

TEXTILE MANUFACTURING. The industrial group of manufactures embracing the production from the various raw materials of fabrics of cotton, wool, silk, flax, hemp, and jute; hosiery and knit goods; felt goods and wool hats; cordage and twine; laces, braids, and embroideries.

Textile Manufacturing in the United States.—Statistics. The importance of the textile industry in the United States is seen from the table (I, page 148) of statistics derived from Census Reports of 1910, which shows 75.4 per cent increase in the capital invested, during the first decade of the present century, over the decade immediately preceding; an increase of 59.7 per cent in the annual amount of wages paid for the same period; and 79.2 per cent increase in the annual value of the manufactured product. An exact knowledge of the general growth of the industry is difficult to arrive at, in consequence of varying conditions, and probably the best idea of its growth is the increase of wage earners as shown by decades in Table II. In spite of the fact that the improved machinery makes the productive power of one man's labor many times greater than it was a half century ago, the increase in wage earners each decade has exceeded the general growth of the population except between 1850 and 1860.

The importance of the industry is also shown by Table III, which shows not only the "combined textiles," but individual industries classed to show conditions by decades, 1860-1910.

The increase in the amount of the various raw materials used by decades from 1840 to 1910 is shown by Table IV, which also furnishes a measure of the relative growth of the several industries. It is well to notice in this connection, however, that because of the unsettled conditions in the Southern States from 1860 to 1870 there was a decrease in the amount of cotton used, while for each decade there is a large and steady increase in the amount of wool used. During the twenty-year period 1860 to 1880 the amount of cotton used did not double itself, while the use of wool increased over 300 per cent; but the use of cotton shows a wonderful increase from 1880 to 1910, due largely to the development of the cotton-manufacturing industry in the Southern States, which bids fair to monopolize the production of the medium and coarser grades of cotton fabrics.

The world's production of commercial cotton in 1914, i. e., the amount available for mill purposes, was approximately 24,764,000 bales of 500 pounds net weight. The contributions of the leading countries to the world's mill supply of cotton for 1913 and 1914, according to the United States Bureau of the Census, are shown in Table V, page 150.

Reduced to percentages, the contributions of the leading countries to the mill supply in 1914 were: United States, 62.3; India, 15.4; China, 7.1; Egypt, 5.6; Russia, 4.6.

The world's consumption of cotton for 1914-15 is estimated by the Bureau of the Census as 19,761,000 bales of 500 pounds net weight, of which the United States took 5,429,000, the United Kingdom 3,890,000, and continental Europe 6,250,000 bales. In the United States the

the greater part of the spindles in the United States run on coarse or medium-sized yarns, and those of England on much finer yarns, the United States actually spins more pounds of the raw material. Nevertheless cotton manufacturing is an important industry in other countries than Great Britain and the United States. The cotton consumption for the chief countries of the world and the number of spindles in operation in 1915 are given in Table VI.

TABLE I

COMPARATIVE SUMMARY OF TEXTILE INDUSTRIES, 1889 TO 1909, WITH PER CENT OF INCREASE

	COMBINED TEXTILES							
	Number or amount				Per cent of increase			
	1909	1904	1899	1889	1899-1909	1904-1909	1899-1904	1889-1899
Number of establishments	5,352	4,737	4,521	4,420	18.4	13.0	4.8	2.3
Persons engaged in the industry	915,858	770,512	†	†	.....	18.9	.....	.....
Proprietors and firm members	3,522	3,611	†	†	.....	*-2.5	.....	.....
Salaried employees	31,208	24,372	17,024	†	83.3	28.0	43.2	.....
Wage earners (average number)	881,128	742,529	664,429	520,196	32.6	18.7	11.8	†
Primary horse power	2,099,050	1,623,403	1,310,834	831,730	60.1	29.3	23.8	57.6
Capital	\$1,841,242,131	\$1,351,451,715	\$1,049,636,201	\$772,673,605	75.4	36.2	28.8	35.8
Expenses	1,488,817,311	1,123,356,860	824,336,963	681,538,981	80.6	32.5	36.3	21.0
Services	384,522,370	283,376,354	233,602,184	182,165,458	64.6	35.7	21.3	28.2
Salaries	49,123,634	32,862,121	23,532,793	†	108.7	49.5	39.6	.....
Wages	335,398,736	250,514,233	210,069,411	†	59.7	33.9	19.3	.....
Materials	992,635,299	753,174,981	527,209,771	454,272,489	88.3	31.8	42.9	16.1
Miscellaneous	111,659,642	86,805,525	63,525,008	45,101,034	75.8	28.6	36.6	40.8
Value of products	1,684,636,499	1,225,686,444	940,052,688	768,357,254	79.2	37.4	30.4	22.3
Value added by manufacture (value of products less cost of materials)	692,001,200	472,511,463	412,842,917	314,084,765	67.6	46.5	14.5	31.4

* A minus sign (-) denotes decrease. Where percentages are omitted, comparative figures are not available.
 † Comparable figures not available. † Figures not strictly comparable.

cotton-growing States took 2,938,000 bales and the other States 2,491,000 bales. There were 141,500,000 active and idle spindles in the world in 1915, of which there were in the United States, during November, 31,497,435 active spindles. There were located in the cotton-growing States at that time 12,801,204 active spindles and in the other States 18,696,231.

It is difficult to obtain exact information about the relative importance of the United States in the manufacture of textiles, as the

The relative standing of the countries in wool manufacturing is more difficult to arrive at accurately since wool is grown as well as manufactured in many lands, so that it is impossible to secure exact figures as to consumption. It might be said that Great Britain, France, Germany, and Austria-Hungary produce fully five-sixths of all the woollen goods made in Europe, Great Britain being in the lead. See WOOL MANUFACTURES; also SHEEP.

Great Britain has perhaps the most important woolen industry, since the quality of wool used is better and a greater amount of labor is employed. More fine goods are produced in France than in the United States, but the relative rank of that country and Germany cannot be fixed. The carpet industry, which absorbs large quantities of wool, is probably more important in the United States, but large amounts of coarse goods are produced in both countries.

Among the several countries engaged in silk manufacturing the United States now stands in first place, having surpassed France in the value of its product in the early years of the twentieth century. This is the more remarkable when we consider that the industry in the United States has been developed since 1870, and note, as in Tables III and IV, the rapid growth. It must be said, however, that statistics or estimates for Japan and China are not available, and it may be that one or both of these Eastern nations leads the United States. (See SILK.) The importance of the silk industry and the

TABLE II

INCREASE IN AVERAGE NUMBER OF WAGE EARNERS AND IN VALUE OF PRODUCTS, PER ESTABLISHMENT, 1889-1909

YEAR	INCREASE IN	
	Average number of wage earners	Average value of products
1889	118	\$173,836
1899	147	207,930
1904	157	258,747
1909	165	314,768

The increase in combined value of products was from \$572,253,099 in 1879 to \$1,684,636,499 in 1909, and in the number of wage earners for the same period, from 405,744 to 881,128.

statistics are collected in no other country with the thoroughness which characterizes the American census. It is universally known that Great Britain is far in the lead in cotton manufacturing; but because of the fact that

TABLE III. COMPARATIVE SUMMARY, BY INDUSTRIES, 1850 TO 1910

INDUSTRY	Year	Number of establishments†	Capital	SALARIED OFFICIALS, CLERKS, ETC.		WAGE EARNERS		Miscellaneous expenses	Cost of materials used	Value of products
				Number	Salaries	Average number	Total wages			
Cotton manufacture—Cotton goods and cotton small wares.....	1910	1,324	\$822,237,529	8,514	\$14,411,758	378,880	\$132,859,145	\$35,941,315	\$371,009,470	\$628,391,813
Wool manufacture.....	1910	1,124	506,205,584	6,987	12,306,199	202,029	87,962,669	27,599,714	322,441,043	507,166,710
Silk manufacture.....	1910	852	152,158,002	5,537	7,527,279	99,037	38,570,085	23,311,439	107,766,916	196,911,667
Hosiery and knit goods.....	1910	1,374	163,641,171	5,721	7,691,457	129,275	44,740,223	13,056,850	110,241,053	200,143,527
Cordage twine, jute, and linen goods.....	1910	164	76,020,366	1,314	1,862,546	25,820	9,132,999	4,166,177	40,914,810	61,019,986
Dyeing and finishing textiles.....	1910	426	114,092,654	2,939	5,034,710	44,046	21,226,924	7,124,918	35,261,301	83,556,432
Combined textiles.....	1910	5,264	\$1,834,355,306	31,012	\$48,833,949	879,087	\$334,492,045	\$111,200,413	\$987,634,593	\$1,677,190,135
Cotton manufacture—Cotton goods.....	1900	973	\$460,842,772	4,713	\$7,123,574	297,929	\$85,126,310	\$21,650,144	\$173,441,390	\$332,806,156
Cotton small wares.....	1900	82	6,397,385	189	226,625	4,932	1,563,442	462,534	3,110,137	6,394,164
Wool manufacture.....	1900	1,414	310,179,749	4,495	6,455,495	159,108	57,933,817	17,329,932	181,159,127	296,990,484
Silk manufacture.....	1900	483	81,082,201	2,657	3,134,352	65,416	20,982,194	10,264,208	62,406,665	107,256,258
Hosiery and knit goods.....	1900	921	81,860,604	2,809	3,124,798	83,387	24,358,627	6,599,865	51,071,859	95,482,566
Flax, hemp, and lute.....	1900	141	41,991,762	641	957,190	20,903	6,331,741	2,678,286	32,197,885	47,601,607
Dyeing and finishing textiles.....	1900	298	60,643,104	1,318	2,267,128	29,776	12,726,316	4,137,947	17,958,137	44,963,331
Combined textiles.....	1900	4,312	\$1,042,997,577	16,822	\$23,289,162	661,451	\$209,022,447	\$63,122,916	\$521,345,200	\$931,494,566
Cotton manufacture.....	1890	905	\$354,020,843	2,709	\$3,464,734	218,876	\$66,024,538	\$16,716,324	\$154,912,979	\$267,981,724
Wool manufacture.....	1890	1,693	245,886,743	3,652	4,037,695	154,271	54,339,775	15,622,263	167,233,987	270,527,511
Silk manufacture.....	1890	472	51,007,537	1,531	1,917,677	49,382	17,762,441	4,259,623	51,004,425	87,298,454
Hosiery and knit goods.....	1890	796	50,607,738	1,621	1,685,153	59,588	16,578,119	3,627,245	35,861,585	67,241,013
Flax, hemp, and lute.....	1890	162	27,731,649	458	609,170	15,519	4,872,389	1,431,632	26,148,344	37,313,021
Dyeing and finishing textiles.....	1890	248	38,450,800	666	805,291	19,601	8,911,720	3,131,081	12,385,220	28,900,560
Combined textiles.....	1890	4,276	\$767,705,310	*10,637	\$12,539,920	517,237	\$168,488,982	\$44,788,668	\$447,546,540	\$759,263,238
Cotton manufacture.....	1880	756	\$208,280,346	.....	.....	1174,659	\$42,040,510	.....	\$102,206,347	\$192,090,110
Wool manufacture.....	1880	2,330	143,512,278	.....	.....	132,672	40,687,612	.....	149,160,600	238,085,686
Silk manufacture.....	1880	382	19,125,300	.....	.....	31,337	9,146,705	.....	22,467,701	41,033,045
Hosiery and knit goods.....	1880	359	15,579,591	.....	.....	28,885	6,701,475	.....	15,210,951	29,167,227
Dyeing and finishing textiles.....	1880	191	26,223,981	.....	.....	16,698	6,474,364	.....	13,664,295	32,297,420
Combined textiles.....	1880	4,018	\$412,721,496	.....	.....	1384,251	\$105,050,666	.....	\$302,709,894	\$532,673,488
Cotton manufacture.....	1870	956	\$140,706,291	.....	.....	135,369	\$39,044,132	.....	\$111,736,936	\$177,489,730
Wool manufacture.....	1870	3,208	121,451,059	.....	.....	105,071	35,928,150	.....	124,318,792	199,257,262
Silk manufacture.....	1870	86	6,231,130	.....	.....	6,649	1,942,286	.....	7,817,559	12,210,662
Hosiery and knit goods.....	1870	248	10,931,260	.....	.....	14,788	4,429,085	.....	9,835,823	18,411,564
Dyeing and finishing textiles.....	1870	292	18,374,503	.....	.....	13,066	5,221,538	.....	99,539,992	\$113,017,537
Combined textiles.....	1870	4,790	\$297,694,243	.....	.....	274,943	\$86,565,191	.....	\$353,249,102	\$520,386,764
Cotton manufacture.....	1850	1,094	\$74,500,931	.....	.....	92,286	.....	.....	\$34,835,056	\$61,869,184
Wool manufacture.....	1850	1,675	31,971,631	.....	.....	45,438	.....	.....	28,831,583	48,608,779
Silk manufacture.....	1850	67	678,300	.....	.....	1,743	.....	.....	1,093,860	1,809,476
Hosiery and knit goods.....	1850	85	544,735	.....	.....	2,325	.....	.....	415,113	1,028,102
Dyeing and finishing textiles.....	1850	104	4,818,350	.....	.....	5,105	.....	.....	11,540,347	15,454,430
Combined textiles.....	1850	3,025	\$112,513,947	.....	.....	146,877	.....	.....	\$76,715,959	\$128,769,971

* Includes proprietors and firm members with their salaries; number only reported in 1900 and 1905 but not included in this table.
 † In addition to these data there were in the census of 1880 returns for 249 "special mills," engaged in working raw cotton, waste, or cotton yarn into hosiery, webbing, tapes, and fancy fabrics, and mixed goods or other fabrics, which are not sold as specific manufactures of wool or cotton. These 249 establishments reported \$11,224,448 capital, 12,928 employees, \$3,573,909 wages, \$2,836,385 cost of cotton consumed, \$18,860,273 value of products, and should be considered in making comparisons. In 1890 this class of mills is reported under a number of different heads, although some of them may be included in the totals for textile industries presented in the figures for 1890.
 ‡ Includes 2,115 officers and clerks, whose salaries were not reported.
 § At the census of 1870 the value of the fabric itself was reported, whereas in all subsequent censuses merely the value added to such fabric by the process of dyeing and finishing is given.

range of products in American manufactures are shown in Table VII, from the Thirteenth United States Census (1910).

Influences Controlling Development. The influences controlling the establishment of the textile industry in a given country are primarily the supply of the raw material and the adaptability of the people to manufacturing life. Among the earliest forms of machinery are the hand loom and spinning wheel; and as

TABLE IV
CONSUMPTION OF TEXTILE FIBRES, 1840 TO 1910

YEAR	Cotton, pounds *	Wool, pounds †	Silk, pounds
1910	2,335,344,906	559,850,995	17,472,204
1900	1,910,509,193	412,323,430	9,760,770
1890	1,193,374,641	372,797,413	6,376,881
1880	798,344,838	296,192,229	2,690,482
1870	430,781,937	219,970,174	684,488
1860	443,845,378	98,379,785	462,965
1850	288,558,000	70,862,829	.....
1840	126,000,000	.....	.....

* Includes cotton consumed in establishments classed as cotton goods, cotton small wares; woolen goods, worsted goods, carpet and rugs, other than rag; felt goods; wool hats; and hosiery and knit goods.

† Includes wool consumed in establishments classed as woolen goods; worsted goods, carpets and rugs, other than rag; felt goods; wool hats; and hosiery and knit goods.

sheep usually are raised in any country where clothing must be warm, it is not surprising to find in the world's earliest history records of the production of fabrics of wool; these came to be known as homespun, because made from yarn spun at home and woven by hand in the household. That the woolen industry should spring up in primitive communities, and among people not easily able to purchase clothing material, is only natural; as the comforts of life became more accessible and labor became diversified and specialized, owing to the increase in population, the tendency was to produce fabrics for sale and in such quantities as required the use of more improved machinery; and in order to reduce the cost further large numbers of machines were collected and there resulted the mill or factory.

TABLE V
WORLD'S SUPPLY OF COTTON

COUNTRY	1914 500-pound bales	1913 500-pound bales
United States	15,438,000	13,545,000
India	3,826,000	3,692,000
Egypt	1,384,000	1,496,000
China	1,750,000	1,200,000
Russia	1,126,000	1,030,000
Brazil	440,000	420,000
Mexico	125,000	150,000
Peru	103,000	110,000
Persia	127,000	140,000
Turkey	120,000	130,000
All other countries	325,000	285,000
Total	24,764,000	22,198,000

As cotton is a subtropical plant and the lint is easily separable from the seed by hand, and as the fibre can be spun and woven in as simple a way as wool was manufactured in primitive communities, it would seem that the cotton industry should have developed near the source of the raw material; but the sections of

the countries suited to raising cotton were largely inhabited by people with agricultural instincts, hence the industry developed in thickly settled communities remote from the cotton field. One

TABLE VI
ESTIMATED COTTON CONSUMPTION, 1914-15

COUNTRY	Cotton spindles 1915	Cotton consumed, bales of 500 lbs. gross 1915
Great Britain	56,500,000	3,945,000
Germany	11,720,000	2,060,000
France	7,400,000	*1,200,000
Russia	9,100,000	*1,800,000
Austria	4,950,000	†850,000
Italy	4,600,000	720,000
Spain	3,100,000	400,000
Switzerland	1,500,000	125,000
Belgium	1,200,000	*250,000
Japan	2,652,000	1,400,000
China	1,100,000	2,500,000
India	6,779,000	2,175,000
Brazil	1,500,000	320,000
United States	32,300,000	6,122,000
Canada	920,000	156,000
World total	148,226,000	24,581,200

* 1914.

† Including Hungary.

important feature in the early days of the cotton industry in factories was the fact that cotton fabrics must necessarily be light in weight and of comparatively fine yarns—consequently the proportion of labor cost to the cost of production was much greater than in the production of fabrics of wool, and the tendency was to concentrate in their production; this also stimulated invention of labor-saving machinery. The result is that virtually the whole manufacture is in the hands of invested capital, and the tendency is for it to expand in communities where it is already established, and, unless favored by special advantages, to languish or to be neglected in sections where it is newly introduced.

TABLE VII
NUMBER AND CHARACTER OF THE LOOMS IN THE UNITED STATES

KIND OF LOOMS	Total	Carpets and rugs	Cotton goods	Silk goods	Woolen goods
Power:					
1910	793,004	11,736	632,963	75,406	72,899
1905	696,750	11,002	559,781	59,775	38,104
1900	573,194	9,841	455,752	44,257	36,714
Hand:					
1910	248	207	*	*	41
1905	1,039	690	*	283	66
1900	1,311	1,055	*	173	83

* Not reported.

In the thickly settled centres of India the industry had its greatest growth in a semitropical country, fully adapted to the production of the fibre; yet the inhabitants make better laborers in the factories than they do cultivators of the crop. Those who follow agricultural pursuits are content to do so in a small way, simply raising the product for individual use rather than in commercial farming.

In China, Japan, the East Indies, and Mexico there has been of recent years a considerable introduction or development of the industry, due almost entirely to the adaptability of the people to a manufacturing life. Yet it is doubtful if the movement would have been as success-

ful in some of these cases if there had not been encouragement in the way of government measures.

The most wonderful growth of the cotton-manufacturing industry has been in the southern United States. The availability of the raw material, made possible largely by the agricultural labor of the negro, and the presence of a class of the white population who, after the war, found themselves without homes or occupation

TABLE VIII
PRODUCTS OF SILK INDUSTRIES

PRODUCT	Total production 1909	Production in the silk-manufacturing industry	Production in other industries *
Broad silks, plain and fancies:			
All silk:			
Yards	82,307,526	81,934,158	373,368
Value	\$53,418,522	\$53,282,704	\$136,818
Silk mixed:			
Yards	28,645,106	24,742,556	3,902,550
Value	\$15,136,632	\$14,207,861	\$928,771
Pushes:			
Yards	2,770,311	2,759,411	10,900
Value	\$2,112,968	\$2,104,768	\$8,200
Ribbons	\$32,873,469	\$32,744,873	\$128,596
Braids and bindings ..	4,495,964	4,483,248	12,716
Trimmings	3,853,448	3,850,448	3,000
Hosiery	†3,600,416	‡	3,600,416
Shirts and drawers, silk and silk mixed	†709,074	‡	709,074
Combination suits, silk and silk mixed	†239,218	‡	239,218
All other products	86,237,765	86,237,765	.....
Value of all products	202,678,476	196,911,667	5,766,809

* Includes products made by establishments in the following industries: clothing, men's, including shirts; corsets; cotton goods and cotton small wares; fancy articles not elsewhere specified; furnishing goods, men's; hosiery and knit goods.

† Exclusive of hosiery and knit goods made in the silk-manufacturing industry.

‡ Included with "all other products."

and who it was found were teachable and tractable, and would make good factory hands, and were to be had in abundance, were chief factors in this development; there were available water power and land which could be secured cheaper than elsewhere, and at first municipal aid in the way of exemption from taxation for a term of years. The growth of the industry in the Southern States has been remarkably steady since 1880, and ample proof of its success is evidenced by the fact that more and larger mills have been built and that older ones have been enlarged and developed. The difficulty of finding sufficient suitable labor has proved some hindrance to recent cotton manufacturing in the South.

The sources which first gave the so-called civilized nations their fine and beautiful fabrics of silk were China and Japan; there the silkworm flourished, labor was plentiful and cheap, and the nations æsthetic; they produced beautiful but costly fabrics which were considered luxuries as far back as the nations have a history, yet these nations now put forth less in value than many others, though they still produce fabrics which the more highly civilized nations can hardly equal. The growth of the silk industry should be greatest in those countries which can produce the raw material, but this is not always the case. The introduction of the silkworm into central and western Europe caused a remarkable

expansion of the manufacture of silks in Switzerland, Italy, Austria, and France. The Germans, producing practically no raw silk, however, have made a great success of the industry, as has the United States in recent years. England, however, with a wonderful capacity for manufacturing, having attempted the silk industry, relying on imported silk, though fairly successful for a time, has seen it decline for the last half century, while the cotton industry during the same period has had an extraordinary development. Mr. Edward Stanwood, of Boston, a textile statistician, in speaking of the development of the industry of the United States, has said that cotton and silk mills in the greatest proportion over "the country, are in the five adjoining States of Pennsylvania, New Jersey, New York, Connecticut, and Massachusetts, and of the spindles, more than $\frac{1}{10}$ of the whole are in the mills of those States." The most important reason for this localization is the presence of sufficient labor of requisite skill to manufacture the raw material and produce fine and costly fabrics—a labor which would be too costly to employ in the production of cotton goods except those of the very finest quality, but which may be employed in the silk industry with profit. Yet another factor has been an encouraging government policy, which has helped to establish the industry more firmly.

These are briefly the important features in connection with the development of the most important of the world's textile industries. Consult: E. A. Posselt, *Recent Improvements in Textile Machinery* (Philadelphia, 1905); A. F. Barker, *Textiles* (New York, 1910); *Lamb's Textile Industries of the United States* (5 vols., Boston, 1911); W. H. Dooley, *Textiles for Commercial, Industrial, and Domestic Art Schools* (ib., 1914); C. H. Lander, *Ventilation and Humidity in Textile Mills and Factories* (New York, 1914); *Davison's Textile Blue Book* (28th Office ed., ib., 1915). See COTTON; FACTORIES AND THE FACTORY SYSTEM; MANUFACTURES; SILK; WOOL AND WORSTED MANUFACTURES; ETC.