

THE TEXTILE INDUSTRY SINCE 1890.

THE Census year of 1890 saw the textile industry of the United States rapidly advancing in regard to both quality and economy of manufacture. The gross value of the products of this industry, including its allied branches, exceeded that of any other branch of manufacture. (The same relative importance exists, no doubt, to-day.) The South was looming up as a great manufacturing section in the production of cotton yarns and fabrics, in competition with those made in the Northern States. She had trebled the spinning capacity of her mills within the decade then ended, and was giving employment to one-sixth of the number of operatives engaged in the cotton-factories of the country. She had established her position as a district possessing all the essential elements of success for the manufacture of cotton. In no other respect had there been any change in the geographical distribution of the textile industry. The manufacture of wool and silk remained where it had for decades been chiefly confined; viz., in the New England and Middle States.

When the Census of 1890 was taken, the cotton-mills of the country were running above 90 per cent of their full capacity, with their production considerably ahead of any previous year. The woollen-mills, on the contrary, especially those engaged in the manufacture of carpets, were operating only 85 per cent of their capacity, and contributed largely to the failures of that year.

The linen industry was considered of too small importance at the taking of the Census of 1890 for any well-defined enumeration. Its true status at that time cannot, in consequence, be satisfactorily ascertained. All that can be learned is that 517 persons were employed in the dressing of flax, valued at nearly \$1,000,000, and 583 persons in the manufacture of linen goods, valued at about \$550,000; while everything pertaining to the production of thread was relegated to the category of "all other industries."

Even at the present time little can be said concerning this industry, or its recently tentative and probably ephemeral relation to the cotton-manufacturing industry. Although there are in the trade directories forty-four establishments classified as engaged in the manufacture of

flax, there are, strictly speaking, only twenty-four thus employed; and of these only five can be considered of much importance. No fine linens are made in this country, though the Customs tariff of 1897 was so framed as to encourage any disposition in that direction, by placing a relatively low duty on fine-spun yarns suitable for weaving. This favorable concession to the importation of such yarns met with no opposition from American flax-spinners, because it was patent that no domestic demand could be created till the manufacture of fine linens had been established. This latter the tariff still further aided by the imposition of high rates of duty upon the foreign article. For the present, the flax-spinners of this country are satisfied with protective rates of duty on yarns coarser than No. 80, as provided in the law, and even on those coarser than No. 30, leaving comparatively low rates on yarns that are finer.

The tariff of 1897 has not yet had any visible effect upon the linen industry of the United States. The experimental or makeshift attempts to amalgamate the manufacture of cotton and linen for certain lines of fabrics, which a few cotton-mills have lately made to relieve the depression in their regular production, have not yet developed into anything that promises permanency. Linen comes into more direct competition with cotton fabrics than with any other class of textiles; and, with cotton at its present low range of prices, there is little or no encouragement offered for the profitable manufacture of flax into any class of goods except the coarsest or a few specialties. The Census of 1900 will probably find the linen industry but little advanced beyond its condition in 1890.

Aside from what little is done in a few cotton-mills in the manufacture of goods with cotton warp and linen weft, the linen manufactures of this country are limited to crash towelling, thread, yarn, twine, fishing-lines, and the like. Much of the domestic growth of flax is turned into tow for upholstery, cordage, and other purposes. Laces, edgings, handkerchiefs, and all fine fabrics, have to be obtained from abroad, to the extent of \$15,000,000 to \$20,000,000 annually.

There has been no material change in the character of American manufactures of wool for the past nine years, beyond that due to the tendency toward those made of worsted, which has been growing in popular favor. Styles and designs have varied to meet the vicissitudes of fashion; but the general character of the product remains the same. Improvements have been effected in manipulation; and the productive capacity of machinery has been increased. But the most marked advance has been in the art of dyeing, which, however, has affected all textiles.

The growth of the worsted industry, at home and abroad, is revealed in the "Waste" clauses of the tariff; the Act of 1890 first taking cognizance of it, by placing special rates of duty on the waste products of worsted manufacture, which had by that time become of commercial importance. That Act, also, for the first time, coördinated woollen and worsted manufactures as subject to no distinction as to rates of duty, though a sort of preliminary or anticipatory Act of similar purport had been passed by Congress a few months previously.

The changed status of the woollen manufacture—which has remained the same to the present day—received Congressional recognition at that time. In 1890, American dress goods were rapidly gaining in reputation, style, and variety, and gave great promise (which has been very largely fulfilled) of successful competition with the best of foreign makes. For their manufacture and improvement special machinery, appliances, and methods have been introduced; and the workpeople have become more skilled in their manipulation.

In some respects the dress goods manufactures of our mills have been thoroughly revolutionized in construction, colors, and finish. Their designs are more original with the mills producing them; and foreign ideas are less depended upon for a conception of the proper forms of fabrication. This is characteristic of all lines of textile manufacture. An idea may be had of the growth of the dress goods manufacture in the United States from the statistics in the national Census of 1890, giving the value of this product in Massachusetts as \$14,028,820; while, according to that State's census, in 1895 it amounted to \$16,872,121. Values in 1895 were at least 25 per cent lower than in 1890, which, applied to the foregoing, would show an increase of 60 per cent in the production of this class of goods made in that State. The significance of this can be still further realized from the fact that, according to the Census of 1890, nearly 44 per cent of this class of goods made in the United States was the product of Massachusetts mills.

All statistics relating to the woollen as well as to all textile manufactures at the present time are mostly estimates and the results of private enterprise and inquiry. The unit of calculation for the productive capacity of a woollen-mill is the set of carding-machines,—a set consisting of a series of machines necessary to prepare the wool suitably for spinning. The corresponding unit for a worsted-mill is the combing-machine, which, in its productive capacity, is taken to be equivalent to three sets of cards for the same fineness and quality of work. The distribution of woollen machinery is shown in the accompanying table:—

DISTRIBUTION OF WOOLLEN MACHINERY IN THE UNITED STATES.

STATES.	1890.		1894.		1898.	
	Sets of Cards.	Combs.	Sets of Cards.	Combs.	Sets of Cards.	Combs.
New England	4,091	528	4,027	600	4,130	726
Middle.....	2,982	308	3,070	519	3,150	573
Southern.....	400	....	248	2	280	2
Western, east of the Mississippi.....	473	19	557	27	566	28
Western, west of the Mississippi.....	161	....	143	....	167	....
Pacific.....	91	....	66	....	70	1
Totals.....	8,198	855	8,111	1,148	8,363	1,330
Equivalent to sets of cards	10,763		11,555		12,353	

The significance of combing machinery is that worsted goods are made, and finer yarns spun. A little more than nine-tenths of the woollen- and worsted-producing machinery is in the New England and Middle States. Outside of this section no material progress has been made since 1890. On the contrary, there has been practically either stagnation or a decline. In this respect the worsted industry has shown a much more decided gain since the last Census year than the woollen industry; the increase being 56 per cent for the former, as compared with only 22 per cent for the latter. This gain in favor of worsted is likely to continue, which means an increased tendency toward perfection of manufacture. This statement, however, may require some modification, should the same practices be pursued as were adopted by a number of mills last year—greatly to the discredit of American manufactures—of introducing cotton threads, to the extent of 90 per cent of the weight of the fabric, with worsted threads, and of placing the goods upon the market in a manner calculated to deceive the public as to their true character. A purely all-wool worsted thread, however, represents the acme of a perfect production in wool manufacture.

The Census of 1890 does not give the value of home-made and foreign-made woollen and worsted machinery, but simply states that there were at that time 674 foreign and 181 American combing-machines operated in the manufacture of worsted. This meant practically that at least 79 per cent—and probably very much more—of the machinery employed in worsted manufacture, other than that employed in weaving and finishing and in the early processes of cleaning the wool, was of foreign make.

There are no means of ascertaining the situation in this particular, as it exists to-day, for the whole country. The State Census returns of Massachusetts for 1885 and 1895, however, furnish for comparison interesting material that will give some idea of the relative positions of these two branches of the wool-manufacturing industry at those periods in that Commonwealth, especially the extent to which dependence is had upon foreign-made machinery of all kinds, not only for combing, but for all purposes. The import of these statistics to the industry at large lies in the fact that about one-fourth of the invested capital and more than one-fifth of the value of the product of the woollen-mills of the United States are represented by those of Massachusetts.

The value of machinery employed in the manufacture of woollens in Massachusetts in 1885 and 1895 is shown in the following table:

VALUE OF MACHINERY EMPLOYED IN WOOL MANUFACTURE IN MASSACHUSETTS.

Year.	Description.	Home-made.	Foreign-made.	Totals.	Grand Totals.
1885.....	Woollen	\$5,938,420	\$181,357	\$6,119,777	\$8,655,035
	Worsted	2,052,683	482,575	2,535,258	
1895.....	Woollen	\$6,982,502	\$119,810	\$7,102,312	\$12,536,533
	Worsted	2,792,706	2,641,515	5,434,221	

Comparatively very little foreign-made machinery is operated in woollen-mills. American textile machine-shops are now turning their attention more to the making of special machinery for worsted. American combs have been made, to a limited extent, for a number of years; and, as already noted, 181 were enumerated in the Census of 1890. But until within the last year or two all other worsted machinery proper has not been successfully made in this country; and even the efforts in this direction have been in the line of closely imitating, for prudential business reasons, the popular makes of English shops. With the greatly increased demand for worsted machinery since 1890, there is arising a sufficient incentive for American shops to incur the heavy expense of special equipments for its construction.

The gross value of the wool manufactures of the United States at the present time must necessarily be a matter of estimate; and this estimate I put at \$343,730,812. The basis of the estimate is as follows: I have accepted the computation of the Census of 1890, viz., that of holding a worsted combing-machine as the equivalent of three sets of

woollen cards in productive capacity; then the productive machinery of woollen- and worsted-mills has been calculated on the basis of sets of cards, with their capacity increased since that date one-sixth, because of mechanical improvements; and the market value of their finished product is estimated to have decreased 24 per cent.

Referring to preceding statistics, the productive machinery of the wool-manufacturing industry in 1890 was equivalent to 10,763 sets of cards, and, in 1898, to 12,353 sets of cards, or, with the one-sixth increase in capacity added, 14,412 sets. The gross value of wool manufactures in 1890 was \$337,768,524, or \$31,382 per set. This value, extended to the 14,412 sets in 1898, would bring the gross value to \$452,277,384, or, with the 24 per cent depreciation in market value deducted, \$343,730,812. This would show that the present value of our wool manufactures is but a trifle more than in 1890.

In the following table are given statistics showing the consumption of wool for all purposes in the United States, from the Census year 1890. The percentages showing the running-time of the mills indicate how well they were kept in operation during the several years under consideration. Mills operating on the average 90 to 95 per cent of their full capacity show a state of general prosperity. The periods 1893-94, 1895-96, and 1896-97 were unprosperous ones.

CONSUMPTION OF WOOL IN THE UNITED STATES FROM THE YEAR
1890 TO 1898, IN POUNDS.

Year.	Foreign Wool Entered for Consumption.	Domestic Production.	Total Consumption.	Per Cent of Capacity of Mills Operated.
1889-90.....	\$109,902,105	\$295,779,479	\$405,681,584	85
1890-91.....	119,390,280	309,474,856	428,865,136	85
1891-92.....	134,622,366	307,101,507	441,723,873	88
1892-93.....	149,636,041	333,018,405	482,654,446	85
1893-94.....	45,726,055	348,538,138	394,264,193	75
1894-95.....	265,726,347	325,210,712	590,937,059	80
1895-96.....	228,647,542	294,296,726	512,944,268	78
1896-97.....	349,250,027	272,474,708	621,724,735	75
1897-98.....	72,355,944	259,153,251	331,509,195	85

The figures showing consumption for any particular year should be taken with due relation to those of proximate years; otherwise the apparently extraordinary consumption in 1896-97 of mills running at only three-fourths of their capacity would seem absurd. This apparently large consumption was owing to the unusual importations and

takings of mills in anticipation of the imposition of duties on wool imports in the Tariff Act of 1897. The figures for 1896-97 should be read together with those for 1897-98.

The increased amount of wool consumed in our manufactures is observed in the consumption for 1889-90 (405,681,584 lbs.) and in the average yearly consumption for the four years ending in 1898 (514,278,814 lbs.). This increase corresponds proportionately with the increase in the productive capacity of the industry, proper allowance being made for the bad state of manufacturing during the latter period. I have given the average for the foregoing four-year period so as to eliminate abnormal conditions affecting importations, which did not exist in 1889-90.

The eminent position held by American cotton manufactures in the textile industries of the world was well developed in 1890; and by that time fine spinning had entered considerably into the making of lawns and muslins. But all of the fine yarns for such fabrics were spun in the mills of Massachusetts, Connecticut, and Rhode Island. Diversification of manufacture also had set in—was in fact well under way—for such goods as lenoes, gauzes, and specialties. The South was improving its output by raising the standard of its product 15 per cent above what it was in 1880. It is now 20 per cent above what it was in 1890. For woven fabrics we have little need to seek foreign markets to satisfy our most fastidious wants; and only for such goods as laces and embroideries and for some lines of hosiery do we find advantages—often in the matter of price—in foreign manufactures.

There were a number of cotton-combing-machines in operation in 1890; but no account was taken of them in the Census of that year, though their enumeration would have given a fair idea of the extent of fine cotton-spinning in the country at that time. Fine spinning, however, may be measured by the consumption of sea island and foreign cotton, mostly Egyptian, practically all of which is combed preparatory to spinning. The Census of 1890 gives the quantity of such cotton consumed in the United States at that time as 14,452,866 lbs., which approximates the Government statistics of cotton imports, and the trade estimates of the takings of spinners of sea island cotton (15,816,305 lbs.). By 1896 this consumption of cotton for fine spinning amounted to 69,798,044 lbs. annually, though for the year 1897-98 it dropped to 65,475,279 lbs., owing to the great depression in the industry. I think it may be safely stated that fine cotton-spinning in this country has increased nearly fivefold since 1890. Fine spinning follows the

combing-machine; and the number of such machines, enumerated according to States, as obtained from a most reliable source of information, is as follows: Massachusetts, 2,300; New Jersey, 400; Rhode Island, 348; Connecticut, 360; New York, 75; New Hampshire, 40; Pennsylvania, 25; and Vermont, 20; or a total of 3,568. The average production of a comb, as run in American mills, is about 55 to 60 lbs. per day, full time, which will be recognized as a good performance, though characteristic of American methods of getting out of a machine all that it is capable of doing well—and, oftentimes, a little more, at the expense of quality of work. There is a large field open to our manufacturers for supplying a domestic demand for fine cotton fabrics. This demand is increasing with the decline in the price of the commodity. There is no good reason why our mills—those of New England in particular—should not satisfy this want, amply protected as they are by Customs rates of duty against foreign competition. In 1890—a fair average year—the imports of such goods amounted to 27,759,641 square yards, or .43 square yard *per capita* of population; while in 1898 the imports amounted to 44,779,399 square yards, or .61 square yard *per capita* of population. Nearly 3 per cent of the value of cotton goods consumed in this country is of foreign make, which should and might be made in our mills. This does not include hosiery, laces, thread, yarns, etc., which are imported. This may not seem to be a large *per capita* consumption of foreign goods; but it should be understood as that of fine goods—such as retail at an average of 20 cents a square yard—and not of coarse or even ordinary grade goods.

The relative position of the United States to the cotton-spinning world, in respect to the number of spindles, is about the same as in 1890. In that year this country had $17\frac{1}{2}$ per cent of all the spindles of the world; and the same proportion exists to-day. But the relative consumption of our mills has increased from 22.8 per cent to 25.2 per cent of the world's consumption. While the number of cotton spindles in the United States has increased nearly 21 per cent within the past eight years, a corresponding increase has taken place elsewhere.

But more important changes and developments than those relating to any increase in the number of spindles have occurred within this period to affect our domestic manufactures. Conspicuous among these is the firm establishment of cotton-manufacturing in the so-called Piedmont district of the Southern States, where it has increased its productive capacity from less than 12 per cent to nearly 21 per cent of that of the whole country, and this under conditions which have fully demon-

strated the fitness of that section for the economical production of the highest grade of goods.

The change of greatest consequence in the economy of cotton manufacture that has taken place since 1890 is the introduction of the Northrup loom, which effects a saving of fully one-half in the labor cost of weaving. This loom is one of the great inventions of the century, and marks an era in the progress of textile manufacturing. The machine is a remarkable piece of mechanism, but its possibilities give promise of greater wonders. Mechanical improvements follow one another so rapidly that one is almost in doubt as to whether they are really beneficial to the industry for which they are intended. Their cheapening of processes antiquates machinery and methods almost before the latter have proved their utility.

One advance that is likely to become of great value to the cotton industry almost immediately is the utilization of the discovery—patented in 1850 by John Mercer, an English chemist—of the peculiar action of caustic soda or caustic potash upon the cellulous structure of the cotton fibre, changing its physical and chemical nature. This discovery remained dormant till within a year or two ago, because of the very serious objection to its economical use; viz., that of the shrinking of the goods or yarn. Mechanical devices have now been invented by which this shrinking is permanently overcome, and, at the same time, an enduring lustre like that of silk is imparted to the fabric or yarn. “Mercerized” goods, or those made from mercerized yarn, are known in the trade as silkoline, etc. Fabrics beautiful in color, lustre, and finish, and of greater strength and durability than those made from ordinary cotton, are now being made from yarn thus prepared. Mercerized cotton takes a deeper and more brilliant shade of color from the same dyes than unmercerized cotton. So little was known of this method of preparing cotton, or so rudimentary was it in the art of manufacturing, at the time the Tariff Act of 1897 was under consideration, that absolutely no suggestion was offered by any one concerning the goods made according to it for any special rate of duty, which otherwise would surely have been imposed, on account of their greatly enhanced value. Therefore, when an importation of mercerized goods was made at the port of New York in the early part of last year, its proper status under the law at once became a serious question to the Collector of Customs; resulting in a carefully prepared and ingenious decision of the Board of General Appraisers, consistent with the cardinal idea that the tariff was enacted as a protective measure for the American manufac-

turer, and that classification and rates of duty should be in harmony therewith, wherever the rendering of the law could be made so to appear.

The gross value of cotton manufactures in the United States in 1890 was \$267,981,724, or at the rate of \$18.88 per spindle. The number of spindles was given by the Census of that year as 14,188,103. The present value of these products, according to our best estimate, is \$255,429,858, or less than in 1890, notwithstanding the fact that there has been an increase, not only of 24 per cent in the number, but of 10 per cent in the productive capacity, of the spindles.

The loss, or decrease in value, is entirely due to the great depreciation in the market price of the goods made, which I place at 30 per cent. My method of calculation is as follows: Value of product, 1890, \$267,981,724, divided by number of spindles (14,188,103), shows a value of \$18.88 per spindle. Accepting 17,570,290 as the number of spindles for 1898, and adding 10 per cent for the increased productive capacity per spindle, because of greater speed, would make their spinning capacity equivalent to 19,327,319 spindles, on the 1890 standard. This number, multiplied by \$18.88, would give a product value of \$364,899,783, provided prices were the same now as in 1890, which is not the case, they being 30 per cent less. For this reason, the value is brought down to \$255,429,858. With all due allowance for finer spinning, and more costly goods made by many of our mills, I should regard a gross product value of \$300,000,000 as an extreme estimate. Although much finer yarns are made now than in 1890, I doubt if the average is much, if any, finer than in that year, considering that most of the increase in mill construction has been in the South, where coarse yarns are spun.

I have alluded to the proportional value of foreign and domestic machinery in woollen- and worsted-mills, as given by the decennial censuses of Massachusetts for 1885 and 1895. The value of cotton machinery in the mills of that State in 1885 was \$37,849,394, of which 8.3 per cent was of foreign make. In 1895 the value was \$54,659,232, of which 16.2 per cent was foreign. There has probably been no material change since the last-mentioned date.

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