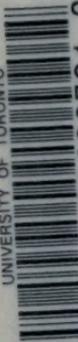


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The silk industry of
the world at the opening
of the twentieth century

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The Silk Industry of the World
At the Opening of the XXth
Century



By FRANKLIN ALLEN, C. P. A.

1904



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*The Silk Industry of the World at the
Opening of the Twentieth Century*

By

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INTRODUCTION.

In this pamphlet it is not deemed necessary to describe what raw silk is, or how it is grown, or what the processes of sericulture and the silk worm are. Numerous publications, both in this country and abroad, give this information very fully, and it seems superfluous to reproduce it. The aim here is to trace the development of the silk industry in the principal countries which manufacture silk fabrics, to describe the processes of manufacture, and to indicate the causes and present conditions of its progress and equipment at the beginning of the Twentieth Century. Notwithstanding the antiquity of the silk industry, and the important relation that the principal countries of the world have borne to it from time to time, it is plainly evident that the silk industry of to-day is a modern achievement.

The major portion of the pamphlet was originally prepared by the writer as an article for the "Encyclopedia Americana," an entirely new work from the Twentieth Century point of view, now being published in 16 volumes by the Scientific American Compiling Department. It is now reprinted by the Silk Association of America for distribution among its members, with "copyright" permission of the publishers of the "Encyclopedia Americana."

SILK EXCHANGE BUILDING,
Broadway and Broome Street, New York.
September, 1904.

INDEX.

	PAGE
Silk the queen of all the fibres	5
Sericulture in America	6
End of the sericulture bubble	11
Sewing Silks and Small Wares	12
1860	13
Power Loom Weaving, and the changes wrought by it	15
Centennial Exhibition, 1876	16
The Tariffs of the United States	17
Modern Silk Machinery and Raw Silk Supply	19
The Making of Silk—Past and Present Methods	20
Jacquard	20
A silk mill in the XXth Century	21
Foundation Weaves	23
Loom and Harness	24
Change of Weave	24
Velvets	25
The Result	25
Throwing Plants	26
Broad Weaves: Power-looms and hand-looms	27
Weaving Ribbons	29
The End of the Century	29
Statistics, Power Looms and Hand Looms in the U. S., 1875-1900	31
New York's Silk District	31
The Silk Industry in Europe and Asia	39
Table A. Power Looms and Hand Looms in Europe, 1870-1900	41
France	42
Fashion's Supremacy	44
Germany	46
Switzerland	48
Italy	51
Great Britain	53
Austria-Hungary	57
Russia, Spain, Portugal, Belgium, Sweden, Turkey, India	58
China	58
Japan	59
Other Countries in Europe, Asia, Africa and America, compilation by M. J. M. Piotet, of Lyons, France, Reporter of the International Silk Jury at the Paris Exposition, 1900	62
World's Production and Consumption of Raw Silk, 1902, compilation by Messrs. Chabrières, Morel & Co., Lyons, France	62

THE SILK INDUSTRY OF THE WORLD AT THE OPENING OF THE TWEN- TIETH CENTURY.

SILK is the queen of all the fibres, and conquered the world long ages ago. The silk-maker's art originated in China 3400 years before the Christian era. In 2650 B. C., Si-ling-Chi, Empress of China, invented silk tissues, which contributed so immensely to the prosperity of her country that she was placed among the Chinese divinities under the name of *Sien-Thsan*. This name means *the first promoter of silk industry*. Thence the art traveled to India and Japan, and finally to Europe in 552 A. D. Wherever introduced its development has been slow. The Moors imported sericulture into Spain about 910. Greece and Italy undertook sericulture in the twelfth century. Roman Emperors weighed it in the balance with the precious metals. Silk culture was next undertaken in Spain and then in France. "And silk became so common," says Mezerin in his chronicles, "that in the year 1347 as many as a thousand citizens of Genoa appeared clothed in silk in a public procession." In England silk was scarce, even as late as the reign of Elizabeth. The story is related that Henry IV. of France had indulged the fancy to stock the grounds of the Tuileries with mulberry trees: in 1600 he procured silk worm eggs from Italy, and this patriotic King took other measures to encourage the nascent industry. James I. of England, hearing the news across the Channel, set to work in 1608 to imitate him at the royal domain of Oatlands. Then the thought occurred to some of the more progressive and independent nobles of the English Court that the time had arrived to have done with importing luxuries from the Continent. There were the fair and promising possessions in America which should be made to yield the mother country silk at least. A half century previous, in 1552, Cortes had experimented with partial success in the same product among the Aztecs in Mexico. The time seemed propitious now to reap great profit from such an undertaking. The Earl of Southampton was among those who showed the most interest in the project. In a man-

date to this earl, who was treasurer and counsel to the Company of Virginia, James wrote: "Right trusty and well-beloved, we greet you. Whereas we understand that the soil in Virginia naturally yieldeth store of excellent mulberry trees, we have taken into our Princely consideration the great benefit that may grow to the Adventurers and Planters by the breeds of silk-worms and setting up of silk works in those parts. And therefore of our gracious inclination to a design of so much honor and advantage to the public we have thought good, as at sundry other times, so now more particularly to recommend it to your special care, hereby charging and requiring you to take speedy order that our people there use all possible diligence in breeding silk-worms and erecting silk works, and that they rather bestow their travell in compassing this rich and solid commodity than in that of tobacco, which, besides much necessary expense, brings with it many disorders and inconveniences."

This was the beginning of sericulture and the silk industry in the United States.

It was from Italy that those skilled in the making of silk carried the industry into France. But at the end of the seventeenth century, after the revocation of the Edict of Nantes (1685), the workers in silk fled in crowds from France and tried silk manufacture, with more or less success, in Switzerland, Germany, Austria, and England. The French Revolution also influenced the migration of silk weavers from France to other lands. Those two events were chief causes in the distribution of the industry in Europe. What other among the textile industries can group such an array of picturesque and romantic incidents in tracing a rise from the obscure?

SERICULTURE IN AMERICA.

To return to America. Shipwreck overtook the expedition sent out from England by the Virginia Company under Sir George Summers. A fleet of seven ships disappeared. It was with these emigrants that the seed of the mulberry tree and the silk-worms from the King's domain were intrusted for the new colony, named in his honor, at Jamestown in Virginia. A part of the voyagers eventually reached their destination, but the seed and the worms had been lost. Not till four years later was the actual beginning in silk culture made. In London, in the meanwhile, the merchants and the noblemen who had advanced money on the future products of the Virginia plantations were not satisfied with the results. Nothing substantial was forthcoming. Even the profits on the tobacco crop were small. There were seven thousand shops in London that sold the weed, it was stated, in the

time of James. These he desired to abolish, and he issued a decree against the importation of tobacco. Then word was passed over the sea that the colonists were suffering disaster. Fever, famine, and the Indians had reduced their number. Something like panic ensued among the faraway stockholders in the Company of Virginia. In 1619 they got the sanction of the King and the exclusive privilege of taking negroes from Africa into slavery in the Colonies. They also turned their attention for awhile almost exclusively to silk. The most valuable authority for these statements is the copy of the Virginia Company's affairs, April, 1619, in the Library of Congress. In 1622 peremptory and urgent directions were forwarded to encourage silk-culture. In 1629, a charter of incorporation was granted to the silk throwsters of London. Aid was promised by the Crown to colonists who entered heartily into the work, and punishments were ordered for those who neglected it. New supplies of silk-worm eggs were taken to Jamestown from England by John Bonoell, an instructor in silk culture, along with this order direct from the King. The Colonial legislature, accepting the royal hint, passed an act requiring ten mulberry trees to be planted on every hundred acres. The fine for neglect to do this was twenty pounds of tobacco. The same act included a premium of fifty pounds of tobacco for every pound of reeled silk produced.

But the most strenuous effort amounted to little. The King and the Company of Virginia had a falling out; and the latter was bereft of all rights and powers. Another King came to the English throne. In 1666, all acts giving bounties for silk or requiring mulberry trees to be planted in Virginia were repealed. An interlude occurred in silk-culture until the last years of the century when several French Huguenots settled in South Carolina. These were skilled workmen and they were in earnest in their endeavor to cultivate silk in profitable quantities. Contemporary with them was an energetic Englishman, Sir Nicholas Johnson, who formed a colony in the same province which was known for more than a century by the name of Silk Hope. The demand for raw silk in England soon increased by reason of the establishment of a silk-throwing mill at Derby, in 1719, by Sir Thomas Lombe. During the first thirty-five years of the eighteenth century the silk industry was also introduced into Louisiana and Georgia.

But, notwithstanding the efforts of essayists and the premiums and bounties offered by colonial assemblies and by the English Parliament, the planters could not be stirred to much activity in raising silk. Silk culture by the colonists would evidently have been a good thing for British manufacturers, but the record of history is that it had a fitful,

uncertain existence. From 1750 to 1772, the period of its greatest activity before the Revolution, the export of raw silk averaged only 500 pounds per annum and rarely exceeded 1,000 pounds in a single year.

For many years after the War of the Revolution premiums and bounties for planting mulberry trees and for producing raw silk were authorized by a number of states. In New England, New York, New Jersey, and Pennsylvania, especially, great interest was taken in the subject. Dr. Ezra Stiles, president of Yale College, at New Haven, Conn., and Dr. Benjamin Franklin, of Philadelphia, were among the most notable promoters of the movement. In December, 1825, the subject of silk culture began to receive national attention, being brought before Congress by a resolution of inquiry introduced by Mr. Miner, of Pennsylvania, and referred to the Committee on Agriculture. This committee reported favorably in the spring of 1826, the report including a resolution directing the Secretary of the Treasury to cause to be prepared a well-digested manual on the growth and manufacture of silk. Inquiries for information on the subject were sent out by the Secretary, Mr. Richard Rush, in 1826; and from the replies and other material a manual was compiled entitled "Letter from the Secretary of the Treasury," dated February 7, 1828. Six thousand copies were printed by order of Congress. This document became known as the "Rush Letter;" it contains 220 pages, besides illustrations of machinery, and is a carefully executed work.

This favorable action and the publication by Congress at the same session, and at many subsequent sessions, of other documents relating to silk culture, together with the serious consideration of the subject by the Congressional Committee on Manufactures, as well as by the Committee on Agriculture, enlisted general attention. Sericulture gained the public ear. Legislatures of several states passed bills for its encouragement, and a most determined effort was made to place silk growing on a paying basis. For ten years all went well. Silk conventions were held in Maryland, New Jersey, New York, and Connecticut, between December, 1838, and April, 1839, and there were many other gatherings devoted to the cause.

Prominent among those in New England who spent much time and money at this period in the effort to develop sericulture in the United States were the Cheney Brothers, of South Manchester, Connecticut.

At the beginning of 1838, Ward Cheney, with his brothers Ralph and Frank, built a mill for silk manufacture on the home farm. It was a small, primitive establishment. In the January number, 1838, of a

monthly, "The Silk Culturist and Farmers' Manual," published at Hartford by F. G. Comstock, there was a leading item of news which stated the fact. "A joint-stock corporation," the paragraph read under a caption head, "according to the provisions of an act passed at the last session of the Legislature, has been formed at Manchester, with a capital of \$50,000. The name assumed by the association is the Mount Nebo Silk Mills; and their object is the manufacture of silk and cotton goods generally and goods of which silk forms the component part. The officers of the corporation are Ralph Cheney, president, and Ward Cheney, Edward H. Arnold, and Frank Cheney, directors." These partners, however, had scarcely got the Mount Nebo Mill in working order before they changed their minds in regard to operating it. The suspicion suddenly seemed to dawn on them that they were going ahead too fast, that the best thing to do was to cultivate the mulberry tree and let those who would manufacture silk. They closed the mill without much parley and immediately scanned the horizon for some place where the *Morus multicaulis* speculation could be begun on a large scale. This act has been recorded as a special illustration of the strange delusion prevalent while the mulberry tree mania continued. The actual making of silk took quite a secondary consideration in comparison with the multiplying of the trees on which the worms might be nourished. But the Cheney brothers at this period, it should be considered, were young. Ward Cheney was barely twenty-five years of age. They were getting experience.

In the survey of the universe the place which seemed to offer the best inducement to these young men appeared to be Burlington, New Jersey, and thence they journeyed from South Manchester. Trees were imported from France and set out in many rows on land taken there. In July, 1838, they sent out the statement, under the designation "A Sight Worth Seeing," that there was already growing on their silk plantation, in one field of six acres, over 100,000 of the *Morus multicaulis*. Many of these trees were four feet in height; their foliage nearly covered the whole grounds and a more charming sight, it was believed, could scarcely be imagined. From the best information that they could obtain it was concluded that there was not so large a number of large trees growing in one field in any other place in the United States. During this month of July, also, the brothers brought out the first number of "The Silk-Grower," a monthly that immediately took rank, attaining a circulation of ten thousand copies, as among the best devoted to the interests of those investing in *Morus multicaulis* and

silk-worms. Charles Cheney, another brother, located at Mount Healthy, Ohio, was not too far away to be a partner in this undertaking. The artist-brother, Seth, likewise joined the staff. The monthly was a quarto of twenty-four pages, published by C. Alexander, Athenian Buildings, Franklin Place, Philadelphia, terms one dollar a year in advance. It was this publication, together with two or three others of its class, that illuminates the years during which they appeared. The salutatory, for instance, recounts, among other statements, that large sums of money have been made by the cultivation of "our favorite tree." It had proved an exceedingly lucrative employment to those engaged in it. "But we would advise," says the editor, "that more than this should be aimed at by those who intend to embark in this new and, we think, important enterprise, viz.: To make money by growing silk. This can be done, and our country becomes one of the greatest silk-producing regions on the globe, should our people but will to have it so. No competition in our business need be feared for a number of years to come, if ever. The bounty offered on silk by the State of New Jersey will pay all the expense of making it and leave the whole of the crop a clear profit. The bounty granted by Pennsylvania will do even more. Then why not advance in this great enterprise? Why remain idle when such weighty considerations invite to action? It is one of the most pleasant employments that ever was conducted under the sun. The lame, the halt, the widow, and the orphan can perform the labor. Then why not permit them to do so and pay them a part of the \$20,000,000 which is annually sent abroad in exchange for silks and to feed foreign mouths and enrich foreign aristocrats? This would afford thousands of the poor and feeble among us the means of comfort and independence."

The prospect now looked bright from every point of view. The making of a fortune was believed to be a matter of only a few years. The issue of the monthly for August contained the following: "We are glad to learn that the inhabitants of the western part of New York are engaged in the silk culture. We have received orders for trees amounting in all to 25,000, to be delivered in October next. The prices agreed on were somewhat higher than those of last year, yet entirely satisfactory to the purchasers. The sales of the mulberry have already begun with a briskness that evinces the great interest the public takes in the enterprise." There seemed to be so much promise of a good financial return in this undertaking that one of the brothers was despatched as far South as Augusta, Georgia, to take advantage of a warmer climate to start a second nursery of these trees. The end of these fond

hopes loomed in sight in less than a year. The Cheney brothers lost all they had invested and journeyed back to the homestead at South Manchester. The Mount Nebo Mill stood there silent and forsaken; and the thought occurred to the brothers that it was wise to begin now where they had left off less than two years in the past. Seth, who was now in France, sent them over some raw silk; and with the assistance of six young girls they set to work to make sewing-silk, using about ten pounds of the raw silk in a week.

END OF THE SERICULTURE BUBBLE.

The sericulture bubble in the United States burst in 1844. Notwithstanding the favorable climatic conditions both in France and the United States for the growth of mulberry trees and the rearing of silkworms and cocoons, silk culture has dwindled in both countries, because more remunerative occupations are afforded by other lines of industry. Although in France the raisers of cocoons and reelers of silk are protected by a considerable bounty, payable by the French government to her citizens as against the Italians, that country produces today less than four per cent of the world's supply of raw silk. Her silk manufacturers are well content to purchase, as America does, the raw silk from Italy, Japan, and China, in all of which countries the ruling rates of wages are much less than in France and very much less than in the United States. Both France and the United States pursue the same fiscal policy of admitting raw silk free of duty and therefore both are on a par in this respect. Under this policy France produces only a small portion of the raw silk needed for its silk manufacturers, while in the United States silk culture, which was introduced simultaneously to its stimulation in France three hundred years ago, has practically ceased to exist, although since 1844 sporadic attempts to revive it have been made in California and Kansas and more recently in Georgia.

From first to last the results of fully one hundred and fifty years were required to demonstrate in the South that the culture of silk could not be made there a paying occupation. As a pursuit it never crowded out the cultivation of the tobacco plant; and when cotton was introduced as an agricultural staple, the effort to maintain the silk product was relinquished without a struggle. The real reason of the failure was always plain. The cost of producing reeled silk has ever remained less in Italy and the Orient than elsewhere. The unpaid labor of the negro slave and the untutored Indian, it was believed, would contribute to the reduction of that competition. It never did, however. Neither the African nor the savage took kindly to reeling the cocoon, and the

skilled hand of the white had to be employed. That hand in this country cannot be employed for a few cents a day. Without doubt the white mulberry tree will grow and flourish in great abundance in California soil. Silk-worms can be raised there apparently without limit. But when the time arrives in California or in the South to harvest the cocoons the same old difficulty comes to pass that was encountered by the people who believed that the slaves brought from Africa, together with the native Indians, would reel the cocoons without cost.

To the practical person of experience in silk culture and silk manufacture, it has seemed evident enough the last forty years that the effort to establish sericulture in any part of the United States is misdirected. It has been the testimony of all engaged in the industry and acquainted with facts that sericulture in the United States offers no pecuniary inducement.

During the period of protection afforded to sericulture in the United States by the National Government, in addition to the bounties voted by many States, revenue duties were imposed on foreign raw silk, as follows:

- 1816 to 1831, 15 per cent ad valorem.
- 1831 to 1841, 12½ per cent ad valorem.
- 1842 to 1846, 50 cents per pound.
- 1846 to 1856, 15 per cent ad valorem.

After 1857 raw silk was free of duty, although ten per cent duty had to be paid till 1865 on any Asiatic silk which was reshipped from Europe to the United States, because coming from countries beyond the Cape of Good Hope. The foreign invoice value of this "reshipped Asiatic" during the years 1858-65 amounted to \$1,174,624. The amount of duty paid between 1843 and 1857 exceeded \$1,000,000. In that year all duties on raw silk were removed. "This was one of the few alterations of the tariff," remarks a thoughtful commentator, Mr. W. C. Wyckoff, special agent for the tenth census of the United States, "which did little harm to anybody at the time, which has done good ever since, and which has not been disturbed by our legislators."

SEWING SILKS AND SMALL WARES.

The making of sewing-silk had become a household industry in New England, at first by hand and later by machinery. The manufacture of silk trimmings of various kinds was commenced in 1815 at Philadelphia, and ribbons in 1829 at Baltimore. In 1838 Mr. Wm. H. Horstman, in Philadelphia, had power looms made from his own designs;

and he introduced in this country power-loom weaving for narrow textile fabrics and small wares simultaneously with the first power-loom in Basel, Switzerland. A successful competition was established with nearly all articles of passementeries of French manufacture. Gold laces were made by power by Mr. Horstman several years prior to the first attempt in Europe. At Baltimore, in 1840, there was a factory using 15 or 20 Jacquard looms in making silk and worsted vestings. But these were the days of relatively small things. Some raw silk was imported to supply these establishments. The importation of raw silk in 1830 from Great Britain amounted to \$17,985; from France, \$3,240; Italy, \$8,153; China, \$89,696; total value, \$119,074. In 1837 the total value of the importation had risen to \$211,694; in 1840 to \$234,235.

The United States Census compilation for the year 1840 gives the production of raw silk for the previous year in the United States at 61,552 pounds, valued at \$250,000. The capital employed in silk manufacture is stated as \$274,374. Probably the consumption of raw silk, both domestic and foreign, during any one year in the period under consideration, did not exceed a value of \$300,000, and the goods made may have been worth \$600,000, or even more, since the sewing-silk made in Massachusetts in 1837 was valued at \$150,000.

The following are summaries of the United States Census returns of the American silk industry in 1850 and 1860:

	1850.	1860.
Number of manufacturing establishments.....	67	139
Amount of capital employed.....	\$678,300	\$2,026,980
Number of operatives, male.....	503	1,585
female.....	1,220	3,850
Total operatives	1,723	5,435
Amount of wages paid.....	\$297,416	\$1,050,224
Value of products, sewing silk.....	\$1,209,426	\$6,607,771
silk cloth.....	17,050	
fringes, gimps and tassels.....	583,000	
Pounds of raw silk consumed.....	(Not reported)	462,965

1860. Three events that occurred about the year 1860 were destined to exert a marked influence on the silk industry of the world. Two of these events may be classed as political and one as industrial, but all and each greatly influenced industrial-commercial consequences which flowed therefrom.

England decreed free trade by the Cobden treaties of 1860, whereby the silk duties of fifteen per cent were abolished, and thereafter in Great Britain all silk goods have been entered free of duty. In the same year at Adlisweil in Switzerland, the first large silk mill to operate power-loom weaving on the factory system was established in Europe

by the Schwarzenbachs. It started with several hundred power-looms, all operated by water power.

In the United States, when the Civil War began in 1861, it was essential of course to provide money for the National Government. At this time the duty on silk goods imported was twenty-four per cent ad valorem. Among the new duties that were imposed on imports for revenue only was thirty per cent, on March 2, 1861, and then forty per cent, August 5, 1861, on manufactured silk. During a short time before and after the outbreak of hostilities business of almost every sort was paralyzed; the imports of raw silk and of silk goods alike fell off materially. The following statistics of imports indicate the trade movements of the period:

Years.	Pounds of Raw Silk Imported, in the United States.	Foreign Invoice Value of Silk Goods Imported.
1858.....	422,658	\$21,229,538
1859.....	388,597	28,080,366
1860.....	297,877	32,961,120
1861.....	361,891	23,657,269
1862.....	132,460	7,588,376
1863.....	250,740	12,890,760
1864.....	407,935	20,597,723
1865.....	290,021	8,439,145
1866.....	567,904	28,508 696

It was apparent, however, that the war duty had given impulse to the silk industry both at Paterson, New Jersey, under the leadership of the Ryles, the Tilts and of Mr. C. Lambert, all of whom were English born, and at South Manchester, Conn., by the Cheney Brothers. The Cheney had, in 1855, begun experiments to introduce in the United States the manufacture of spun silk* yarns and fabrics woven therefrom. Many of the experiments met partial or complete failure at first, but were again and again renewed until the difficulties were overcome.

When the tariff was again advanced, on June 30, 1864, and this time not only for revenue but for protection, to sixty per cent, there was an immediate show of activity among those engaged in silk importing to consider the possibilities of manufacturing at home. They saw the commercial advantage of supplying their deficiencies in supplies of imported goods by more rapid manufacturing at the domestic centres of the industry. They installed power-loom weaving in

*Spun silk is the name given to that made from the pierced cocoon. Raw silk is as reeled from the cocoon. All other is waste silk. Spun silk is made from waste silk. In working spun silk there is no effort made to use the continuous thread as spun from the silk-worm within the cocoon; but the cocoon is treated as a bundle of fibres and spun the same as wool or cotton by special textile machinery, adapted to the characteristics of the particular fibre.

their mills which at first were small in size, but rapidly grew larger. Thus it was that the manufacture of ribbons and broad goods was largely influenced at the outset by the importers themselves. Likewise those already engaged in the effort to satisfactorily weave silk fabrics here received a fresh stimulus. They had had a long up-hill struggle, owing largely to lack of a sufficient number of skilled silk weavers in the country. Lack of sufficient capital also greatly hindered its development.

POWER LOOM WEAVING.

Prior to this period the European production was for the most part on hand looms. The aim became at once to overcome the advantage of cheap labor there by power-looms here; and a considerable development of the silk business by power-looms was made within a few years after the passage of the high tariff bill. A prejudice was encountered at first, however, in favor of the foreign make of goods. Mr. William Strange, of Paterson, who erected there a large ribbon plant in 1868, and whose father and uncle had been large importers of ribbons for many years at New York, met this prejudice by boldly stating: "We manufacture the same goods from the same material, by the same workmen and on better looms."

The demand for skilled labor was constantly attracting a large immigration from the silk manufacturing centres of the continent and from Great Britain. The effect of this impulse given by power-loom weaving of silk goods in the United States was marked. It soon came to be admitted in the New York market that domestic ribbons were quite as good in manufacture and pattern as the imported. That concession steadily increased among buyers, and in time it applied to all the products of the American silk mills. The protective duty did not affect merely the weaving machinery alone, but it touched every branch of the silk manufacturing industry. This protective tariff, allied with Paterson's abundant water power, its proximity to New York (17 miles) and good facilities for transportation, resulted in the making of Paterson. Locomotive works, iron works and rolling mills, cotton and woolen mills, linen thread mills must be scheduled in any list of the manufactories that city possesses; but the leading and most noted feature of its industries is its many silk mills, and the multiplied prosperity of these has been the direct result of the tariff bill of 1864.

For the year 1870 the United States Census returns showed that the value of manufactured silk in Paterson amounted to \$4,263,260. The population counted 33,579, of whom 12,868 were of foreign birth. These included 5,124 natives of Ireland, 3,347 English, 1,429 Germans,

and 1,360 from Holland. There were also French weavers from Lyons, Italians and Swiss. It was beginning to be demonstrated that the silk-makers' art, transplanted from Europe, had a fair prospect of becoming domesticated in the United States.

In 1872 (June 26) the Silk Association of America was organized in New York as the outcome of a call issued on June 12 by the Silk Industry Association of Paterson. The Hon. John Ryle, of Paterson, formerly an English weaver, and later mayor of the city, was elected its first president. The proclaimed object of those who thus associated themselves was co-operation in all measures that in any way affected the common interest of silk making in the United States.

CENTENNIAL EXPOSITION OF 1876.

The American silk exhibit at the Centennial Exhibition, held at Philadelphia during six months of the year 1876, attracted great attention day after day, and excited much surprise by the variety and excellence of fancy silks, ribbons, handkerchiefs and scarfs displayed and woven on the spot. The discovery was made by the newspapers and general public that silk fabrics made in the United States met many wants of the consumer.

Among the foreign observers, one wrote to the "Courier" in Macclesfield, the headquarters of the English silk manufacture, that, in his opinion, the English silk manufacturers had acted wisely in not exhibiting their goods in competition, as they would have exposed their inferiority in quality and price. "I noticed at the Exhibition," the writer continued, "that our neighbor at Leek had had the courage to send exhibits of sewing silks, but anyone comparing them with the cases of the Nonotuck or Corticelli Silk Company, Belding Brothers, or Brainerd, Armstrong & Co., would not fail to notice their inferiority, in lustre and finish. In silk piece goods and dresses, I was quite astonished at the magnificent goods shown by Cheney Brothers, Dexter, Lambert & Co., Hamil & Booth, and William Strange & Co., of Paterson; and that there is no inferiority in machinery or dyeing is testified by the beautiful silk-throwing machinery of the Danforth Machine Company and the finely arranged cases of Weidmann & Greppo, dyers of Paterson." In an appreciative article on the Exhibition, published in the "Revue des Deux Mondes," Jules Simonin pointed out the silk industry of America as among the successes with which France would be driven to a closer competition. || The Swiss Commissioner-General to the Exhibition called attention, in his official report, to the progress

of Americans in silk manufacture and warned his countrymen to be prepared for vigorous rivalry.

The Centennial Exposition at Philadelphia gave a considerable impulse to the domestic production of "fancies" and jacquard weaves. Mr. Albert Tilt had prophetically said in a report on "Fancies, Scarfs, Handkerchiefs and Tie Silks" to the Silk Association of America in May, 1875: "Surely the destiny of American silk manufacturers rests in their own hands."

In 1876 the production of the American silk mills was:

Silk dress goods	\$ 1,350,535
Millinery and tie silks.....	1,799,112
Silk handkerchiefs	927,000
Foulards	472,000
Ribbons	4,526,556
Laces	244,500
Sewings and twist.....	7,252,519
Ladies' dress trimmings, etc.....	4,278,830
Braids and bindings	315,000
	<hr/>
	\$21,166,052

Pounds of reel silk consumed, 1,144,860 (raw silk averaged \$9.10 per pound).
Pounds of spun silk consumed, 140,000.

THE TARIFFS OF THE

At the opening of the nineteenth century the United States was practically a newly organized force in the development of the philosophic ideals of government up to that time, and for some time afterwards the country was in a formative period. In industrial affairs, the thirteen states which formed the original Union were a law unto themselves, and independently represented the views of the various communities thus associated for national independence and national defense. True it is, that the first tariff act introduced for the consideration of the National Congress of the United States by Alexander Hamilton, in 1789, then Secretary of the Treasury under President George Washington, declared as follows in its first section: "Whereas, it is necessary for the support of Government, for the discharge of the debts of the United States, and the encouragement and protection of manufactures, that duties be laid on goods, wares and merchandise imported," etc. At that time the United States represented rather an aspiration than a force in commercial and industrial affairs. As regards silk, it had a legacy and a memory of over two centuries of effort in several of its colonies, where sericulture had sought to be established through the favor of the Imperial Government of England, and by bounties of the local governments organized on this side of the Atlantic.

The widespread interest in sericulture laid the foundation for the later successes achieved in silk manufacturing. The war tariffs of the Civil War, 1861-64, gave a great impulse to all kinds of manufacturing in the United States, and quite naturally the domestic silk industry was benefited. The demand for skilled labor attracted a considerable immigration from the manufacturing centres of Europe. The quality of the domestic silk fabrics put on the market were gradually improved. Economies in processes were introduced. Following the commercial and industrial depression which existed in the United States from 1873 to 1878, growing out of the commercial panic of 1873, all textile industries were much vexed by tariff agitations, tariff commissions, and proposed changes of schedules and rates of duty. In 1881, the tendency of fashion veered from brocades and jacquard weaves to grosgrain, both in broad goods and ribbons. Finally, on July 1, 1883, the general rate of duty on silk goods was reduced from sixty to fifty per cent. That year the foreign invoice value of silk manufactures entered at the port of New York amounted to \$32,305,236, and for the entire United States, \$33,307,112. The value of the domestic product amounted to \$40,659,640. From 1893 to 1897 there was a space of four years of stress and struggle to the textile industries of the United States, a time when the weak were forced to the wall and the strongest in staying capacity found endurance difficult. Those were years when the law-makers juggled with the tariff and no man could prophesy just what legislation in that regard might happen next. But during the year last named the Dingley Tariff Bill fixed a specific duty averaging fifty per cent on all silk manufactures from abroad, which immediately removed many of the disadvantages endured by the domestic industry since 1883. In 1900 the industry attained to third place in any consideration of textile manufactures in the United States, and to second place among the silk manufacturing countries of the world. It produced in that year:

67,636,883 yards of broad silks, plain, fancies, jacquards and piece dyed...	\$52,152,816	value
8,970,933 yards of velvets and plushes.....	4,959,971	"
1,333,119 yards of upholstery and tapestry stuffs.....	1,009,835	"
Ribbons to the value of.....	18,467,179	"
1,465,575 pounds of machine twist, sewing, embroidery and wash silks....	9,274,800	"
Gloves, laces, veilings, trimmings and sundries.....	6,586,611	"
	<hr/>	
	\$92,451,212	

Number of pounds of raw silk consumed.....	9,760,770
Number of pounds of spun silk consumed.....	1,774,120
Number of pounds of waste silk consumed.....	1,687,193
Number of pounds of cotton yarns consumed.....	6,444,201
Number of pounds of mercerized cotton yarns consumed.....	219,861
Number of pounds of wool yarns consumed.....	239,461
Number of pounds of mohair and other yarns consumed.....	219,254

**MODERN SILK
MACHINERY
AND RAW SILK
SUPPLY.**

In the past fifteen years power-loom weaving has revolutionized most of the processes of silk manufacturing. The changes wrought have brought silk fabrics within the reach of a small purse, and thereby greatly increased the demand on the raw silk producing countries. Changing conditions in the industrial world, which have introduced a vastly greater variety of silk fabrics mixed with cotton and wool fibres, have also added to the demand. The annual raw silk supply of the world has increased $2\frac{1}{2}$ times since 1870; has doubled since 1875; since 1890 it has increased sixty per cent; since 1895 twenty per cent. No limit can be placed upon the capacity of Japan and China to produce raw silk provided the demand continues steadily. By close attention to the commercial requirements of her customers in raw silk Japan has very greatly increased her output and export. Her annual shipments of raw silk are now more than ten-fold greater than they were in 1870. At that time she shipped abroad 1,000,000 pounds. In her last silk season she has exported more than ten million pounds, and the United States alone took two-thirds of it. For the past eight years the American silk manufacturers have received and consumed sixty per cent of Japan's export of raw silk.

From China, the increase is much less marked. In 1870 China exported less than six million pounds of raw silk. In 1899-1900 season, China reached her highest figures of export, viz.: fifteen million pounds, or an increase of 150 per cent in the thirty years. The best authorities estimate that China now produces annually the equivalent of 250,000 picul bales of raw silk, 55 per cent representing domestic consumption and 45 per cent export. Japan produces the equivalent of 120,000 picul bales, 40 per cent representing domestic consumption and 60 per cent export. Italy produces the equivalent of 75,000 picul bales, 20 per cent representing domestic consumption and 80 per cent export. To represent one million kilograms of raw silk reeled in Italy from imported cocoons in 1902-1903 season, we must add the equivalent of 15,000 picul bales to the usual output of Italian raw silk in ordinary years. The supply of raw silk to the silk mills of the United States at the present time is approximately as follows in ordinary seasons:

From Japan	50 per cent.
From China	25 per cent.
From Italy	25 per cent.

Silk is a unique thing because its raw material is produced by the cheapest labor in the world, while its finished product is among the most costly of merchandise.

**MAKING SILK.
PAST AND
PRESENT
METHODS.**

A silk mill of the present day would very likely prove a curious and interesting establishment to the pioneers of the industry. As for those first experimenters in the making of the fabric, who crossed from Italy into France during the latter part of the thirteenth century and labored long for crude results, present methods might suggest even the magic of the magician. It was under the patronage of Louis XI. of France that Guillaume Brissonet established at Lyons a small factory for the making of silk textile mixed with silver and gold; but nearly a century and a half vanished before any progress in the manufacture was sufficiently pronounced to be recorded. The first looms for "fashioned silk"—figured tissue—were set up in 1605 by Claude Dagon. His loom caused a complete change in the way of manufacture. Following that chronicle comes a brief account about Octavio Mey, a merchant of Lyons, who, one day in the year 1663, put a small bunch of silk threads into his mouth and chewed them. When he took them out he saw that the silk had a lustre. That observation led to the method of giving artificial gloss to the woven cloth. After eighty-one years more had passed, in 1744, an inventive workman, named Vaucanson, tried to convince his associates that the manual labor given to the loom could be reduced. They destroyed his loom and beat him. Then, as the legend is set down, he invented a machine, for spite, by which a donkey wove a whole piece of silk without the aid of man. But nothing additional has been related of Vaucanson or his work.

JACQUARD.

Not again till 1804, when Joseph Marie Jacquard emerged from obscurity and appeared before Napoleon as the man persecuted by his fellow workmen in Lyons, who had invented a contrivance for tying a knot in a taut string, did the progress of silk manufacture become notably evident. Napoleon appreciated the exceptional ingenuity of Jacquard and placed him in charge of the machinery of the Conservatoire des Arts et Metiers. It is a pleasing story among many told of Napoleon, and it has been repeated many times. Before the arrival of Jacquard, figured silk weaving was a complicated labor. It had been going on with an infinite display of patience and pains a couple of centuries. Every loom required the attention of at least two workmen; and there was a great deal of mounting and dismounting, screwing and unscrewing, whenever it was necessary to fix or unfix the silk on the frames. The weaving was tedious. Jacquard's loom needed only one man. The handling of the mechanism was sufficiently simplified to make his work

easy. It was an appendage to the old loom, or an ordinary loom with a modified harness consisting of a set of strings, one for each of the warp threads, every string suspended from a bearing at the top. A pattern could be worked out by cards pierced with round holes. In the cards lay the greatest part of the ingenuity. It was plain at once that any number of patterns could be produced. With the addition of some minor inventions in other divisions of the industry, the manufacture of silk by hand looms went on the next half century without any improvement which created any radical change. Power-loom weaving was the next great advance.

A SILK MILL IN THE TWENTIETH CENTURY.

The silk mill of the present day, completely equipped, presents an interesting appearance. The largest of these in the United States are in New Jersey, Pennsylvania, Connecticut, Massachusetts, Michigan, and New York. Some of these mills, with their collateral buildings, form quadrangles and groups that compose an industrial community. There are seven separate divisions in the silk manufacture—throwing, dyeing in the skein, winding, weaving, dyeing in the piece, printing and finishing. A few exceptional plants include the entire process. Raw silk has a yellow or white color. It is reeled from the cocoon in skeins; fifty per cent of all that is used in this country comes from Japan, twenty-five per cent from China, and twenty-five per cent from Italy. Any visitor on a tour of observation in the mills would be shown this supply first packed in the storage house. The several departments of the establishment are devoted to the throwing, spinning and weaving. The dyeing, printing and finishing departments are often separate buildings. Any one whose interest can be stimulated by ingenious achievement will find the process of creating silk fabrics attractive from the beginning. Brought from the storage house the raw silk is given to the throwster. It being in a condition too fine and delicate for ordinary use, there is necessity to subject it to a series of operations called throwing—that is, winding, cleaning, doubling, twisting, re-winding and reeling the raw into more substantial yarn. The operator who does this is called a throwster, the dictionary makers say, from the old Anglo-Saxon verb *throwan*, meaning to turn or twist. The silk when thus treated is named, according to the several purposes for which it is designed, singles, tram and organzine. The first is made by giving the single thread a twist to give it strength and firmness. The second consists of two or more threads thrown just sufficiently together to hold, by a twist of from one or more turns to the inch. The degree of twist varies according to the special article pro-

posed to be made. Organzine is formed of two or more singles, according to the thickness required, twisted together usually in a contrary direction to that of the singles of which it is composed.

Sewing silk and machine twist is likewise manufactured complete in the gum, sewing silk being made from two strands and machine twist from three. The last process before reeling is stretching. The stretching machine is an American invention of great value to sewing silk manufacturers. This is to even up the thread and to give it firmness and uniformity in size, the operation tending to draw down the looser and thicker portions to the same diameter as the thinner ones. Singles, tram, organzine, sewing silk and machine twist are then transferred to a reel and made into skeins preparatory for the dyer.

The dyer boils the skeins in soap and water to free them from any remaining gum and to give the desired softness and lustre. This takes away from the silk from 20 to 30 per cent of its original weight, leaving it on an average 12 ounces to the pound. Next it is put into the dye vat; and the dyer may or may not, by use of metallic substances in the dye, make the silk appear heavier and thicker and stronger than it naturally would be. By general consent black or dark-colored silk is allowed to be weighted sufficient to make up partly the loss in boiling. Light colors do not bear so much weighting. Most of them, in fact, admit of no adulteration. It injures and weakens the texture. Any silk, if heavily loaded, will break easily, feel rough to the touch because of the particles of the dye, and burn smoulderingly into a yellow, greasy ash, instead of a crisp cinder.

Following the dyeing comes the process of winding the silk on spools, work requiring much skill and care, as it is in a condition known as soft silk. The operatives who perform this work are a separate class, soft-silk winders. Sewing silk and machine twist are spooled or skeined preparatory for the market either on small spools, or if embroidery silks, in skeins. When dyed silk leaves the hands of the "soft-silk winder" it is ready for weaving broad goods, ribbons, braids, laces, sashes, handkerchiefs, etc. In any woven fabric there are two systems of threads, the warp or chain running lengthways in the cloth, and the filling or woof crossing the former at right angles. This crossing, or interlacing, consists of every warp thread being placed alternately under and over one or more threads of the filling system. The arrangement of this interlacing is technical called the weave, and the variety in which the points of crossing can be distributed appears to be without limit. It is chiefly the weave which gives to a fabric its

character, in connection with the material used, the tension of the threads and the combination of colors.

FOUNDATION WEAVES.

There are three foundation weaves. They are designated as taffeta, serge and satin. In the foundation weaves each thread effects only one crossing in one repeat of the weave, and the points of the interlacing occur in a given rotation. A repeat in the foundation weaves comprises the same number of warp-threads as of picks or filling threads; and if this number be eight, for instance, the weave is called an eight shaft or an eight harness weave. In the old heavily built and complicated looms, the repeat was limited to twelve shafts and twelve picks, but modern looms are of much lighter make and simpler construction. A repeat of twenty-five shafts can now be made, while in the filling it is almost unlimited. There are also two additional and entirely different weaves, viz.: gauze and velvet weaves. Velvet weave is described below. In gauze weaves, the threads work in groups of two sets. One set continuously remains below the filling; the other is alternately raised on the right and left side of the first, and is therefore always above the filling. In this manner, a crossing is made, which holds the filling in place. To begin with, a warp must be constructed, and this is usually made of organzine, but can be made of single thread or tram. Those engaged in that labor—usually women—will be found, perhaps, in one of the upper lofts of the mill. It is one of the quiet processes, cleanly, and, though not particularly difficult, is considered one of the most important in successful silk manufacturing. The yarn having been transferred from the skeins to bobbins or spools, these are set in a frame from which the warp-machine is to be fed. At best the mere written description of any mechanical process can only prove more or less vague. It needs the eye to reveal it. But it may be said that this contrivance on which the warp is arranged would have the appearance, to the casual observer, of an upright frame girded with long, white strings. It is about a yard in width. Two women sit before it and draw the silken threads between the cords. They are strung over a sheet a couple of yards or more to an opposite frame, similar in appearance to the first mentioned, where two more women receive them and draw them taut. As the warp is fastened it is drawn forward around a cylinder. This warp, when put on the loom by a "drawer in," is ready for the weaving, whether it be plain, or as satin or velvet, twilled on one side, or in figures introduced by means of the Jacquard harness. The winding of the woof, or the filling, is accomplished by winding from the spool or bobbin to a smaller spool called a

quill on a quilling frame. The quill fits into the shuttle which conveys the thread across the warp.

LOOM AND HARNESS.

The modern power-loom is a strong iron frame, at the back of which is the horizontal beam or roller from which the warp unwinds, and at the front the roller on which the web is wound as it is made. Between the two is the harness, which is a series of frames with eyelets, one for every thread, or set of threads, of the warp. In plain or taffeta weaving the harness frames are in two sets, of three frames each, one set of which is up while the other is down. The number can be increased to several frames, all acting independent of one another, for complicated patterns; and in the Jacquard loom the harness becomes a set of strings instead of a frame, so that every thread of the warp can be raised or lowered separately. Between the beam and the harness is the reed, through which the warp threads pass to the take-up roller in front of the loom, and between the harness and the web roller, the shuttle and the batten. As the machine revolves the warp threads passing from the beam through the reed, are lifted or depressed by the harness; in the opening made by such lifting or depressing, the shuttle flies across the warp, and the batten beats up the thread it leaves, and a new woof is added to the fabric. The complications of the fabrication reveal themselves as soon as the power is turned on and the actual web begins to appear, close, compact and delicate. In high-grade Jacquard work the back of the weave is uppermost, and moment after moment it steadily increases as if by magic. It is the rich and costly fabric coming into view for which the worm spun its cocoon many months previously in Japan, China or Italy. An energetic weaver on a power-loom can turn out from ten to twenty yards a day—that is, a day of ten hours' labor.

CHANGE OF WEAVE.

Attention may be directed to the fact that there are other ways of varying the weave. In satin, for instance, the result is attained by throwing the warp mostly to the upper surface. As the organzine, or warp silk, is the most lustrous, the satiny effect is produced. Gros-grain is made by plain weaving, half up and half down, with a woof of a thickness to correspond with the rib or grain. Stripes, if in the length, are produced by warp threads of different colors; if in the width, by feeding the woof from shuttles carrying different colors of thread, each of which, by an automatic device, is lifted into position

to be thrown at the proper moment ; and plaids by making both warp and woof threads of different colors.

VELVETS.

Velvet is made in two ways, that of the finest grade being woven by looping the warp thread over fine wires, which give, by their size, the desired length of pile. When the weaver has made a few inches of web requiring several hundreds of these wires, he stops the loom and runs a knife along each of these wires, guided by a groove in its upper surface. The other system is that made possible by the power loom for the production of pile fabrics. In this two cloths are woven together, the pile binding the two until a knife, working like a shuttle, cuts them apart. Velvets are brushed, sheared, and ironed to the finest possible degree of evenness. It should have been stated also in regard to broad silk that after it leaves the loom it passes to work-women, who pick it over, yard by yard, for knots in the weave and to discover any imperfections. These are remedied, and wherever the silk may have been soiled it is cleaned. Then it is sent to the finishing room. It is there treated with different processes, according to the special characteristics desired, as high luster, hard or soft touch, etc. If, however, the silk is not yarn dyed, it goes from the loom to be piece dyed in any shade desired or to be printed. Like calico, it is printed on a machine having a roller for each color.

THE RESULT.

Finally the total result comes to the superintendent of the mill for inspection. He considers it critically, for the reputation of the establishment, in competition with the numerous other mills, depends on the quality of the silk he can produce. These men are experts, and they give as much time to the acquiring of an education in the textile schools of France, Switzerland and Germany as a lawyer or physician does qualifying himself to practice. At Lyons, Zurich and Crefeld they are taught silk weaving as one of the fine arts. It is they who provide much of the instruction now which is given in the American mills. There are, however, textile schools of recent origin at Paterson and Philadelphia for instruction in silk weaving. The Philadelphia Textile School instruction includes the designing, warping, weaving, dyeing, analysis, etc., the practical portion of the instruction being facilitated by an equipment of the most up-to-date machinery. The self reliance and courage so characteristic of Americans in producing successful results in the industrial and commercial progress of the country are characteristic also of the operatives and workers in the mills. The American system of education which for the most part is absolutely without any charge to the boys

and girls develops keenness of intellect, habits of thought, enterprise and knowledge which are of great service to them in whatever employment they enter. This is an element of strength to the country which competing nations will have to face more and more in the future. Trained and educated men, even from the highest colleges and universities, are more and more devoting themselves to the industrial arts and to transportation and commercial problems, the practical effect being the cheapening of transportation, economies in cost of production, and therefore lower prices to consumers.

For the most part the American manufacturer of broad silk uses only the best quality of the raw material, and usually only coarse sizes. In this respect he differs noticeably from the European manufacturer. His aim, besides perfection in his goods and small waste of materials, is the gaining of the best results from the looms in yardage. A high yardage reduces the average of wages and general expenses. Low grades and fine sizes are better suited for hand looms and are, therefore, not much used by silk manufacturers in the United States. Notice should be taken also that it is essential for those in control of these mills to study assiduously the trend of style and fashion. Versatility is a decided necessity in the capacity of a plant. It has been remarked by an experienced observer that it is astonishing to note the facility with which the American mill changes from light to heavy, from simple to complicated, from plain to *façonné* goods, and from yarn to piece dyed weaves. One of the important factors that contribute to the energy which endeavors to rise equal to any occasion is the simplicity of the American machinery. It is agreed that it enables an ordinary weaver to do work which in foreign mills can be accomplished only by the most skilled and experienced. In the United States there has never been any suspension in the endeavor to keep foremost in new mechanical introductions. Antiquated and worn out equipment have been replaced always by the modern and more economical, the constant effort being to reduce the cost of production.

THROWING PLANTS.

Some of the American improvements made within the past decade should include the success in perfecting the winding frame in throwing, so as to produce more perfectly wound spools at high speed and obviate the necessity for redrawing. In the latest improved frame the bobbin is carried by a spindle having two heads resting on the driving wheels, its bearings being supported upon inclined planes that sustain most of the weight yet force the spindle into sufficient con-

tact with the friction wheel to secure a positive drive, the double support allowing high speed without throwing out the spindle. Double decking the winding frame has also been adopted by some to economize space. The doubling frame has been perfected sufficiently to permit work to be done at double speed of heretofore, and with better results. The old "flyer" and "jack-pin" system has been partially displaced by a cap on the bobbin, by means of which the thread can be drawn off naturally and the desired tension applied on the assembled threads. In spinning, the Continental belt system, so-called, where the spindles are driven by contact with an endless belt instead of by bands, has been adopted in all new installations. More than one-half of all the spinning spindles in the American mills are of this system, although only first introduced in 1889. A double-deck machine of this type, giving double the number of spindles in the same space, still further solved the problem of economy of space. In 1895 a combined spinner and doubler was designed that has resulted in being largely adopted, not only in the United States, but in several foreign countries, and in the technical schools of England and Switzerland. An effort to solve the problem of spinning, doubling and twisting organzine in one process has resulted in the production of practical machines of both belt-driven and the old band-drive system. The improvements in throwing machinery during the past twenty years are estimated to save about forty per cent in floor space and twenty per cent in the cost of throwing.

BROAD WEAVES.

POWER LOOMS

AND

HAND LOOMS.

In weaving perhaps there has been more progress in improved machinery the last decade than in the three preceding decades. The improvements have produced a loom of very high efficiency, equipped with mechanical devices designed for saving time, labor and material, such as numerous multipliers, two weave, leno, swivel, embroidery motions, and many others all arranged to work automatically. Special mention should be made of the improvements by which all classes of taffeta effects, formerly made on hand looms only, are now made on power looms. In the Jacquard loom there have been so many improvements the last ten years that it has become almost a new loom. This is specially noticeable in the saving of cards and the increase of speed. Attachments have been added which dispense with the pattern or box chain on the loom, the cards being so punched that the shuttle boxes are controlled by the Jacquard.

HAND LOOMS.

While the hand loom is no longer a factor of importance in broad silk weaving in the United States, nevertheless it remains a very considerable factor in Europe and the countries of lower wages. A glance at statistical table A shows that in 1900 there were 97,445 hand looms, available for broad silk weaving, in France, Germany, Switzerland, and Italy, as against 61,957 silk power looms in the same countries. Hand looms do not require so much capital to install and operate. They are much less expensive in construction; when idle, the interest and general expense account running against them is small, and production is therefore readily stopped without loss. It represents a household industry in the main, and quite the reverse of the factory or mill system which has been described. The greatest perfection in weaving is also obtainable on the hand loom on account of the slower production. There are two commercial reasons, also, why hand looms continue in such considerable use, despite the perfection which power loom weaving has attained.

1. The possibility of using finer sizes and cheaper grades of silk. The more uneven and less elastic raw silks and the inferior grades of waste silk bring a lower price than the better grades, and require a slower manipulation than is possible on the power loom. With low wages for labor, and every item of cost of production lessened, a profit is reached which vanishes when higher priced labor undertakes to do the same thing. Europe has always had a monopoly of the cheapest goods and the highest priced goods.

2. The highest class and most expensive productions known to the industry are possible only on the hand loom. Weaves of highly complicated design, and great variety of materials, require very slow production and the most skilful operatives. Some fabrics are limited to one or two yards production per day, and some weaves employ 10 to 20 colors in the filling. Their cost may range from \$4 to \$10 per yard. France, and especially Lyons, has always been renowned for these productions. Among these high grade specialties may be named:

- Furniture coverings, tapestries and curtains.
- Church vestments and altar cloths.
- Fabrics intermixed with gold and silver.
- Broche velvets, laces and novelties of every kind.

In other words these Lyons productions fill the gap between the power looms and the Gobelin tapestries.

There is also the power driven hand-loom called the French loom,

but there are not many of these looms in the United States, and not many now in use in Switzerland or in France. The regular power loom known as the crank loom has largely supplanted them. In the French loom the lay swings from the top of the loom; is moved backward by an eccentric, but falls forward by its own weight; in so doing the pick is beaten up with a short quick stroke. On the crank loom the lay revolves on a shaft at the bottom of the loom; it is moved back and forth by a crank and the pick is pressed into the cloth.

RIBBONS.

Many changes have also come to pass in the development of the ribbon loom. These are now capable of high speed and show a great advance over the Swiss and German types, which were the ribbon looms principally in use ten years ago. The modern ribbon loom was first designed in the United States. Under the old methods of handling the warp it was necessary to employ men on the looms. At present the warp is placed on beams similar to broad-silk looms, and every warp is let off automatically from each beam, making it unnecessary for the weaver to go behind the looms for this purpose. The best type of ribbon loom, the high-speed automatic, includes all the latest improvements of construction. It is adapted to high-grade Jacquard work, where high speed has been slow of adoption. It has the automatic let-off system for the warps, is capable of a more uniform weave than the old machine and has greater productive capacity. Attention may be directed also to a very efficient silk-velvet ribbon loom that has recently come into use. Incidentally, it may be mentioned that nowhere has inventive genius, in connection with the power loom, been so notable as in the United States.

The most pronounced features of the American power looms are light construction, ease in handling, simplicity in operation, accuracy of weave, and moderate cost.

The total weekly labor in an American silk mill is usually fifty-eight hours, although the legal time allowed by factory laws varies in different states.

THE END OF THE CENTURY.

Looking back fifty years at the end of the century, the notable fact is apparent that the value of American products in silk in 1900 was nearly sixty times as great as in 1850. The American manufacturer had arrived at a period in which the importation was confined almost wholly to the costliest fabrics in broad silks, the fashionable novelties,

church vestments and specialties not suitable for mechanical weaving. The industry had spread from New England and the Middle States into many other States, although the comparative rank in importance was as follows: New Jersey, Pennsylvania, New York, Connecticut and Massachusetts. Those States had respectively 180, 121, 92, 38, and 20 silk manufactories. The greatest growth was noticeable in Pennsylvania. Twenty years previously the silk industry in that portion of our country was scarcely apparent. Between 1880-1890, in Pennsylvania alone, "throwing" plants at first and weaving plants later, were established in eighteen separate towns or places where previously there had been none. The incentive was cheaper fuel, cheaper wages, lower taxes, less cost for factory space, etc.

During the last decade the silk industry of the United States reached the point where its future seemed assured as a permanent branch of the textile industries of the country. American manufacturers had shown their ability to meet the exacting demands of consumers by producing nearly all descriptions of weaves known to the trade. Silk mills were erected at many new points in this decade, 52 being located in Pennsylvania, 14 in New York, 10 in New Jersey, 4 in Connecticut, 4 in New Hampshire, 3 in Rhode Island, 2 each in Delaware, Maryland, Virginia and North Carolina, and one each in Michigan, Ohio, Illinois and Wisconsin, aggregating 99 separate places where silk mills were put in operation in the ten years.

Power loom weaving and ingenious mechanics combined have revolutionized nearly all the processes of the manufacture. The accompanying statistical tables illustrate the great changes that have taken place in mechanical equipment in recent years.

The United States have been a leading factor in the development, and especially so in the past five years. If the present fiscal policy of the Republic endures, the United States will soon take first rank in its annual output of silk products. It now holds second place, France being first in value of annual production. The supremacy of the United States as an industrial nation means lower prices to consumers, and consequently a much wider distribution of products than ever before. When this can truthfully be said of articles of adornment and art, as of silk goods, every American can take pride in the industrial and commercial achievement.

The table following indicates in figures the comparative growth of the silk industry in the United States, 1875-1900, by loom equipment, description of production, etc.:

POWER LOOMS AND HAND LOOMS IN UNITED STATES OF AMERICA.

Year.	POWER LOOMS.			HAND LOOMS.		
	Broad Goods.	Narrow Fabrics.	Total.	Broad Goods.	Narrow Fabrics.	Total.
1874.....	1.189	.888	2.077	.779	.728	1.507
1875.....	1.428	1.260	2.688	1.005	.809	1.814
1880.....	3.103	2.218	5.321	1.629	1.524	3.153
1890.....	14.866	5.956	20.822	.413	1.334	1.747
1900.....	36.825	7.432	44.257	.164	.009	.173
1904.....	47.725	8.500	56.225	Practically none.		

Prior to 1900 the silk trimmings industry gave employment to a considerable number of looms, both power and hand, and these are included in the foregoing figures.

COMPARATIVE GROWTH OF THE SILK INDUSTRY OF THE UNITED STATES.

The figures for 1880-1900 are United States census returns for those years.

Production.	1875.	1880.	1890.	1900.
Piece goods	\$5,446,329*	\$11,224,895	\$22,955,750	\$52,152,816
Ribbons	4,815,485	6,023,100	17,081,447	18,467,179
Laces	199,652	437,000	261,750	803,104
Braids and bindings.....	383,100	999,685	2,771,382	1,522,565
Trimmings, etc.	3,961,114	8,306,520	8,554,566	2,295,010
Sewings and Twist.....	6,420,833	6,783,855	7,068,213	9,274,800
Other products		744,668	2,542,625	1,965,932
Velvets and plushes.....			3,141,026	4,959,971
Tapestries and upholstery stuffs.....			3,712,332	1,009,835
Hosiery and knit goods.....			1,065,508	.....
Total	\$21,226,513	\$34,519,723	\$69,154,599	\$92,451,212

*Strictly dress goods were \$1,412,500 only. The balance were millinery and tie silks, scarfs, handkerchiefs and foulards.

No. of throwing spindles.....	168,843	262,312	718,360	1,045,304
Spun silk consumed.....pounds	150,000	A	A	1,550,291
Raw silk consumed.....	1,275,872	2,690,482	6,376,881	9,760,770
Yarns other than silk.....	A	A	5,624,960	7,116,728
Consumed in sewings and twist..	544,470	791,525	1,119,825	1,465,575
No. of operatives.....	18,017	31,337	49,382	65,416
Wages paid	\$ 6,392,256	\$ 9,146,705	\$17,762,441	\$20,982,194
Capital invested	\$17,913,858	\$19,125,300	\$51,007,537	\$89,417,511

No. of throwing spindles in 1904, 1,250,000; accessory spindles, 1,128,000.

A indicates not reported.

IN NEW YORK'S SILK DISTRICT.

In close association with the silk industry of the United States is, of course, that center which dominates it commercially. For a long while there has been in New York a business quarter known as the silk district. It has become distinctive in character. The business transacted there annually in silks is estimated to amount to at least one hundred and fifty million dollars. Perhaps there is no other silk market that can make so large a showing; and the history of the growth of this great business, as related by those who remember as far back almost as its beginning, is interesting. It began with a few importers and jobbers, who gave no thought whatever to a domestic industry. They had their places of business, when New York was a small city, in Pearl Street, Exchange Place, and Wall Street. About 1840 they could be found also in Beaver Street, Hanover Square,

William and South William Streets. The next move was to Broad Street and Broadway. As late, however, as 1857 none of these importers and jobbers had established business on the latter thoroughfare farther north than Maiden Lane. Among the importers in the forties who were more or less prominent mention is made of Charles Payen & Co., Gignoux & Co., Morlot & Schefer, L. & B. Curtis, Chevrolat, the Brugieres, Cancange, F. Cottenet, whose firm became later A. Person Harriman & Co., Moran & Iselin, Underwood, Tetterel & Blain, William A. Kobbé, Gustave Hessenberg & Co., Spies, Christ & Co., Schuchard & Gebhart, Paul Schmid & Andreae, Mahler Brothers, and Charles Dambmann. The prominent jobbers included Arthur Tappen & Co., Petit & Dunning, Clark, Smith & Co., Bowen and McNamee, and Benjamin Loder. With the importers of silk fabrics in those days business was, for the most part, merely speculative. They brought over the silks and offered them to the buyers independent of any advance orders; and the scarcity of goods kept prices high. There was only one mail steamer a month, a Cunarder; and most of the consignments were brought to New York in sailing vessels from Havre. The most popular of the packet ships of that period were owned by Fox & Livingston and Boyd & Hinken. They were called the "Louis Philippi," "Duchess d'Orleans," "Burgundy," and "St. Nicholas." The day of the arrival of any of these ships was one of importance to the whole town. As for the importers, they were always on hand as soon as the ship made fast to the dock; and the buyers likewise came early, anxious to see the samples of whatever novelties had been imported. It has been related to the writer by one of the silk importers of the period under notice, Mr. Otto Andreae, Senior, that frequently the entire invoice was sold on sight even without asking the price. "The cable," says Mr. Andreae, "has not always proven a blessing; and it is quite true that, not being able to ascertain how many goods were to come, restrictions in buying seasonable goods were never put in practice. At that time one of the principals invariably did the buying. There existed no high-priced buyers or salesmen. A salary of fifteen hundred dollars was about the extreme for an influential salesman. The amount of business done in those years by silk importers was of course quite insignificant compared with the business of the present day. It may safely be stated that a million dollars in sales was not reached by the largest importer. Lyons and Zurich furnished the broad goods. Crefeld provided only velvets. Ribbons of all kinds were imported from St. Etienne. Basle sent some plain taffetas, but mostly satin ribbons. From Italy were obtained

Matteoni silks and sewing silks from Rubinacci in Naples. In later years Basle began to produce all sorts of ribbons and became a great source of supply for the American market."

During about five years, from 1841 to and including 1846, there was a noticeable falling off in the demand for silk goods. The importers and jobbers, therefore, suffered by the decline. There are those who date the prosperity of the country from the acquisition of California,—the Eldorado in the West,—and some say that from that time on should be fixed the beginning of rapid growth in the silk business of New York. Before 1850 the retailers began to trade directly with the importers. The jobbers took exception to this new departure and refused to trade with any importer who, as they stated it, undermined their business. A struggle was then begun which ended in the defeat of the jobber. New firms that now attracted notice were Buckley & Claffin, later H. B. Claffin & Co., and Eno, Bulen & Valentine, who created silk departments. Boell & Oelbermann and Vietor & Achelis, importers of broad cloths, were also among those who became prominent. Mr. Andreae recollects that there was a man named L. M. Stevens in the millinery business during the forties who should not be overlooked. "He appeared," he states, "like a meteor in the firmament, coming from Norwalk, Conn. Beginning business in a small store in Beaver Street near Wall Street, he soon eclipsed all the other millinery establishments. The importers found in him a very large and profitable customer. One furnished his parlor in Norwalk; another gave him a piano; and a third took him to Europe on a purchasing tour. When he appeared aboard the ship ready to sail it was noticed that he had come without any impediment in the way of luggage. But it was revealed that he carried a clean collar in the lining of his hat. He died while in business perfectly solvent. He was probably one of the most remarkable apparitions in the dry goods trade." The notable retail merchants, who were among the largest buyers of silks, were A. T. Stewart & Co., A. Arnold & Co., Upsdell, Pierson & Co., and Le Boutellier Brothers. The first mentioned occupied a store from 1841 to 1846 on Broadway opposite the City Hall. The three other firms were in business in Canal Street. Most of the dealers in millinery were in William Street. Among importers who became prominent were Nathan, Soleliac and Pigott, in Hanover Square, importers of silk ribbons, and Sorchon, Allien and Diggleman. Among the jobbers Bowen & McNamee attracted attention about 1850 by erecting a marble building on Broadway between Cedar and Pine Streets. And mention may be made of the fact that 1850 was the year when the

up-town movement in business became the most perceptible. For more than half a century Broadway had existed as a residential street rather than a commercial thoroughfare. But the time now arrived when several blocks of old dwellings were demolished for the purpose of giving room for business houses. The old City Hotel, on Broadway at the corner of Dey Street, was one of the ancient buildings that disappeared during the year mentioned. A. T. Stewart enlarged the marble building on the corner of Broadway and Chambers Street, which he had erected on the site of Washington Hall in 1847, extending its dimensions to Reade Street. When the retail shops began to take possession of Broadway the increase was rapid, and there soon followed an eager desire to keep up with the trend business appeared to take. Large buildings for wholesale transactions in trade were constructed during the following ten years in Church Street, first called Chapel Street, in Franklin, White, Worth, Leonard, Walker and Lispenard Streets. It was in these thoroughfares the silk importers and jobbers soon found quarters; and there the majority remained more than twenty years. After 1860 the business began to be based on orders. It was about that period also that the selling agents of the American silk manufacturers took some place among those whose business was wholly in silks. A. B. Strange & Brother, who for many years had been importers of ribbons and millinery silks, had salesrooms in this quarter after 1861 for their Williamsburgh ribbon mills. Cheney Brothers, who in 1850 were represented by E. H. Arnold at 34 Beaver Street, Thomas N. Dale and John N. Stearns & Co., soon followed the example of setting up independent establishments under their own names for the sale of their fabrics.

With the beginning of the Civil War there were many changes among the importers, and several jobbers retired from business, or at least any association with the silk business. The house of Arthur Tappan & Co. failed, not being able to collect large bills due them in the South, and the chief partner turned his attention to the founding of what has become one of the two leading mercantile agencies. Bowen & McNamee separated, the former assuming the ownership and management of the New York "Independent." Importers began to consider whether the market could not be supplied by the home manufacture with grades of which the invoices were short under the war tariff. As stated heretofore, A. B. Strange & Brother were among these. In the course of the following ten years the selling houses of the mills at Paterson and those distributed in New England added largely to the character of the growing silk district. In 1873 the

directory of the Silk Association of America showed one hundred and two silk manufacturers and dealers in silk manufacture having places of business in New York. There were also twenty-four firms and individuals, designated as importers of raw silk, and five as brokers in that commodity. All that large territory, which to-day may be found occupied almost wholly by those engaged in one branch or another of the silk business, began to be invaded slowly four or five years after the close of the war. It was the result probably of the desire always to take advantage of what is latest and best in buildings; and the stores north of Canal Street were in some respects improvements. They were larger and afforded more floors. Howard Street, Mercer Street, and Broome Street were the localities selected by those who led the way. In the early seventies B. B. Tilt & Son established themselves at 447 Broome Street, and among other domestic silk manufacturers who followed the movement were the Nonotuck Silk Co., Brainerd & Armstrong, Belding Brothers Co., William Skinner, the Jennings Lace Works, M. Heminway & Sons, Seavey, Foster & Bowman, William Ryle & Co., and the Holland Silk Co. Broadway also, from Canal to Broome, became a favorite place for the silk house. Hamil & Booth, Givernaud Brothers, Pelgram & Meyer and Johnson, Cowdin & Co., established their own houses for the sale of their products, and among the importers were Edward Warburg & Co., who in 1878 became the exclusive sales agents of J. Schwarzenbach-Landis of Zurich. The successors of the latter firm were H. Sallenbach & Co., until in 1888, the well known firm of Schwarzenbach, Huber & Co., was formed. The boundary of the silk district at present is described south by Canal Street, north by Spring Street, west by West Broadway, and east by Broadway. Included within those limits is a large region; and the census of those employed there daily number several thousand persons. It would be easy for any stranger in the district to discover quickly that the silk mills in the United States or Europe are the sources which give rise to all the business. Silks, velvets, ribbons, laces, and all goods of which silk forms a part, are advertised by the agents of the mills and the commission merchants by numerous business signs that represent a wide variety of nationalities. Americans, Germans, Swiss, French, Italians, Austrians, Hungarians, Hebrews and Japanese are all engaged in the silk business in the district. At the corner of Broadway and Broome Street there is a large twelve-story building designated as the Silk Exchange. It is there that the Silk Association of America has its headquarters; and the two upper stories are occupied by the Merchants' Central Club, the membership of which is largely composed of those

who manufacture or deal in silk. Statistics prove that the United States has finally come to be the greatest silk consuming country in the world; and any inspection of this district devoted to the wholesale trade in silks should readily impress the fact on the observer. In the spring, when the stocks of the season have accumulated, there are many large fortunes included in the thousands of cases of silks and velvets and laces housed here. The total value of the stock, it is believed, usually amounts to \$20,000,000. There are several firms doing a business in domestic silks alone that foots up to four to six million dollars at the end of the year. Whenever there is any public demonstration in which the commercial part of the city puts forth its numerical strength the silk district is always conspicuous by its representation. It counts many among its number who are prominently identified with the leading banks and financial institutions of the city. These several distinguishing characteristics seem to suggest that the district is sufficiently unique in its way to merit a passing query whether any other metropolis has, within its commercial limits, any similar district. Not even that importer endowed with the most active imagination back in that period when sailing vessels brought cargoes from Europe every other month could have anticipated such a region devoted to the sale of silk as at present exists. It is not the result of a slow growth, but of a rapid growth; and it is one of the evidences of general prosperity which the history of no other country exhibits.

As pointed out, the silk business in New York began with the importers. Now, however, there are three classes in the silk district,—the commission merchant engaged in selling the products of the silk mills in the United States, those who work off the imports from foreign mills, and those who represent both domestic and foreign manufacturers. The oldest firm, dating back nearly seventy years, is Vietor & Achelis. Other houses, which include in their business existence a half century or more, are William Iselin & Co., C. A. Auffgivemordt & Co. (1836), Schefer, Schramm & Vogel (1839), Passavant & Co. (1844), Fleitmann & Co. (1847), Creef & Co. (1850), Oelbermann, Dommerich & Co., Abegg & Rusch, and Spielmann & Co. In all, there are eighty-five commission houses selling silk goods. It used to be the custom with the foreign manufacturer to send a representative to this country who undertook to build up a business for his employer and pay himself by a commission on his sales. Time, though, changed that relation. The representative in New York of the foreign mills came eventually to be frequently not only the selling agent, but the manufacturer's banker, who advanced him credit. That is the

character of much of the importer's business at present, especially with the more noticeable houses. Money is advanced to the manufacturer before his product is sold, to enable him to continue his business; the customs duties are paid and charged to his account; the goods are sold and return three separate profits to those handling them and providing the necessary capital,—interest on the loan before selling, on the money paid in duties, and commission for the sale. With the exception of paying customs duties, the seller of the products of the American mills often stands in the same relation to the manufacturer. That is one of the facts that are deplored by those intimately interested in the prosperity of the industry. One of the most prominent manufacturers has stated that notwithstanding the favorable conditions, the great productiveness of the mills and the large sale of their products, the American silk industry does not enjoy the desired prosperity it should. "Insufficient working capital, impractical and insufficient organization for the sale of goods," he attributes, "are accountable for these conditions." And he further points out that "it is generally known the American silk manufacturers are not composed of capitalists. Their enterprise," he continues, "has often urged them to take advantage of credits to build up their business instead of using their own funds. Naturally they suffer in consequence in case of irregularities and depression of business. The American manufacturer, with few exceptions, puts his whole energy to the improvement of his manufacturing methods and increase of production as regards both quantity and quality. The study of the condition of the selling market he neglects and depends largely on his commission house, or selling agents, whose interests do not always correspond with his own. In many cases he is wholly dependent on them for advances given him on his stock, for bonds and guarantees, which deprive him of the advantages of independent action. This poor state of affairs as between manufacturer and the selling agent is increased by the fact that the latter does not know much about manufacturing and the manufacturer as a rule is not up to the requirements and needs of the market." Inasmuch as prices are not fixed, in taking orders, according to the cost of production, but in the speculative way of competition, the result is now and then a flurry in the silk district when prices are said to be slaughtered. If for any unforeseen reason the price of the raw material, of which New York is now the largest purchasing market in the world, advances after the spring orders are taken, the manufacturer oftentimes suffers a loss. Or, if he has been led to anticipate a larger consumption of manufactured silk than actually comes to pass, of course he finds himself again

saddled with a weight to carry. Thus far the American has not acquired any outside market which he can use as a "dumping ground" for his surplus production, as France in times past has used New York.

One of the memorable and interesting crises of recent years which the silk district has experienced took place in the last third of 1900. Broad silks during those months fell to a price never before quoted. Plain and fancy silks were sold fifty per cent cheaper than the previous year and for much less than in any European capital. This condition was brought about because of a large surplus production. In 1898-9 the stock of raw silk in the markets of the world became reduced; and a movement was made in Europe to force up the price. This attempt the New York market ignored for a time, until scarcity created some apprehension. (Usually there are between four and five thousand salable bales of raw silk on hand.) The buying began at panic prices, at even one dollar a pound higher than the raw silk had been quoted; and shortly most of the manufacturers had as much on hand as they could use. The next effort, considering the extra outlay for the raw material, was to make haste to turn it into manufactured product and get rid of it. In the early part of 1900 there seemed every indication of a lively demand for silk. But when the fall came and the goods were in the market at an advance price, a consequence of the rise in the raw product, there was a quick falling away of purchasers. There was an eager desire on the part of the manufacturers to sell their stocks at even twenty and thirty per cent below order prices. The retail buyers were well aware of all the facts stated and they waited until the prices might be precipitated to the very lowest possible figure. In the meanwhile the auction rooms were watched closely. It has not usually been the custom, though, of the manufacturers to seek that way of escape. But one day in October of 1900 it came to pass that nine thousand pieces of broad silks of American make were offered at auction, where they were purchased at wholesale at forty-seven cents a yard, taffetas and fancy colored silks. The bargains were so tempting that representatives were present from all the big retail dealers in New York and from cities as far off as San Francisco. The next day some of the up-town retail stores, that were forced into competition with this auction, dropped prices to thirty-seven cents a yard, twenty cents below the cost of manufacture. That was the beginning of the end of the sacrifice. Before many days there was a reaction. This is related to illustrate the uncertain future with which the silk manufacturer is obliged to take chances. But there is another indiscretion he must always guard against, and that is finding himself led

away by a false action to produce some style that proves unpopular. It is usually believed that fashion is the creation annually of the arbitrary manufacturers; and that the consumers are for the most part forced to make use of what is offered them. The popular fashion, however, of a coming season is something at first which no one can undertake to control. It is rumor, perhaps. No one will say definitely just where it has originated; and it is one of those rumors that may easily be misleading. Paris is said to set most of the fashions in silks and satins and velvets, though New York is now making rapid advances towards changing that idea. The reason is possibly because Paris keeps in closest touch with buyers from all the world and therefore learns before elsewhere the prevailing sentiment and requirements. In the United States a large quantity of the American and foreign products are taken in the West. The public desire is what really creates the popular fashion in this country or any other. It is that which the manufacturer is all the while endeavoring, by such aid as he can get from his salesmen and distributors, to anticipate. And the anxiety in this respect gives him in the course of a year presumably several bad quarters of an hour.

In 1904 there are a great array of American silk establishments selling their own products in New York's silk quarter, and while it is true that many of the former representative silk firms continue in business under their original titles, nevertheless their representative character as consignees of foreign silk manufacturers, or as importers on their own account, has greatly changed. As a rule they now prefer to be known as bankers, or factors, or commission houses, of the domestic silk manufacturers of the United States.

THE SILK INDUSTRY IN EUROPE AND ASIA.

Only a brief outline of this branch of our subject is here attempted. Table A indicates the loom equipment of France, Switzerland, Germany, Italy and Austria at various dates between 1870-1900. Separate paragraphs follow indicating the most salient features of the silk industry in those countries and in Great Britain in 1900. From the figures presented estimates can readily be made of the probable volume of home consumption of all silk and silk mixed fabrics in the countries named. Silk ribbons are not included, except incidentally.

Finally are a few paragraphs indicating conditions in Russia, and several other European countries, Turkey, India, China and Japan, followed by a table indicating the estimate of the Reporter of the Inter-

national Jury on Silks at the Paris Exposition of 1900, regarding the production of silks, exports and imports, in many of the silk markets of the world. The editor of the Official Report, M. J. M. Piotet, of Lyons, France, states that the figures are approximate, based on the commercial transactions in silk goods in the respective countries from 1895-1899. Taking all the silk markets of the world into his view, M. Piotet recapitulates a production of 60,000,000 pounds of raw silk at the end of the nineteenth century, and a valuation of \$400,000,000 annually in finished goods.

The closing table is the world's production and consumption of raw silk in 1902, by countries, from the silk chart of Messrs. Chabrieres, Morel & Co., of Lyons, France. It indicates a total production of raw silk (including Tussahs) of 33,091,000 kilograms, or 72,952,418 pounds. No better statistical authority than Chabrieres, Morel & Co. exists regarding raw silks in all quarters of the globe, on account of their extensive commercial representation in all silk growing countries.

In Asia, as in Europe, the coarser and inferior grades of raw silk are kept at home; America, which is now the largest purchasing silk market in the world, uses only the finest and best. What may be called "country silk" is reeled in households and by primitive methods and is suited only for hand-looms and the cheapest labor and the cheapest fabrics. By the "World's Production and Consumption Chart" of Messrs. Chabrieres, Morel & Co., 30,000,000 pounds of raw silk are allotted for consumption by the silk producing countries of Asia, viz.: China, 18,600,000 pounds; Japan, 6,600,000 pounds; India, 3,000,000 pounds; Tonquin and Annam, 2,000,000 pounds. Assuming one-half of this to be "country silk," we find that the statement of M. Piotet that the world's production of raw silk amounts to 60,000,000 pounds is not wide of the mark. The balance, say 15,000,000 pounds, may not improperly be classed as "country silk." A percentage of "country silk" is also raised and used in Italy, the Caucasus, Brutia, Syria, Persia and Turkestan. It is only in the countries where labor is low priced that these inferior silks can be manipulated to advantage in the manufacturing processes.

By "country silk" is meant raw silk not usually classed as suitable for export, and though some of it is shipped to Europe for manufacturing the cheapest grades of silk fabrics, it cuts no figure in the American market.

It should be understood that while the authorities here quoted from regarding the raw silk production of the world are the most competent existing at the present moment, nevertheless the figures pre-

TABLE A.

POWER LOOMS AND HAND LOOMS IN EUROPE. BROAD GOODS CHIEFLY. (RIBBON LOOMS NOT USUALLY INCLUDED.)

Years.	FRANCE.		SWITZERLAND.		GERMANY (Crefeld only).		ITALY.		AUSTRIA.	
	Power.	Hand.	Power.	Hand.	Power.	Hand.	Power.	Hand.	Power.	Hand.
1870.....	138,000	39,429	.....	.....	.....	.....	.....	.....	.....	.....
1872.....	.....	.....	1,150	26,560	.....	.....	.....	3,000	.....	.....
1880.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1881.....	.....	.....	3,151	30,398	881	84,778	10,768	.....	.....	.....
1883.....	.....	.....	4,007	29,716	1,467	39,463	12,742	.....	.....	.....
1885.....	.....	.....	4,129	20,724	2,777	29,520	11,211	.....	.....	.....
1887.....	.....	.....	.....	.....	3,820	26,496	11,390	.....	.....	1,892
1889.....	20,000	65,70,000	4,000	40,000	4,568	23,124	11,175	.....	.....	4,000
1890.....	.....	.....	.....	.....	5,588	22,156	11,918	.....	.....	.....
1891.....	.....	.....	7,173	20,625	5,428	15,603	9,886	.....	.....	.....
1892.....	.....	.....	.....	.....	4,796	13,766	8,729	.....	.....	.....
1893.....	.....	.....	8,625	20,472	6,277	13,269	10,068	.....	.....	.....
1894.....	25,000	62,000	42,714	.....	5,827	11,101	8,999	.....	.....	.....
1895.....	.....	.....	9,609	20,552	7,039	12,840	10,708	.....	.....	.....
1896.....	.....	.....	.....	.....	7,296	11,137	10,478	.....	.....	.....
1897.....	.....	.....	10,445	21,202	7,862	9,551	10,591	.....	.....	.....
1898.....	.....	.....	.....	.....	8,965	9,436	11,061	.....	.....	.....
1899.....	.....	.....	.....	.....	8,997	8,882	11,521	5,900	11,000	9,044
1900.....	30,638	60,000	47,781	13,326	19,544	18,910	11,475	8,490	11,000	11,633
1901.....	.....	.....	.....	.....	11,939	6,293	13,737	.....	.....	.....

N. B.—The foregoing compilation is from the excellent statistical tables furnished annually by Robert Schwarzenbach, Esquire, of Thalweil, Switzerland.

Three and one-half hand looms are considered the equivalent in production to one power loom. The statistical authorities quoted from are indicated for each country.

sented must be taken as arbitrary estimates on account of the inability of experts to absolutely determine at this writing the raw silk production in the Oriental countries.

FRANCE.

From the learned author of "Les Industries de la Soie," Mons. E. Pariset, published at Lyons in 1890, and which is esteemed as standard authority regarding the development of the silk industry of France up to that time, we here make liberal quotation. It should be understood that the figures given as to loom equipment are not limited to silk piece goods, but include ribbons and velvets and all branches of the industry, possibly also those devoted at times to the weaving of fine cottons in which the French are great experts. Power loom weaving was not introduced in France until after the successful experiments in Switzerland, and the figures here given regarding looms in France prior to 1870 are for hand looms only. The beginning of the precedence of Lyons was first attained in the 16th century. By that time the industry had concentrated there. Earlier silk making had flourished at Avignon under the patronage of the Popes; then the manufacture was divided and was equally recognized at Tours (1480), Paris, Nimes and Lyons (1520); finally the latter place drew to itself the chief importance. Here were used the best Italian and Spanish raw silks, and soon the large purchases made by Germany and the Netherlands gave great impetus to the industry in France. Lyons gained in prosperity over the other French towns, because for one reason, it was exceptionally well favored by its geographical position. It is admirably situated for trade on two navigable rivers which make it a great entrepot both for the north and south. It forms a common center where the roads from Paris, Marseilles, Bordeaux and Geneva, from Switzerland, Italy and Auvergne all meet. The four annual fairs held at Lyons drew people from remote distances, merchants, manufacturers, travelers, and Italians who established themselves there in silk-weaving colonies. In 1609 the town had a couple of thousand looms. Before the Edict of Nantes (1685) there were 18,000 looms. From 5,000 in 1701 the number increased to 15,000 in 1785. Later came the Revolution and the looms decreased again to about 5,000. Then the times mended, and France and Lyons began slowly to recover their prestige in the manufacture of silk. A count in 1873 showed 110,000 hand-looms at Lyons and the country within a radius of forty miles. In 1887 the increase had resulted in 145,000 looms; and the product, 400,000,000 francs—eighty millions in dollars—represented two-thirds of the output of France.

The remaining third was divided between St. Etienne, St. Chamond (the ribbon centers), Paris, Nimes, Tours and Calais. The philosophical who look back at the whole history of silk manufacture in France—like, for instance, Mons. E. Pariset—linger on the statement that the “good old days” of prosperity were before the sixth decade of the last century got well under way. The year 1865 is, in fact, fixed by Monsieur Pariset in the exhaustive treatise mentioned as the apogee of prosperity at Lyons. Previous to that period there had been a great and constant demand from the United States. “Suddenly the horizon became obscured,” says this writer. “Commercial treaties were not renewed. Foreign manufacturers doubled their efforts; and, in order to render competition more easy, they raised customs barriers against the Lyons trade. Fashion, giving vogue to low-priced goods that could easily be produced, moreover, paralyzed a portion of the Lyons manufacture. Progress in the construction of machinery permitted every industry to produce equally well the same goods and destroyed the personal superiority of the workman. The inequality between the economic conditions in the midst of which production was realized in France and the conditions that industries found in Germany, Switzerland, Russia, England, and the United States, became ruinous.” Monsieur Pariset goes on to say that France and Lyons, however, arose to the occasion. But, all the energy and enterprise which is attributed to the French at this crisis might not have achieved so much reward had not the great market of England been thrown open to them when that of the United States was partially closed.

As soon as Switzerland, Germany and the United States began to make some distinctive showing in silk manufacture, it was understood in France that competition had arisen to reduce the cost of the production. It is enumerated that it became essential to produce “stuffs the most simple” and also goods mixed with cotton and woolen. Dyeing in the piece was undertaken. Tulle and crêpe had been the only products woven in the raw. During the thirty years though, from 1870 to 1900, every kind of plain and figured weave was tried in France in raw silk. The art of the dyer and finisher, it is asserted, was carried forward to perfection. The power loom was also introduced; and a low price in production was sought in the delicacy of the raw silk used, together with the rapidity of the loom. The number of power or “mechanical looms” in 1873 was only 7,000; but in seven years these increased to 20,000. The production of mixed silks, which was about 30,000,000 francs before 1870, rose to 69,000,000 in 1878, to 160,000,000 in 1880. It is pointed out that the manufacturers at Lyons, with

an extraordinary suppleness, equalled by the rapidity of execution the mobility of the fashions. They passed from plain to figured goods, from the costly to the low-priced, from all silk weaves to silk mixed with cotton and wool. These articles varied without limit, taffetas, satins, velvets, plushes, poplins, foulards, laces, silks for linings, umbrellas, figured silks for upholstery and passementeries. One of the secrets of strength, it is said, was in the division of labor. Every manufacturer, and all the succession of operatives whom they employed, concentrated their attention on one species of weave and stuck to it with the best results.

FASHION'S SUPREMACY.

Mons. Pariset thus comments on the supremacy of Fashion acquired by Paris. "To be just," he says, "it is due in part to the supremacy Paris acquired in the matter of fashion and which was accepted in the eighteenth century by all the capitals of Europe. Travelers and merchants began then to come from every country to learn the taste of Paris and to take the costume from its example. It is the supremacy that Paris possesses in all that pertains to the decorative arts. It is Paris that radiates the world. It is at Paris that each season the makers of dress goods and the milliners find out the taste of the consumers and decide, following it quickly, the qualities that should be in the market. The manufacturers at silk centers receive their impulse from Paris and create the fabrics or the colors which are believed will satisfy the capricious desires of the buyer. It is thus in turn reappear, with a certain periodicity, the vogue of laces, ribbons, velvets, satins, etc. France, with its competitors, has the advantage of getting its inspiration from the world. It sends its products to every market in Europe, to Asia, Africa and America. Its success is displayed by the figures of exportation of silks which fluctuate between 250,000,000 and 350,000,000 francs, according to the price of silk in the raw and following the nature, low or advanced, of the goods required for consumption. France absorbs a great part of the silk raised by Asia for the commerce of the West. It employs 4,500,000 kilograms of raw silk and 800,000 kilograms of waste silk."

Tabulation A of Power Looms and Hand Looms in Europe indicates the marked decrease of hand looms in France since 1870, and the gradual increase of power looms since 1889. Looms representing the ribbon industry at St. Etienne are not included. Following are the figures of Lyons production, and the exports and imports for all France in 1900:

FRANCE.

1900. Description.	LYONS.	ALL FRANCE.	ALL FRANCE.
	Production. Silk Piece Goods. Fracs.	Exports. Silk Piece Goods and Ribbons. Fracs.	Imports. Silk Piece Goods and Ribbons. Fracs.
All silk goods.....	172,500,000	75,122,000	38,613,000
All silk jacquard.....	20,800,000	3,250,000	.....
Silk mixed	114,850,000	88,049,000	7,541,000
Silk jacquard	18,250,000	.....	.....
Silk with gold and silver.....	6,300,000	.....	.....
Mousselines, gauzes, grenadines and crepes.....	66,200,000	3,850,000	5,438,000
Tulles, laces and confections.....	42,450,000	87,817,000	10,418,000
	Piece goods only.	Including ribbons.	Including ribbons.
Total.....	441,350,000	258,088,000	62,010,000
		Distribution.	Imports From.
To United States.....		51,496,000	.....
" England		115,111,000	10,282,000
" Germany		18,295,000	9,410,000
" Belgium		12,336,000	.....
" Switzerland		11,021,000	18,154,000
" Turkey		5,962,000	.....
" Spain		5,681,000	.....
" Italy		2,959,000	754,000
" Austria-Hungary		1,397,000	176,000
" Russia		805,000	.....
" South America		1,446,000	.....
" all other countries.....		31,579,000	23,234,000
Total.....		258,088,000	62,010,000

The exports of silk goods from France have greatly fallen off since 1870. In that year they were 134,352,872 francs, to the United States alone, and to all countries 485,093,505. In 1870 France exported plain silk dress goods alone to the value of over 350,000,000 francs.

The silk loom equipment of France in 1900, for piece goods, being equal to 47,781 power looms (Table A), the average loom production is 9,237 francs, or \$1,847.00.

The official report of the International Jury on silks at the Paris Exposition of 1900, edited by M. J. M. Piotet, of Lyons, gives the following figures regarding production of silks, exports and imports in France:

Production.	Fracs.
Lyons	405,000,000
St. Etienne (Ribbons)	85,000,000
Calais, LeNord and Paris.....	110,000,000
	600,000,000
Imports	53,000,000
Exports	260,000,000

Home consumption and Paris sales.. 393,000,000 francs, or say \$78,600,000.

N. B.—Tariff Duties: The present rate (specific duties) on silk goods from Switzerland equals about 4 per cent. ad valorem on blacks, and 5 per cent. on colors. It is proposed in the commercial treaty now under consideration between the two countries, to advance the duties to about 15 per cent.

Value of franc in U. S. currency, 19.3 cents.

Imports in United States of Dutiable Silks from France in 1900-1903, fiscal years ending June 30th, were as follows:

FRANCE AND GERMANY

Description.	Foreign Invoice Value in Dollars.			
	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$ 7,104,208	\$ 5,611,157	\$ 5,678,657	\$ 5,927,254
Laces and embroideries.....	2,357,013	2,275,492	3,420,304	3,503,570
Velvets, plushes and other pile fabrics....	1,259,845	2,330,830	2,195,639	2,239,614
Ribbons	765,256	986,063	1,276,740	1,442,605
Wearing apparel and ready-made clothing..	802,491	931,500	1,247,561	1,317,800
All others not specially provided for....	780,979	452,700	449,546	747,534
Schappe or spun silk yarns.....	1,184,233	919,746	1,043,480	937,167
Total.....	\$14,254,025	\$13,507,488	\$15,311,927	\$16,115,553
Pounds of spun silk yarn imported.....	699,059	577,914	663,339	598,727

GERMANY.

All the figures regarding looms in Germany are for hand looms only prior to 1880.

That neighbor in Europe which in silk manufacture is next in importance to France is Germany. But the French are desirous of having it understood that, from the French point of view, Germany rivals the looms of Lyons, St. Etienne, and St. Chamond, only in the growth of prosperity in trade with other countries, not in setting the fashions for them. It is explained by the French manufacturer that the German owes much of his good fortune to the fact that the many thousands of those who have emigrated from Germany to other countries have drawn the trade after them. The French are not colonizers in other lands, and therefore the silk-makers do not derive any advantage from such a source. The silk industry was established in Germany first at Berlin. The workmen were French, going from France about 1685. After twenty years, however, there were not more than a thousand looms. Later, in order to take advantage of the cheap labor offered elsewhere, the Berlin manufacturers went to Crefeld, Elberfeld, Barmen, Weiser and Ronsdorf. These places became the centers of the industry. They began to make a specialty first of velvets and next of ribbons and piece goods of mixed materials. The total of the looms in 1844 was estimated to be 25,000. After a decade the increase made them number about 42,000. In 1873 they counted 87,000. The product in 1844 amounted to about \$18,000,000, or 72,000,000 marks. That value had been raised in 1873 to 180,000,000 marks, or \$45,000,000. Three-fifths of the product was then in velvets and plushes. When fifteen more years had come and gone there were in 1887, at Elberfeld, Barmen, Ronsdorf and the Grand Duchy of Baden 30,000 looms, making goods, chiefly ribbons, for export that amounted in value to \$20,000,000, annually. Half of this output was taken by the Continent. At Crefeld, where in the same period there were 40,000 looms, the manufacture is more varied. About half the looms in those days, though, were devoted to velvets and plushes. Cotton played a great part in the manufacture. It was estimated that Crefeld made

use of 2,200,000 pounds of cotton, 8,000,000 pounds of schappe and 8,800,000 pounds of silk. There were 37,000 looms employed. The growing industry in the United States in the manufacture of velvets has decreased the output at Crefeld very noticeably in the last few years. From one-half to two-thirds of all the silk goods manufactured at Crefeld, of whatever sort, are for export, chiefly to England and the United States.

The following table indicates exports to the United States.

Imports in United States of Dutiable Silks from *Germany* in 1900-1903, fiscal years ending June 30th, were as follows:

Description.	Foreign Invoice Value in Dollars.			
	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$1,779,768	\$1,228,477	\$1,188,584	\$1,271,510
Laces and embroideries.....	171,705	192,973	336,184	547,154
Velvets, plushes and other pile fabrics....	1,014,546	889,177	929,776	893,140
Ribbons	160,283	334,643	372,978	1,051,062
Wearing apparel and ready-made clothing..	342,364	358,233	528,302	1,032,860
All others not specially provided for.....	1,048,824	752,533	948,587	1,257,839
Schappe or spun silk yarns.....	584,946	587,620	786,242	683,316
Total.....	\$5,102,436	\$4,343,656	\$5,090,653	\$6,736,890
Pounds of spun silk yarn imported.....	348,197	375,445	503,324	447,790

Tabulation A of Power Looms and Hand Looms in Europe indicates the steady increase of power looms and the diminishing number of hand looms employed in Germany since 1881. Following are the figures of silk production (piece goods and velvets) in Crefeld, and the exports and imports for all Germany in 1900:

GERMANY.

1900. Description.	CREFELD. Production.		ALL GERMANY. Exports.		ALL GERMANY. Imports.	
	Piece Goods and Velvets.	Mixed Marks.	Piece Goods and Velvets.	Mixed Marks.	Piece Goods and Silk Mixed.	Silk Mixed Marks.
Piece goods, all silk and silk mixed	57,289,895		13,874,000			17,276,000
Velvets and plushes.....	24,943,044		88,733,000			4,133,000
Total.....	82,232,939		102,607,000			21,409,000
	Distribution.		Imports From.			
To Germany	44,198,460		4,614,000 Switzerland.			
“ Austria-Hungary	2,136,880		1,471,000 Austria-Hungary.			
“ England	17,135,932		2,004,000 England.			
“ France	3,817,036		9,857,000 France.			
“ other European countries....	4,798,260		643,000 Italy.			
“ other than European countries, including U. S.	10,146,371		2,564,000 Eastern Asia. 256,000 Other countries.			
Total.....	82,232,939		21,409,000			
			Distribution.			
To U. S., all silk.....			870,000			
“ U. S., silk mixed.....			19,861,000			
“ France, both.....			6,809,000			
“ Belgium and Holland, “			7,317,000			
“ Denmark, Sweden and Norway.....			5,782,000			

		Distribution. Marks.
To England,	both.....	41,127,000
" Switzerland,	"	3,326,000
" Austria-Hungary,	"	2,672,000
" Italy,	"	1,878,000
" other European countries.....		5,072,000
" British possessions		3,569,000
" Central and South America.....		2,934,000
" all other countries.....		1,390,000
Total.....		102,607,000

It is impossible to learn the production of all Germany in silk goods. The only available statistics are those of Crefeld, the center of the velvets and silk mixed goods industry. The silk loom equipment of Crefeld in 1900 was equal to 11,475 power looms. There are also 3,652 power looms in southern Germany, which, being operated by Swiss ownership, are commercially known as "Swiss production." The value of this production in 1900 was 17,600,000 marks. There are also a number of silk establishments making gloves, knit goods, laces and passementerie in Saxony, and umbrella silks in other parts of Germany, concerning whose statistics and production no reliable information is available. The silk ribbon industry at Elberfeld and Barmen are likewise not included in foregoing figures.

N. B.—*Tariff Duties*: The present rate (specific duties) on silk goods, imported into Germany, averages about 12 per cent.

Value of mark in U. S. currency, 23.8 cents.

SWITZERLAND.

In Switzerland, the first silk power loom weaving on the Continent on the factory system was inaugurated by the Schwarzenbachs at Adlisweil. It was in 1860 that the industrial experiment was successfully tried by water power. The enterprise of the Schwarzenbachs finally enlarged the plant, but there are many difficulties in introducing new methods in silk weaving. It will be remembered that Vaucanson was set upon by rival weavers at Lyons in 1744, and soundly beaten for his temerity in introducing a new system of weaving. Among the familiar difficulties that formerly had to be overcome in the successful introduction of labor-saving mechanisms may be mentioned—

1. The natural or inherent prejudice by the "operative" class against any and all new systems.
2. The natural longing in favor of the old ways or customs.
3. The slow advance in educating operatives.
4. The unwillingness of operatives to favor a factory system, which through systematized control and discipline enables the same operative to work a far less number of hours and for better pay than was possible under the individual or independent system.

These prejudices were very strong forty years ago in all countries. In England the male operatives rose en masse against the introduction of steam power in the mills and factories. On the Continent no woman could withstand the opprobrium of being called a "factory girl." Even in progressive Switzerland progress was at first very slow in familiarizing the population with the new method of weaving.

The figures herein given prior to 1871 are for hand looms only. Tabulation A indicates the increase in power loom weaving at Zurich and neighborhood from 1872, and likewise the decline in the number of hand looms operated on broad silks. The ribbon looms at Basel are not included in Tabulation A.

The second rival of France, Switzerland, also depends considerably on America for a market. Like the industry in Germany, the silk making in Switzerland is the result of a few looms scattered here and there in the country at the end of the eighteenth century. The operatives combined agriculture with weaving. The centers of the production finally became Zurich and Basel, the latter devoted to ribbons. In 1811, Zurich possessed 7,000 looms, producing silks valued at \$1,000,000; in 1830, the return was 9,000 looms; in 1839, 15,000; in 1855, the number of looms had risen to 25,000; in 1872, to 27,000; in 1883, about 30,000 were scattered in the canton of Zurich and the neighboring cantons of Zug, Schwyz and Unterwalden. Thereafter the number of hand-loom began to decrease, and the number of power or mechanical looms to increase. There were in 1871 only 920 mechanical looms; but that number was increased in 1881 to 3,151, and to 4,129 in 1885. Since then the progress has been constant. In 1891 they numbered 7,173, in 1895, 9,609, and in 1900, 13,326. Of this number 11,163 were employed on plain and twilled weaves, 2,133 on Jacquard weaves, and 30 were velvet looms. There were also 8,563 power looms in factories beyond the Swiss frontier, but working for Swiss firms. The number of hand looms in Switzerland had decreased in 1900 to 19,544 and 2,309 additional were in factories beyond the Swiss frontier, but working for Swiss firms. A total of 46,619 persons were employed in 1900, 24,816 being employed in the hand-weaving branch (but many of these do not weave during the summer months), and 15,475 in the power-weaving branch. About 4,000 persons are employed in the throwing mills, 2,000 in silk dyeing, 322 in silk finishing and 43 in the "conditioning" houses. The raw materials consumed in 1900 were 2,566,379 pounds of raw silk, 26,506 pounds of "schappe" or spun silk, 920,233 pounds of cotton yarns, and 8,805 pounds of wool and other yarns. The yardage of products in 1900 was as follows:

	All Silk.	Half Silk.	Total Yards.
Taffeta, Dobby Articles and Fancy Weaves—			
Piece goods and mufflers.....	39,839,996	4,495,129	44,335,125
Jacquard Weaves—			
Piece goods and mufflers.....	4,253,728	222,603	4,476,331
Piece-dyed Weaves—			
Piece goods	48,119	3,730,252	3,778 371

	All Silk.	Half Silk.	Total Yards.
Mufflers			16,536
Velvets and plushes.....			70,603
Bolting cloth			671,719
Total yardage.....			53,348,685
Value of the broad goods production.....			\$20,823,696

In 1900 the exportation of silk piece goods from Switzerland was \$20,000,000. The consumers are the English, French, Americans and Germans; about \$730,000 worth goes to Austria. Belgium and Holland together take \$650,000. At Basel the production of ribbons, quoting from the statistics presented by Mons. Pariset in "Les Industries de la Soie," amounted in value in 1846 to 20,000,000 francs; in 1857, to 45,000,000; in 1862, 31,000,000; in 1872, to 65,000,000, or in dollars, thirteen millions. Later the production presented considerable variation, and the fall was often to 30,000,000 francs a year, due, says the authority quoted, to the growth of the manufacture of ribbons in the United States. But the annual production in Switzerland of broad goods, ribbons and laces reached a value in 1900 of about \$38,000,000. The following table shows in detail the production, exports and imports of silk piece goods in that year:

1900. Description.	SWITZERLAND.		Imports.	
	Production. Zurich only. Silk Piece Goods. Francs.	Exports. Piece Goods. Francs.	Silk	Piece Goods. Francs.
Silk piece goods.....	113,460,000			9,404,621
All silk stuffs and shawls.....		91,322,941		
Spun silk stuffs.....		57,806		
Silk mixed stuffs and shawls.....		14,312,586		
Bolting cloth		4,289,605		
Total.....	113,460,000	109,982,938		9,404,621
		Distribution.		
To United States		16,579,780		
" Great Britain and Canada.....		48,426,162		
" France		15,886,763		
" Germany		6,625,975		
" Austria-Hungary		4,224,643		
" Belgium and Holland		3,304,121		
" Central and South America.....		2,719,616		
" all other countries.....		7,926,273		
		105,693,333		
Bolting cloth		4,289,605		
Total.....		109,982,938		

The exports of silk piece goods from Switzerland have shown a constant increase since 1890, with the exception of 1894, which was a bad year for the industry in all countries. The increase in the exports since 1890 has been 37 per cent.

Swiss manufacturers concede that 95 per cent. of their production is for export.

The silk loom equipment of Switzerland in 1900 was equal to 18,910 power looms (Table A). The amount named above as production is based on a loom output of 2,550 metres per annum, or say 6,000 francs per loom production. At Basle, in addition, about 80,000,000 francs' worth of ribbons are produced annually, Great Britain being the largest consumer. The factory laws of Switzerland permit 11 hours work per day, or 65 hours per week.

Value franc in U. S. currency, 19.3 cents.

Imports in United States of Dutiable Silks from *Switzerland* in 1900-1903, fiscal years ending June 30, were as follows:

Foreign Invoice Value in Dollars.

Description.	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$2,797,876	\$2,115,010	\$2,129,844	\$2,607,649
Laces and embroideries.....	140,517	112,084	176,738	322,271
Velvets, plushes and other pile fabrics....	17,248	29,822	18,137	107,158
Ribbons	834,972	469,009	1,141,040	1,772,134
Wearing apparel and ready-made clothing..	82,001	111,575	82,630	148,652
All others not specially provided for.....	39,695	42,349	116,753	144,251
Schappe or spun silk yarns.....	452,377	485,273	927,256	790,176
Total.....	\$4,364,686	\$3,365,122	\$4,592,398	\$5,892,291
Pounds of spun silk yarn imported.....	242,814	292,436	576,253	479,408

ITALY.

It is estimated that Italy now employs about one and a half million persons in her sericulture. The average yield of raw silk is about 10,000,000 pounds reeled from Italian cocoons, and another 2,000,000 pounds, adding the reeling of imported cocoons. The value of the silk crop at the prices of the past few years averages \$45,000,000 to \$50,000,000. About eighty per cent. of the output is exported to supply the silk manufacturers of France, Switzerland, Germany, Russia, England, and the United States, the remainder being consumed in the silk industry at home. In Italy, once the land of the gorgeous velvets of Genoa, the damasks and brocades of mediæval Sicily, Venice and Florence, the center now is at Como. Velvets are still made, however, in Genoa; and at Turin the manufacture includes a variety of goods. Sicily is devoted chiefly to the manufacture of ribbons.

At the beginning of the seventeenth century there were several weaving shops, as well as a few velvet looms, in Como, but it took about 150 years more before there was an improvement worth mentioning in the silk industry. Since 1740 the number of looms in Como increased steadily, and was, according to Prof. Pinchetti, as follows:

In 1800.....	575 hand looms
In 1848.....	2,520 hand looms
In 1860.....	3,000 hand looms

and, according to Mr. Fritz Zeuner, of San Pietro-Seveso, there were in Como and other Italian silk centers:

In 1890.....	22,414 hand looms and 2,535 power looms
In 1900.....	11,100 hand looms and 8,490 power looms

In the province of Como alone in 1900 there were 32 manufacturers with 3,965 power looms; in the province of Milan, seven manufacturers with 3,360 power looms, and in other provinces of Northern Italy five manufacturers with 795 power looms. The total Italian output annually was reckoned in 1901 the equivalent of about \$14,000,-

000. The indicated exports and imports of silk piece goods, silk mixed and spun silk weaves, in 1901, follow:

1901. Description.	ITALY.		Imports. Francs. Silk Piece Goods.
	Production. Silk Piece Goods. Francs.	Export. Silk Piece Goods. Quantity. Kilograms. Value. Lire.	
Silk piece goods.....	70,000,000	.....	10,357,000
			Laces, Ribbons, Passementerie and Confections.
All Silk—			13,069,000
Black, plain		209,152	12,130,816
Black, jacquard		12,915	878,220
Colors, plain		544,040	40,803,000
Colors, jacquard		63,815	5,424,275
Mufflers and Scarfs—			
Plain			
Jacquard		706	59,304
Silk Mixed Weaves—			
Black, plain		74,752	1,943,552
Black, jacquard		856	27,392
Colors, plain		121,562	4,862,480
Colors, jacquard		48,537	2,329,776
Grenadine and Chiffon Weave—			
Plain		535	37,450
Jacquard			
Spun silk weaves.....		22,886	595,036
Wearing apparel		29,589	3,698,625
Velvets, tulle, plushes, passementerie, etc.		44,629	2,709,913
Total.....	70,000,000	1,173,974	75,499,839
			Distribution.
			Value to Each Country Not Given.
To United States.....		48,278	
" Great Britain		403,817	
" Switzerland		185,452	
" Germany		105,665	
" Turkey		105,274	
" Africa		92,983	
" France		75,286	
" Austria-Hungary		12,652	
" Malta		4,298	
" Belgium		3,175	
" Spain		51,396	
" Central and South America.....		56,551	
" all other countries.....		29,147	
Total.....		1,173,974	

The silk loom equipment of Italy in 1900 for piece goods was equal to 11,633 power looms. (Table A).

Averaging the loom production at 6,000 francs per annum, Italy's production would be 70,000,000 francs.

There is a considerable interchange of silk (thrown and raw weaves) from Italy to France, Switzerland and Germany to be dyed and finished and returned again. Impossible, therefore, to estimate correctly the home consumption of Italy in silk goods. Factory laws permit 13 hours work per day, or 78 hours per week.

N. B.—*Tariff Duties*: The present rate (specific duties) on silk goods imported into Italy averages about 15 per cent.

Value of franc and lire in U. S. currency, 19.3 cents.

Imports in United States of Dutiable Silks from Italy in 1900-1903, fiscal years ending June 30th, were as follows:

Description.	Foreign Invoice Value in Dollars.			
	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$281,886	\$263,975	\$154,852	\$243,391
Laces and embroideries.....	14,641	16,781	20,818	39,071
Velvets, plushes and other pile fabrics....	1,883	2,887	863	3,487
Ribbons	4,047	822	5,355	37,962
Wearing apparel and ready-made clothing..	3,688	7,599	55,995	150,577
All others not specially provided for.....	52,517	39,352	50,784	45,589
Schappe or spun silk yarns.....	120,654	78,582	109,659	164,446
Total.....	\$479,316	\$409,998	\$398,326	\$684,523
Pounds of spun silk yarn imported.....	74,231	50,669	74,509	102,818

The value of the exports averages \$6.00 per pound, and the value of the imports \$7.00 per pound. The exports of silk fabrics from Italy to Great Britain have greatly increased in recent years, having more than doubled since 1897, and quadrupled in quantity since 1895. It is evident, likewise, that the Italians are able to manufacture more successfully, as their silk goods exports to all countries were 165 per cent. greater in quantity in 1901 than in 1895, and but 150 per cent. greater in value.

GREAT BRITAIN. The earliest historical notice known to us of silk manufacture in England is contained in an Act of Parliament passed in 1363, during the reign of Edward III., making exception to certain restrictions named in the Act against merchants, shopkeepers and manufacturers in favor of certain employments, silk being one of the number.

In 1454, during the reign of Henry VI., a law was passed protecting the silk women of London against the importation of narrow silk fabrics, such as ribbons, fringes, trimmings and embroideries. In 1463 a further Act prohibited the importation of laces, ribbons, silk, fringes, and similar goods. The weaving of plain and figured silks is attributed to the Flemish who settled in the country in the sixteenth century. The silk industry of England was greatly benefited by the revocation of the Edict of Nantes, it being estimated that 70,000 Huguenots, many of whom had been engaged in the fabrication of silks in France, sought refuge in England.

There was a time, during the first half of the last century, when England gave every promise of becoming a very formidable rival of the silk industry in France. About 1800, the annual consumption of raw and thrown silk in England was given as 900,000 pounds, says an English writer in the "National Review," evidently thoroughly

familiar with the facts he discusses. This quantity had increased in 1812 to 1,110,000 pounds; and by 1823 had doubled that amount. Coventry then had 7,000 working looms; Leek, 300 or 400; London, 24,000 hand looms; Macclesfield, 5,000; and Manchester probably 20,000. But internal dissensions began; disputes between weavers and masters were followed by strikes and consequent distress. The supply of silk goods was inadequate, and the demand led to wholesale smuggling. In 1826 the duties on raw and thrown silk were greatly reduced and foreign silks were allowed to be imported at an ad valorem duty of 30 per cent. Affairs were more prosperous for awhile. The imports of raw silk rose steadily from 22,741 bales in 1830 to 112,757 bales in 1857. Meantime, in 1846, the duties on imported silk fabrics were still further reduced to 15 per cent, and the duties on raw and thrown silk were abolished. In 1852, agitation had begun for the repeal of the duties on French silks; and twenty-seven of the silk firms of Manchester and the neighborhood memorialized the Government to repeal, "not partially and gradually," but "totally and immediately," the duties. Those manufacturers were prepared to meet the consequences, whatever they might be; and they maintained that they were fully equal to the competition which would ensue. "Those twenty-seven firms," the writer declares from whom these statements are taken, "have gone one and all out of existence, and from 1860, when the duties were wholly removed, the silk trade of England has suffered a painful decline. Instead of 24,000 looms in London there may be now (in 1894) 1,200; instead of 60,000 operatives, there are something under 4,000; and these figures express also the state of the trade at Manchester and Middleton combined. In 1845 there were 850 looms in Derby; now there are 150. In 1860 there were 8,886 ribbon looms in Coventry; now there are less than 1,500. In 1851 the population of Coventry was 86,801; in 1881, it was 46,000. At Macclesfield from 1841 to 1851 there were 5,000 to 6,000 looms, which number in thirty years was reduced by one-half. In Congleton in 1859 there were 40 silk throwsters, and now there are less than a dozen. This decline in manufactures is only too well corroborated by the decline in the imports of raw silk for manufacturing purposes." The total valuation of the annual import of manufactured silk from European countries in 1853 was £2,000,000, and in 1854 £2,225,000, the supply being chiefly from France. After the duty was removed by the Cobden Free Trade Act of 1860 the import rose in 1861 to £6,000,000, and in 1863 to £6,639,115. Ten years later it stood at £10,065,378. In 1894 the total value of imported silk goods footed up to over £12,000,000.

In 1899 it had reached £16,109,583. The Cobden Act dispersed the silk makers of England. Very many came to the United States. They came from Spitalfields, Coventry, Macclesfield and Manchester. Mons. Pariset relates in his volume, with evidently some satisfaction, how the French manufacturers profited at the very beginning in 1861, when the duty in England was removed, by sending their goods in large consignments across the Channel. He states that they were placed on the counters in the London shops and in those far north, in Glasgow, with a feeling of perfect security on the part of the English against successful competition. "But the consumer," he says, "was seduced by the novelty of the goods and influenced by the Parisian modes. During fifteen years the English manufacture sustained vigorously the struggle in spite of the constant encroachment of the importation. For France alone the importation of silks, which under the regime of prohibition was valued at 5,000,000 francs, and in 1832 represented 35,000,000, next attained more than 100,000,000." During the Franco-Prussian war in 1870 the English manufacturers made some slight headway, which was lost again in 1873. Although societies have been organized, technical schools opened, and all sorts of concerted efforts are still making to get back the lost industry, no headway has thus far been observed in undoing the damage inflicted by the free trade triumph. "We come now," remarks the candid writer heretofore mentioned, "to the efforts which are being made, not only to restore this prosperity, but to place the industry on a level with that which it occupies in France and Germany. We see that we have not only to restore the output of fifty years ago, but to increase this in a ratio corresponding to the increase of population and the consequent increased demand for silk manufactures of all description."

In 1902 England appears as the greatest consumer of French silks of any foreign country. The entire products of several Lyons mills are manufactured on advance orders from London.

From a highly interesting paper on the "British Silk Industry," read by Mr. Frank Warner in the applied art section of the Society of Arts, London, England, on December 15, 1903, the following extracts and statistics are taken to illustrate the situation of the silk trade in England at the present moment. The meeting was held under the auspices of the Silk Association of Great Britain and Ireland.

"From 1860, when the duty on the manufactured article was entirely abolished, the decline of the home industry has been both rapid and continuous."

Spitalfields (East end of London). "Nowhere has the ruin been more complete than in Spitalfields. If I put the total number of silk workers there to-day at from 300 to 400, I shall have estimated freely. * * * Formerly there were 50,000 people there who were directly and indirectly engaged in the silk trade."

Macclesfield. "Although now the most important silk producing center in England, the silk trade has fallen off nearly 50 per cent."

Coventry. "There are not more than 2,000 people employed to-day at Coventry, and only a few of these are working on ribbons."

Leek, celebrated for skein silk dyeing, and piece-dyeing, and finishing establishments of the Messrs. Wardle. "At Leek, there is now but very little weaving, the output consisting almost entirely of sewing and embroidery silks, bindings, braids, and trimmings."

Bradford. "Messrs. Lister & Co., Limited, of Manningham, Bradford, employ over 5,000 work people. They are by far the largest silk manufacturing firm in the country. * * * In addition to being extensive spinners of silk (from waste silk), they manufacture dress and furnishing fabrics, silk tapestries, Genoa velvets, antique velvets, velvets for millinery, dress and collar purposes, plushes, tussahs, pongees, fancy silks, fringes, trimmings, sewing silks, twist, etc. Also silk piles, seals, beavers, fox, ermine, mole, minever, etc., which are simply wonderful as imitations of the skins they represent, and it is not surprising that their goods find an enormous sale in Paris, Berlin, and practically all over the world."

Mr. Warner makes the claim that the English spinners of spun yarns (from waste silk), "make the finest qualities and counts in the world, and their products are extensively used in the lace trade of Calais, St. Etienne, Lyons, and other silk consuming countries."

Mr. Warner thus sums up his views on the English silk industry: "Of the causes which still operate against its revival, undoubtedly the chief one is that which has caused its decline, viz., the unrestricted importation of foreign goods made by cheaper labour."

The statistics presented by Mr. Warner are taken from England's Board of Trade returns, and are as follows:

Number of Persons employed in the Silk Industry decennially, from 1851 to 1901.

Year.	Males.	Females.	Total.
1851.....	53,936	76,787	130,723
1861.....	43,732	72,588	116,320
1871.....	29,225	53,738	82,963
1881.....	22,205	42,630	64,835
1891.....	10,098	28,937	39,035

*Silk dyers, machinists, and many others whose trades depend on silk are not included in these returns, or the numbers would be much larger.

Comparative Table of Board of Trade Returns for Imports of Raw, Thrown and Waste Silk, and Manufactured Silk Goods—1858-60 and 1900-03.

	1858.	1859.	1860.
Raw	(Lbs.) 6,277,576	9,920,891	9,178,647
*Thrown	" 358,269	327,462	224,335
Waste	(Cwts.) 16,765	20,808	17,435
Goods	(Value) £2,111,819	£2,655,357	£3,246,119
	1900.	1901.	1902.
Raw	(Lbs.) 1,413,320	1,322,840	1,262,848
Thrown and spun.....	664,641	624,859	802,964
Waste	(Cwts.) 60,720	48,162	56,782
Goods	(Value) £14,281,250	£13,030,321	£13,416,400
			£12,663,771

*There were probably no imports of Spun Silk at this date.

†Lowest import of Raw Silk since 1816.

The annual production of silk goods in Great Britain now is estimated to be about £3,000,000 or \$15,000,000.

To illustrate in part the exchange of silk fabrics between the principal silk manufacturing countries of the Continent and England in 1900, the following tabulation is presented:

Imports and Exports of Great Britain (1900) from:	
Imports.	Exports.
115,111,000 fcs.	France.....10,282,000 fcs.
48,426,162 fcs.	Switzerland.....Not known
41,127,000 fcs.	Germany.....2,404,800 fcs.
*26,989,620 fcs.	Italy.....Not known
231,653,782 fcs.	

*Value estimated. The reported quantity is 385,566 kilograms of fabrics.

Imports in United States of Dutiable Silks from England in 1900-1903, fiscal years ending June 30, were as follows:

Foreign Invoice Value in Dollars.				
Description.	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$ 577,948	\$ 506,024	\$ 508,352	\$ 489,931
Laces and embroideries.....	230,412	348,409	322,860	319,088
Velvets, plushes and other pile fabrics....	20,493	6,985	12,533	21,597
Ribbons	45,387	46,599	52,754	52,276
Wearing apparel and ready-made clothing..	239,763	300,716	437,939	444,016
All others not specially provided for.....	317,677	213,333	302,807	281,932
Schappe or spun silk yarns.....	1,373,121	511,794	425,218	409,375
Total.....	\$ 2,804,801	\$ 1,933,860	\$ 2,062,463	\$ 2,018,215
Pounds of spun silk yarn imported.....	1,052,068	418,194	336,148	360,026

AUSTRIA-HUNGARY.

1900. Distribution.	Production. Silk Piece Goods. Kronen.	Export. Silk Piece Goods. Kronen.	Import. Silk Piece Goods. Kronen.
Silk piece goods.....	80,000,000	.....	.....
All silk .....	.....	5,630,000	18,130,000
Silk mixed .....	.....	4,262,000	7,860,000
Total.....	80,000,000	9,892,000	25,990,000

Seven-eighths of the Austrian silk industry is for home consumption.

The silk loom equipment of the empire is equivalent to 10,000 power looms (Table A).
 The tariff duties (specific) average about 15 per cent.
 Value of Kronen in U. S. currency is 20.3 cents.

OTHER COUNTRIES.

RUSSIA possesses modern silk establishments at Moscow, and the annual output of the Empire (in Europe) is about \$21,000,000 in value. A special feature is the weaving of gold and silver tissues, together with brocades, for sacerdotal use and for traffic with Central Asia.

SPAIN produces silk goods valued at \$4,000,000 on an average. The establishments are in Barcelona, Valencia and Grenada.

PORTUGAL, BELGIUM, AND SWEDEN, each and severally, produce a few silk goods. The total values of their products present, however, no consideration of evident importance in the world's production.

ASIA AND THE EAST. Like much else in the region of the most remote civilization, silk fabrication is left to please the imagination with its history and its modern condition. With the Turk in particular, both in Europe and in Asia, the manufactured product of silk appears to be quite an unknown quantity. He uses most of it himself. His looms are primitive and the designs are very oriental. It is not easy to estimate the amount of silk goods produced. There are no statistics given under official authority which can be obtained.

INDIA. The silk industry of India is known chiefly by the fouldars, or Corahs sent to Europe. Benares and its district form the most important center of the manufacture, though silk is made in nearly all the provinces of India. The industry is largely for domestic consumption; and, it should be added, less goods are produced at low prices than formerly, because the population has adopted the use of cottons and woolens made in England. Silks have become more exclusively for the rich. The manufacture in India of silk mixed with other stuffs is said to be considerable.

In British India great attention has been given in recent years to raising native or Tussur silk. The most improved reeling processes and highly skilled reelers are employed, but the export output cuts no commercial figure of importance at this writing outside of about 600,000 pounds annually to England, France and Italy.

CHINA. In all the villages of the great empire there are dense populations composed of artisans and agricultural laborers. With these the weaving of silk in the household has been practiced

from generation to generation. No official statistics are collected of their products. In 1883 it was estimated by a French writer, M. Natalis Rondot, that the number of looms should be at least reckoned at 350,000, and the product at 300,000,000 francs, or \$60,000,000. The exports include taffetas, foulards, satins, serges, and crepes; but it was reported, after the sacking of the summer palace of the Emperor during the war in 1894, that the Chinese manufacture of silks and velvets was displayed in a way not familiar to the European. The best of everything had been retained within the Empire.

Messrs. Chabrieres, Morel & Co., of Lyons, France, estimated in 1902 that the Chinese silk industry consumes annually about 18,600,000 pounds of raw silk, or say 55 per cent. of the estimated production of China. This estimate would indicate a probable annual value of production of silk stuffs in China of \$70,000,000 or upwards. The imports in United States of silk goods from China, 1900-1903, are appended:

Imports in United States of Dutiable Silks from *China* in 1900-1903, fiscal years ending June 30th, were as follows:

Description.	Foreign Invoice Value in Dollars.			
	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$ 26,724	\$ 30,021	\$ 58,397	\$102,929
Laces and embroideries.....	27,549	30,831	38,466	43,060
Velvets, plushes and other pile fabrics.....				
Ribbons	86	352	43	2
Wearing apparel and ready-made clothing..	90,552	82,654	90,628	87,039
All others not specially provided for.....	30,270	41,460	38,958	30,331
Schappe or spun silk yarns.....				
Total.....	\$175,181	\$185,318	\$226,492	\$263,361
Pounds of spun silk yarn imported.....	None	None	None	None

JAPAN. In Japan silk factories are established in many provinces. The greatest number are in Kioto, in the province of Yamashiro, notable for taffetas, brocades and crepe. Next in rank is Kiriū, in the province of Jōshū, Gunma Prefecture. Published statistics not long since stated that there were 382,000 hand looms employed in the several textile industries in Japan. Among these, though details are not given, it was estimated the silk looms numbered 40,000. Half of the output was attributed to Kioto, and one-quarter to Kiriū. The power loom weaving in Japan devoted to silk fabrics is inconsiderable. At Kioto there is a power loom silk plant of 500 looms, making 464,000 yards of cotton back satins annually. The product is chiefly used for obis and edges of women's kimonos, brocades for domestic use, and cotton back satins for export to China. It is the largest power loom silk plant in Japan. At the same place there is a smaller plant of 250 power looms, running on similar goods, and a still smaller plant of 40 power looms making umbrella silks for domestic use.

At Kiriu there is an establishment of 400 power looms making cotton back satins for export to China and for domestic use, and these four establishments constitute, we understand, the silk power loom equipment of Japan.

All the Habutai silks shipped to the United States and Europe are made on hand looms. A few power looms in Japan are making linen fabrics for domestic use. Like Italy, Japan devotes more attention to raising silk than to manufacturing the raw product. Messrs. Chabrieres, Morel & Co.'s estimate chart, issued in December, 1902, indicating the world's current production and consumption of raw silk, placed the production of Japan at 16,093,580 pounds, and the domestic consumption at 6,613,800 pounds, or say 41 per cent of the production.

According to the returns of the Department of Agriculture and Commerce of Japan in 1903, the raw silk production of Japan in 1902 was 10,940,169 kin (1,3225 pounds), say 14,468,373 pounds. The amount reported as exported was 8,697,706 kin, showing a domestic consumption of say 3,000,000 pounds in that year. Undoubtedly there is a considerable quantity of waste silk entering into the production of silk tissues in Japan, for the reported production of silk tissues in 1902 amounts to 76,941,003 yen, say \$38,316,619. The output of production of silk tissues in the four largest weaving districts amounted in 1902 to \$23,591,880. The exports of silk tissues in the same year amounted to \$15,627,653. We must therefore conclude that the reported production of raw silk, and of noshi, waste, etc., are understated in the accompanying official reports, the reason apparently being that the actual production is beyond the reach of the statistical authorities of Japan. The latest returns regarding the silk trade of Japan, production, exports and imports, are appended:

EMPIRE OF JAPAN—1902.

Table No. 1.

Production.	Kins.	Pounds.	Yens.	Value in U. S. Gold.
Amount of production of raw silk.....	10,940,169	14,468,373	Not given	Not given
“ exported raw silk.....	8,697,706	11,502,716	74,667,331	\$37,184,330
“ production of Noshi, waste, etc.	4,446,781	5,880,867		
“ exported Noshi, waste, etc.	4,789,287	6,333,832	4,468,769	2,225,526
“ production silk tissues, 1902			76,941,003	38,316,619
“ production in four largest weaving districts:				
No. 1, Kioto.....			19,034,985	9,479,422
No. 2, Fukui.....			14,629,427	7,285,454
No. 3, Gunma.....			8,068,741	4,018,236
No. 5, Ishikawa....			5,640,097	2,808,768

The 18th statistical report published by the Department of Agriculture and Commerce of Japan, 1903.

Value of yen in U. S. currency, 49.8 cents. Kin, 1.3225 pounds.

Exports—Description.	1902.		1903.	
	Yens.	U. S. Gold.	Yens.	U. S. Gold.
Raw silk up to 13 deniers.....	20,234,410	\$10,076,736	17,735,014	\$ 8,833,531
Raw silk over 14 deniers.....	51,636,645	25,715,049	48,042,613	23,925,221
Others	4,988,421	2,484,234	8,648,278	4,306,843
Silk Noshi waste.....	1,694,271	843,747	1,997,802	994,005
Other silk waste.....	4,010,524	2,001,723	4,993,669	2,486,847
Total silk materials.....	82,573,271	\$41,121,489	81,420,376	\$40,547,347
Silk tissues (silk crepes).....	41,160	\$ 20,498	156,922	78,147
Silk tissues, Habutze, plain.....	23,462,664	11,684,406	24,886,460	12,393,458
figured	1,222,742	608,925	2,624,017	1,306,760
Silk tissues, Kaiki.....	2,672,887	1,331,100	1,000,386	498,192
others	478,686	238,386	423,743	211,024
handkerchiefs	3,154,236	1,570,809	2,938,420	1,463,333
embroidered	73,895	36,799	82,398	41,034
All others	274,560	136,730	168,665	83,995
Total silk piece goods.....	31,380,830	\$15,627,653	32,281,011	\$16,075,943
Total exports	113,954,101	\$56,749,142	113,701,387	\$56,623,290

The Foreign Trade of Japan, Published by the Department of Finance of Japan, 1904.

Imports—Description.	1902.		1903.	
	Yens.	U. S. Gold.	Yens.	U. S. Gold.
Cocoons	546,365	\$ 272,090	927,018	\$ 461,655
Raw silk	1,382	688	6,778	3,375
Tussah silk yarn.....	955,275	475,727	596,725	297,169
Silk yarns	7,109	3,540	2,934	1,461
Total silk materials.....	1,510,131	\$ 752,045	1,533,455	\$ 763,660
Pongees	84,187	41,925	45,360	22,589
Satins	37,529	18,689	19,936	9,928
Silk faced cotton satins.....	122,311	60,911	36,407	18,131
Pinsh and velvets, silk and cotton....	631,233	314,354	265,372	132,155
All other silk tissues.....	71,582	35,648	40,060	19,950
Total silk piece goods.....	946,842	\$ 471,527	407,135	\$ 202,753
Total imports	2,456,973	\$ 1,223,572	1,940,590	\$ 966,413

Imports in United States of Dutiable Silks from *Japan* in 1900-1903, fiscal years ending June 30th, were as follows:

Foreign Invoice Value in Dollars.

Description.	1900.	1901.	1902.	1903.
Dress and piece goods.....	\$ 2,736,788	\$ 2,135,727	\$ 3,842,379	\$ 3,268,355
Laces and embroideries.....	177,924	126,968	155,764	195,353
Velvets, plushes and other pile fabrics.....				388
Ribbons	15	10	49	104
Wearing apparel and ready-made clothing..	74,014	79,593	98,793	114,697
All others not specially provided for.....	432,403	499,852	618,474	380,548
Schappe or spun silk yarns.....		688	4,393	2,085
Total.....	\$ 3,421,144	\$ 2,842,888	\$ 4,719,851	\$ 3,961,530
Pounds of spun silk yarn imported.....		405	12,305	2,189

SILK PRODUCTION—OTHER COUNTRIES, 1900.

Approximate statistics published in the official report of M. J. M. Piotet, of Lyons, reporter of the International Silk Jury at the Paris Exposition of 1900.

M. Piotet indicates that, in the absence of official statistics, his estimate averages the best information obtainable for the five years, 1895-1899.

Country.	Production.	Export.	Import.
Russia in Europe.....	\$ 21,000,000	\$ 300,000	\$ 900,000
Russia in Asia.....	*4,000,000	None	300,000
Spain and Portugal.....	4,000,000	300,000	2,240,000
Belgium and Holland.....	None	None	6,400,000
Sweden and Norway.....	None	None	1,300,000
Denmark	None	None	1,000,000
Egypt	*1,500,000	Feeble	1,100,000
Algiers, Tunis and Morocco.....	*600,000	None	350,000
The Soudan and Central Africa.....	None	None	460,000
Cape Colonies and Madagascar.....	None	None	280,000
Australasia (British)	None	None	2,600,000
Turkey, in Europe and Asia.....	*1,500,000	200,000	3,160,000
Greece	*100,000	None	200,000
Persia	*2,000,000	Feeble	80,000
Caucasus	*2,000,000	None	Feeble
Afghanistan and Beloochistan.....	*400,000	None	Feeble
Brazil	None	None	700,000
Argentine Republic	None	None	510,000
Paraguay and Uruguay	None	None	370,000
Chili, Peru and Bolivia.....	None	None	330,000
Venezuela, Ecuador, Colombia and Guiana.....	None	None	200,000
Mexico	*100,000	None	550,000
Central America	None	None	110,000
Canada	*500,000	.....	2,600,000
British India	*13,000,000	1,000,000	4,000,000
The Philippines	None	None	100,000
Corea	Small	None	400,000
Indo-China and Burmah.....	*9,000,000	600,000	3,000,000
China	*70,000,000	10,000,000	1,400,000
Total.....	\$129,700,000	\$12,400,000	\$34,640,000

*Indicates figures are based on reported consumption of raw silk.

WORLD'S PRODUCTION AND CONSUMPTION OF RAW SILK.

1902.

A highly interesting chart, indicating the world's current production and consumption of raw silk, was issued in December, 1902, by Messrs. Chabrieres, Morel & Co., of Lyons, France. They state their figures are based either upon their own estimates of each country's production and consumption, or upon the statistics issued from 1900 to 1902 in Lyons, by the Chamber of Commerce and the Syndicate of Silk Merchants of that city.

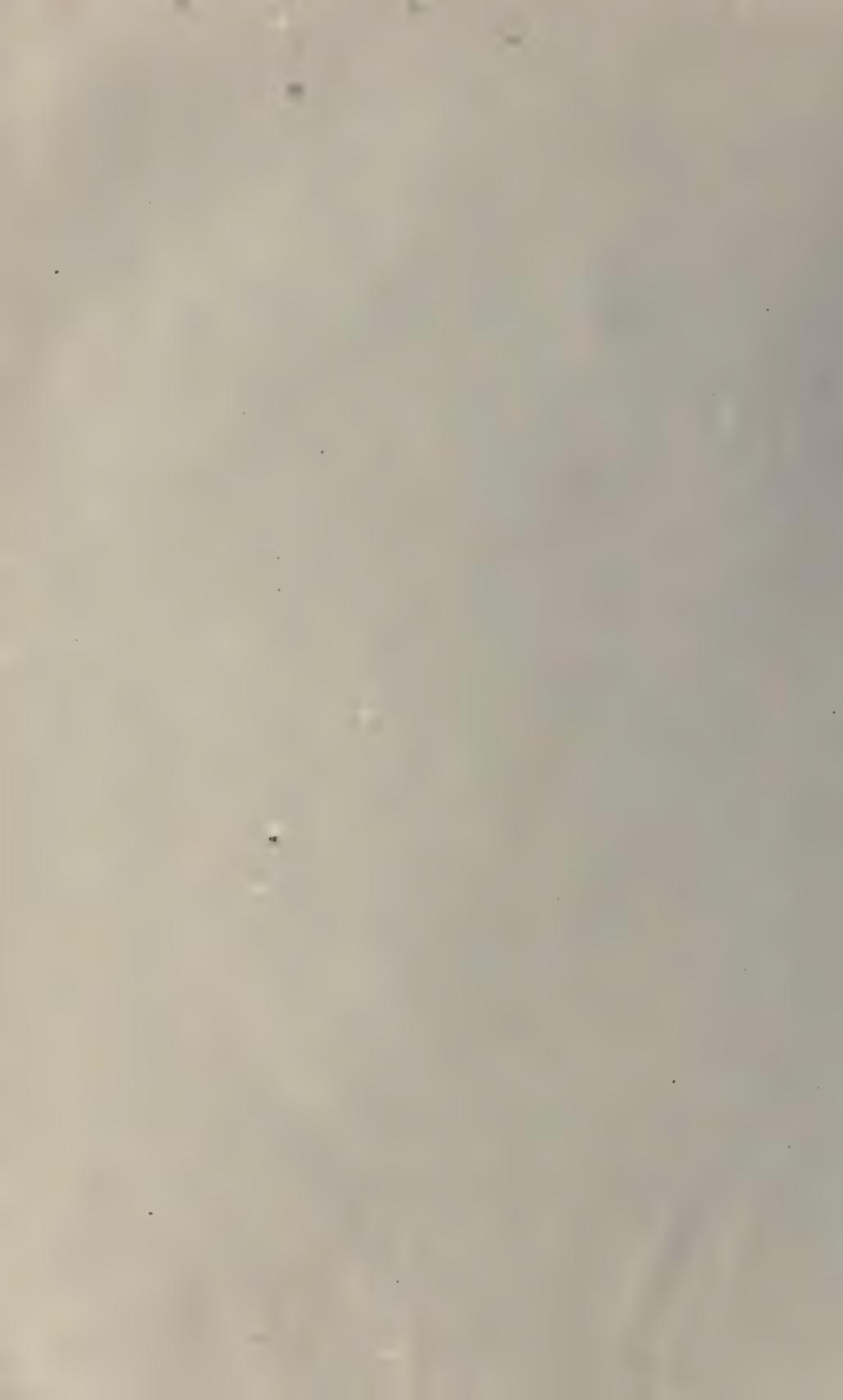
Reduced to pounds the figures are as follows for the respective countries:

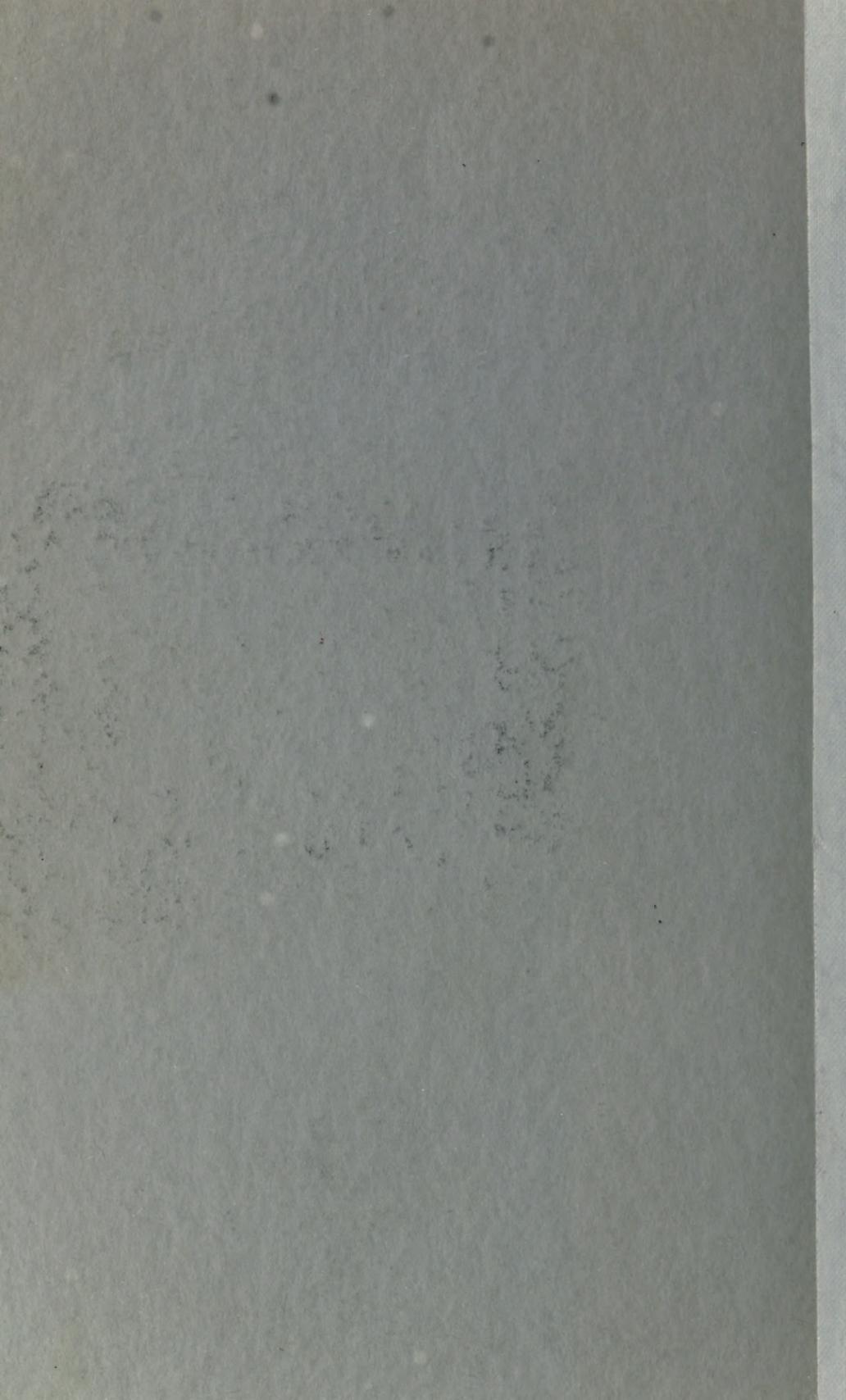
	Production, Pounds.	Consumption, Pounds.
EUROPE —France	1,543,220	8,818,400
Italy*	9,726,695	2,204,600
Switzerland	110,230	3,417,130
Spain	180,777	440,920
Austria	449,738	1,598,335
Hungary	253,529	.....
Russia and Caucasus.....	881,840	3,086,440
Bulgaria, Servia, Roumania.....	194,005	.....
Greece and Crete.....	132,276	33,069
Salonica, Adrianople	440,920	.....
Germany .....	.....	6,172,880
England .....	.....	1,763,680
AMERICA —United States .....	.....	10,802,540
ASIA —Brutia	881,840	110,230
Syria	992,070	220,460
Persia	727,518	363,759
Turkestan	1,807,772	1,543,220
China	24,867,888	14,186,601
China, Canton	8,818,400	4,409,200
Japan	16,093,580	6,613,800
India	2,645,520	3,086,440
Tonquin and Anam.....	2,204,600	1,984,140
AFRICA —Egypt .....	.....	396,828
Tripoli and Morocco.....	.....	220,460
Algeria and Tunis.....	.....	165,345
Other countries and balance.....	.....	1,813,941
Reduced to pounds.....	72,952,418	72,952,418

N. B.—Chinese Tussah Silks are included in Messrs. Chabrieres, Morel & Co.'s statement.

It will be noticed that the statement estimates the domestic consumption of China at, say, 55 per cent. of her production; domestic consumption of Japan at, say, 41 per cent. of her production.

*Later official figures published in April, 1903, indicate the production of Italy to have been 65,000 kilograms, or, say, 143,299 pounds, greater in the silk season 1902-3.





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Allen, Franklin
The silk industry of
the world at the opening
of the twentieth century

