agricultural implements to the value of $2,989,276 in 1909, and to the value of $1,349,679 in 1904, were made by establishments engaged primarily in the manufacture of products other than those covered by the industry designation.
[2] Not reported separately.

The value of products increased from $101,207,428 in 1899 to $146,329,268 in 1909, or 44.6 per cent. The value of products in 1909 included a large amount ($48,690,082, or one-third of the total value of products for the industry) which represented the value of products that could not be classified with either of the four general groups of products. Of this amount, $11,477,829, as stated in the discussion of Table 1, was found to represent products other than agricultural implements, leaving $37,212,253 which it was impracticable to account for in detail. Much of this represents the value of parts and attachments of agricultural implements, traction engines, hay presses, tobacco presses, manure spreaders, wagons, cane mills, windmills, wheelbarrows, dairy machinery, road scrapers, water tanks, evaporators, and various kinds of hand tools, like scythes, shovels, and spades. Thus, although many of these products are directly associated with agriculture, there are many which are common to agricultural and to other pursuits, and still others which are not generally used as agricultural implements.

In 1909 the aggregate value of the four groups of agricultural implements—seeders and planters, implements of cultivation, harvesting implements, and separators—for which separate figures are presented, was $94,524,494, as compared with $79,335,400 in 1904, representing an increase of 19.1 per cent during the five-year period.

A comparison of the numbers of the various classes of agricultural machinery reported at the several censuses is of little value, since each class includes a considerable variety of implements and the make-up of the class may change from census to census, either by reason of improvements in the machinery or by reason of changes in the type of machinery most extensively used.

Principal classes of products, by states.—Table 15 shows, by states, the values reported for the four main groups of agricultural implements for 1909 and 1904. Statistics of this kind are not available for 1899.

The value reported for implements of cultivation shows an increase of $4,638,070, or 15.2 per cent, between 1904 and 1909. Illinois was the leading state in the manufacture of this class of agricultural implements, reporting approximately two-fifths of

the total value of such implements for the United States at both censuses, while Indiana ranked second.

Table 15 PRODUCT AND STATE.	1909	1904
IMPLEMENTS OF CULTIVATION.		
United States	**$35,246,030**	**$30,607,960**
Illinois	14,422,970	12,273,939
Indiana	4,606,748	3,346,895
New York	3,348,203	2,545,947
Ohio	3,062,194	3,031,384
Wisconsin	2,324,579	2,219,657
Michigan	1,150,927	1,313,564
Pennsylvania	1,147,063	987,619
HARVESTING IMPLEMENTS.		
United States	**34,568,131**	**30,862,435**
Illinois	22,417,070	16,874,413
New York	5,950,777	5,841,389
Ohio	2,675,727	3,193,853
Iowa	1,157,701	868,104
California	860,062	413,262
SEEDERS AND PLANTERS.		
United States	**13,679,921**	**11,225,122**
Illinois	5,680,681	2,998,075
Ohio	2,245,512	2,016,919
Wisconsin	1,639,295	911,438
Indiana	1,499,639	694,047
Michigan	640,001	1,004,734
SEED SEPARATORS.		
United States	**11,030,412**	**6,639,883**
Indiana	2,748,913	718,575
Illinois	1,847,026	915,095
Michigan	1,753,043	1,479,173
Wisconsin	1,435,296	1,035,688
Ohio	858,106	501,482
Pennsylvania	828,617	489,956
New York	790,494	461,814

Harvesting implements show an increase in value of $3,705,696, or 12 per cent, between 1904 and 1909. Illinois reported 64.8 per cent of the total value in 1909, and New York, the second state, 17.2 per cent. The value reported for seeders and planters increased $2,454,799, or 21.9 per cent, between 1904 and 1909, Illinois also reporting a larger proportion of the total for this class than any other state (41.5 per cent in 1909), and Ohio ranking second. Seed separators show an increase of $4,390,529, or 66.1 per cent, in value from 1904 to 1909. Indiana, the leading state in 1909, reported 24.9 per cent of the total value.

Exports.—Table 16 shows the value of the exports of agricultural implements for the fiscal years (ending June 30) 1870, 1880, 1890, and 1900, and for each succeeding year to 1909, inclusive.

Table 16 VALUE OF EXPORTS OF AGRICULTURAL IMPLEMENTS.[1]				
YEAR ENDING JUNE 30—	Total.	Mowers and reapers, including parts.	Plows and cultivators, including parts.	All other implements, including parts.
1870	$1,068,476	$65,533	$143,527	$859,416
1880	2,245,742	768,945	169,211	1,307,586
1890	3,859,184	2,092,638	878,784	887,762
1900	16,099,149	11,243,763	2,178,098	2,677,288
1901	15,313,434	9,943,680	1,888,373	4,481,381
1902	16,286,740	8,813,370	2,791,092	4,677,278
1903	21,006,622	10,326,641	3,169,961	7,510,020
1904	22,749,635	11,568,062	3,537,810	7,643,763
1905	20,721,741	10,559,891	2,892,060	7,269,790
1906	24,554,427	12,150,101	4,128,331	8,275,995
1907	26,936,456	15,078,231	3,492,073	8,366,152
1908	24,344,398	13,750,434	3,139,496	7,454,468
1909	25,694,184	14,052,083	3,795,800	7,846,301

[1] Figures taken from the Statistical Abstract of the United States, issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

DETAILED STATE TABLES.

The principal statistics secured by the census inquiry concerning establishments engaged in the manufacture of agricultural implements are presented by states in Tables 17 and 18.

Table 17 shows for 1909, 1904, and 1899 the number of establishments, number of persons engaged in the industry, primary horsepower, capital invested, salaries, wages, cost of materials, value of products, and value added by manufacture, while Table 18 gives more detailed statistics for the industry, for 1909 only.

AGRICULTURAL IMPLEMENTS—COMPARATIVE STATISTICS, BY STATES: 1909, 1904, AND 1899.

Table 17

STATE.	Census.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried employees.	Wage earners (average number).	Primary horsepower.	Capital.	Salaries.	Wages.	Cost of materials.	Value of products.	Value added by manufacture (value of products less cost of materials).
								Expressed in thousands.					
United States	1909	640	60,229	465	9,213	50,551	100,601	$256,281	$10,140	$28,609	$80,307	$146,329	$86,022
	1904	648	55,089	496	7,199	47,394	89,738	196,741	7,573	25,003	48,281	112,007	63,726
	1899	715	57,254	626	10,046	46,582	70,646	157,708	8,363	22,451	43,945	101,207	57,262
California	1909	25	749	19	108	622	1,186	2,359	123	451	1,441	2,670	1,229
	1904	25	585	19	87	479	583	2,240	99	349	724	1,484	760
	1899	20	655	12	81	562	689	1,852	75	322	539	1,358	819
Connecticut	1909	4	210	1	18	191	730	398	24	76	136	332	196
	1904	3	200	2	17	181	590	320	17	82	117	270	153
	1899	5	174	1	19	154	630	348	13	62	76	195	119
Georgia	1909	17	614	20	42	552	1,307	1,410	60	190	583	1,117	534
	1904	16	635	16	35	584	939	792	44	171	602	1,040	438
	1899	10	393	10	23	360	409	455	31	100	438	738	300
Illinois	1909	79	21,511	48	2,223	19,240	38,040	110,605	2,633	11,718	24,824	57,268	32,444
	1904	82	17,331	43	1,929	15,359	34,934	71,383	2,152	8,851	17,751	38,412	20,661
	1899	94	22,731	56	4,444	18,231	30,161	62,202	3,420	9,065	18,860	42,034	23,174
Indiana	1909	39	6,061	30	1,282	4,749	9,254	23,008	1,196	2,565	4,864	13,670	8,806
	1904	41	3,947	15	389	3,543	3,831	14,523	466	1,841	2,975	8,061	5,086
	1899	45	3,957	20	518	3,419	4,091	8,325	490	1,594	2,620	6,415	3,795
Iowa	1909	42	1,620	29	273	1,318	2,554	5,066	360	683	2,171	4,757	2,586
	1904	30	1,277	19	231	1,027	1,741	3,319	204	470	1,357	2,692	1,335
	1899	24	814	16	154	644	1,030	1,878	123	243	670	1,509	839
Kansas	1909	18	181	13	42	126	434	563	44	74	162	369	207
	1904	7	146	9	32	105	255	629	36	52	205	395	190
	1899	4	27	10	6	11	22	20	1	2	11	18	7
Maine	1909	10	147	8	18	121	1,014	449	27	78	84	226	142
	1904	13	186	14	19	153	1,691	394	13	77	76	206	130
	1899	17	260	15	27	218	1,446	584	17	100	98	290	192
Massachusetts	1909	5	401	2	53	346	487	605	63	188	257	647	390
	1904	9	452	7	27	418	888	732	36	213	252	654	402
	1899	9	356	9	35	312	752	706	45	160	216	535	319
Michigan	1909	32	3,041	22	660	2,359	5,195	15,649	770	1,261	2,890	9,273	6,383
	1904	42	3,903	26	713	3,164	5,986	14,342	678	1,686	3,497	8,720	5,223
	1899	59	2,624	60	620	1,944	3,721	8,932	549	953	2,432	6,340	3,858
Minnesota	1909	17	1,283	7	272	1,014	1,468	6,074	312	632	1,090	3,014	1,924
	1904	21	1,435	10	249	1,176	2,527	7,793	319	637	1,090	2,885	1,795
	1899	18	1,120	10	182	928	1,018	3,730	190	423	719	1,764	1,045
Missouri	1909	25	532	16	78	438	1,080	1,725	86	219	504	981	477
	1904	21	632	18	89	525	856	1,300	93	261	452	1,068	616
	1899	26	599	25	81	493	937	1,412	102	242	407	954	547
Nebraska	1909	11	91	6	22	63	180	295	22	33	83	152	69
	1904	3	38	2	11	25	32	135	6	15	14	46	32
	1899	9	107	9	11	87	215	184	7	41	83	176	93
New Hampshire	1909	5	32	6	2	24	265	57	3	12	14	43	29
	1904	8	59	11	3	45	365	62	2	25	14	62	48
	1899	12	64	15	4	45	533	112	2	17	22	80	58
New Jersey	1909	10	294	9	61	224	724	771	77	112	327	755	428
	1904	10	250	9	37	204	403	432	40	90	118	392	274
	1899	11	168	13	8	147	280	250	11	60	116	250	134
New York	1909	57	6,851	41	1,093	5,717	10,744	26,109	1,012	3,270	6,415	14,971	8,556
	1904	75	7,279	66	934	6,279	12,019	23,436	809	3,241	5,678	13,046	7,368
	1899	87	6,290	80	659	5,551	8,228	20,116	676	2,797	4,825	10,537	5,712
North Carolina	1909	22	169	22	15	132	356	306	21	50	90	262	172
	1904	13	128	13	8	107	206	117	9	31	51	127	76
	1899	9	112	14	7	91	178	78	4	20	41	99	58
Ohio	1909	55	6,972	23	952	5,997	9,867	25,637	1,148	3,155	6,319	14,440	8,121
	1904	71	6,616	39	918	5,659	8,354	24,302	1,002	2,910	5,692	12,891	7,199
	1899	78	8,498	58	1,588	6,852	7,836	23,628	1,369	3,271	6,060	13,975	7,915
Pennsylvania	1909	36	2,671	37	233	2,401	3,842	6,491	257	1,223	2,082	4,805	2,723
	1904	43	2,668	54	220	2,394	3,230	5,460	227	1,103	2,075	5,017	2,942
	1899	50	1,825	64	197	1,564	2,240	4,102	184	688	1,232	3,198	1,966
South Carolina	1909	4	24	5	4	15	53	35	1	7	12	36	24
	1904	4	17	5	.....	12	34	13	.....	4	13	35	22
	1899	5	17	7	.....	10	76	15	.....	3	5	14	9
Tennessee	1909	16	712	9	58	645	1,236	1,466	80	268	413	1,004	591
	1904	12	656	9	34	613	692	757	51	216	314	769	455
	1899	11	422	11	38	373	568	418	35	113	202	463	261
Vermont	1909	11	401	5	36	360	1,194	950	36	185	272	582	310
	1904	10	278	8	23	247	666	491	31	114	182	442	260
	1899	17	254	19	24	211	972	484	18	86	164	370	206
Virginia	1909	16	319	22	25	272	503	474	24	117	244	516	272
	1904	11	353	18	21	314	383	330	20	116	182	404	222
	1899	13	327	20	29	278	443	473	22	108	128	343	215
Wisconsin	1909	45	4,095	29	1,362	2,704	7,301	21,540	1,414	1,506	3,937	11,411	7,474
	1904	52	4,628	42	1,017	3,569	6,966	20,838	1,050	1,886	3,520	10,077	6,557
	1899	51	4,511	42	1,180	3,289	2,894	15,292	836	1,626	3,291	7,886	4,595
All other states	1909	39	1,238	36	281	921	1,587	4,239	347	536	1,063	3,028	1,965
	1904	26	1,390	22	156	1,212	1,567	2,601	169	562	1,330	2,812	1,482
	1899	31	949	30	111	808	1,277	2,112	143	355	640	1,666	1,026

AGRICULTURAL IMPLEMENTS—DETAILED STATISTICS, BY STATES: 1909.

Table 18

STATE.	Number of establishments.	PERSONS ENGAGED IN INDUSTRY. Total.	Proprietors and firm members.	Salaried officers, superintendents, and managers.	Clerks. Male.	Clerks. Female.	Wage earners. Average number.	Wage earners. Number, 15th day of— Maximum month.	Wage earners. Number, 15th day of— Minimum month.	WAGE EARNERS—DEC. 15, OR NEAREST REPRESENTATIVE DAY. Total.	16 and over. Male.	16 and over. Female.	Under 16. Male.	Under 16. Female.	Primary horsepower.
United States	**640**	**60,229**	**465**	**2,024**	**6,137**	**1,052**	**50,551**	De 55,465	Au 44,906	**55,429**	**54,529**	**674**	**225**	**1**	**100,601**
California	25	749	19	24	66	18	622	Ap 702	Au 513	668	668	.....	.....	.....	1,186
Connecticut	4	210	1	11	4	3	191	Mh 206	Au 172	198	198	.....	.....	.....	730
Georgia	17	614	20	18	20	4	552	De 774	Je 286	768	740	2	26	.....	1,307
Illinois	79	21,511	48	604	1,342	277	19,240	De 21,855	Jy 16,391	21,528	21,244	264	20	.....	38,040
Indiana	39	6,061	30	208	948	126	4,749	De 5,310	Ja 4,330	5,503	5,333	142	28	.....	9,254
Iowa	42	1,620	29	93	123	57	1,318	Ap 1,509	Se 1,188	1,369	1,278	89	2	.....	2,554
Kansas	18	181	13	16	17	9	126	Se 141	Jy 110	108	108	.....	.....	.....	434
Maine	10	147	8	10	5	3	121	Mh 151	Au 74	135	133	2	.....	.....	1,014
Massachusetts	5	401	2	11	36	6	346	Ap 377	Au 318	353	353	.....	.....	.....	487
Michigan	32	3,041	22	140	418	102	2,359	De 2,593	Se 2,028	2,570	2,556	3	11	.....	5,195
Minnesota	17	1,293	7	43	213	16	1,014	De 1,169	Se 910	1,184	1,182	.....	2	.....	1,468
Missouri	25	532	16	28	40	10	438	Je 522	Se 332	471	469	1	1	.....	1,080
Nebraska	11	91	6	12	9	1	63	Jy 89	Ja 40	92	92	.....	.....	.....	180
New Hampshire	5	32	6	2	.....	.....	24	Mh 35	Jy 2	27	27	.....	.....	.....	265
New Jersey	10	294	9	17	36	8	224	Ap 277	Au 181	219	217	1	1	.....	724
New York	57	6,851	41	294	688	111	5,717	Mh 6,916	Au 3,958	5,998	5,921	64	13	.....	10,744
North Carolina	22	169	22	11	4	.....	132	Mh 159	Jy 108	137	135	.....	2	.....	356
Ohio	55	6,972	23	200	630	122	5,997	Ap 6,721	Jy 5,547	6,231	6,178	43	9	1	9,867
Pennsylvania	36	2,671	37	51	149	33	2,401	Ap 2,445	Oc 2,337	2,374	2,355	4	15	.....	3,842
South Carolina	4	24	5	2	1	1	15	Ap 20	No 11	15	15	.....	.....	.....	53
Tennessee	16	712	9	26	22	10	645	De 743	My 567	761	745	4	12	.....	1,236
Vermont	11	401	5	14	15	7	360	Ap 393	Au 298	376	366	4	6	.....	1,194
Virginia	16	319	22	11	10	4	272	Fe 294	Jy 253	305	300	.....	5	.....	503
Wisconsin	45	4,095	29	120	1,150	92	2,704	Fe 3,149	Au 2,304	2,814	2,726	46	42	.....	7,301
All other states [1]	39	1,238	36	58	191	32	921	.....	.....	1,225	1,190	5	30	.....	1,587

STATE.	Capital.	EXPENSES. Total.	Services. Officials.	Services. Clerks.	Services. Wage earners.	Materials. Fuel and rent of power.	Materials. Other.	Miscellaneous. Rent of factory.	Miscellaneous. Taxes, including internal revenue.	Miscellaneous. Contract work.	Miscellaneous. Other.	Value of products.	Value added by manufacture (value of products less cost of materials).
United States	**$256,281,086**	**$117,940,357**	**$3,863,588**	**$6,276,410**	**$28,608,615**	**$2,042,974**	**$58,263,545**	**$105,914**	**$1,011,526**	**$93,632**	**$17,674,153**	**$146,329,268**	**$86,022,749**
California	2,359,158	2,245,031	58,490	64,688	451,083	31,830	1,409,348	870	17,508	3,703	207,511	2,669,651	1,228,473
Connecticut	397,996	260,505	18,640	5,528	76,379	10,237	125,778	.....	2,239	.....	21,704	331,542	195,527
Georgia	1,410,458	915,718	38,600	21,475	190,364	21,182	561,755	794	9,844	6,090	65,614	1,116,700	533,763
Illinois	110,605,187	44,148,098	1,226,127	1,406,696	11,718,384	797,922	24,026,185	8,315	358,174	15,631	4,590,664	57,268,325	32,444,218
Indiana	23,008,107	11,064,993	380,563	815,541	2,564,517	215,382	4,648,433	4,122	95,162	50	2,341,223	13,669,824	8,806,009
Iowa	5,066,300	3,836,487	190,241	169,601	682,694	44,735	2,126,381	3,985	16,705	39,676	562,469	4,757,089	2,585,973
Kansas	562,944	322,395	21,414	23,073	73,796	7,286	154,634	589	5,832	400	35,371	368,779	206,859
Maine	448,622	204,987	12,104	14,998	78,350	11,003	73,269	700	2,510	.....	12,053	226,308	142,036
Massachusetts	605,284	592,553	26,200	36,637	188,056	5,939	280,702	10,550	6,577	.....	37,892	646,534	359,893
Michigan	15,649,248	7,471,899	267,056	503,251	1,260,815	104,887	2,785,266	2,549	94,030	80	2,453,965	9,272,787	6,382,634
Minnesota	6,074,278	2,775,879	101,685	210,495	631,775	58,606	1,031,840	723	22,031	100	718,624	3,013,595	1,923,149
Missouri	1,724,669	894,187	46,301	39,641	219,112	16,883	487,608	2,495	5,174	75	76,898	981,458	476,967
Nebraska	294,708	155,704	12,300	9,621	32,845	3,153	80,320	738	811	.....	15,916	152,343	68,870
New Hampshire	56,700	31,791	3,100	.....	11,518	1,020	13,220	.....	473	.....	2,460	43,280	29,040
New Jersey	770,916	603,977	29,278	47,286	111,516	7,983	318,702	600	1,509	160	86,943	754,909	428,224
New York	26,108,792	12,263,095	414,694	597,477	3,270,305	259,683	6,154,967	6,036	98,800	1,146	1,459,987	14,970,980	8,556,330
North Carolina	306,437	182,696	18,167	3,000	49,693	4,568	85,401	620	1,694	.....	19,553	261,819	171,850
Ohio	25,637,082	12,339,545	472,305	675,635	3,155,115	161,928	6,156,591	4,445	108,334	8,521	1,596,671	14,440,461	8,121,942
Pennsylvania	6,491,212	4,019,921	108,611	148,402	1,222,897	70,027	2,012,195	454	21,208	220	435,907	4,804,521	2,722,299
South Carolina	34,500	23,411	450	535	6,650	290	12,100	.....	178	2,500	708	36,300	23,910
Tennessee	1,465,895	838,978	41,213	38,975	268,119	29,018	383,872	.....	11,440	340	66,001	1,003,747	590,857
Vermont	949,520	528,988	21,591	14,435	185,459	19,957	251,678	.....	3,683	438	31,747	581,949	310,314
Virginia	473,693	426,580	12,667	11,367	117,015	13,664	230,140	3,630	1,720	12,202	24,175	516,358	272,554
Wisconsin	21,540,057	9,591,055	234,664	1,179,261	1,505,778	100,997	3,836,339	51,518	101,274	.....	2,581,224	11,411,303	7,473,967
All other states [1]	4,239,323	2,201,884	107,127	238,792	536,380	44,794	1,016,821	2,181	24,616	2,300	228,873	3,028,706	1,967,091

[1] All other states embrace: Alabama 3 establishments; Arkansas, 1; Colorado, 3; Florida, 2; Idaho, 1; Kentucky, 6; Louisiana, 1; Maryland, 2; Mississippi, 2; North Dakota, 2; Oregon, 2; South Dakota, 3; Texas, 4; Washington, 5; West Virginia, 2.