

THE COTTON
MANUFACTURING INDUSTRY
OF THE UNITED STATES

BY

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AWARDED THE DAVID A. WELLS PRIZE FOR
THE YEAR 1911-12, AND PUBLISHED FROM
THE INCOME OF THE DAVID A. WELLS FUND

SECOND IMPRESSION

FIRST PUBLISHED 1917

TO
MY FATHER AND MOTHER

PREFACE

COTTON manufacturing constitutes at the present time one of the most important industries in the United States, and in volume of output this country ranks second among the nations of the world. The task here undertaken is to set forth the relative position of the American cotton manufacturing industry by means of an international comparison of geographical factors, technical methods, labor conditions, and industrial and commercial organization. To provide a basis for comparisons and conclusions, the history of the industry in America is traced and its present organization analyzed. In the historical section attention is directed particularly to the period since 1860, but in the first chapter the history of the industry prior to the outbreak of the American Civil War is sketched.

The work has necessarily been restricted at several points. The early history is not given more space because, for the purposes of this study, it has seemed advisable to concentrate upon the later period. A history of wages in American cotton mills has not been undertaken because of the vast amount of time that would be required to secure the data on which to base any reliable conclusions. In the second part very little is said concerning the European lace industry, because of its complicated character and the small size of our own lace manufacture. Finally, but slight reference has been made to the social conditions under which the operatives live, and no attempt has been made to compare cost of living in the different countries. The object has been to secure unity, and by no means to imply that the question of laborers' welfare or standard of living is less worthy of investigation.

The data for the analysis of the present situation in America and for the comparison of European and American conditions have been obtained largely by personal investigation and inquiry.

Manufacturers, merchants, and other persons connected with the industry have been consulted, in New England, New York, Philadelphia, and the southern mill towns; in various towns in Lancashire; in Bremen, Berlin, Saxony, The Rhine Province, Bavaria, Wurttemberg, and Alsace; in Switzerland; and in Paris, the "Nord," the Vosges, and Normandy. Mills have been visited in all these districts. More than two hundred persons have been interviewed personally and information has been obtained from others by correspondence. Statements of fact in the text not otherwise vouched for are usually based on such information. In inquiries of this sort the personal equation must be allowed for, but by checking up the statements of one man with those of others, I feel confident that, although a few errors and misstatements have doubtless crept into the book, they have been reduced to the minimum.

Inasmuch as this monograph was submitted for the Wells Prize competition in November, 1911, and delivered to the publishers in March, 1912, the Tariff Board's *Report on Cotton Manufactures* appeared too late to permit me to utilize its data in this work. My own conclusions concerning comparative costs, however, are substantially the same as those of the Tariff Board.

I began the study of the cotton manufacturing industry while holding the Charles Carroll Everett Fellowship of Bowdoin College, and continued my researches while an Austin Teaching Fellow at Harvard University. Later, to enable me to conduct the investigation of the industry in the European countries, I was granted a Frederick Sheldon Fellowship from the latter institution. Without this aid the task would not have been completed.

To the numerous business and professional men who have assisted in the carrying on of the study grateful acknowledgment is due, particularly to Major H. L. Higginson, Mr. E. A. Whitman, Mr. Sidney Coolidge, Mr. S. S. Dale, and General S. M. Weld of Boston, Mr. H. L. Knoop and Mr. J. R. Barlow of Manchester, England, Mr. C. A. Albrecht of Bremen, and

Dr. Eduard Simon and Professor Schmoller of Berlin. I am deeply indebted to Professor F. W. Taussig for friendly advice and helpful criticism and to Professor Edwin F. Gay for constant encouragement, valuable suggestions, and a kindly oversight over the preparation of the manuscript.

M. T. COPELAND.

CONTENTS

PART I

HISTORY AND PRESENT ORGANIZATION

	PAGE
I. GROWTH BEFORE 1860	3
II. GROWTH SINCE 1860	17
Spinning and Weaving	17
Lace and Small-Wares	22
Knit Goods	23
III. GEOGRAPHICAL DISTRIBUTION	27
New England	27
Middle Atlantic States	30
Southern States	32
IV. TECHNICAL DEVELOPMENT	54
Yarn and Cloth Manufacturing	54
V. TECHNICAL DEVELOPMENT (continued)	101
Knitting	101
VI. LABOR	112
Employees	112
Labor Unions	123
Wages	128
VII. TEXTILE SCHOOLS	134
VIII. SCALE OF PRODUCTION AND SPECIALIZATION	140
Large Scale Production	140
Specialization	145
IX. ASSOCIATIONS AND COMBINATIONS	154
Associations	155
Amalgamations	161
Integration	171
X. THE RAW COTTON MARKET	176
XI. THE CLOTH MARKET	193
History	193
Present Organization	207
XII. EXPORT TRADE	220
XIII. IMPORT TRADE	232
Cloth and Fancy Goods	232
XIV. IMPORT TRADE (continued)	253
Knit Goods	253
XV. DIVIDENDS AND PRICES	262

PART II

THE RELATIVE POSITION OF THE UNITED STATES

	PAGE
XVI. GEOGRAPHICAL FACTORS	275
XVII. RELATIVE LABOR CONDITIONS	287
Wages	294
Wage Agreements	305
Textile Education	309
XVIII. PLANT; SCALE OF PRODUCTION; SPECIALIZATION	312
Plant	312
Management	318
Scale of Production	320
Specialization	326
XIX. COMBINATIONS	333
Associations	333
Amalgamations	339
XX. KNIT GOODS	346
General Comparison	346
Scale of Production	348
XXI. RAW COTTON MARKETS	354
XXII. ENGLISH MARKETS	361
Manchester	361
Nottingham	372
XXIII. CONTINENTAL MARKETS	374
Germany	374
France and Switzerland	382
XXIV. CONCLUSIONS	386
APPENDIX	391
BIBLIOGRAPHY	398
INDEX	407

PART I

HISTORY AND PRESENT ORGANIZATION

THE COTTON MANUFACTURING INDUSTRY OF THE UNITED STATES

HISTORY AND PRESENT ORGANIZATION

CHAPTER I

GROWTH BEFORE 1860

Raw cotton was imported into New England from the West Indies before the middle of the seventeenth century,¹ and small importations continued during the following hundred and fifty years.² This material was spun into yarn and also used for other purposes.³ But it was not till the last decade of the eighteenth century that the manufacture of cotton was begun on a considerable scale in the United States.

The progress of the industry prior to 1790 had been handicapped by the dearth of labor and capital. It may have been checked somewhat by the colonial policy of the British government. The jealousy with which England guarded the new inventions of cotton manufacturing machinery retarded their introduction into America. Finally the Revolutionary War and the subsequent period of industrial instability also hindered the expansion of the industry. But these last three factors were obstacles of a secondary order in comparison with the fundamental economic conditions in regard to labor and capital.

After several ventures at different places in New England, the first successful cotton mill was started in Rhode Island in 1790. The owners of the mill secured the services of Samuel Slater, a young Englishman who had worked in a cotton mill

¹ W. B. Weedon, *Economic and Social History of New England*, vol. i, pp. 163, 170.

² *Ibid.*, p. 681.

³ A. M. Earle, *Home Life in Colonial Days*, p. 206.

in his native land. Seeking a broader opportunity, he came to this country in response to an advertisement of a society for the promotion of industrial growth. He was not able to bring with him any models or plans, owing to the severe restrictions imposed by the British government. Yet he constructed from memory the water-frame and other machines in use in Great Britain. Thus the elementary technical knowledge was supplied and one of the obstacles to the growth of the industry removed.

During the next fifteen years the progress was slow. Several mills were established, but the conditions were not favorable to rapid development. In the first place the competition of the experienced British manufacturer was encountered. Furthermore the inhabitants of the sparsely populated country were engaged in other occupations, chiefly agriculture and foreign trade. Consequently the supply of labor was inadequate. Moreover the capital was invested in shipping and foreign commerce. Another handicap was the difficulty of obtaining the raw material, since it was not till 1793 that the invention of the cotton gin made possible the utilization of the upland cotton of the South.

The period of the second contest with England, however, witnessed a rapid expansion of the cotton manufacturing industry in America. With the Embargo of 1807, the Non-Intercourse Act, and the War of 1812, the supply of cotton goods from Great Britain was almost entirely cut off and the Americans were thrown upon their own resources. The high prices of cotton cloth attracted investors to this form of industrial enterprise, and at the same time the restrictions on foreign trade encouraged the withdrawal of capital from the sea.

Several New England men who had accumulated wealth in foreign commerce now became interested in cotton mills in their own country. Mr. Nathan Appleton, for example, who played a prominent part in the financing of a number of the new mills, had until 1807 been engaged in the import trade.¹ Mr. P. T. Jackson, associated with Mr. Appleton and others in the pro-

motion of cotton mills, had previously been interested in the India trade.¹ Mr. Francis C. Lowell was an importing merchant till 1810, when the international dispute so cut into his business that he determined to become a cotton manufacturer, crowning his career in that field by the invention of a power loom.

The statistics for this early period are not very reliable, and the estimates of various persons differ. Yet they all agree in showing that the number of spindles increased rapidly after 1807. The period following that year was the time when cotton spinning was firmly established as a factory industry in the United States, although it had been founded seventeen years earlier. The following figures were given by Mr. Woodbury in a report to Congress.²

NUMBER OF SPINDLES IN THE UNITED STATES

1805	4,500	1815	130,000
1807	8,000	1820	220,000
1809	31,000	1825	800,000
1810	87,000		

Although the number of spindles continued to increase after the close of the war in 1814, the young industry was beset with difficulties. The American manufacturers were no longer protected from their foreign competitors by the prohibitions of war, and the British merchants began to ship large quantities of cotton goods to America. The influx of this pent-up stream threatened destruction by pushing the exorbitant prices down to a low level.

From this ruinous competition the American manufacturers sought relief in two ways. For a time the tariff of 1816 aided them. Of more importance, however, in warding off the imminent calamity, was their ingenuity in improving their machinery. All the early mills had been equipped according to the English plans introduced by Slater, but during the war the manufacturers began to experiment for themselves. The most important invention of that period was the power loom in 1814 by Lowell,

¹ *Professional and Industrial History of Suffolk County*, vol. iii, p. 506.

² 24th Congress, 1st session, *Executive Document*, No. 146, p. 51.

¹ *Professional and Industrial History of Suffolk County*, vol. iii, p. 504.

who constructed the machine independently of any English plans or models. A year later looms of the English type were introduced,¹ and within a few years practically all of the cotton cloth manufactured in the country was woven on power looms, although in Pennsylvania yarn was sold for-household use till 1840.²

Another factor in the development of the industry was the increasing production of raw cotton in the southern states and the consequent decline in the price of the raw material. While this benefited the foreign manufacturers as well as those in America, it nevertheless stimulated a greater demand for cotton cloth and thus gave all a better chance. This cheaper material partially supplanted wool. Finally, the population of the country was becoming larger and wealthier; hence a larger market was afforded.

The industry progressed steadily from 1830 to 1860, as is indicated by the following table. The statistics for 1831 were collected by a committee appointed at the convention of "The Friends of Domestic Industry"³ held in that year, and included only the mills in New England and the Middle States. The other figures are mainly from the census reports, and are admittedly inaccurate, though not without significance.

COTTON MANUFACTURES, 1831-1860				
	Establishments	Cotton Used (pounds)	Spindles	Value of Product
1831.....	795	77,800,000	1,200,000	\$32,000,000
1840.....	1,240	113,100,000	2,300,000	46,400,000
1850.....	1,094	276,100,000	3,600,000	61,700,000
1860.....	1,091	422,700,000	5,200,000	115,700,000

The greater efficiency of the machinery at the later dates is indicated by the increase in the consumption of raw cotton at a rate more rapid than that of the number of spindles. The

¹ J. L. Bishop, *History of American Manufactures*, vol. ii, p. 207.

² *Eighty Years' Progress*, vol. ii, p. 284.

³ A convention of American manufacturers was held in New York, October 26, 1831, with a view to promoting their interests by tariff legislation. The sentiment was strongly protectionist, and its *Report*, from which these facts were ascertained, was issued in the name of "The Friends of Domestic Industry."

quantity of raw cotton also increased relatively faster than the value of the product, thus reflecting the fall in the price of cloth as a result of cheaper cotton and more economical methods of manufacture. The number of establishments, on the other hand, did not increase after 1840; the mills were becoming larger, and the little ones passing out of existence.

While the industry was progressing in the United States, it did not reach the proportions of the British cotton manufacturing industry. The total number of spindles in Great Britain was estimated at about 21 millions in 1850,¹ and at 30 millions in 1861.² The quantity of raw cotton used in England was correspondingly greater than in America. The same factors which had stimulated the introduction of cotton manufacturing in Great Britain in the last half of the eighteenth century,—climate, water-power, coal, inventive genius, and business ability, as well as freedom from social and political restraints,—these forces continued to promote the growth of the industry in later years.

On the continent the development of the industry was retarded by unsettled political conditions and frequent wars, by numerous local customs barriers, and by contentment on the part of entrepreneurs and workmen with antiquated methods. In France there were in 1867 about 6 million spindles,³ not including doubling spindles; in Germany the number of spindles in 1840 was 658,358,⁴ and in 1860 about 2 millions.⁵ In both of these countries the industry was still carried on in small plants, and even in the homes.

The first cotton mills in America were in New England and there they increased most rapidly during this period. Some were built in the Middle States, and a few elsewhere, but the conditions were not as favorable in other parts of the country as in New England, where there was abundant water-power and more available capital. The supply of labor to be had was also

¹ L. Levi, *History of British Commerce*, p. 410.

² *Ibid.*, p. 410.

³ H. Lecomte, *Le Colon*, p. 334.

⁴ W. Lochmüller, *Die Baumwollindustrie in Deutschland*, p. 21.

⁵ A. Opiel, *Die Baumwolle*, p. 656.

relatively greater in that region of rock-ribbed hills and unfertile soil, where the "Yankee" sentiment encouraged thrift and industry on the part of all, including women and children.

The geographical distribution of the industry in 1860 is shown by the Census statistics of that year.

COTTON MANUFACTURES, 1860			
Establishments	Cotton Used (pounds)	Spindles	Value of Product
New England . 570	283,700,000	3,800,000	\$79,400,000
Middle States 340	87,100,000	1,000,000	26,500,000
South 159	43,900,000	300,000	8,100,000
West 22	7,900,000	40,000	1,600,000

New England with fifty-two per cent of the establishments in 1860 had seventy-five per cent of the spindles, whereas the Middle States with thirty-one per cent of the establishments had only twenty per cent of the spindles. The same ratios held for the number of looms. New England not only had more mills than all the other states combined, but the mills in this section were larger than those elsewhere. The average number of spindles per establishment was 6,700 in New England as compared with 2,900 in the Middle States, and a still smaller number in the other parts of the country. The average New England mill, therefore, was at least twice as large as the average sized mill in the other states.

Within the New England states the industry was centralized in Massachusetts and Rhode Island. These two states had forty-eight per cent of all the spindles in the country in 1860, and Massachusetts alone had thirty per cent. In these states several large centres had grown up, — Providence, Fall River, and Lowell. Manchester in New Hampshire was another. In the Middle States, Philadelphia was the largest cotton manufacturing city.

Thus, prior to the Civil War the cotton manufacturing industry not only expanded, but showed well-defined tendencies toward concentration and localization. Its internal structure, moreover, was also undergoing change.

The American cotton manufacturers early began to develop

machines especially suited to the prevailing industrial conditions. They were urged on by the dearth of labor to supplant human muscle and eyesight as far as possible with mechanical power and automatic appliances. They found it economical to seek the greatest possible output per operative. On this depended the prosperity of the growing industry. The machinery in all departments was steadily improved so as to accomplish more and better work. Mention has already been made of the invention and adoption of the power loom, one of the first accomplishments. Another invention, of especial significance to the student of the later history of the industry, was that of the ring spindle, about 1830, by Mr. Jenks, a pupil of Slater.¹ It was a modification of the throstle, which had been developed from the water-frame of Arkwright. The modification consisted in the replacing of the double armed flyer of the throstle by a wire, or "traveller," running on a fixed steel ring. At first it was applied only to twisting, but soon came to be used for spinning and even before the Civil War competed on about equal terms with the mule which had been introduced from England.

The use of improved machinery run at high speed and equipped with various automatic stop motions gave a comparatively large output per machine and per unit of labor. One of the most trustworthy accounts of the state of the industry prior to 1860 is that written in 1840 by James Montgomery, who had been engaged in cotton manufacturing in Great Britain before coming to America. He commented on the greater use of stop-motion devices in the American mills,² and remarked that "the factories at Lowell produced a greater quantity of yarn and cloth from each spindle and loom (in a given time) than was produced in any other factories, without exception, in the world."³

England, in the meantime, was advancing in technical development. The mule, for example, was being increased in length and improved in the working parts. At first the mule contained about 144 spindles, but by 1835 the average length was over 300

¹ *Eighty Years' Progress*, vol. ii, p. 286.

² J. Montgomery, *Cotton Manufacture*, p. 56.

³ *Ibid.*, p. 162.

spindles, and by 1860 the latter number had been doubled.¹ The self-acting mule was invented about 1825 and resulted in a reduction of the amount of labor necessary for spinning cotton yarn. The self-actor, however, although improved from time to time, was used only for spinning coarse counts till after 1860.

In weaving, to take another department, the use of the power loom by English manufacturers began before it did in the United States. But the hand loom continued to be employed in Great Britain for weaving cotton cloth after it had been entirely dispensed with in this country. The difficulties with which the transition was made in England are recorded in the Parliamentary reports on the hand-loom weavers and their sufferings. The invention of the Blackburn loom in 1828 sounded the knell of the hand loom, but it was not entirely eliminated till after 1850.

The American manufacturers not only were the first to adopt the power loom exclusively but they secured a relatively greater output per laborer by inducing the weavers to tend more looms. In 1860 the average number of looms per weaver was four in the United States, and two in Great Britain;² the higher earnings in the former country being accompanied by greater productivity.

On the Continent new machines and new methods did not find a ready acceptance. Only a fourth of the spindles in operation in France in 1860 were self-acting mules.³ In the same country the power loom had hardly come into use at that date⁴ and did not oust the hand loom till some years later.⁵ Likewise in Germany hand mules and hand looms were in general use in 1860.⁶ Under such circumstances the French and Germans were not very dangerous competitors, at least on coarse plain goods which could be produced in large quantities.

Cotton manufacturing developed earlier in Great Britain than in the United States and in 1860 there were nearly six times

¹ T. Ellison, *Cotton Trade of Great Britain*, pp. 65-66.

² S. Batchelder, *Early Progress of the Cotton Manufacture*, p. 90.

³ L. Amé, *Les Tarifs de Douanes*, vol. i, p. 312.

⁴ *Ibid.*, pp. 312, 395.

⁵ *Enquête sur l'Etat de l'Industrie Textile*, vol. ii, p. 12; vol. iv, p. 100.

⁶ A. Oppel, *Die Baumwolle*, p. 656.

as many spindles and slightly over three times as many power looms in operation in the former country. Nevertheless the American industry was in a healthy condition and was ahead of the Continental European. The American manufacturers had met the requirements of the conditions incident to a young country with a large area of fertile agricultural land and a consequently high scale of wages. By skillful adjustment of labor and machinery they had established themselves, in the manufacture of the coarser fabrics, on a firm competitive basis. The situation in 1860 was summed up by Mr. Samuel Batchelder, a competent critic, who said: "The advantage of manufacturing in England on account of wages is much less than we have generally supposed.

. . . Fine articles, or such as require experience and skill, can undoubtedly be produced cheaper there than here; but it is questionable whether heavy goods such as drilling and sheeting, which make up a very large proportion of the consumption of this country, can be produced cheaper than in the United States."¹

The substitution of machinery for labor in American cotton mills is roughly indicated by the smaller relative increase in the number of persons employed as compared with the increase in the number of spindles. The latter was over four times as great in 1860 as in 1831, while the former was only twice as large. The following table gives the details of the changes in number of employees. The statistics for 1831 are those collected by "The Friends of Domestic Industry," the others are Census figures.

EMPLOYEES IN COTTON MILLS

	Total	Male	Female	Children
1831.....	62,177	18,359	33,506	4,691
1840.....	72,119
1850.....	92,286	33,150	59,136
1860.....	122,028	46,859	75,169

The children were classed in the Census returns only according to sex. Hence it is not possible to ascertain the exact composition of the labor force. As to the prevalence of child labor,

¹ S. Batchelder, *Early Progress of the Cotton Manufacture*, p. 91.

Miss Abbott has concluded that "children formed a very large proportion of the total number of employees."¹ Since there is no reason to suppose that the girls greatly outnumbered the boys, we may conclude that the number of women employed in cotton mills was considerably in excess of the number of men.

The labor during the first five decades of the nineteenth century was supplied mainly by the native population, that is by descendants of the English settlers. The sons and daughters of the farmers entered the mills to get a start in life. But they looked upon it merely as a temporary employment, frugally saving their earnings to help pay for a farm, to enter business, or, in the case of the young women, to assist in furnishing a home. No stigma was attached to work of this sort; on the contrary it was looked upon with favor by a majority of the people.

Inasmuch as the operatives were an independent class, and since they were frequently changing, the managers felt compelled to make the environment as attractive as possible.² It is true that the hours were long, from sunrise to sunset, but there was an absence of abusive treatment and unhealthy conditions. This served especially to protect the children. Although child labor was practically unregulated before 1860, there seems to have been no brutality,³ and the children in the American mills were not subjected to those abuses which make the early history of the English cotton factory so dark.⁴ The superior conditions in the American mills were due in part to the fact that there were no pauper apprentices and that the children were usually under the oversight of parents or relatives. Then, too, perhaps a warning had been taken from the reports of conditions in England. But the absence of a permanent operative class and the high moral standards of the factory employees had most to do with eliminating abuse.

¹ Edith Abbott, "Study of the Early History of Child Labor in America," *American Journal of Sociology*, vol. xiv, p. 25.

² H. H. Robinson, *Loom and Spindle*, p. 71.

³ Edith Abbott, *op. cit.*, p. 34.

⁴ Mr. Persons has concluded that the conditions of child labor in New England mills early in the nineteenth century were "immeasurably above the English level." C. E. Persons, M. Parton, and M. Moses, *Labor Laws and their Enforcement*, p. 5.

The frequently changing supply of labor exerted an influence in other directions. One of these was technique. It was necessary to adopt machinery which did not require a great amount of skill, since, as Mr. Batchelder phrased it "the greater part of those at work in the mills were only a succession of learners, who left the business as soon as they began to acquire some skill and experience."¹ The automatic devices, the ring spindle, and other inventions not only diminished the quantity of labor required, but made its quality less important. The introduction of immigrant labor took place with less friction than would have been possible had there been a fixed operative class, and the technical improvements were likewise favorable to the utilization of the unskilled foreigner, since it made little difference to the manager whether he employed unskilled Americans or unskilled Irishmen. The exact date when the employment of immigrants in our cotton mills began is uncertain, but it was before 1836, since in that year Miss Martineau wrote: "A large proportion of the labor in the Lowell factories is supplied by women. Much of the rest is furnished by immigrants. I saw English, Irish, and Scotch operatives."² The male immigrants were at first employed only for the rough work around the mill, but they gradually assumed positions as machine tenders. Foreign women appeared in the mills somewhat later. Mr. Miles collected statistics for the nationality of the females employed in the Lowell mills in 1847,³ which show that at that date the greater part of the women were of New England parentage, although a few were from Ireland.

The stream of immigrants, however, which became large in volume after 1845, turned at once toward the cotton mills as the most available point whence to begin the industrial ascent in the new country. The Irish were the first to come in large numbers and they began to take the places of the native employees as the latter dropped out. The transition was made quietly, for the most part, and attracted little comment from contemporary writers.

¹ S. Batchelder, *Early Progress of the Cotton Manufacture*, p. 89.

² H. Martineau, *Society in America*, vol. ii, p. 55.

³ H. A. Miles, *Lowell as it was and as it is*, p. 185.

Neither the machinery nor the labor employed in the United States at this period were favorable to the manufacture of fine or fancy cloths. The greatest demand, moreover, was for plain coarse and medium fabrics, such as could be most economically manufactured in the country. Expensive goods, in the production of which more labor and more skill were required, were obtained from Europe.

The import trade in cotton goods, therefore, was made up largely of the more expensive fabrics and fancy articles. The average annual value of the imports increased from about nine million dollars in the decade 1821-1830 to twenty-six and a half million dollars in the decade 1851-1860, or nearly three-fold. The increase in volume of imports was especially great during the last decade of this period, when the average annual value nearly doubled.¹

IMPORTS OF COTTON MANUFACTURES, 1821-1860²
(Average annual value)

	Total	Plain Cloth	Colored Cloth	Knit Goods	All Other
1821-1830.....	\$9,200,000	\$2,900,000	\$5,300,000	\$ 500,000	\$ 500,000
1831-1840.....	11,600,000	2,100,000	7,500,000	1,000,000	1,000,000
1841-1850.....	13,700,000	1,700,000	8,800,000	1,200,000	2,100,000
1851-1860.....	26,600,000	no data	no data	2,800,000	6,000,000

Owing to an incomplete classification during three years of the last decade, it is not possible to separate the average value of plain cloth from the average value of colored cloth. But the figures for 1860, the year of the largest importation up to that time, reflect what had been taking place during the decade. In 1860 the total value of the cotton manufactures imported was \$38,200,000. The value of the plain cloth imported was \$1,200,000; of colored cloth, \$25,900,000; and of all other cotton goods, \$11,100,000; thus those goods classed as "printed, painted, or colored" heavily predominated.

From 1850 to 1860 was the period of greatest prosperity for the cotton industry in this country up to that time, although the duties were low and the importation of cotton goods nearly

¹ All imports increased rapidly during these years.

² *U. S. Commerce and Navigation Reports.*

doubled. This points to the conclusion that the general industrial conditions and the prosperity of the country had more to do with the progress of the industry than any stimulating tariff. After the industry was well established it mattered little to the cotton manufacturers whether the tariff was high or low. The act of 1816 probably did serve to assist the infant industry, and later acts may have somewhat encouraged the production of goods of a higher grade.¹ But the latter was also fostered by the technical improvements, the knowledge and experience acquired by the manufacturers, and the increasing demand which resulted from the accumulation of wealth in the country. By 1860, moreover, the protective sentiment was on the wane among American cotton manufacturers, since, as Mr. Webber stated, "the business of cotton manufacture was by that time (1850) so firmly established as to be little affected by changes in legislation in regard to duties on the coarser fabrics required for domestic consumption, to which American machinery had been adapted."²

The production of cotton cloth in the United States prior to 1860 was largely for the home market. The export trade had not become extensive.

EXPORTS OF COTTON MANUFACTURES

(Average annual value)

	Total	Plain Cloth	Colored Cloth	All Other
1826-1830.....	\$1,200,000	\$920,000	\$80,000	\$170,000
1831-1840.....	2,520,000	2,060,000	310,000	150,000
1841-1850.....	3,960,000	3,180,000	420,000	360,000
1851-1860.....	7,310,000	3,740,000	1,830,000	1,740,000

Throughout the thirty-five years plain cloth constituted the bulk of the exports, and was disposed of chiefly in Asia. The evident expansion of the export trade from 1850 to 1860 emphasized the prosperity of the industry in spite of low tariff duties and the large importation of cotton goods.

¹ A detailed discussion of the various tariff acts will be found in Taussig, *Tariff History of the United States.*

² S. Webber, *History of Cotton Manufacture in the United States*, p. 57.

At just this time, when the rate of progress was great, the war broke out. For five years the industry was disrupted not only by the disarrangement of capital, labor, and markets, but by the impossibility of securing raw material. Thus there is practically a void in the history of the industry during the period of conflict. However, resuscitation was rapid after 1865 and cotton manufacturing progressed along the previous lines of development. The war caused but a slight break in the tendency toward larger scale of production and more efficient organization. It made easier the substitution of immigrants for native laborers, yet did not originate that substitution. After 1865, just as before 1860, the relatively high wages in this country placed a premium upon labor-saving devices, which stimulated invention. Moreover the machinery had to be adapted to the utilization of untrained workers. The war brought in its train the era of high protection. As a result of the tariff or other causes the production of fine and fancy fabrics has been augmented, but the output still consists predominantly of coarse plain cloth for the domestic market. The break caused by the Civil War, therefore, did not divert the development of the American cotton manufacturing industry into new lines.

CHAPTER II

GROWTH SINCE 1860

THE forces which have influenced the growth of the American cotton manufacturing industry during the last fifty years can best be analyzed after the magnitude of that growth has been set forth. Hence we will first consider the general statistics which indicate the volume of expansion. The manufacture of yarn and cloth is the most important branch of the industry, yet the secondary industries of lace, small-wares, and knit-goods manufacturing demand attention. To avoid confusion this statistical chapter is divided into three sections.

Spinning and Weaving

The following table, compiled from Census reports, indicates the growth of the industry in the United States since 1860.

	Establish- ments	Spindles (millions)	Cotton Used (million pounds)	Employees	Value of Product (million dollars)	Exports (million dollars)	Imports (million dollars)
1860....	1,091	5.2	422.7	122,028	115.7	10.9	38.2
1870....	956	7.1	398.3	135,369	177.5	3.8	23.4
1880....	756	10.7	750.3	174,659	192.1	10.0	29.9
1890....	905	14.2	1,118.0	218,876	268.0	10.0	29.9
1900....	973	19.0	1,814.0	297,929	332.8	24.0	41.3
1905....	1,077	23.2	1,873.1	310,458	442.5	49.7	48.9
1910....	1,208	27.4	2,332.2	371,120	616.5	33.4	66.5

These statistics are subject to the criticism which may be directed against all of our Census statistics. Although the methods have tended to become more accurate, they have varied from Census to Census. Some of the statistics given by the Census have been deemed too misleading and insignificant to be included. The amount of capital invested, for example, cannot be ascertained from the Census because of its duplications and ever-

¹ The data for 1910 are based on newspaper reports of statements issued by the Director of the Census.

varying definitions.¹ The above figures for the cotton industry, however, are fairly trustworthy for a general comparison.

The number of establishments has not been affected by changes in the standard, since there were few very small plants in this industry. They were nearly all well above the dividing line.² Similarly with value of product, there has been little duplication in the statistics for this industry since most of the mills manufacture the raw cotton into cloth and the product of one mill does not to a great extent become the raw material for other mills included above. Prior to 1900 what have since been classed as "cotton small-wares,"—braids, trimmings, etc.,—were included with cotton goods proper, but they were of such relatively small amount that the error involved is immaterial.

¹ The Census itself condemns the statistics for capital, which by the Congressional Census Act it was required to collect. "In the inquiry concerning capital, comparisons have no real statistical value prior to the Census of 1890. The form of inquiry regarding capital, in all Censuses down to and including 1880, was so vague and general in its character that it cannot be assumed that any true proportion exists between the statistics on this subject, as elicited prior to 1890. At the Census of 1880, the question read: 'Capital (real and personal invested in the business).' At the Census of 1890, live capital, *i. e.*, cash on hand, bills receivable, unsettled ledger accounts, raw materials, stock in the process of manufacture, finished product on hand, and other sundries, was for the first time included as a separate distinct item of capital." (12th *U. S. Census*, vol. vii, p. lxi.) Again it states: "The attempt to measure capital absolutely and accurately has never yet been successful in a Census in the United States or elsewhere," and it quotes approvingly the statement made by General Walker in the 9th Census report: "The Census returns of capital invested in manufactures are entirely untrustworthy and delusive. . . . The results are and must remain wholly worthless." (*Ibid.*, p. xcvi.) The difficulties in satisfactorily defining capital for Census purposes have been heretofore and will very likely remain insuperable. The value of the land may be dependent upon its use as a factory site. The value of rented property may be included, but if so on what basis is it to be capitalized? Is machinery to be entered at its original cost, or its present market value? Are outside investments, in other manufacturing or financial enterprises, to be included? Are good will, patents, and trade marks to be capitalized? Finally, is credit to be taken into account, as was done in 1890 and 1900, when unpaid accounts due, for instance, were returned as capital? It is because of the worthlessness of such estimates of capital that they have not been included above.

² The line of demarcation in determining what was to be called an "establishment," which the United States Census has followed, has been to exclude from the statistics all plants with an annual product of less than \$500. Moreover no hand trades were canvassed, in 1900 at least, which were not carried on in a shop. 12th *U. S. Census*, vol. vii, p. xxxix.

In pursuance of the tendency for the smaller plants to disappear, which became apparent after 1840, the statistics show a decline in the number of establishments between 1860 and 1880. This process of disappearance or absorption continued in New England after 1880, but was counter-balanced in the summary for the whole country by the increase in the number of establishments in the South.

The number of spindles in operation is the best standard for measuring the size of the cotton manufacturing industry. On this basis cotton manufacturing was four and one-half times as extensive in the United States in 1905 as in 1860. During the same interval the number of spindles in Great Britain increased from thirty¹ millions to forty-eight and one-half millions,² an increase greater absolutely, but smaller relatively. Whereas in 1860 Great Britain had six times as many spindles as the United States, in 1905 the number was only twice as great. On the Continent, Germany has shown the greatest expansion in cotton manufacturing, the number of spindles increasing from 2,235,000 in 1861³ to 8,435,000 in 1901.⁴ Part of this increase was due to the acquisition of Alsace and its cotton mills at the termination of the Franco-Prussian war. In France, the number of spindles was 4,600,000 in 1876⁵ and 6,150,000 in 1903.⁶ Italy in 1876 had 715,300 cotton spinning spindles and in 1903, 1,694,000.⁷ In Russia there was an increase from 3,000,000 spindles 1878⁸ to 6,555,000 in 1904.⁹ Although the expansion has been important in these Continental countries, England and the United States have remained far in the lead. In fact England has acquired more spindles since 1900 than are in operation in any one Continental country.

¹ T. Ellison, *Cotton Trade of Great Britain*, p. 65.

² *Commercial and Financial Chronicle*.

³ H. Lecomte, *Le Coton*, p. 335.

⁴ *Enquête sur l'Etat de l'Industrie Textile*, vol. v, p. 458.

⁵ H. Lecomte, *op. cit.*, p. 335.

⁶ *Enquête, op. cit.*, p. 458.

⁷ *Annuario Statistico Italiano*, 1907.

⁸ H. Lecomte, *op. cit.*, p. 335.

⁹ *Enquête, op. cit.*, p. 458.

In addition to the statistics for the number of spindles, we also have those for looms, but the latter numbers are not as good indices of growth because of the variations in capacity according to the width of the loom and the complexity of design.

The number of looms in American mills was 126,000 in 1860, 451,000 in 1900, and 541,000 in 1905; in British mills 400,000 in 1860 and 680,000 in 1903. The increase was greater both absolutely and relatively in America. Now, while there are twice as many spindles in Great Britain as in the United States, there are only fifty per cent more looms. This is due, in the first place, to sale of yarn for auxiliary trades, such as lace making, and for export from Great Britain; in the second place, to the larger output of yarn per spindle in America; and, finally, to the greater productivity of the English looms, which are generally run at a higher speed than American looms.

The quantity of raw cotton used in American mills was almost four and one-half times as great in 1905 as in 1860. The quantity consumed per spindle was 81.3 lbs., in 1860, and 95.5 lbs. in 1900, but only 80.7 lbs. in 1905. The decline at the last date was caused by unsettled conditions and protracted idleness in some of the northern mill centres during the Census year. And in comparing the present consumption per spindle with that of 1860, it must not be forgotten that more fine yarn is now spun, whereby the average weight per spindle is relatively diminished. It is also to be added that the mills most affected by the disturbances of 1904-05 were those spinning coarser counts.

The average annual consumption of raw cotton in Great Britain in 1856-60 was 947.3 million pounds; in 1905, 1,654.9 million pounds. Whereas England used twice as much cotton as the United States in 1860, the total quantity is now actually less than that taken by the American mills. Twice as many spindles are employed in England for spinning a smaller quantity of cotton than is used in America. This is explained by the larger production of fine yarn in England and the more extensive use of the mule, on which the output per spindle is about two-thirds of that on the ring frame.

On the Continent of Europe the quantity of cotton consumed

averaged 627.4 million pounds per year in 1856-60; and 2,487 million pounds in 1901-05. Not till 1886 did the Continental spinners take a quantity of raw cotton equal to that used in Great Britain, but since that date their "takings" have shown a constantly increasing excess. The greater consumption per spindle on the Continent, as in the United States, arises from a relatively larger number of ring spindles and the predominance of coarse counts.

The number of persons employed in American cotton factories was only three times as great in 1905 as in 1860 although the number of spindles and quantity of raw cotton manufactured had risen in greater ratio. The product per operative was therefore greater at the later date; it averaged 9,412 square yards of cloth in 1860 and 15,134 square yards in 1905. This was brought about by the relative decline in the number of children employed and particularly by the improvements in machinery.

The character of the cotton goods produced in the United States has not been greatly changed since 1860. The cloth is generally of better quality and several mills are now manufacturing fine and fancy fabrics. Yet, to quote from the Census of 1905,¹ "Almost three-fourths of the yardage of all the woven goods reported falls under the classification of coarse or medium counts—print cloths, sheetings and shirtings, drills, ticks, denims and stripes, duck and bagging." Over one-half of the yarn spun in American mills is still coarser than number 20, and five-sixths of the remainder is from number 21 to number 40 in fineness.² The bulk of it, evidently, is of coarse and low medium counts.³ The proportions for the Continental spinning industry are approximately the same, but England would show a higher percentage of fine yarn.

The domestic market has continued to be the chief goal of the American cotton manufacturers and they have supplied the

¹ *U. S. Census of Manufactures, 1905, Bulletin No 74, p. 45.*

² *Ibid.*, p. 48.

³ The number (or count) of cotton yarn is the number of hanks, of 840 yards each, required to make one pound in weight. The finer the yarn, therefore, the higher the number. Nos. 1 to 20 are called coarse, nos. 20 to 60 medium, and over no. 60 fine.

greater part of that demand. From a total production valued at more than \$616,000,000 in 1910 only \$33,400,000 was exported. The imports, including not merely cotton cloth but all fabrics of cotton, — hosiery, embroidery, laces, etc., amounted to \$66,500,000. But the imports of cloth were only \$9,000,000, or considerably less than two per cent of the value of the cloth manufactured within the country.

The American cotton manufacturing industry, therefore, has expanded during the last fifty years at a pace fast enough to keep up with a rapidly increasing population. This expansion of cloth manufacturing has been supplemented by a similar development of the production of other fabrics made of cotton.

Lace and Small-Wares

Although the statistics for the lace and lace-curtain manufacture are included by the Census under woven goods, the growth of this subsidiary branch of the industry is worthy of separate consideration. Like the other supplementary branches it has developed recently, and has its own peculiarities. The manufacture of lace curtains was begun in the United States in 1885,¹ and 642,061 square yards of lace and lace curtains were reported at the Census of 1890. The value of this product was \$354,987. In 1900 the Census reported 9 establishments with 183 machines, employing 2,383 persons, and producing 37,825,000 square yards, valued at \$3,585,000. By 1905 the number of lace machines had increased to 417; the number of establishments to 13; the number of employees to 4,502; and the product to 53,451,000 square yards, valued at \$7,203,000. In spite of the increased production, however, more lace is imported than is made in this country. In 1900 the value of the imports of lace and embroideries was \$19,200,000; in 1905, \$25,900,000.

The miscellaneous products of cotton, not included in the preceding categories, are grouped by the Census as "small-wares." "At the Census of 1900 for the first time a separate classification was made of the establishments producing cotton small-wares, including cotton embroideries, edgings, boot and

¹ *Report of the Secretary of Internal Affairs, Pennsylvania, 1899, p. 56.*

shoe lacings, corset lacings, lamp and stove wicks, tapes, webbings, and trimmings."¹ At that date there were 82 establishments of this class, employing 4,932 persons and having an aggregate product valued at \$6,394,164. In 1905 the number of establishments had decreased to 77, but the number of employees had risen to 5,416, and the value of the product to \$8,016,186.² These industries are too heterogeneous to permit of further analysis.

Knit Goods

The second half of the nineteenth century has witnessed the emergence of knit-goods manufacturing from the household stage into a factory industry. Before 1850 hosiery was chiefly the product of the knitting needle, and many a frugal American housewife spent her odd moments in making stockings for her family. Some were thus made at home for sale and some manufactured in small mills. That system of production has since yielded to the factory, with several far-reaching effects. Knitted undergarments have superseded the flannels worn a generation ago, and cotton underwear and cotton stockings are far more common than before this industrial change took place. With the development of the knit-goods industry relatively more cotton and less woolen yarn has been manufactured in this form.

A confusion of statistics and other data places serious obstacles in the path of the investigator who wishes to trace the history of a single branch of the knit-goods industry. The same methods and machines serve for knitting woolen, cotton, and silk yarns. Many knitting mills use more than one sort of yarn. And some products contain a mixture of two fibres.

The Census reports for knit-goods manufacturing have become more elaborate with the general development of such statistical inquiries and with the progress of this particular industry. But for purposes of comparison it is possible to give only the statistics which include all knit goods.

¹ 12th *U. S. Census*, vol. ix, p. 70.

² In 1910 the number of employees was 7,698 and the value of the product \$13,174,111.

KNIT GOODS¹

	Establishments	Machines	Employees	Value of Product
1860.....	197	no data	9,100	\$7,300,000
1870.....	248	5,625	14,800	18,400,000
1880.....	359	12,659	28,900	29,200,000
1890.....	796	36,327	59,600	67,200,000
1900.....	921	69,047	83,400	95,500,000
1905.....	1,079	88,374	103,700	136,600,000
1910.....	1,374	no data	129,300	200,100,000

The number of establishments was about seven times as great in 1910 as in 1860, the number of employees over fourteen times as great, and the product nearly thirty times as high in value. All this has taken place in fifty years! The advance has been especially rapid since 1880.

The relative importance of the different branches of the industry is shown by a table of classified products.

KNIT GOODS
(In thousands)

	1905	1900	1890	1880
HOSIERY				
Woolen				
Half Hosedoz. prs.	1,310	940	1,361	288
Value	\$3,402	\$1,739	\$2,893	not stated
Hosedoz. prs.	1,084	1,177	2,243	1,216
Value	\$2,205	\$2,268	\$4,723	not stated
Merino				
Half Hosedoz. prs.	1,611	958	376	627
Value.....	\$2,215	\$1,385	\$605	not stated
Hosedoz. prs.	746	437	433	2,653
Value.....	\$1,182	\$660	\$791	not stated
Cotton				
Half Hosedoz. prs.	15,223	11,352	5,342	
Value.....	\$11,822	\$7,907	\$3,937	
Hosedoz. prs.	24,170	15,028	7,387	
Value.....	\$22,765	\$13,276	\$6,214	
UNDERWEAR				
<i>Shirts and Drawers</i>				
Woolendoz.	485	1,085	1,089	
Value	\$3,648	\$4,981	\$8,882	
Merinodoz.	2,114	2,675	2,526	
Value.....	\$13,032	\$13,294	\$15,056	
Cottondoz.	17,108	12,058	3,247	
Value.....	\$39,659	\$26,883	\$9,024	

¹ Data for 1910 obtained from preliminary statement published in newspapers.

KNIT GOODS—Underwear (*continued*).

	1905	1900	1890	1880
Combination Suits				
Woolen..... doz.	68	10		
Value.....	\$965	\$202		
Merino doz.	105	140		
Value.....	\$1,200	\$1,133		
Cotton doz.	1,260	824		
Value.....	\$4,479	\$2,240		

In addition to these articles there was a small production of silk knit goods, sweaters, shawls, and minor specialties.

The elaboration of the classification at each succeeding Census emphasizes the increasing diversification of product. From a simple statement of the total production of hosiery and underwear as given in 1860, the new divisions and sub-divisions have been introduced until at the Census of 1900 twenty-four classes of cotton and woolen hosiery and underwear were separately enumerated. In 1860, 1,906,000 dozen pairs of hose and half-hose were manufactured in our factories, as compared with the combined output of 62,825,000 dozen pairs in 1910. In 1870 the product was reported as 2,917,000 dozen pairs of woolen and mixed hose and half hose, and 2,600,000 dozen pairs made of cotton. In 1880 the woolen and mixed hosiery were separated (see table) but cotton hose and half-hose were still enumerated together, their total being 2,491,000 dozen pairs. In 1890, however, they too were fully classified.

The first classification of underwear also appeared in the Census of 1890, the totals at the previous Census dates having been 550,000 dozen shirts and drawers of all descriptions in 1860; 1,132,000 dozen in 1870; and 2,671,000 dozen in 1880. Combination suits are such a recent innovation that no mention of them was made till 1900.

The manufacture of cotton knit goods has advanced at a faster rate than any of the other branches of the knitting industry. The rapid increase in the output of cotton hosiery after 1880 and of cotton underwear after 1890 was due to the technical inventions introduced at those dates. Woolen knit goods, on the contrary, have declined in volume of output and their place

has been only partially filled by goods of mixed cotton and wool, called "merino."

The success of cotton knit goods and their substitution for woolen articles has resulted from the lower prices at which they are sold. Raw cotton is cheaper than raw wool, and in the United States the normal difference is enhanced by the high import duty on the latter. The cost of spinning is also greater for wool than for cotton, and the price of the yarn thereby augmented. Finally, cotton yarn lends itself with greater readiness to manipulation by rapidly moving machinery; hence the cost of knitting is less. In consequence of these advantages the cotton fabrics can be sold more cheaply, and are favored by the demand where climatic conditions are not too rigorous.

This preliminary survey prepares the way for the detailed discussion of the several aspects of the growth of the entire cotton manufacturing industry. The first of the subjects to which attention is directed is geographical distribution.

CHAPTER III

GEOGRAPHICAL DISTRIBUTION

THE cotton manufacturing industry has not expanded at the same rate since 1860 in all parts of the United States. Although New England continues to be the largest centre, its predominance has been lessened. The Middle Atlantic states are also relatively less important in this branch of manufacturing. The cotton mills of the West, moreover, are still a negligible quantity. But in the southern states there has been a great change. It is to the South, therefore, that especial attention will be directed in the following discussion of the growth of the industry in the separate sections and the localization within each.

New England

The number of establishments ¹ has steadily declined in New England, from 570 in 1860 to 308 in 1905, but the number of spindles has increased from 3,859,000 in 1860 to 13,911,000 in 1905. The latter figure indicates the flourishing condition of the industry in this section. Till 1880 the cotton manufacturing supremacy of New England was not threatened. But when mills began to spring up in the South like mushrooms, grave fears were entertained for the future of the industry in the section where it had first taken root. These fears have now almost entirely disappeared, since by readjustment and economy the New England manufacturers have given evidence of being able to keep their foothold.

Within New England the mills are still scattered, but certain localities have grown faster than others. The industry was first established in southern New England, and today a larger number of spindles are concentrated within thirty miles of Providence than are to be found in a similar area anywhere

¹ This does not include knitting mills.

else in the United States.¹ Fall River is the largest centre with New Bedford, only twenty miles distant, not far behind. Other large centres in New England are Lowell, Lawrence, Manchester, Pawtucket, and Taunton.

Statistics of the number of spindles per city are not given, but a statement of the value of the cotton goods manufactured in these New England cities conveys some idea of the local con-

	VALUE OF PRODUCT		
	1890	1900	1905
Fall River	\$24,925,000	\$29,286,000	\$32,538,000
New Bedford	8,185,000	16,748,000	22,412,000
Lowell	19,789,000	17,046,000	19,384,000
Manchester	10,957,000	11,723,000	14,366,000
Pawtucket	3,955,000	5,635,000	10,099,000
Lawrence	6,047,000	8,151,000	5,745,000
Taunton	2,748,000	4,593,000	6,141,000
New England	181,112,000	191,690,000	224,072,000

centration. The low figure for Lawrence in 1905 was not normal and that city may be given a higher rank when the statistics for 1910 are published.

The reasons for the more rapid growth of the industry in these places are the advantages which accrue from centralization in general, and the natural advantages possessed by the different localities in particular. In the early growth of the cotton manufacturing industry in New England the factor which determined the location of the mills was water-power. Fall River, Lowell, Lawrence, Manchester, Nashua, Saco, Lewiston, and other cities grew up because of the water-power which was available at those points. Although water-power is still a very important factor in the continued prosperity of several of these cities, during the last half-century steam has become more important in supplying power for cotton mills.²

¹ *U. S. Census of Manufactures*, 1905, vol. 1, p. cxxxviii.

² In 1870 water furnished 99,073 horse power and steam 46,967 horse power for cotton mills; in 1905, the former supplied 251,884 horse power, the latter, 702,023 horse power; and in addition 77,936 horse power were obtained from other sources, chiefly electricity. *U. S. Census of Manufactures*, 1905, *Bulletin* No. 74, p. 62.

The system of canals which was constructed at Lowell has been of great value to that city and shows the foresight of those who planned for its future growth, since by means of these canals the water flows through the heart of the city and is used over and over again as it passes from one mill to another. In Lawrence and Manchester canals were also constructed, from which a considerable part of the power for driving the machinery in the mills is still derived. In 1900, according to the Census,¹ water furnished 49 per cent of the power for cotton mills in Lowell, 36 per cent in Lawrence, and 50 per cent in Manchester. However, since all the water-power privileges in these centres have been appropriated, few new mills have been built there, and the growth which has taken place has been merely the enlargement of the older plants.

The more rapid growth of the industry in southern New England cannot be ascribed to water-power. Fall River and New Bedford do not rely upon that to a great extent. Nor is the reason to be found in labor conditions, since the more northern cities possessed as large and as skilled a supply of labor as Fall River and New Bedford, when the latter cities began to forge ahead. Nor is the location of machine and repair shops the reason, since Lowell is well provided for in that respect.

One reason, as Mr. Sidney Coolidge has pointed out, is the advantage which the tide-water cities gain in transportation rates. This saving, however, is not in the rates on raw cotton, since for that portion (about 40 per cent) which is shipped to the North by rail, a blanket rate is given for all New England and the railroads meet the water rates. Neither does the advantage arise in the freight on the cloth, since practically the same rate is paid from all sections of New England to New York or the West. The tide-water mills, however, are able to obtain their coal at lower rates, inasmuch as the charges from Boston to points north are relatively high. The cost of discharging coal is about the same in Fall River and New Bedford as in Boston, and in the former cities it can be sent directly to the mills without further transportation. Thus, as the use

¹ 12th *U. S. Census*, vol. vii, p. cxciv.

of steam power has become more and more common, cheaper coal has favored the cities of southern New England.

Climatic conditions have been another reason for the more rapid increase in the number of spindles in that district. New Bedford, of all the cities in New England, has progressed most rapidly in cotton manufacturing during the last thirty years. The Wamsutta Mills were built in 1845, but only a few similar establishments followed till after 1880. At the present time, however, there are more than 2,100,000 spindles in the city. In that particular locality the temperature is less variable and the atmosphere more humid than in the neighboring regions. The climate has been particularly adapted to the manufacture of fine yarn and cloth. Although the natural advantage of humidity has been partially equalized elsewhere by artificial humidifiers, the greater stability of the temperature retains its potency. These are the chief bases for New Bedford's progress, but an important supplement was the wealth which had been accumulated in the whale fisheries by New Bedford residents, and which became available for building cotton mills when the whaling industry declined. The largest mill interests in New Bedford at the present time are in the hands of families which had acquired fortunes in whale fishing. This transfer of capital to cotton manufacturing stimulated the industry and its evidences of prosperity attracted investments from other sources.

While new mills continue to be built and additions to old mills are made from time to time in all parts of New England, economies in transportation and favorable climatic conditions will very likely cause an even greater predominance of the southern section of that district. The relative position of New England as a whole, however, can best be indicated after considering the progress of the industry in the Middle States and the South.

Middle Atlantic States

Since the Civil War the number of establishments in the Middle Atlantic states has diminished from 340 to 204. But until 1900 the number of spindles increased slightly. From 1900 to 1905 there was a slight falling off. The number of spindles

reported in 1860 was 1,042,000; in 1900, 1,647,000; and in 1905, 1,548,000. Thus since 1860 the industry has been practically stationary in this section.

Cotton factories are located in Pennsylvania, New York, and Maryland, and a few are found in the other states of this group. But Philadelphia is the only point at which there is concentration. In the Philadelphia district small weaving establishments are particularly numerous; three-fourths of the mills in the United States which weave but do not spin are located in Pennsylvania, chiefly in Philadelphia, and the average number of looms per mill is only 101.¹ Textile manufacturing is a long established industry in that city and immigrant labor was probably employed there sooner than in New England. The immigrants, however, who entered the textile industries of Philadelphia, were more or less experienced in textile manufacturing and therefore could be employed in the production of more fancy fabrics. Thus we can account, at least in part, for the existence of these mills and the character of their product. The labor supply has been the chief asset, supplemented by machine-shops and market facilities. The textile industries of Philadelphia, moreover, are urban enterprises dependent on urban conditions and in that respect are more or less analogous to the clothing industries of New York.

The Middle Atlantic states are pre-eminent in the knit-goods industry. Establishments were reported in thirty-five states in 1905, but three-fifths of the total number were in the Middle Atlantic states, chiefly New York and Pennsylvania. Here are also the largest knitting factories, as a rule, although there are several large mills of this sort in Massachusetts, which ranks third among the states of the Union in knitting.

In both New York and Pennsylvania there is a localization of the knitting industry, — around Cohoes in the Mohawk Valley, and at Philadelphia. Each of these localities was a pioneer in its own field, and the advantages accruing therefrom have been a strong attraction. At Cohoes power was first

¹ *U. S. Census of Manufactures, 1905, Bulletin No. 74, p. 57.*

manager in need of operatives would hesitate to reject the whole family merely because some of the children were young. But the whole family has not always worked, to judge by the statements of Mr. Thompson.¹ He pictures a large number of idle fathers, "tin-bucket toters" he calls them, who are supported by their children. These worthy personages lounge around the village loafing places and discourse upon the capabilities of their children, much as farmers gather at a country store to argue upon the relative merits of their cattle. This abuse does not prevail to the same extent today as in former years. That it should have arisen was not unnatural. The older men could not easily adapt themselves to tending machines and fell into the habit of depending on the women and children for support. They were poor and uneducated when they came to the mills, and they did not realize that it was more unhealthy for the women and children to work in a factory than to labor in the field.

These social conditions have been discussed not only because of their bearing upon the success of the cotton manufacturing industry in this section, but also on account of the wide attention that they have attracted.² While the evils have been numerous, it is an injustice to criticise too harshly. It must be remembered that long hours and child labor were once common in New England, and the latter evil has not yet been eradicated from the mills and factories in various northern states. The southern mill operatives are, as a rule, better off than before they entered the mills. And their dwellings and modes of living do not compare unfavorably with those in the tenement districts of New England mill towns. The mills are generally well lighted, well ventilated, and some are artificially cooled in summer.

¹ H. Thompson, *From Cotton Field to Cotton Mill*, p. 115; also E. G. Murphy, *The Present South*, p. 106; and *Report of the Industrial Commission*, vol. vii, pp. 545, 566.

² The magazine articles on this subject have been numerous. The following may be mentioned as presenting the subject from different points of view:— A. J. McKelway, *Annals of American Academy*, vol. xxvii, and *Outlook*, vol. lxxxv; M. A. Bacon, *Atlantic Monthly*, vol. xcix; A. W. Page, *World's Work*, vol. xiv; H. Robbins, *Gunton's Magazine*, vol. xxiii; D. A. Willey, *Chataouquan*, vol. xxviii.

The conditions in the South are not praiseworthy; yet in the North they are often nearly as bad. The pictures of southern child operatives in the popular magazines give an unfair impression. Let a photograph be taken of a dozen children emerging from a northern print-cloth mill, glass works, or silk factory, and how much more prepossessing an appearance would they present?

The school system has been inadequate and the regulations in regard to attendance lax, yet the children have received more education than if they had remained in the mountains or on the farms. While recognizing the abuses that still exist and appreciating the opportunities for betterment, my own impression is that the conditions in many southern mills, not all, are not inferior to those in northern mill centres. The outlook for the future is brightened by a wide-spread spirit of progress. The employers are by no means heartless. They are generally quite the reverse and take an active interest in uplifting their employees. The operatives themselves are slowly adopting higher standards, and improving their condition. Whether they are to use the cotton mill as a stepping-stone, or whether, because of ignorance and lack of thrift, they are to become a permanent operative class, remains to be seen.¹

These people, with limited wants and accustomed to inexpensive living, were employed at wages lower than were paid in New England. No statistics are available which can safely be used for an exact comparison of labor cost, but it has been sufficiently below that of the northern mills to stimulate a rapid increase in the number of spindles in the South.

The following table illustrates the difference in earnings in the two sections. It gives the computed full time earnings

¹ The conditions in the United States are gradually approaching the European standard, so that it is becoming more difficult for the mill operatives and other workmen of that class to raise themselves to a higher level. Yet the absence of social restrictions and firmly fixed customs as well as the promise of further industrial expansion in this country seem to afford sufficient opportunity for these people to emerge from their position as factory employees. To the author, the progress of the operatives appears to depend chiefly on their own efforts. The falling off in the proportion of women employed (see p. 114) may be an indication that they are not to become a permanent factory class.

In the first class, where the selling house has been the leader, we include the groups of mills controlled by several of the large selling houses of Boston and New York. An example of this is the recent formation of a syndicate by Deering, Milliken & Co., commission agents, for the purchase of the Garner Print Works in the state of New York, these works to be used for converting cloth produced in southern mills controlled by the selling house. Similarly, other large selling houses control many of the mills for which they act as agents. They do not always control a converting plant, but that is unnecessary in the case of mills which finish their own cloth, and which constitute a large proportion of the concerns employing selling agents.

The best illustration of the absorption of a selling house by the mills is the purchase of the Turner Company by the Consolidated Cotton Duck Company, to which reference has already been made. There are probably other instances, which have not been made public, where control of the selling house was secured as soon as the mills were strong enough financially.

The establishment of a private selling agency is well illustrated by the concern of B. B. & R. Knight of Providence. This company has four mills in Massachusetts, and thirteen mills, a print works, and a bleachery in Rhode Island. The head office is in Providence and has combined with it a selling department. The company controls more than 500,000 spindles and 12,000 looms. The greater part of the product is sheetings, especially fine sheetings, but shirtings, twills, and other fabrics are also manufactured in smaller quantities. The Fall River Iron Works and the American Printing company are largely owned by Mr. M. C. D. Borden, and within a year the selling of the product has been taken over by M. C. D. Borden & Sons, of New York. A similar example is furnished by the Sayles interests, which control the Lorraine Manufacturing Company and a bleachery and dye-works, and have their own selling office in New York. The Cannon Mills Company, also, has established an office in New York where it sells the product of its North Carolina mills.

This movement of integration has assumed more importance within the last five years. The causes are, in general, those which have stimulated combination in all parts of the industrial world, and in particular the necessity for perfecting the merchandizing organization, the desire of the selling house to justify its existence, and the narrowing of the margin between the cost of raw material and the selling price of the cloth. The fundamental cause, the one into which practically all of the others can be resolved, is keen competition arising from the increase in the size of the establishments and the growth of the cotton manufacturing industry in the South.

The narrowing of the margin between the cost of raw materials and the selling price of the product reflects the stress of the competition. Throughout the ten year period from 1896 to 1906 the margin, although fluctuating more or less, as the accompanying chart shows, was constantly below the lowest level hitherto reached. The method used in this chart for ascertaining the margin is that adopted in Fall River as the basis for fixing the sliding wage scale. It is the difference between the cost of eight pounds of middling cotton and the average selling price of forty-five yards of 28-inch, 64 x 64 print cloth and of thirty-three and eleven one-hundredths yards of 38½-inch, 64 x 64 print cloth.¹ While open to the criticism that may be directed against any average or index, it nevertheless seems to bear out the statement frequently made by manufacturers that the margin has been unusually low during the last ten years. Its upward leap in the year 1907 was due to the great boom preceding the panic. Although the data submitted cover only the period since 1881, one may safely say, in view of the reduction of the costs of production during that time, that previously the margin was never as low. This has stimulated the introduction of economies in manufacturing and in management, and has started this movement to economize in selling, either by direct sales or through closer relation of the selling agency to the manufacturing branch.

¹ Tables of prices are given in the appendix.

positions. The overseers are recruited from this class. But the majority of the operatives do not attend the schools, and the proportion seeking such education is less than in the New England cities where textile schools are available.

German textile education is primarily for the sons of mill owners, directors, merchants, and others who can afford to devote all their time to study, and the instruction is largely confined to day courses. Although there are a few evening schools, young men of promise sometimes enter the day courses of the textile schools after having worked several years in a mill, the expenses being paid from their savings or by their employers.

The courses for the day students in Germany are generally shorter than in America or England.¹ A few specific examples will make this clear. The textile school at Reutlingen, which averages 140 to 150 students per year, has a one year course in spinning, a one year course in weaving, a two year course in designing, and other supplementary courses of one year each. The M. Gladbach institution has a spinning course and a weaving course, each of one year's duration, and a finishing course for which two years are required. The Mülhausen Spinning and Weaving Schools each offer a one year course, the number of students in both averaging sixty. In other schools the courses are from three months to two years in length.

Technical education in France bears much resemblance to that of Germany. The schools in which textile courses are given have varying standards of requirements for admission. The National Technical School at Lille, in which the courses in spinning and weaving are of three years' duration, imposes a high standard. The Municipal Spinning and Weaving School in the same city is of lower grade. The National Professional School at Armentières, which has only a weaving department, trains boys who have been apprenticed to that trade. At St. Quentin and Amiens, technical schools with textile courses are supported by the local manufacturers' associations. That at Amiens is of long standing, having been established fifty-five years. Both of these institutions, unlike the others, hold

¹ The courses in spinning and weaving at Manchester are three years each.

classes in the evening as well as in the day. But the number of students is not large; there were thirty-five evening students in weaving at Amiens in 1911. At Epinal a branch of the Industrial School is devoted to spinning and weaving, but only day sessions are held. The number of students enrolled in this school in 1910 was twenty. Except for the evening schools, we may say that the object of the various institutions is to fit the students for positions as overseers or managers.

The contribution of the Continental textile schools is not to be belittled, yet one may suspect that too much credit is occasionally given to these institutions for the part they play in the development of the industry in their respective countries. The number of students attending the day classes is comparatively small, and the number of evening students still smaller.

The New England textile schools, in addition to the advanced work of the day classes, open opportunities for instruction to the immigrants and in that way improve their efficiency as laborers, and accomplish more perhaps for the operatives themselves than for the manufacturers. The English employers, likewise, benefit from the increase in the supply of men who can take responsible positions in the mills. Yet there again, it is the social significance which attracts particular attention. The ambitious youth, although he has to work all day in the mill, may materially improve his condition, provided he has sufficient mental capacity and enough energy. The evening textile school is a valuable means of economic and social advancement. But on the Continent it is only the very exceptional boy from the operative class, who can make use of the trade school. The bulk of the operatives cannot improve their condition in that way, and social barriers are thereby kept more impregnable. In our own country the efforts of the textile schools should be heartily supported, if for no other reason than to give a better chance to those workmen who are willing to help themselves.

and from the outset many of them have been weak. The combination has practically a monopoly of mercerizing, and has an agreement with the Fine Spinners' Association whereby it does all their mercerizing work. But as with several of the other combinations, little benefit has accrued from what amounts to an increase in the scale of production.

In Great Britain, as in the United States, the amalgamations in the cotton manufacturing industry have been confined to special branches, and have not affected the ordinary spinning and weaving trade. As Macrosty has said, "It is in the derivative and not in the primary industries that we find combination attempted."¹ These English combinations were formed at about the same time as those in the American cotton manufacturing industry. With the exception of the Coats concern and the Fine Cotton Spinners' and Doublers' Association, there have been occasional reorganizations. As a rule, neither appreciable economies nor effective monopoly have been realized. This is similar to the experience of the duck and yarn combinations in the United States. The small units were fairly well managed, and in the case of the English combinations in the finishing processes it was found difficult to organize them effectively on the large scale demanded by their extent. A loose association of separate concerns secured as good results and avoided many of the difficulties. The necessity of including weak firms in a merger of these extensive trades impaired the efficiency of the combinations, and the overcapitalization is a burden which may yet prove too heavy. These experiences emphasize the difficulties which would attend any attempt at wholesale amalgamation of the spinning or weaving business in the English or American cotton manufacturing industry.

There have been sporadic instances of integration in the English cotton industry, but chiefly in connection with amalgamations. The most prominent are the Central Thread Agency of the thread combination, the inclusion of merchants in the Calico Printers' Association, and the acquisition of collieries by Coats, the Fine Cotton Spinners, and the Calico

¹ H. W. Macrosty, *op. cit.*, p. 121.

Printers. Rylands & Sons combine spinning, weaving, bleaching, dyeing, and finishing with the manufacture of clothing, corsets, oil cloth, etc., and carry on a large foreign and domestic wholesale trade. But that is a unique concern, and, taking the English industry as a whole, the movement has, up to the present time, been toward specialization rather than integration.

In the Continental countries, where a relatively smaller scale of production predominates, the associations meet all the needs of the situation. Through them the manufacturers can secure whatever harmony of action is necessary. When the units are comparatively small and widely scattered, competition does not reach the combining stage.

CHAPTER XXIV

CONCLUSIONS

THE advance of the cotton manufacturing industry in the United States, as well as in European countries, has been rapid during the last half century. The period has been one of great industrial and commercial expansion under the influence of world-wide forces. In spite of numerous years of depression, it has been a period of great prosperity. Notwithstanding high protective tariffs, it has been an era of voluminous international trade. Improvements in means of transportation and communication have fostered commerce and widened markets. Yet within each country peculiar economic conditions have been encountered, and to these the cotton manufacturing industry had to be adapted. Consequently the history of that industry is primarily a study of adaptation.

In the United States the economic conditions have been continually changing; hence the industry has been almost constantly in a state of transition. This has been manifested most clearly, perhaps, in the progress of the industry in the southern states, and the reaction upon the older manufacturing sections. But taking the country as a whole, the problem to which the manufacturers have had to devote the greatest attention has been the reduction of labor cost. Face to face with a high wage level in all industries, the owners of cotton mills have been forced to find means whereby they could employ as little labor and as cheap labor as possible, and yet assure the workmen of an income sufficiently high to induce them to accept the employment. To economize in quantity of labor the manufacturers have adopted new types of machinery and automatic devices of various sorts which necessitated the minimum of attention from the operatives. To utilize the cheapest labor, the immigrants, those mechanical appliances which required the least skill on the part of the workmen were introduced.

The relatively high cost for labor has been partially counterbalanced and the burden of the overhead expense lightened by the enlargement of the scale of production and the standardization of product. The limits to which the former can profitably be carried at the present time are indicated by the poor success of the combinations of competing firms. The integration of coördinate branches, except spinning and weaving, has as yet not progressed far.

The success of the industry as a whole has also been dependent upon the entrepreneur ability of the men who have been responsible for its direction. The influence of efficiency in plant organization and factory management is most plainly shown in the relative prosperity of the individual companies. Practically every type of machine that has been invented is available to each manufacturer, since the acceptance of new inventions depends upon the appreciation of the benefits to be derived therefrom. But systems of organization are less tangible, more personal, and therefore more heterogeneous. Although no less fundamental than proper technical equipment, particularly in large scale enterprises, first class managing ability is less easily obtained.

The cotton goods manufactured in the United States up to the present time have been destined principally for the domestic market. That market has been constantly expanding, yet it has been fairly homogeneous. The methods of selling have been adjusted to the amount of financial assistance needed by the manufacturers, the length of credit required by the customers, and the difficulties in securing the orders for the cloth. As the market has become more diversified, a new middleman, the merchant-converter, who assumes the risk in the selection of finish and design, has arisen. The export trade, in the meanwhile, has not received consistent attention and the special arrangements necessary for carrying on such business have not been fully developed.

The growth of the export trade depends upon the power of the American industry to meet its European competitors in neutral markets. The American manufacturers are not espe-

