

REPORT

ON THE

SILK MANUFACTURING INDUSTRY

OF THE

UNITED STATES.

BY

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LETTER OF TRANSMITTAL.

NEW YORK, N. Y., *October 7, 1881.*

Hon. FRANCIS A. WALKER,

Superintendent of Census, Washington, D. C.

DEAR SIR: I have the honor to submit herewith a report upon the silk manufactures of the United States. The report covers the entire period from the earliest introduction of silk into America to June 30, 1880. I am under obligations, which I take great pleasure in acknowledging, for assistance in the historical references, to Mr. J. Carson Brevoort, of Brooklyn, to the Long Island Historical Society, and to the Society Library of New York; and for efficient aid, in the statistical portion of the work, to Mr. P. T. Wood, of New Providence, New Jersey. In closing my labors I embrace the opportunity to express my hearty thanks for the uniform promptness and courtesy of your office at Washington.

Yours respectfully,

WM. O. WYCKOFF,
Special Agent.

SILK MANUFACTURE.

The Spanish conquest of Mexico was the means of introducing the silk industry on this continent. We may dismiss the vexed question alluded to by Prescott (*a*) as to whether the Aztecs made fabrics containing silk. Humboldt declares that the material they used was not the product of the *Bombyx mori*.(*b*) Herrera asserts that there was no silk, (*c*) and Acosta, that there were no mulberry trees in the Indies prior to their introduction from Spain. The voluminous work of Hernandez (*d*) gives full accounts of the plants and animals of the new world, and does not mention the silkworm or the mulberry.

In the year 1522, Cortes, as ruler of New Spain (Mexico) prepared a plan for its government; the details included the appointment of officials in charge of the silk industry. The first step was the planting of mulberry trees, and we learn that these were flourishing near the city of Mexico a few years afterward. The record of certain legal proceedings has secured to history the date of the introduction of the silkworm into America. After Cortes withdrew from personal rule in New Spain, the authorities who were placed in charge by the king made an investigation of what had been done by the board of auditors who preceded them. This was in the year 1531. Among the items of this procedure is a statement (*e*) that a quarter of an ounce of silkworm seed (eggs) was sent on public account from Spain to Francisco de Santa Cruz, a citizen of Mexico. The seed arrived in safety, and was placed by Francisco with Auditor Diego Delgadillo, who was a native of Granada, and presumably knew something of silk culture in his own country, where it was introduced by the Moors. Delgadillo made use of the eggs in a garden about a league from the capital, where mulberry trees were in good condition for the support of the worms. The experiment was eminently successful. The auditor returned two ounces of eggs to Francisco, and retained enough to supply various amounts to other people. The point of the accusation against Delgadillo was that he sold this seed at \$60 per ounce; thus disposing of the property of the crown for his own benefit. He was convicted of the crime, though credited with the introduction of silk into the country.

This was the beginning of an industry in the culture of silk, its manufacture into woven goods, and their export abroad, which has not generally attracted the notice of modern writers on the subject. Acosta gives the following account:

But the silke that is made in New Spaine is transported into other countries, as to Peru. There were no mulberrie trees in the Indies but such as were brought from Spaine, and they grow well, especially in the province which they call Mistecqua, where there are silkwormes, and they put to worke the silke they gather, whereof they make very good taffetaes: Yet to this day they have made neyther damaske, sattin nor velvet. (*f*)

By the end of the sixteenth century this manufacture had almost wholly ceased. (*g*)

So far as silk culture is concerned, however, the industry was after a short interval to reappear on this continent, and unfold itself in the sunshine of royal favor. A brief reference to European events may throw light on the causes that brought about the new effort. At the beginning of the seventeenth century Henry IV, of France, was at the height of his glory and power. Olivier de Serres, whom the French call "the father of agriculture", published in the year 1600 an important and suggestive book on field husbandry. The work attracted the attention of the king, and he bestowed high honor and authority upon its author. Upon the recommendation of de Serres, 14,000 mulberry trees were brought from Italy and planted in the royal gardens of France. Shortly afterward silkworm eggs were similarly procured, and other measures were taken to encourage the nascent manufacture. The prime minister of the king looked coldly upon this enterprise. An old and respectable citizen, the spokesman of a

a Conquest of Mexico, vol. i, p. 144; note.

b Essai Politique, book v, chap. 12.

c Historia General, decade v, book vi, chap. 12.

d Rerum Medicarum Novæ Hispaniæ Thesaurus (Rome, 1651), first published in 1607.

e Historia General, decade iv, book ix, chap. 4. Also, Descripcion, chap. x.

f The Naturall and Morall Historie of the East and West Indies, by Joseph de Acosta, book iv, chap. 32. Edwd. Grimestone's transl.; London, 1604.

g Essai Politique, Humboldt, book v, chap. 12.

deputation from the silk merchants of Paris, was at this time treated with extreme rudeness by Sully. The quaint garb of the merchant, ornamented with various silks, was made the subject of mockery; the old man, while on his knees to the great minister, was twirled around and dismissed with a sneer. Returning to his friends, the merchant reported that the servant was above his master. Never was there a greater mistake. The king had a will of his own, and was about to help the silk merchants of France toward a prosperity far beyond their dreams. Sully tells the story of his own discomfiture.^(a) "I exclaimed against this project, which I never liked; but the king was prepossessed; all that I could say was futile." In vain the minister argued that luxury should be repressed, most certainly not encouraged. "I could not persuade him. 'Are these,' he said to me, 'the good reasons you have to offer? I would much rather fight the king of Spain in three pitched battles than all those gentlemen of the robe, of the inkstand, and of the city, beside their wives and daughters, whom you will bring down upon me with your fantastic regulations.'"

The industry was established in France and made notable progress, as to both culture and manufacture. It soon excited the envy of ^(b) James I of England, and he proceeded to copy, even in details, the performance of Henry of Navarre. So the royal gardens at Oatlands were stocked with mulberry trees and the worms were fed on English soil. In 1608 King James addressed a long letter on the subject, written with his own hand, to the lords- lieutenant of every county in his kingdom. He orders that they shall "persuade and require such as are of ability to buy and distribute in your county the number of ten thousand mulberry plants, which shall be delivered to them at the rate of three farthings the plant, or at six shillings the hundred."^(c) Mulberry seeds were to be furnished also in the following spring, and to be similarly distributed, *i. e.*, at a price. The supposed wants of England having received attention, America was next looked after. In fact, however, nearly a century elapsed after their introduction by the Spaniards before silkworm eggs were again brought to this continent from Europe, and King James supplied the "seed". The undertaking met with delay at the outset. The expedition of Sir George Summers with a fleet of seven vessels bound for the shores of Virginia in 1609, suffered shipwreck and disaster. Two vessels were lost entirely; the rest were driven by storm to the Bermudas. A part of the expedition ultimately reached Virginia, but brought no silkworm eggs. This was two years after the settlement of Jamestown (named in honor of the king) by the London Company, the holders of a grant which covered the region between 34° and 41° of latitude. There is abundant evidence that the colonists were in no condition at this period to prosecute silk culture. Indeed they were soon afterward on the verge of starvation.

The historian of the unlucky voyage of 1609, William Strachy, seems to have taken much interest in silk. He mentions that they found silkworms on the Bermuda islands rolled up in the leaves of the palmetto, and that these worms were like those described by Acosta, that were found on the *tunall* tree. The two statements are bewildering errors, and it is worth while to notice them as of a piece with many records of native silkworms found in the Bermudas and on the American continent. The true silkworm does not roll itself in palmetto leaves. Acosta had evidently not seen the "worms" he refers to; his description of the cactus on which they feed and the red dye that is obtained from them, shows that he was giving an account on hearsay, being very imperfectly informed, respecting the cochineal insect. No doubt there were strong representations made to King James of the fitness of the colony for silk raising. Sir Thomas Gates, about the year 1610, was adjured by the Council of Virginia to "deal plainly with them" as to the capabilities of the new country and the prospects of the colony. He replied under "a solemn and sacred oath". In the course of this testimony he says:

There are innumerable white mulberry trees, which in so warme a climate may cherish and feede millions of Silkwormes, and return us in a very short time as great plenty of Silke as is vented into the whole world from all parts of Italy.^(d)

For some years the colony was in a forlorn condition,^(e) but in 1619 great efforts were made for its relief. Silk culture appears prominently as among the means to help the people out of their poverty, in the measures taken by legislative and governing powers on both sides of the Atlantic. The colonial assembly, in its first brief session of five days, found time to order the planting of mulberry trees and the rearing of silkworms.^(f) The following is recorded as one of the items in a sort of invoice described as "A Note of the Shipping, Men and Provisions sent to Virginia by the Treasurer and Company in the Yeere 1619":^(g)

Silke: for which that Countrey is exceeding proper, having innvmerable store of Mvlberry Trees of the best, and some Silkwormes naturally found upon them, producing excellent Silke: some whereof is to be seene. For the setting vp of which Commoditie his Majesty hath beene graciously pleased now the second time (the former having miscarried) to bestow vpon the Company plenty of Silkwormeseed of his owne store, being the best.

^a Mémoires de Sully, année 1603, liv. xvi; London, 1778, vol. v, pp. 150-159.

^b An Essay upon the Silk-Worm, by Henry Barham; London, 1719, p. 46.

^c *Ibid.*, p. 50. This letter was printed with "Instructions for the Increasing of Mulberrie Trees and the Breeding of Silke-Wormes" (illust.), London; 1609.

^d Purchas, his Pilgrimes, vol. iv, p. 1734.

^e Sir Dudley Diggs asserts in 1615: "The great Expence that the Nobility and Gentry have been at in planting Virginia is in no way recompensed by the poor Returns from thence." An Historical and Chronological Deduction of the Origin of Commerce, by Adam Anderson; London, folio edition, 1764, vol. i, p. 494.

^f A Reporte of the Manner of Proceedings in the General Assembly, convented at James City in Virginia July 30, 1619, by John Pory, the Secretary and Speaker.

^g Purchas, vol. iv, p. 1777.

The royal gardens at Oatlands furnished this supply of eggs, and from there also a person skilled in silk culture was sent to give instruction to the colonists. In the same year King James issued his famous "decree and proclamation" against tobacco, checking its import into England by an almost prohibitory duty. Nor was that duty intended to protect home industry in the Virginia weed, for another proclamation in that year forbade the cultivation of tobacco in England and Wales, and the plants growing in the kingdom were uprooted. The king was undoubtedly anxious to have silk raised instead of tobacco throughout his domain. Another circumstance made 1619 a memorable year; it was then that this most christian monarch, while striving to check the comparatively harmless vice of using tobacco, sanctioned and authorized by royal charter a joint-stock company in London with the exclusive privilege of taking negroes from Africa into slavery in the colonies. The effects of that enterprise were permanent.

Sending out silkworm eggs from England was followed in 1622 by the most peremptory and urgent directions to encourage silk culture. Aid was promised on the one hand to colonists who entered heartily into the work, and on the other hand punishments were ordered for those who neglected the matter. As will be seen by the documents, the king was impatient and would brook no further delay :

His Maesties gracious Letter to the Earle of South-hampton, Treasurer, and to the Counsell and Company of Virginia here: commanding the present setting vp of Silke Workes, and planting of Vines in Virginia:(a)

Right trusty and wellbeloued, We greete you well: whereas We understand, that the soyle 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 breede of Silkwormes, and setting vp of Silkeworkes in those parts. And therefore of Our gracious Inclination to a designe of so much honour and advantage to the publiik, We have thought good, as at sundry other times, so now more particularly to recommend it to your speciall care, hereby charging and requiring you to take speedy order, that our people there use all possible diligence in breeding Silkwormes, and erecting Silkeworkes, and that they rather bestow their travell in compassing this rich and solid Commodity, then in that of Tobacco; which, beside much vnnecessary expence, brings with it many disorders and inconueniences. And for as much as Our seruant, John Bonoell (b) hath taken paines in setting downe the true vse of the Silkeworme, together with the Art of Silke-making, and of planting Vines, and that his experience and abilities may much conduce to the aduancement of this businesse; We doe hereby likewise require you to cause his directions, both for the said Silkeworkes and Vineyards, to be carefully put in practice thorowout our Plantations there, that so the worke may goe on cheerefully, and receive no more interruptions nor delays.

Giuen vnder Our Signet, at Our Pallace of Westminster, the ninth day of Iuly, in the twentieth yeare of our Raigne of England, France and Ireland, and of Scotland the five and fiftieth.

To our right trusty and right wellbeloued Cousin and Councillour, HENRY, Earle of South-hampton, Treasurer of our Plantation in Virginia, and to Our trusty and wellbeloued, the Deputy, and others of our said Plantation.

WINDEBANK.

Virginia.

The royal instructions were transmitted and strongly enforced, as appears by the following communication:

The Treasourour, Counsell and Company of *Virginia*, to the Gouvernour and Counsell of State in *Virginia* residing:

After our very hearty commendations: His Sacred Majesty, out of his high wisdom and care of the noble Plantation of Virginia, hath bene graciously pleased to direct his Letters to us here in *England*, thereby commanding vs to aduance the setting vp of *Silkeworkes*, and planting of *Vineyards*; as by the Copy herewith sent, you may perceiue. The intimation of his Maesties pleasure, we conceiue to be a motiue sufficient, to induce you to employ all your indeouors to the setting forward those two Staple Commodities of *Silke* and *Wine*; which brought to their perfection, will infinitely redound to the honour, benefit, and comfort of the Colony, and of this whole Kingdom: yet we, in discharge of our duties, doe againe renew our often and iterated Instructions, and inuite you cheerefully, to fall vpon these two so rich, and necessary Commodities. And if you shall finde any person, either through negligence or wilfulnesse, to omit the planting of *Vines*, and *Mulberry trees*, in orderly and husbandly manner, as by the Booke is prescribed, or the planting of conuenient rooms for the breeding of *Wormes*; we desire they may by seuer censures and punishment, be compelled thereunto. And on the contrary, that all fauour and possible assistance be giuen to such as yeelde willing obedience to his *Highnesse* Commands therein. The breech or performance whereof, as we are bound to giue a strict account, so will it also be required of you the *Gouvernour* and *Counsell* especially. Herein there can be no Plea, either of difficulty or impossibility; but all the contrary appeares, by the naturall abundance of those two excellent Plants afore-named euerywhere in *Virginia*; neither will such excuses be admitted, nor any other pretences serue, whereby the businesse be at all delayed; and as wee formerly sent at our great charge the *French Vignerons* to you, to teach you their Art; so for the same purpose we now commend this Booke vnto you, to serue as an Instructour to euery one, and send you store of them to be dispersed ouer the whole Colony, to euery Master of a Family one, Silke-seede you shall receiue also by this Ship, sufficient to store euery man: so that there wants nothing, but indvstry in the Planter, svddenly to bring the making of *Silke* to its perfection: which either for their owne benefit (we hope) they will willingly indeouor, or by a wholesome and necessary seuerity they must be inforced.

The letter goes on to state that it is of urgent character, and not to be taken as a common instruction. There is a marginal note stating that the "Booke" referred to contains good rules for silkworke, vines, and other husbandry. The document itself is signed by the Earl of Southampton. In 1623 the legislature of the colony issued further orders requiring mulberry trees to be planted, the fine for neglect being 20 pounds of tobacco. The act also offered a premium of 50 pounds of tobacco for every pound of reeled silk produced.(c)

At this point we can give what is probably the earliest quotation for raw silk in this country. It includes also the price of cocoons; here described as "coddess" and elsewhere as "bottomes". Too much stress should not be

a Purchas, vol. iv, p. 1787, *et seq.* b This name is also spelled "Bonoell". Vid. Barham's Essay, which also gives these letters.

c This curious act was reproduced in full in a monthly publication, *The American Silk Grower*, Philadelphia, December, 1838.

laid upon the accuracy of the record, as it was put in print nearly thirty years after the period to which it refers. The traffic could not have been large, but there is other evidence that some silk was made, and we may in any case regard the quotations as "offering prices" of that date :

From "A valuation of the commodities growing and to be had in Virginia: valued in the year 1621. And since those Times improved in all more or lesse, in some $\frac{1}{2}$, in others $\frac{1}{3}$, in many double, and in some treble.

"Silk Coddess, two shillings sixpence the pound.

"Raw silk, 13s. 4d. the pound, now at 25s. and 28s. per pound.

"Silk grasse to be used for Cordage, 6d. the pound." This has reference to a fibrous plant growing wild and extensively in the colony. Queen Elizabeth had a gown made of this material, described as "a substantial and rich peace of Grograine". It was hoped that by cultivation the fibre of this grass could be improved so as to equal the silk which it was said to resemble.(a)

The art of weaving broad silks was introduced into England, and those who were so engaged were included in the great company of weavers, at or about this period; the date generally assigned for the event being 1620. The silk-throwsters of London formed a corporation and were chartered in 1629.(b) The needs of the growing manufacture in the mother country probably caused the advance of price of the raw material in the colony. Royal encouragement was of brief duration. The king and the Virginia Company quarreled, and the latter were ousted from all their rights and powers by proclamation of James I, July 15, 1624. On his accession to the throne in the next year, Charles I took the government of the colony into his own hands.(c) Very little progress in silk culture seems to have been made during the reign of that unfortunate monarch. Under the Protectorate, interest in the subject was revived, and several curious tracts were written on behalf of the industry. The most noted of these essays were by ("E. W.") Edward Williams (d) (1650) and Hartlib (1652-'55). Williams regards the production of silk as one of the wonders of nature; a mystery, which if taught to the savages, might impress them with pious awe. He says:(e)

1. First, the Indian is naturally curious and very ingenious, which they show in all their works and imitations; the only thing that frights them from bringing any work to perfection, is the labour attending it.

2. But to feed his curiosity, there is nothing in the world more proper then this curious atome of Nature the Silkworme: to see this untaught Artist spin out his transparent bowels, labour such a monument out of his owne intralls, as may be the shame, the blush of Artists, such a Robe that Solomon in all his glory might confesse the meannesse of his apparell, in relation to the workemen, cannot but bring them to admiration; and that those spirits whose thoughts are of a higher wing then ordinary, may bee convinced of a divine power of the hand of God in the Creation: which gayned upon him, it will not be impossible to drive him to an acknowledgement of Redemption, if private ends or any other respect then that to God's glory, possesse not those who should cover a multitude of sinnes, by winning a soule to his Creator, and forcing him from the jawes of his Destroyer.

3. In this curiosity there is little or no labour (a thing which they abhorre) their women and children will bee sufficient to goe through with it: and if they could but be brought to it, our Trade with them for Silke would be of greater consequence, then all their Furs or other commodities put together.

This is followed by an estimate that the silk thus produced might be purchased in barter at five shillings per pound; the barter to be for British cloths which it was hoped the Indians might be induced to want when they were so far civilized as to require clothing. A similar idea impressed itself on Samuel Hartlib, who was an enterprising merchant of London, and who has a better chance of remembrance in literature than the other silk essayists of the period, since Milton dedicated to him a Treatise on Education. The title of one of Hartlib's books is itself a curiosity:

"The Reformed Virginian Silk-Worm, or, a Rare and New Discovery of a speedy way, and easie means, found out by a young Lady in England, she having made full proof thereof in May, Anno 1652. For the feeding of Silk-worms in the Woods, on the Mulberry-Tree-leaves in Virginia: Who after forty dayes time, present their most rich golden-coloured silken Fleece, to the instant wonderful enriching of all the Planters there, requiring from them neither cost, labour, or hindrance in any of their other employments whatsoever. And also to the good hopes that the Indians, seeing and finding that there is neither Art, Skill, or Pains in the thing: they will readily set upon it, being by the benefit thereof inabled to buy of the English (in way of Truck for their Silk-bottoms) all those things that they most desire."(f)

In his introduction, Mr. Hartlib refers to the efforts of King James to extend silk culture in England by planting mulberry trees and rearing silkworms. The Hartlib essay is addressed to the planters of Virginia, and is designed to urge them in the same industry and to exhibit the superior advantages they may enjoy by obtaining the cocoons of certain native insects producing wild silk. The Indians were to be pressed into this service, in the hope of converting them to christianity and making a profit at the same time, and the essay overflows with pious phrases and calculations of gain, curiously intermingled. The insect and its cocoon are described as of extraordinary size, as follows:

"The fashion of the Botome.(g) The Silk Bottome of the naturall Worm in Virginia, found there in the woods, is ten Inches about, and six Inches in length to admiration: & whereas ours in Europe have their Sleeve and loose Silke on the outside; and then in a more

a Virginia: More especially the South part thereof * * * —the fertile Carolana, by Edward Williams; second edition, London, 1650; reprint, Force's Tracts, vol. iii, No. xi, p. 51.

b Act 5, Charles I. Anderson's Origin of Commerce, ii, pp. 4 and 36.

c Jefferson's Notes on Virginia, p. 182.

d Virginia's Discovery of Silke-Wormes, with their Benefit. And Implanting of Mulberry Trees, by E. W., London, 1650. The engravings in this work are exquisitely quaint.

e Force's Tracts, vol. iii, No. xi, p. 93.

f London, 1655.

g This word is variously spelled.

closer covering they intombe themselves. These rare Worms, before they inclose themselves up, fill with silk the great emptinesse, and afterward inclose themselves in the middle of it, so they have a double Bottom. The loose Sleeve silk is all on the outside of that compass, for if that were reckoned in, the compasse of the Bottom would far exceed this proportion: But this is sufficient to be the Wonder of the whole world: to the Glory of the Creatour, and Exaltation of VIRGINIA."^(a)

The essay concludes with "Ryming lines", "collected by a young Scholar, out of Letters", sent from Virginia to England. A few specimens will suffice:

Where Wormes and Food doe naturally abound,
A Gallant Silken Trade must there be found:
Virginia excells the World in both,
Envie nor malice can gaine say this troth.^(b)

* * * * *
Her Worms are huge whose bottoms dare
With Lemmons of the largest size compare.
* * * * *

* * * * *
Master William Wright of Nansamound
Found Bottoms above seven Inches round.^(c)

But although a governor of the Colony, Edward Diggs, joined the ranks of the essayists,^(d) it does not appear that the planters were stirred to much activity in raising silk. The hopes that illumine the pages of many writers of the period were slenderly if at all fulfilled. The causes of such complete failure are not obvious. The historian Bancroft has summed up the subject in a resounding sentence which declares that "the culture of silk, long, earnestly, and frequently commended to the attention of Virginia, is successfully pursued only where a superiority of labor exists in a redundant population".

Punishments and rewards were alike in vain. An act of the colonial assembly in 1656 imposed a fine of ten pounds of tobacco on any planter who had not at least ten mulberry trees to every hundred acres. A premium of 4,000 pounds of tobacco was given as a reward for remaining in the business of silk culture in the colony. In 1657, 10,000 pounds of tobacco were offered to any one exporting £200 worth of raw silk, and 5,000 pounds of tobacco to any one producing 1,000 pounds of "wound silk" in a year. The act of 1656 was repealed in 1658, but was revived in 1660. A reward was offered in 1662,^(e) of 50 pounds of tobacco for every pound of silk raised, and Sir William Berkeley, the governor of Virginia, received, September 12, pressing instructions from King Charles II to urge forward the industry. But it is difficult to find any record of the product. There is indeed a tradition, treated rather incredulously by historians, that the king at his coronation in 1660 wore a robe and hose of Virginia silk. A letter of instructions to Governor Berkeley gives color to this legend in the following phrase: "We ourself having made experience of the Silk grown there and finding it to be equal to any we have seen."^(f)

In 1666 all acts giving bounties for silk or requiring mulberry trees to be planted were repealed; in 1669 there was a brief revival of the bounties, but after that, all legislative encouragement ceased.^(g) The mulberry had been abundantly planted, and one claimant for bounties proved that he had 70,000 trees growing in 1664. Governor Berkeley "made essays" of flax, hemp, silk, and other productions,^(h) and in 1671, in an answer to the committee on plantations, used the cautious expression: "Of late we have begun to make silk." In that year the number of persons engaged in silk manufacture in England was estimated at 40,000. Perhaps if the pressure brought to bear upon silk culture had been equally applied to the making of silk goods, Virginia might have shared in England's prosperity, and both branches of the industry could have been sustained. But this was no part of the colonial policy of Great Britain. Even the trained skill of Piedmont was not welcomed. Cromwell's navigation laws of 1651 not only prohibited receipt or export by other than English-built ships, manned by Englishmen, but also forbade that any alien should manage a trade or factory in the colonies.⁽ⁱ⁾

The Virginia legislature did indeed make an effort toward manufacture, by ordering each county to establish a loom and support a weaver, but the act was repealed in 1684, and seems to have been of no practical effect. There are no records of any further noteworthy production of silk in Virginia, though we are told that "the mulberry tree grows there like a weed, and silkworms have been observed to thrive extremely and without hazard."^(j) Virginia's weed supplanted even the thrifty mulberry. Formerly, says the historian of the colony, "there was great encouragement given for making of linen, silk, etc., and all persons not performing several things toward producing of them were put under a fine. Now, all encouragement of such things is taken away or entirely dropped by the assemblies, and such manufactures are always neglected when tobacco brings anything of a price."^(k) Lastly, about the year 1698, Governor Nicholson sent a memorial to England, in which he urged parliament to pass an act forbidding the plantations to make their own clothing. But there was no necessity for choking the provincial industry; it was dying a natural death.

^a Hartlib, p. 18.

^b *Ibid.*, p. 33.

^c *Ibid.*, p. 34.

^d Writing in 1654, Governor Diggs mentions that he had raised "400 pound weight of silk bottomes", and he adds: "This next spring there will be divers tryals made of the hopeful natural Worms that you so highly prize, and not without good cause." *Ibid.*, p. 28; also, Barham, p. 100.

^e History of Virginia, by Robert Beverley; London, 1705, vol. i, p. 58.

^f Hazard's Historical Collections, vol. ii, p. 608.

^g Twentieth Congress, 1st sess., H. R. Doc. 158, p. 14.

^h Beverley's Virginia, i, p. 58.

ⁱ *Ibid.*, i, p. 51.

^j *Ibid.*, iii, p. 239.

^k *Ibid.*, iii, p. 261.

During the latter part of the seventeenth century a large body of French Huguenots settled in the southern part of the province of Carolina.^(a) They brought with them a knowledge of various industries, and are probably to be credited with the earliest production of silk-mixed fabrics in this country. "South Carolina hath gained a manufacture of linens by means of the French refugees, and invented a new kind of stuff by mixing the silk it produces with its wool."^(b) At about the same period, 1693 to 1702, a vigorous though restricted attempt at silk culture was made by Sir Nathaniel Johnson, and the locality of this undertaking bore the name of Silk Hope for more than a century.^(c) The results are thus summarized: "However, Sir Nathaniel Johnson, after all his pains, rather showed what might have been done toward the culture of silk in that province, than made such progress in it as to render the commodity of national advantage."^(d) There was no slackening of demand for raw silk in the mother country; the silk-throwing mill of Sir Thomas Lombe was started at Derby, England, in 1719.^(e) A writer of that date states the whole case with precision:

Silk is a Commodity of great Use in England for many Manufactures, it being imported to us from *France, Italy, Sicily, Turkey, and the East Indies*; and there is no Foreign Commodity, which exhausts more of our Treasure. I am not so vain as to promise, this country can furnish Great-Britain with so much Silk as is therein manufactured, which would amount to above a Million *Sterling* annually: But if this Province is ever settled (it abounding in most Parts with Forests of Mulberry Trees both White and Red) and we keep a good Correspondence with the Natives, which is both our Duty and Interest, certainly a considerable Quantity of Silk may be here produced. It hath been already experimented, in *South Carolina*, by *Sir Nathaniel Johnson* and others, which would have return'd to great Account, but that they wanted Hands, Labourers being not to be hir'd but at vast Charge. Yet if the Natives or *Negroes* were employ'd who delight in such easy light Labours, we could have that done for less than One shilling, which costs them more than six. Now I appeal to all good *Englishmen*, if we can raise only a Tenth part of the Silk expended in *Great Britain*, etc., and perhaps half an Age hence the Fifth, whether it would not be very beneficial to our Native Country?^(f)

The foregoing extract seems likely to be of interest to modern promoters of schemes for employing southern negroes in silk raising, since the suggestion of such service as peculiarly suitable for the colored race is thus antedated more than 150 years. Joshua Gee, an eminent English publicist, made an estimate that the labor of slaves employed in raising silk would produce about twice as much value as in planting sugar or tobacco.^(g) Nor is the list of possible silk culturists ended when it includes planters, Huguenots, Indians, and negroes. Another writer, who has taken great pains with calculations of profit, urges that the mother country should send her paupers and "small offenders" to South Carolina; "it must be a weak Hand indeed that cannot earn bread where Silkworms and white mulberry trees are so plenty."^(h) The argument will commend itself to the managers of state charities:

Let us suppose that Twenty Five Thousand of the most helpless People in Great Britain were settled there at an expence of half a Million of Money; the Easiness of the Labour in winding off the Silk and tending the Silk Worm would agree with the most of those who throughout the Kingdom are chargeable to the Parishes. That Labour with the Benefit of Land stock'd for them *gratis*, would well subsist them, and save our Parishes near Two Hundred Thousand Pounds a Year directly in their annual Payments; not to compute (what) would also be saved indirectly, by the Unwillingness of many pretended Invalids to go the Voyage, who would then betake themselves to industrious Courses to gain a Livelyhood.⁽ⁱ⁾

There was a general belief that England lost money by the sums paid to foreigners for the raw material from which goods were made. This notion appears prominently in writings upon economical subjects throughout the seventeenth and eighteenth centuries. It began with the birth of English textile manufacture, and lasted till the use of the steam engine altered the conditions and problems of industry. Silk had to bear the brunt of this obloquy.

As this Nation very much inclines to the Wearing Silk Garments in imitation of the French, to the great Discouragement of our Woollen Manufacture, the Manufacture of Silk from our Plantations would not only enable us to supply ourselves, but to be capable of Exporting very great Quantities of Silk fully Manufactured.^(j)

In fact, however, the silk industry of the mother country had made some notable advances. English manufacturers, who had long been dependent upon Italy for thrown silk, were now making their own tram and organzine. The machinery in general use was, indeed, such as is driven by the hand or foot of the operative; but there was one great exception, a power-driven machine in the factory of Sir Thomas Lombe. The importance of this invention seems to have been fairly recognized:

As we have but one Water engine for throwing silk in the Kingdom, if that should be destroyed by Fire or any other Accident, it would make the Continuance of throwing fine Silk among us very precarious; and it is very much to be doubted whether all the Men now living in the Kingdom could make such another.^(k)

^a The official division of the Carolinas into North and South was not made until 1728, when the province was taken under direct control of the crown. *Philos. and Polit. Hist. of the Carolinas*, by the Abbé Raynal; Edinburgh Transl., i, p. 210.

^b Raynal, i, p. 213.

^c Ramsay's *Hist. S. C.*, ii, p. 475.

^d *Hist. Acct. S. C. and Ga.*, by Dr. Alex. Hewatt, i, p. 157.

^e 20th Congress, 1st sess., H. R. Doc. 158, p. 13. This document will hereafter be cited simply as the "Rush Letter".

^f A Description of the English Province of South Carolina, by Daniel Coxe; London, 1722, p. 90.

^g *The Trade and Navigation of Great Britain*, London; 1738, chap. xxx, p. 146.

^h A New and Accurate Account of the Provinces of South Carolina and Georgia; London, 1732, chap. v, p. 55.

ⁱ *Ibid.*, chap. iv., p. 51.

^j Gee's *Trade and Navigation*, chap. xxx.

^k *Ibid.* "This amazingly grand machine contains 26,586 wheels and 97,746 movements, which work 73,726 yards of organzine silk thread every time the water-wheel goes round, being thrice in one minute, and 318,504,960 yards in one day and night." The buildings occupied by this machinery were an eighth of a mile in length. Anderson, *Origin of Commerce*, ii, p. 284.

Far more anxiety for silk culture in the colonies was displayed in England than in America. The planters did not take serious interest in the business. A colony of Swiss who settled in South Carolina about 1733-'35 (a) under the leadership of John Peter Purry, of Neufchatel, was successful in raising silk and cotton, and was credited with some progress in manufacture. The mulberry tree flourished in the light and sandy soil of the pine lands. (b) The excellent quality of South Carolina silk was certified by Sir Thomas Lombe, who considered it equal in strength and beauty to that of Italy. (c) But as to amount produced, the following figures speak for themselves :

Raw silk exported from North and South Carolina to Great Britain between 1731 and 1755. (d)

	Pounds.
1731 to 1741.....	—
1742.....	18½
1743-1747.....	—
1748 (8 boxes).....	52
1749.....	46
1750.....	118
1751 and 1752.....	—
1753.....	11
1754.....	—
1755.....	5½
<i>Total in twenty-five years.....</i>	<u>251</u>

In the last-named year Mrs. Pinckney, who is also famous as the introducer of the indigo plant into South Carolina, took with her to England some silk which she had raised and spun near Charleston; three complete dresses were made therefrom; one was presented to the princess dowager of Wales, one to Lord Chesterfield, and one remained an elegant heirloom in possession of the family for more than fifty years. (e) (During the Revolutionary War the Pinckneys won renown which outshone that of the arts of peace.) It is said that 630 pounds of silk were raised in 1765 at Silk Hope plantation. Perhaps South Carolina did not get full credit for her silk products, as much of it went to Georgia to be reeled, resulting in its ultimate shipment from Savannah. There is some curious evidence of popular belief or rumor to this effect, which will be mentioned hereafter. Charleston people wanted a filature in their city to prevent the diversion of trade, and an act was passed to meet the wish, in 1766, by the colonial assembly. This was followed by a grant of £1,000 to support the enterprise. Meanwhile the London Society of Arts was giving handsome bounties for cocoons and raw silk, and kept up the offer till 1772; Parliament in 1769 granted a bounty of 25 per cent. for seven years on all raw silk imported from the colonies. (f) But the Revolutionary War put a stop to the bounties, and the silk industry of South Carolina ceased to exist. The Abbé Raynal has pronounced its funeral oration. That philosophical writer of course offers a theory; silk was not exported because negresses were not imported. He concludes :

Yet the progress of this branch of trade has not been answerable to so promising a beginning. The blame has been laid on the inhabitants of the colony, who, buying only negro men from whom they receive an immediate and certain profit, neglected to have women who, with their children, might have been employed in bringing up silkworms, an occupation suitable to the weakness of that sex and to the tenderest age. (g)

Tracing the silk industry in the order of its starting at different points in this country, we find it introduced into Louisiana next after South Carolina. In 1716 the notorious John Law formed, at Paris, the Mississippi Company, which was a leading feature in a series of speculative schemes that were afterward called the great South Sea bubble. Louisiana had been settled by the French. The city of New Orleans was founded in 1718, and about that time the whole colony was transferred to the Mississippi company by a grant of the French crown. Law organized and sent out a large expedition in 1718. In the glittering prospectus (h) of this speculation, one of the items was the culture of silk on the banks of the Mississippi, and this part of the programme was in a measure

a Raynal, vol. i, p. 223.

b Description of the Province of South Carolina, by George Milligen; London, 1770, p. 8.

c Letter of Thomas Lombe to the Trustees of Georgia, January 31, 1732.

d A Description of South Carolina, London, 1761, p. 96 (authorship somewhat uncertainly ascribed to Governor Glen, of that province).

e Ramsay, i, p. 221.

f Raynal, ii, p. 160.

g *Ibid.*, ii, p. 159.

h Anderson gives a long abstract of the projects of the South Sea Company. Under one section there are the following details :

"For the *Silk* and *Cotton* manufactures, viz :

1. For the raising of *Silk-worms*.

2. Another for the planting of *Mulberry Trees* and breeding of *Silk-worms* in *Chelsea Park* where 2,000 of those trees were actually planted and many large and expensive edifices were erected; the remains whereof are now (1764) scarcely to be seen. (Particulars about these trees and their estimated value as assets of a stock company can be found in *Barham's Essay*, pp. 95, 105, and 278. It was expected that they would produce 14,000 pounds of silk, worth £14,000 per year.)

3. For making of *Mustin*.

4. For improving the *Cotton* and the *Silk* and *Cotton* Manufactures.

5. Another for improving the *Silk* Manufactures." *Origin of Commerce*, ii, p. 295.

carried out. Many mulberry trees were planted in and near New Orleans. Failure to reach profitable results seems, however, to have overtaken every branch of Law's schemes. "The Ancient India Company never sent more than a few shiploads of its products to France, and the unfortunate Mississippi colony furnished next to nothing."^(a) After the South Sea bubble burst, the ownership of the land and the control of the colony reverted to the crown. The French held possession till 1762, when they ceded it to Spain. We do not read of any considerable silk product. Favorable soil and climate, and a knowledge of the business on the part of the colonists, were not wanting; but legislative bounties were.

Georgia, which had been part of the "fertile Carolinas", was made by royal charter a separate province in 1732, and placed in control of a board of trustees. This event became the occasion of an urgent pressure in favor of silk culture. The trustees themselves heartily favored the project, and fixed upon silk and wine as the leading staples to be raised for export,^(b) silk being chief in their esteem.^(c) Sir Thomas Lombe wrote a forcible letter on the subject to the trustees, declaring that silk culture "appears to me as beneficial to the kingdom, attended with as little hazard or difficulty, as much wanted, and which may as soon be brought to perfection in a proper climate, as any undertaking so considerable in itself that I ever heard of".^(d) The trustees at their meeting in June, 1732, adopted a rule requiring settlers to plant a certain proportion of mulberry trees. In their respective grants ten years were allowed for the cultivation of the soil, and 100 white mulberry trees were to be planted on every ten acres when cleared. Power was vested in the trustees to enter upon lands that remained uncultivated.^(e) A colonial seal was ordered, containing on one side a representation of silkworms, some beginning and others having finished their webs, with the motto: *Non sibi sed aliis*. This, says one historian, was "a very proper emblem, signifying that neither the first trustees nor their successors could have any views to their own interest".^(f) It does not seem to have been meant, by the use of this motto, to suggest that the colonists, in raising silk for British manufacturers, were laboring not for themselves but for others.

Late in 1732 a man from Piedmont was sent out by the trustees to teach the colonists the art of reeling. Several public writers urged the enterprise on various grounds of economy and profit. An estimate in 1733 (based on the assumption that the yearly import of raw silk by Great Britain from Piedmont amounted to £300,000 in value) set forth that the successful raising of silk in Georgia would save the mother country £100,000 per annum.^(g) Another estimate in the same year made the annual import by Great Britain of thrown silk alone—excluding raw silk—300,000 pounds, equal to £300,000 in value.^(h) It was therefore an occasion of much congratulation in 1734-'35 when General Oglethorpe took with him to England eight pounds of colonial silk, and showed it to the trustees, who presented it to Queen Caroline. Under royal instructions Sir Thomas Lombe took charge of the precious consignment, and had it thrown and woven at his factory; so that in 1735, upon the king's birthday, the queen honored the colony by appearing at a levee in a dress said to be entirely made of Georgia silk.⁽ⁱ⁾ But even this neat little episode has suffered by the breath of detraction. A certain Dr. Patrick Tailfer and others, who perhaps bore no good will to General Oglethorpe, have stated in a spiteful way, that most, if not all of this silk, was raised in South Carolina.^(j)

In 1735 a plot of ground was laid out at one end of the town of Savannah, and was planted with vines and mulberry trees at public expense. The "trustees' garden", as the plot was termed, proved to have been ill-located, the soil being sandy and arid; though on this and similar points authorities vary. It is certain that the trustees requested the selection of some other spot of ground, but their wishes were not fulfilled.^(k) The site was on the bank of the river within view of the ocean. Plants and trees, native and foreign, in great variety, including the fig, orange, pomegranate, olive, coffee, cocoa, and cotton, were set out; but chief attention was given to the mulberry. Every planter wanting mulberry trees was supplied with them, gratis, from this nursery. The promise to supply these trees was a feature and condition of the land-grants to colonists.^(l) One writer, describing the garden in glowing terms of praise, declares the soil excellent and the situation "delightful".^(m) Others hold a totally opposite opinion and say that the place was "one of the most barren spots of land in the colony, being only a hill of dry sand; great sums of money were thrown away upon it from year to year to no purpose".⁽ⁿ⁾

^a The Eighteenth Century, by Paul Lecroix; London, 1876, p. 222.

^b Judge Law's Oration, Georgia Historical Society Collections, i, p. 26.

^c An Impartial Inquiry into the State and Utility of the Province of Georgia, by Benj. Martin, secretary of the trustees of the colony; London, 1741, reprint Ga. Hist. Soc., i, p. 160.

^d Appendix, Ga. Hist. Soc. Collns., ii, p. 311.

^e History of Georgia, by Thomas McCall, i, p. 21.

^f Hewatt's Hist. S. C. and Ga., ii, p. 18. McCall's History, i, p. 25.

^g A New and Accurate Account of the Provinces of So. Ca. and Ga.; chap. v, pp. 58, 59.

^h Reasons for Establishing the Colony of Georgia; London, 1733, reprint Ga. Hist. Soc., i, p. 208.

ⁱ The Dead Towns of Georgia, by Charles C. Jones; Savannah, 1878, p. 26.

^j A True and Historical Narrative of the Colony of Georgia; Charleston, 1741, reprint Ga. Hist. Soc., ii, p. 205.

^k McCall, i, pp. 55, 57.

^l *Ibid.*, i, p. 63.

^m A Voyage to Georgia, by Francis Moore; London, 1744, pp. 29, 30.

ⁿ A True and Historical Narrative; reprint Ga. Hist. Soc., ii, p. 205.

Several Italians of both sexes were brought in 1736 at the trustees' expense from Piedmont in charge of a Mr. Amatis. The foreigners were proficient in the arts of silk culture and reeling; the men were ordered to teach male English colonists to raise mulberry trees, the women to take English girls as apprentices in rearing worms and reeling from cocoons.^(a) "In Italy and in the south of France, young girls carry the eggs in their bosom, and hatch them by their natural heat. In other countries this is done by means of manure or hot-houses."^(b) It is not specified which of these processes was taught to the English girls. Some of the Italians behaved badly; one of them stole the reels, broke the copper pans,^(c) spoiled all the eggs he could not steal, and fled to South Carolina; but a little seed and a few faithful Piedmontese were left.^(d)

Meanwhile a number of Protestants, driven out of their home in the valley of the Salza, Bavaria, had emigrated to Georgia and founded a town, which they called Ebenezer, about 25 miles above Savannah, near to, but not quite on the river.^(e) They brought with them several useful arts, and soon accomplished more in the business of raising silk, with far less fuss, than their neighbors at Savannah. They co-operated with the trustees, and before long had two reels busy. There are notices at this period of a scheme for interesting the Chickasaw Indians in the work of silk culture.^(f) English writers were again urging the need of the mother country, and the annual expenditure for silk from Piedmont was estimated at £500,000.^(g) Even the muse was invoked to stir the lagging colonists, and a poem on the return of General Oglethorpe to Georgia in 1736, winds up—

Nor less the care
Of thy young province to oblige the fair;
Here tend the silkworm in the verdant shade
The frugal matron and the blooming maid.^(h)

But as to the export of raw silk, it was admitted in 1740 that "no great entries have been seen of any yet in the custom-house";⁽ⁱ⁾ statements verified by oath declare that "the quantity of silk hitherto made has not been great";^(j) the small portion exported "was produced by an Italian family settled in Savannah".^(k) Another informant sums up the situation with the remark, "there are not as many mulberry trees in the whole province as many a one of the Carolina planters have, nor so much silk as many a one of them makes."^(l) In fact, the colony of Georgia was at this time in a very weak and impoverished condition, and scarcely able to produce enough of the necessaries of life for its own sustenance. Despite the poverty of the province, the trustees firmly adhered to the line of policy they had marked out: wine and silk were to be cultivated in preference to all other staples.^(m) "The tracts of land which had been planted with mulberry trees scarcely retained the vestiges of cultivation" in 1744, but new bounties were offered for silk; a filature was built at Savannah, and the implements for reeling were ordered to be furnished.⁽ⁿ⁾ The premiums were afterward fixed at two shillings per pound for first quality of cocoons, one shilling for second, and eight pence for third.^(o) Bounties were also offered in 1749 for proficiency in the art of reeling, and the trustees supplied the requisite apparatus to competitors. In the following year fourteen young women claimed the bounty and were given permanent employment at the filature, which by this time had an outfit of tools and implements. Special commissioners were sent to the province by the trustees, charged with the duty of promoting the industry.

We are now approaching the period when silk culture in the colonies attained its highest development. An exaggerated notion of the results has been formed by several of the writers who have recorded them. This is chiefly due to neglect in discriminating between cocoons and raw silk. The records, from 1757 to 1768, are mostly of the production of cocoons; and of these articles, when fresh or not specially dried, ten or twelve to fourteen pounds

^a A Voyage to Georgia, p. 31.

^b Treatise on Rearing Silk Worms, by Count Von Hazzzi, of Munich; Transl. U. S. 20th Cong., 1st Sess., H. R. Doc. 226, sec. 61, p. 77. There are precise instructions on this point in Noël Chomel's Dictionnaire Economique (2 vol. fol., Paris, 1718) as follows: "In order to hatch the eggs at their proper time, the women must keep them in their bosoms and the men in their pockets, and on nights between warm pillows put under your bolster or bed, and thus to continue for three days without looking upon them, for fear lest the cold air injure them." Barham's Essay, p. 118.

^c The pans were used for baking the cocoons, to kill the chrysalides.

^d A Voyage to Georgia, p. 31.

^e Raynal, i, p. 223. McCall, i, p. 49. The Long Island Historical Society of Brooklyn, N. Y., possesses very complete records of this emigration and settlement.

^f Letter to the Trustees; Ga. Hist. Soc. Collns., i, p. 193. ^g Life of Oglethorpe, by Thomas Spalding; Ga. Hist. Soc. Collns., i, p. 259.

^h A True and Historical Narrative, Preface; reprint, *ibid.*, ii, p. 175. See also Lines addressed to Oglethorpe, *ibid.*, ii, pp. 64, 66.

ⁱ An Impartial Inquiry, etc., reprint, *ibid.*, i, p. 160.

^j A State of the Province of Georgia, Attested upon Oath; London, 1742; reprint, *ibid.*, ii, p. 71.

^k An Impartial Inquiry, etc.; reprint, *ibid.*, i, p. 192.

^l A True and Historical Narrative; reprint, *ibid.*, ii, p. 265.

^m McCall, i, p. 199.

ⁿ *Ibid.*, i, p. 203.

^o *Ibid.*, i, p. 233.

are required to furnish one pound of reeled or raw silk.(a) The following statements of Georgia production are believed to be authentic:

Years.	Product or export.
1750.....	6,300 pounds cocoons received at filature.
1750 to 1754, inclusive.....	Value of raw silk exported, \$8,800.
1756.....	Amount of raw silk exported, 268 pounds.
1757.....	1,052 pounds cocoons received at filature.
1758.....	7,040 pounds cocoons received at filature.
1759.....	Considerably over 10,000 pounds cocoons received at Savannah.
1764.....	15,200 pounds cocoons produced.
1766.....	20,000 pounds cocoons produced.
1768.....	1,084 pounds raw silk sent to England.
1758-1768, inclusive.....	Nearly 100,000 pounds cocoons received at filature.
1770.....	291 pounds raw silk produced at Ebenezer; none elsewhere.
1771 (b).....	438 pounds raw silk produced at Ebenezer; shipped to England.
1772.....	465 pounds raw silk produced at Ebenezer; shipped to England.
1755-1772, inclusive.....	Amount of raw silk exported, 8,829 pounds.

A careful examination of the foregoing figures will show that they do not involve any contradiction in themselves. They indicate a varying product which culminated in 1766, furnishing from 1750 to 1772 an export averaging 500 pounds of raw silk per annum, and rarely exceeding 1,000 pounds in a single year. It remains to be explained why an assertion has so frequently found place and comment in histories and essays, that in the year 1759 10,000 pounds of raw silk were exported from Georgia to England. The discrepancy between this statement and that of the total export from 1755 to 1772 (which was furnished by the collector of customs at Savannah) has been noticed by some of the more careful writers; others have ignored it; none have traced the error to its origin. It arose in an ambiguous, not to say erroneous, publication from Charleston, South Carolina, which Adam Anderson has fortunately quoted in full. He says:(c)

We had public Advices, in this Year 1759 from *Charles-Town* in *South Carolina*, of a very hopeful Prospect in that Province of the gradual and considerable Progress and Increase of the Production of *Raw-Silk* there and in the adjoining Province of *Georgia*, viz: "In the year 1757, 1,052 Pound weight of *Raw-Silk Balls* were received at the *Filature* in *Georgia*: and the next Year produced no less than 7,040 Pound Weight thereof. And that in this year 1759, there has been received at *Savannah*, the Capital of *Georgia*, considerably above 10,000 Pound Weight of *Raw-Silk*, although the Season has not been favourable. This great Increase of that rich, new, and valuable Production in these Provinces is owing to the increased Number of Hands in raising the same."

It will be seen that the foregoing treats of production, not of export; and therefore presumptively of cocoons, not of reeled silk. At all events the facts were so understood by the Rev. Jared Eliot, of Killingworth, Connecticut (grandson of John Eliot, the "apostle of the North American Indians"), writing in the very year when the advices were received. His version is as follows:

By a late account from *Georgia* it appears that the Silk Manufactory is in a flourishing way. In the year 1757, the Weight of Silk Balls received at the *Filature* was only 1,052, last Year produced 7,040, and this Year already above 10,000, and it is very remarkable that the Raw Silk, exported from *Georgia* sells at *London* from two to three Shillings a Pound more, than that from any other Part of the World.(d)

This seems quite correct, except in calling the business a "silk manufactory". On the other hand, the complete error appears in, and has no doubt been mostly propagated among later writers through, the account given in 1816 by Major McCall, which turns the cocoons into raw silk and the production into export, as follows:

In the year 1757, one thousand and fifty pounds of raw silk were received at the filature in Savannah. In 1758, the silk-house was consumed by fire, with a quantity of silk and seven thousand and forty pounds of cocoons or silk balls. In 1759, the colony exported upward of ten thousand weight of raw silk, which sold two or three shillings per pound higher in London, than that of any other country.(e)

Great as was the mistake which ascribed to one year as large an export as was reached in twenty, it was surpassed in error by a subsequent writer, who says:

In 1776 more than twenty thousand pounds of raw silk were imported into England from Georgia.(f)

This statement was probably based on the production of 1766, and though brief, had the misfortune to be incorrect in every particular.

a E. g., the *Bulletin des Soies et des Soieries*, speaking of a recent crop of Upper Italy, says: "34 millions de kilog. de cocons représentant environ 2,400,000 kil. de soie."

b Operations at the filature were discontinued in 1771, and the basins and reels which had been in use there, were distributed among the colonists of Ebenezer.

c Origin of Commerce; fol. ed., ii, p. 413.

d Essays upon Field Husbandry in New England; Boston, reprint, 1760, note to sixth essay, p. 154. The sixth essay was first published in 1759, printed at New London and New York.

e History of Georgia, i, p. 251.

f Manual on the Mulberry Tree and Silk Culture, by Jonathan H. Cobb, 4th ed. enlarged; Boston, 1839, app., p. 128. One step in this second series of errors appears in the report of the Committee on Agriculture, United States House of Representatives, May 2, 1826, which says: "In 1766 more than 20,000 pounds of cocoons were exported from thence to England."

The policy of raising silk by means of bounties was pushed to its extreme in 1751, when the trustees of Georgia established the following scale of premiums, which has certainly never been surpassed:

For first quality cocoons, 2s. per pound; if delivered at filature, 3s. 6d.

For second quality cocoons, 1s. 3d. per pound; if delivered at filature, 1s. 8d.

For third quality cocoons, 6d. per pound; if delivered at filature, 1s. 1d.

This was at least two or three times what the cocoons were worth, and is "truly astonishing".(a) The patent of the trustees expired in 1752, and with it all the chartered privileges of the colony, which then became a royal province directly dependent upon the crown for government.(b) Acts of parliament of almost equal liberality soon replaced the measures of the trustees for spurring the silk industry. These acts were various, and the encouragement they gave was fluctuating. One of them, in 1749, admitted raw silk from the American plantations free of duty, and provided that Georgia and South Carolina should thereafter "have the honour of being denominated *Silk Colonies*".(c) In the same vein of sweetness, George II, June 21, 1754, directed a silver seal to be made for Georgia, bearing on one side a figure representing the genius of the colony offering a skein of silk to the king, with the motto: *Hinc laudem sperate coloni*.(d) For a while the parliamentary bounties were three shillings per pound; in 1766 they were reduced one-half; in 1769 they were applied to raw silk exported, giving £25 to every £100 in value. The last-named rate was to continue for seven years, when it was to be reduced to 20 per cent., and again for seven years more at 15 per cent.,(e) the political occurrences of 1776 being evidently not anticipated.

The silk product rose while the bounties for delivery at Savannah were most liberal, but sank with marvelous rapidity shortly after their reduction, falling to 290 pounds in 1770. Throughout the entire period of silk culture in Georgia the Saltzburghers of Ebenezer were among the largest producers, and were almost the only ones in the years immediately preceding the war of the Revolution who prepared raw silk for export. During the war the French settlers at New Bordeaux, 70 miles above Augusta, are said to have supplied "much of the high country" with sewing-silk made from cocoons of their own raising.(f) The industry ceased, however, to attract attention; the last parcel of raw silk offered for sale in Georgia during the century being in the year 1790, when over two hundred-weight was purchased for export at prices ranging from 18 to 26 shillings per pound.(g)

Pennsylvania was blest with silk culture at an early date in her history. It was recommended by James Logan to the Penn family in 1725, as "extremely beneficial and promising"; the next year he mentioned that silk from the colony had been sent to England; he "is glad it proves so good".(h) A bill had been introduced in 1719 into parliament to restrain the increase of woolen and other manufactures in the colonies.(i) A more definite application of the *non sibi sed aliis* principle was urged a few years later, based on a complaint that the colonists were engaged in textile manufacturing, especially in the provinces north of Virginia. The British board of commissioners on trade and plantations made an elaborate report on this subject to parliament in 1732. They say:

It were to be wished that some Expedient might be fallen upon to divert their thoughts from Undertakings of this Nature: So much the rather, because those Manufactures in Process of Time may be carried on, in a greater Degree, unless an early Stop be put to their Progress, by employing them in *Naval Stores*.(j)

The conclusion arrived at is as follows:

We would humbly beg Leave to report and submit to the Wisdom of this honourable House, the Substance of what we formerly proposed in our *Report on the Silk, Linen and Woollen Manufactures* hereinbefore recited; namely, whether it might not be deemed expedient to give those Colonies proper Encouragements for turning their Industry to such Manufactures and Products as might be of Service to *Great Britain*, and more particularly to the Production of all kinds of *Naval Stores*.(k)

Ultimately it seems to have been considered that the encouragement of silk culture was one of the "expedients" for preventing manufacture. The commissioners addressed a letter in 1734 to the deputy governor of Pennsylvania, Patrick Gordon, asking him what encouragement should be given in order to "engage the colonists to apply their industry to the cultivation of naval stores of all kinds, and likewise of such other products as may be proper for the soil of the said colonies, and do not interfere with the trade or produce of *Great Britain*".(l) To this Governor Gordon replies that it was the whole study of the merchants how to make returns for the large importations of British manufactures. He recommends among other things that the culture of silk be encouraged, and mentions that small quantities had already been produced in the colony, equal to the best European.(m)

A London paper of February 7, 1765, states that within four days one hundred journeymen silk-throwsters had engaged passage to New York and Philadelphia, under extraordinary encouragements, intending at both places to establish the manufacture of silk.(n) Perhaps the "encouragements" arose partly out of reports concerning efforts

a History of Georgia, by Rev. Wm. Bacon Stevens, M. D.; New York, 1847, vol. i, p. 275.

b Discourse on Georgia, same author; Boston, 1841, reprint Ga. Hist. Soc., ii, p. 25.

c Anderson, Origin of Commerce, fol. ed., ii, p. 392.

d Stevens, Hist. Ga., i, p. 383.

e Raynal, ii, p. 106.

f Letter of Thomas McCall to the Secretary of the Treasury in answer to a circular of inquiry sent out in 1826.

g Letter of Charles Harris to the Secretary of the Treasury, in answer as above.

h Annals of Philadelphia, by John F. Watson; Philadelphia, 1830, p. 618.

i Anderson's Origin of Commerce, ii, p. 283.

j *Ibid.*, ii, p. 343.

k *Ibid.*, ii, p. 345.

l Archives of Pennsylvania, year 1734, p. 434.

m Hazard's Register of Pennsylvania, i, p. 444.

n History of American Manufactures, by Dr. J. L. Bishop; Philadelphia, 1864, i, p. 362.

which were begun about this time by Dr. Benjamin Franklin. Several hundred pounds sterling were paid to American colonists between 1755 and 1772, for premiums on silk and mulberry trees, by the London Society for the Encouragement of Arts, Manufactures, and Commerce. A pamphlet published by the society mentions that in 1761 the following corresponding members were authorized to pay premiums in their respective colonies: Dr. Jared Eliot, the Rev. T. Clap (president of Yale College), and Jared Ingersoll, of Connecticut; Benjamin Franklin, LL. D., and John Hughes, of Pennsylvania; George Pollock, Cullen Pollock, and John Rutherford, of North Carolina; M. Ortolengi (superintendent of the filature at Savannah), of Georgia. The bounties paid in other colonies by the society were probably the same as those announced at that date for Georgia, viz, for first quality of cocoons, 3*d.* per pound; for second quality, 2*d.*, and for third quality, 1*d.* per pound.^(a) About the year 1766, Dr. Nathaniel Aspinwall, of Mansfield, Connecticut, who had a nursery of white mulberry trees on Long Island, and who was a person of large public spirit and enthusiasm in respect to silk culture, gave a number of such trees to be planted near Philadelphia.^(b) An act giving bounty for planting the tree had been recently passed by the legislature of New Jersey, and considerable interest was manifested in the subject by other neighboring colonies. The American Philosophical Society of Philadelphia, of which Dr. Franklin was a leading member, gave much consideration to plans for silk culture in 1768 and 1769. Early in 1770 Dr. Franklin, who was then in London, wrote a letter to the society urging these projects and inclosing his correspondence with Dr. Cadwallader Evans, of Philadelphia, upon the subject.^(c) This seems to have determined the society's course; they took prompt steps for establishing a filature. A subscription for the purpose was started, and during the first year the sum of £875 14*s.* was obtained. Measures were taken to procure supplies of mulberry trees and silkworm eggs, and Dr. Franklin, who was always ready to contribute good advice, sent a copy of a useful work by the Abbé Sauvage.^(d) An application was made to the assembly to authorize "a public filature", the managers to have power to grant premiums equal to about £500 per annum for five years. The filature was actually opened in June, 1770.^(e) It was situated in Seventh street, between Arch and High streets. About 2,300 pounds of cocoons were brought thither in 1771; of this amount, 1,754 pounds were bought by the managers; two-thirds of the cocoons had been raised in New Jersey.^(f) There is room for doubt as to the disposal of the products. It is more than hinted that all the silk made was absorbed in garments for members of the society.^(g) J. d'Homergue, who was a competent witness, though perhaps not wholly disinterested, says:

I have not heard of any raw silk having been prepared at this filature, or sold out of it, yet I have been told that a lady of this city (Philadelphia) had a *négligée* dress manufactured in England out of silk of her own raising.^(h)

A considerable number of successful attempts at silk culture were made at this time in Pennsylvania, several of which have passed into history. Susannah Wright, of Columbia, Lancaster county, a Quaker lady of some literary celebrity, reeled and wove from home-grown cocoons a piece of mantua 60 yards in length. A dress was made from this fabric for Queen Charlotte, and for a second time the wife of a British sovereign honored the colonies by appearing at court in American silk. It is further recorded that Susannah Wright had 1,500 worms in 1772, "and could have raised large quantities if encouraged;"⁽ⁱ⁾ she also made sewing-silk. Another Quaker lady, Grace Fisher, who was a noted preacher, made some silk fabrics which were presented by Governor Dickinson to Mrs. Catherine Macaulay, the historian. There are several instances about this time of Pennsylvania ladies raising the material for their own clothing, and at least one of a bride thus providing her own wedding garment; but, it is significantly added, "the best dresses worn with us were woven in England."^(j)

This was the era of the dawn of independence. Many writers have lamented the complete interruption which the Revolutionary War caused to the silk enterprises. In fact, however, the war made the real industry practicable. Silk culture here, to supply manufacturers abroad, was precisely the reverse of a profitable arrangement for this country. "If when we plough, sow, reap, gather, and thresh, we find that we plough, sow, reap, gather, and thresh for others, why should we repeat the unprofitable toil?"^(k) Legislation to stop manufacturing in America was now the order of the day in England. An act of Parliament, 3 Geo. II, c. 29, sec. 9, passed in 1750, provided that—

From and after the 24th day of June, 1750, no Mill or other Engine for slitting or rolling of bar Iron, or any plaiting Forge to work with a Tilt-hammer, or any furnace for making of Steel shall be erected or after erection continued in any of His Majesty's colonies in America.^(l)

^a Treatise on the Mulberry and Silkworm, by John Clarke; Philadelphia, 1839, note to p. 111. The Society's premiums for planting mulberry trees were very liberal, vid. Tracts on Practical Agriculture and Gardening, by R. Weston; London, 1773, pp. 31 to 34.

^b Historical Collections of Connecticut, by Dr. J. W. Barber; New Haven, 1837, p. 550.

^c Watson's Annals, p. 618.

^d Mémoires sur l'Éducation des Vers à Soie, by l'Abbé Boissier de Sauvage; Nîmes, 1763, 2 vols., 8vo. A summary of this treatise was afterward, 1792 (?), published by Mr. Odell, of Burlington, New Jersey (Cobb's Silk Manual, p. 85). The Bossière family are still engaged in silk culture in France. Also, Mr. E. V. Boissière is now, and for some years past has been, carrying on this business in connection with his silk factory at Williamsburg, Franklin county, Kansas.

^e J. d'Homergue says the filature was established in 1769, but is probably in error.

^f Watson's Annals, p. 618.

^g Clarke's Mulberry and Silkworm, p. 115.

^h *Ibid.*, note at foot of page. J. d'Homergue was a silk-culturist from Nîmes.

ⁱ Watson's Annals, p. 619.

^j *Ibid.*

^k Letters from a Farmer in Pennsylvania, by Mr. Dickinson; Boston, 1768; London reprint, 1774; Letter xii, p. 130.

^l Letters from a Farmer, p. 43.

Act 14 Geo. III, c. 71, was passed in 1774, "To prevent the exportation to foreign parts of utensils made use of in the cotton, linen, woollen, and silk manufactures of this kingdom." The statute imposed a fine of £200 for transgression; such machinery could be seized and confiscated, its holder anywhere was liable to arrest, and even the ship that carried it and the owners of the vessel were reached by the stringent penalties of that law.^(a) The United Society for Promoting American Manufactures (Philadelphia) recommended in 1776 an appropriation of £40 for the encouragement of John Marshall, who had constructed some novel machinery for throwing and twisting silk.^(b) The invention was at once too early and too late. The arts of peace were suspended, and the people were preparing for war.

Legislation concerning silk culture in Connecticut in 1732 indicated that the industry had made some progress there, even at that early date. The first coat and stockings made of New England silk were worn by Governor Law in 1747; the first silk dress by his daughter, in 1750.^(c) Dr. Ezra Stiles, president of Yale college, began a long series of experiments in 1758 by planting three mulberry trees. His carefully kept record of the growth, treatment, and product of the silkworms fills a quarto volume of manuscript still preserved by the college. A professor's gown was made from the fruits of his industry. The experiments were continued till 1790, and during this period Dr. Stiles liberally distributed seeds, eggs, and advice. Nathaniel Aspinwall, who, as has already been mentioned, had a nursery of mulberry trees on Long Island, began about the year 1760 to introduce silk culture into Windham county and other localities in Connecticut. He was successful in planting mulberry orchards at New Haven and Mansfield,^(d) and laid the foundation in the latter town of an industry that lasted three-fourths of a century, and paved the way for the present silk manufacture of this country. Half an ounce of mulberry seed was sent in 1766 to every parish in Connecticut.^(e) Several dresses were made from the resulting silk shortly before the Revolution; the town of Mansfield taking the lead in raising the raw material. William Hanks of that town, a large producer, in company with others, projected a silk factory; it is said that one was already built at Lebanon. The outbreak of war checked these enterprises.

There are brief records of silk enterprises in other northern colonies prior to 1776, but they are generally unimportant. The most promising was an attempt of William Molineaux to employ the poor of Boston in spinning, dyeing, and manufacturing silk. He claimed that he had expended £1,200 to £1,500, chiefly for machinery; and he undertook to buy and to manufacture all the silk raised in the province.^(f) The authorities gave him in 1770 the use of a factory, rent free, to carry out his purpose. It is probable that he undertook to make sewing-silk only, the experiments in weaving at this factory being confined to linen, cotton, and worsted.

Silk history in this country is almost a blank during the struggle for independence, and for several years afterward its records are very faint.

The great demand and high price of breadstuffs, owing to the wars growing out of the French revolution, rendered the cultivation of grain so profitable for many years that the mulberry was neglected.^(g)

Subsequent revivals of interest in culture and manufacture seemed unimportant at the outset. But small as were these beginnings, they proved more permanent (because they obtained a home market) than all the carefully nursed silk culture for export which had been attempted since the country was settled. The manufacture of sewing-silk gave new life to an industry that had sickened and died when fed on royal favor and parliamentary bounty.

It may here be mentioned, however, that at the period of the Revolution, and for at least fifty years afterward, the making of sewing-silk in this country was chiefly a household art rather than an organized business carried on in a mill or factory. This was the bridge between the silk culture of the colonies and the full-fledged manufacture of the present century: a bridge of essential service, though a chasm yawned at its farther end where many fortunes were engulfed. Connecticut became the chief seat of this new industry, beginning with an act of the assembly of that state in 1783, to take effect March 1, 1784.^(h) The passage of the act was chiefly due to the urgent representations of Dr. Stiles and Mr. Aspinwall. The premiums thereby authorized were ten shillings per hundred for planting mulberry trees and preserving them in thrifty condition till three years old; and three-pence per pound for producing "raw silk", which was, perhaps, meant to apply to cocoons. In a few years the bounty for planting trees served its purpose throughout the state, and was then discontinued, but the premiums for silk were kept up during a considerable period. In 1789, 200 pounds of silk were raised at Mansfield; in 1793, 362 pounds.⁽ⁱ⁾ The quantity steadily increased, and the value of sewing and raw silk made in the counties of New London, Windham, and Tolland, in 1810, aside from consumption of refuse silk in domestic garments, was estimated by Tench Coxe at \$28,503. Careful inquiries in the year 1825 showed that the silk product of Windham county was then double that of 1810.^(j) The Hon. Zalmon Storrs, of Mansfield, replied to the circular of inquiry of July, 1826, that—

Three-fourths of the families in Mansfield are engaged in raising silk, and make, annually, from 5 to 10, 20, and 50 pounds in a family, and one or two have made, each, 100 pounds in a season. It is believed there are annually made in Mansfield and its vicinity from three to four tons.

^a Force's American Archives; 4th series, vol. i, p. 222.

^b Bishop, Hist. Mfrs., i, p. 579.

^c Bishop, Hist. Mfrs., i, p. 360.

^d Memorial of Sundry Inhabitants of the counties of Windham and Tolland; 20th Congress, 1st sess., H. R. Doc. 159, p. 4.

^e Barber, Hist. Coll. Conn., p. 550.

^f Bishop, i, pp. 362, 376.

^g Report of the Committee on Agriculture to the U. S. House of Reps., May 2, 1826.

^h Holmes's American Annals; Cambridge, 1805, vol. ii, p. 470.

ⁱ Memorial of Windham and Tolland, p. 4.

^j Rush Letter, p. 18.

The last statement was replaced by the more definite figures of 7,000 pounds in 1827.(a)

The methods of reeling from the cocoon and of making sewing-silk were of the most primitive kind.(b) The writer has in his possession a specimen of the reeled silk; it was called "tow", and it looks like that material, being coarse, of irregular thickness of fiber, and wholly wanting in luster. By a laborious hand-process, this was converted into sewing-silk of fair quality; but only half the amount in weight could thus be successfully manipulated; the rest was a knotted, irregular refuse, barely available in making homespun garments. The sewing-silk or "twist" had a low reputation as compared with that imported from Italy. It was put up in small parcels, called "sticks", containing a definite number of yards. Twenty-five skeins were tied in a bunch, and four bunches were fastened together; this gave a merchantable package of 100 skeins—a unit of trade that was used in barter and took the place of currency. Very little money was used at that time in the state, and the sewing-silk became the "circulating medium". An act of the legislature defined the length of the skein, and was enforced by penalty, as follows:

Any person or persons who shall offer for sale any sewing-silk, unless each skein consists of twenty threads, each thread of the length of two yards, shall forfeit the sum of seven dollars to any person who shall prosecute the same to effect.(c)

Naturally enough, when the medium of trade had thus acquired an artificial value, it became the interest of each producer of this currency to debase it. This was effected in two ways: by making the thread as fine as possible, so as to get the greatest length out of a given weight of material, and by putting only half the length in a skein and calling it a "half-skein". The object of the latter device was to give an opportunity, as the silk went from hand to hand, of passing half-skeins as whole ones. The chance of this immoral advantage made the half-skeins the more popular currency.(d) An improvement in the spinning wheel was patented in the year 1800 by Horace Hanks; it was known as the "double wheel-head". This gave the spindle an increased speed of 145 turns to one as compared with the old-fashioned machinery.

Connecticut's industry at the close of the last century included the manufacture of "some silk buttons, handkerchiefs, ribands, and stuffs", but of a much less value than the sewing-silk. In 1790 the manufacture of silk laces was begun at Ipswich, Massachusetts;(e) it lasted for many years, and the product rose to 41,979 yards of laces, edgings, etc. Silk shoes are also mentioned as an item of some importance among the early manufactures of Massachusetts. These branches of industry were gradually supplanted by others. The change at Ipswich is thus described:

The machinery which once turned out thread and silk laces, those non-conducers to health and comfort, is now profitably employed in manufacturing cotton and other useful fabrics.(f)

The making of fringes, coach-laces, and tassels at Philadelphia, Pennsylvania, began in the year 1793. It was expanded in 1815 to include silk trimmings of various kinds, by William H. Horstmann.(g) There is a record of fresh exertions by Mr. Aspinwall, in 1790, to extend the planting of the mulberry in Pennsylvania, New York, and New Jersey.(h) During the war of 1812 Samuel Chidsey, of Scipio, Cayuga county, New York, made and sold 600 pounds of sewing-silk, the product of native worms.(i)

A small mill, 12 feet square, was built by Rodney and Horatio Hanks, in 1810, at Mansfield, Connecticut, to manufacture sewing-silk by water-power. A larger attempt of the same kind was made by the same persons, associated with others, at Gurleyville, Connecticut, on the Fenton river, in 1814. Neither of these enterprises met the hopes of their projectors; but in 1821 Rodney Hanks built another mill at Mansfield, which was kept in operation for seven years. The Mansfield Silk Company, formed in 1829 by Alfred Lilly, Joseph Couant, William A. Fisk, William Atwood, Storrs Hovey, and Jesse Bingham, undertook the same kind of business, with far better though not complete success; their throwing machinery, devised by Edmund Golding from plans with which he had been familiar in England, being serviceable, though somewhat crude.

The insuperable difficulty during all this period arose from the bad reeling of domestic silk. No power-driven machinery that has ever been devised is capable of making a good uniform thread from such reeled silk as was then produced in the households of New England, although, as has been stated, a fair sewing-silk could be extracted from it by hand-work, with great loss of raw material. The bad reeling which was customary seems more remarkable since several excellent kinds of hand-reels, with a traverse, had been constructed by inventors of that day. Among the makers or describers of improved reels may be mentioned Jonathan H. Cobb, Gideon B. Smith, J. d'Homergue, Jonathan Dennis, jr., Seth W. Cheney, Eliphalet Snow, and Nathan Rixford. The Mansfield Silk Company sought to avoid this difficulty by reeling for themselves, with a power-driven reel. Success attended this effort, and with good reeling "the native silk was found to be of superior quality and strength, winding and doubling with greater facility and less waste than China or Brussia silk".(j) The comparative cost is not stated.

a Memor. Windham and Tolland, p. 5.

b A full account of these processes will be found in Cobb's Manual, pp. 121-124.

c The Silk Industry of the United States from 1766 to 1874, by A. T. Lilly; New York, 1875, p. 3.

d *Ibid.*, p. 5.

e Hayward's Massachusetts Gazetteer, p. 179.

f *Ibid.*; the date of this remark is 1847.

g American Silk Industry Chronologically Arranged, by Franklin Allen; New York, 1876, p. 5.

h Rush letter, p. 17.

i *Ibid.*, p. 18.

j Lilly, Silk Industry, p. 6.

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. During the following spring the committee reported favorably, presenting, among other arguments on the subject, a statement that the value of silk goods imported in 1825 was nearly twice as great as the export of breadstuffs. The report included 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 upon the subject were sent out by the secretary, Richard Rush, in 1826; and from the replies and other material, a manual was constructed, entitled "Letter from the Secretary of the Treasury,"^(a) dated February 7, 1828. Six thousand copies were printed by order of Congress. This manual became known as the "Rush Letter"; it contains 220 pages, beside illustrations of machinery, and is a carefully executed work. Other documents relating to silk culture were received and published by Congress at this time, among which were two that have been previously referred to, viz, "Memorial from sundry inhabitants of the counties of Windham and Tolland, state of Connecticut, praying for the aid of government in the cultivation of the mulberry tree and of silk," and an elaborate "Treatise on the culture of silk in Germany, by Count von Hazzi, of Munich."^(b)

A report presented to the House in 1830 by the committee on agriculture, included two interesting letters from Peter S. Du Ponceau, LL.D., who accompanied Baron Steuben to this country in 1777, and afterward rose to eminence at Philadelphia in public affairs and in studies of philology and law. Essays on American silk by John d'Homergue also formed part of the report. The essays and letters contain much useful information, largely drawn from the experience of their authors in raising silk. The report proposed a grant to M. d'Homergue of \$40,000 for the establishment of a normal school of filature at Philadelphia, to supply gratuitous instruction to 60 young men for two years in the details of reeling, dyeing, and manufacturing silk. M. d'Homergue was to be authorized meantime to travel through the different states and teach the art to farmers and others. A bill containing these propositions was brought to a vote in 1832 and was defeated by a small majority. The subject was again referred to the committee on agriculture, which in 1835 made an adverse report on constitutional grounds. In the following year the matter was referred to the committee on manufactures, which reported in 1837; this report contained a letter from Hon. Andrew T. Judson, of Connecticut, which furnishes more definite statements than can be readily found elsewhere as to the spread of silk enterprises at this period. Finally the committee on agriculture again reported April 20, 1838. This last report, which was very elaborate, declared that the "silk bill" was defeated because "the ingenuity and experience of our countrymen now render it unnecessary, believing as they do that the recent improvements in reeling will do more in a few weeks than the establishment of many normal schools on the old plan will do in many years."^(c) The committee recommended that all public lands in the United States be leased gratuitously wherever the cultivation of the mulberry and the sugar-beet was undertaken thereon.

During the pendency of the bill in 1830 Mr. Du Ponceau started a small filature of 10 reels and 20 operatives on his own account, under M. d'Homergue's direction, at Philadelphia. Among the first fruits of his labor were two flags of American silk; these were presented respectively to the legislature of Pennsylvania and to the United States House of Representatives. About 60 pounds of the silk prepared at this filature was submitted to different manufacturers, who reported upon it as of excellent quality. The subject of silk culture gained the public ear, and the legislatures of several states passed bills for the encouragement of the new industry. The tendency during the years immediately preceding 1837 was toward venturesome enterprises, and silk culture presented an attractive field. A peculiar variety of the mulberry tree, believed to possess many advantages as compared with the white mulberry, was brought to public notice, and a speculation was started of such rapid and extensive growth that in a few years it overshadowed all silk enterprises and changed the whole course of the industry.

Gideon B. Smith, of Baltimore, claimed to have owned the first *Morus multicaulis* tree in the United States; it was planted in 1826.^(d) Dr. Felix Pascalis, of New York (afterward editor of a publication called *The Silk Culturist*) called attention to the supposed merits of this plant in *The American Journal of Science*, July, 1830, and described its introduction into Europe by Samuel Perrottet, of the Linnæan Society of Paris. Dr. Pascalis predicted that by its culture two crops of silk could be raised in a season; the prediction was soon afterward verified. The tree was said to grow with marvelous rapidity, developing large, thin, tender, and succulent leaves, in profusion. It could be propagated easily by cuttings; it could be cultivated as a shrub; its leaves formed the choicest and most nutritious food for silkworms. All the agricultural literature in the country soon became suffused with descriptions of this wonderful tree. In 1831 the Massachusetts legislature ordered the preparation of a manual on silk culture. The work was performed by Jonathan H. Cobb, a silk manufacturer at Dedham, Massachusetts. The manual was printed in the same year; it passed through at least four editions, and spread the merits of the *Morus multicaulis* throughout the New England states.

The following bounties were authorized by legislatures:

Maine: 5 cents on every pound of cocoons raised. Connecticut, act of 1832: \$1 on every one hundred transplanted mulberry trees two years old; 50 cents on every pound of silk reeled on an improved reel.

a Doc. 158, Twentieth Congress, first session.
b. Doc. 226, *idem*.

c Report to Twenty-fifth Congress, second session.
d Clarke's Mulberry and Silkworm, p. 121.

Vermont, act of 1835: 10 cents on every pound of cocoons raised.

Massachusetts, act of 1836: \$1 on every ten pounds of cocoons raised in the state; \$1 for every pound of silk reeled and thrown; 50 cents for every pound of silk reeled but not thrown.

New Jersey: 16 cents per pound for cocoons, and 50 cents per pound for reeled silk.

There were similar acts in New York, Pennsylvania, Georgia, Indiana, and probably in other states. The largest quantity of cocoons raised by any one claimant for bounty in Massachusetts was 615 pounds.^(a) The legislation of that state was regarded as quite liberal.^(b) Beside all this, there were premiums paid by counties, by fairs, and by stock companies interested in silk growing. A grant of 262 acres of land, owned by the United States at Greenbush, New York, was made to G. B. Clark, of New York city, on condition that he should plant 100,000 mulberry trees, and provide sufficient silkworms to consume all the foliage thereof. Certainly the new business did not lack encouragement.

A national silk convention was held at Baltimore in December, 1838; a silk convention in New Jersey, February, 1839; in New York, at Albany, February, 1839; in Connecticut, April, 1839; and there were many other gatherings of the kind. The list of stock companies formed for raising and manufacturing silk at this time is very long; their lives were very short. Many of them were slenderly equipped, in both knowledge and resources. Seven are named in Massachusetts, six in Pennsylvania, nearly as many in neighboring states, and a few at the west. A United States Silk Society was organized at the national convention. The number of private individuals engaged in silk raising cannot be estimated. In Burlington, New Jersey, says a writer of the day, "you can scarcely go into a house but you find the inmates engaged in feeding worms."^(c)

The literature of the period on this subject was abundant and various. In the following list the titles of some of the more noted publications are presented:

Authors.—JAMES MEASE, M. D., of Philadelphia: *Letter to Secretary Rush*; U. S. Twentieth Congress, House Doc. 153. JOHN CLARKE: *Treatise on the Mulberry and Silkworm*; Philadelphia. JONATHAN H. COBB: *Manual*. PETER DELABIGARRE: *A Treatise on Silkworms*; New York. PETER S. DU PONCEAU AND JOHN D'HOMERGUE: Philadelphia. GIDEON B. SMITH (Ed. *American Farmer*): *Manual*; Baltimore. JONATHAN DAVIS: *Manual*. WARD CHENEY & BROS.: *American Silk-Grower and Farmers' Manual*; Philadelphia. THOMAS G. FESSENDEN: *The Silk-Manual and Farmer* (monthly); Boston. S. BLYDENBURGH: *The Silkworm* (monthly); Albany, N. Y. FRANKLIN G. COMSTOCK: *Manual*; also: *Silk Culturist*; Hartford. E. P. ROBERTS (Ed. *Farmer and Gardner*): *Manual*; Baltimore. WM. KENRICK: *American Silk-Grower's Guide*. DR. FELIX PASCALIS: *Instructions for Silkworm Nurseries, and Culture of the Mulberry Tree*; also: *Silk Culturist* (periodical); New York. SAMUEL WHITMARSH: *Eight Years' Experience and Observation in the Culture of the Mulberry Tree and the Care of the Silkworm*; Northampton, Mass. EDMUND MORRIS: *The Silk Record* (periodical); Burlington, N. J. JUDGE BUELL: *The Albany Cultivator* (monthly); Albany, N. Y. EDMUND RUFFIN: *The Farmers' Register* (periodical); Richmond, Va. ANNUAL REPORTS OF THE AMERICAN INSTITUTE (yearly); New York, N. Y. GENERAL HENRY ALEX. SCAMMEL DEARBORN: *Internal Improvements and Commerce of the West*; Boston, 1839. JOHN S. SKINNER: *Christmas Gift to Young Agriculturists*; Washington, D. C., 1841.

London works distributed in this country.—SAMUEL PULLEIN: *The Culture of Silk for the American Colonies, and the Culture of Mulberry Trees*; London, 1758. DR. DIONYSIUS LARDNER: *Treatise on the Origin, Improvements, and Present State of the Silk Manufacture*; London.

Translations.—M. MORIN: *Art of Raising and Feeding Silkworms, and of Cultivating the Mulberry Tree*; Boston, 1836. JULIEN STANISLAUS: *Résumé des Principaux Traités Chinois sur la Culture des Muriers et l'Éducation des Vers à Soie*; Paris, 1838 (Translated by Peter Force, mayor of Washington, D. C., 1838). DESLONGCHAMPS: *Essai sur des Muriers et des Vers à Soie*; Paris, 1824. SIGNOR TINELLI (Doctor of Civil Law in the University of Pavia): *Hints on the Cultivation of the Mulberry*. M. BONAFOUX (Director of the Royal Gardens at Turin): *Essai sur des Muriers, etc.* COUNT VON HAZZI, Munich: *Translation of Essay*; U. S. 20th Congress, House Doc. 226. COUNT S. DANDOLO; *Manual for the Culture of Silk*, abridged; Washington, 1828. DE LA BROUSSE: *Des Muriers et de l'Éducation de Vers à Soie*; Nismes, 1789; abridged translation by W. H. Vernon, Boston, 1828.

To the foregoing should be added the various reports of Congressional committees, and especially that of the committee on agriculture in April, 1838, which gives an account of the merits of the *multicaulis* mulberry.

This literature, so far as our native authors are concerned, is in one respect peculiar. Its errors lie all in a single direction. The silk production in past years is often overstated; the probable yield from trees, eggs, and cocoons is often overestimated; plentiful profits are calculated; but the mistake of understating is nowhere made.

Gradually, but at an increasing rate of velocity, the tide of speculation rose. Large as were the anticipated profits of producing silk, they were insignificant as compared with the fortunes to be made by raising the new mulberry tree. Orchards of it were planted in every state in the Union. At least 300,000 trees were sold at Burlington, New Jersey, by September, 1838,^(d) and all that were growing there could have been sold at 40 to 50 cents apiece, if owners had been willing to take that price. The demand raised the value abroad, so that trees which had been worth 8 to 12½ cents each in France could not be bought there on a remittance of less than 18 to 30 cents.^(e) In December, 1838, sales were made in Boston at \$1 per tree, but the owners withdrew most of the lot, being dissatisfied with the prices obtained.^(f) Trees of a single season's growth were sometimes sold at \$5 each.^(g) A belief in the profit of silk culture was, of course, the basis of the demand for the tree, and a table was published showing that in the actual experience of fourteen people, an average of \$1,000 per acre had been obtained, at \$4 per pound of silk.^(h) But the value of the trees became greater than that of the silk which they could by any possibility be the means of producing. A farmer in Belchertown, who planted \$1,000 worth of the *Morus multicaulis* in 1838 on three-quarters of an acre, sold the trees the next year for \$6,000.⁽ⁱ⁾ The sales in a

a American Silk Grower, p. 267.

b Cobb's Manual, p. 47.

c American Silk Grower, p. 54.

d American Silk Grower, p. 60.

e *Ibid.*, p. 78.

f *Ibid.*, p. 148.

g Lilly, Silk Industry, p. 8.

h American Silk Grower, p. 244.

i *Ibid.*, p. 222.

single week in Pennsylvania exceeded \$300,000, and in many cases the same trees were sold two or three times at advancing prices.(a) In other instances, the proceeds of 15 acres were \$32,500; of 2 acres, \$4,000; of 10 acres, \$38,000. The exact procedure at one of these sales is given as follows:

Annexed is a correct statement of the number, prices, and proceeds of the *Morus multicaulis* sold September 18, 1839, at auction, at the Highfield Cocoonery, Germantown, Pennsylvania. The trees were sold as they stood in the ground; those under 12 inches to be rejected. Owing to a thin soil and close planting, the sizes of trees were generally small and the branches few; the average height, according to an estimate made on the ground, being about 2½ feet. The purchasers were mostly from a distance, the largest portion being from Illinois, Missouri, and other Western States. 260,000 trees were sold at prices ranging from 17 to 37½ cents per tree, averaging 31⅞ cents per tree, or 12½ cents per foot in length of stalk. The total sale was \$81,218 75.(b)

The testimony of an eye-witness at Northampton in 1839 is that—

Mr. Samuel Whitmarsh and Dr. Daniel Stebbins were rejoicing over the purchase of a dozen *multicaulis* cuttings, not more than 2 feet long, and of the thickness of a pipe-stem, for \$25. "They are worth \$60," exclaimed the doctor, in his enthusiasm.(c)

The discovery was made that cuttings with the eyes or buds were sufficient for planting an orchard:

On Friday last the steamboat Alabama took up to Baltimore 22,000 mulberry switchets (*Morus multicaulis*) from 6 to 8 feet in length; the value of which, at the lowest calculation, based upon actual sales all through the country, cannot be less than \$45,000. The number of eyes or buds on these 22,000 switchets is ascertained, by carefully counting them, to be 2,254,000, which, according to prevailing prices would be considered cheap at 2 to 2½ cents apiece. The whole were raised on 15 acres of such land as would be considered well sold at \$10 an acre in ordinary situations.(d)

The bubble burst in 1839. Silk culturists and manufacturers had everywhere been swept into the rising current. As for the tree-speculators, it is related that one, who had been among the most successful, sent an agent to France with \$80,000 to buy trees and cuttings in the winter of 1838-'39.

Before the whole of his purchase had arrived, the crisis had come. The nurseryman had failed for so large a sum that he could never reckon up his indebtedness, and the next spring his *multicaulis* trees were offered in vain to the neighboring farmers at \$1 a hundred, for pea-brush.(e)

Agriculturists were angry and vociferous over their losses, and pulled up most of their mulberry orchards.

In every village, numerous gardens and outlots might be seen planted with *multicaulis*; in 1843 these trees had become a worthless incumbrance, and in many instances were rooted out and thrown away.(f)

For a few years after the collapse of the *multicaulis*, some interest was taken in the hardier *Morus alba*. Two trees of one season's growth, raised by Elder Sharp, of North Windham, Connecticut, were sold standing in his nursery in August, 1842, at auction, for \$106 and \$100. Further sales were withheld because the bidding was not considered sufficiently spirited.(g) In 1844, a blight of a general character, to which even the hardy white mulberry yielded, gave the finishing blow, and silk culture in America ceased to exist.

Meanwhile, step by step, improvements had been effected in the manufacture of silk goods. As early as 1828, Toerhoven Brothers, of Philadelphia, had invented a machine for reeling, doubling, and twisting at once.(h) A later invention by Gamaliel Gay,(i) of Poughkeepsie, New York, had a similar object—to reel silk and to make sewing-thread by one operation—and was highly praised by his contemporaries.(j) But success did not lie in this direction. Improvements in the machinery for winding, doubling, and spinning, which are mostly credited to Nathan Rixford, of Mansfield, Connecticut, were introduced about 1833, and proved of permanent value. One of the most important of these is the "friction roller". This device avoids the unequal strain upon the thread which otherwise arises from the increase of diameter as the wound silk accumulates upon a bobbin.(k)

There are the following statistics of production in Massachusetts for the year 1837: value of sewing-silk manufactured at Dedham, in this year, \$10,000; at Northampton, sewing-silk, 6,100 pounds, valued at \$41,500; at Quincy and Reading, coach lace, value at latter place, \$6,000; Roxbury, fringes and tassels, \$15,000; total in Massachusetts, raw silk, \$952; sewing-silk, \$150,477; hands employed, 156.(l) In 1830 the manufacture of silk fringes, tassels, and the like was begun in New York city; this business, including many different kinds of trimmings, is now one of the largest branches of the silk industry, and is more extensively developed in New York than elsewhere, though for many years Philadelphia held pre-eminence. The machinery in use in 1830 in the silk factories at Mansfield, Connecticut, consisted of 32 doubling spindles, 84 for throwing, 32 for soft-silk winding, two broad looms, and one for fringe silk.(m)

a Morris' Silk Farmer, September, 1839.

b Hazard's United States Statistical Register, 1839.

c The Silk Industry in America, by L. P. Brockett, M. D.; New York, 1876, p. 39.

d American Silk Grower, p. 287.

e Brockett: Silk Industry, p. 40.

f Historical Collections of Pennsylvania, by Sherman Day; Philadelphia, 1843, p. 167.

g Lilly: Silk Industry, p. 9.

h Rash Letter, p. 169.

i Mr. Gay was also the inventor of a silk power-loom, said to be capable of weaving silk more rapidly than cotton of equal fineness could be woven. Looms of this kind were put in operation about the year 1835 in silk factories at Providence, Rhode Island, and Nantucket, Massachusetts.—Bishop, ii, p. 392.

j Clarke's Mulberry and Silkworm, p. 116.

k Allen's Chronology, p. 9.

l Hayward's Massachusetts Gazeteer, p. 135.

m Historical Collections of Connecticut, by John W. Barber; Hartford, 1836, p. 550.

In addition to the preceding details, the dates of starting the silk manufacture in various localities may be briefly stated as follows:

- | | |
|--|---|
| <p>1829. Baltimore, Maryland; ribbons.
 1834. Boston, Massachusetts; dress trimmings.
 1834-1838. Florence, Massachusetts; sewing-silk.
 1835. Dedham, Massachusetts; sewing-silk.
 1838. South Manchester, Connecticut; general silk manufacture.
 1838. Windsor Locks, Connecticut; sewing-silk.
 1840. Paterson, New Jersey; general silk manufacture.
 1840. Canton, Massachusetts; sewing-silk.
 1842. Newark, New Jersey; sewing-silk.
 1843. Philadelphia, Pennsylvania; sewing-silk.
 1848. Holyoke, Massachusetts; sewing-silk.
 1849. Watertown, Connecticut; sewing-silk.</p> | <p>1852. Philadelphia, Pennsylvania; ribbons.
 1863. Rockville, Connecticut; sewing silk.
 1865. Trenton, New Jersey; coach lace.
 1865. New York, New York; general silk manufacture.
 1866. Willimantic, Connecticut; sewing-silk.
 1866. Oneida, New York; sewing-silk.
 1868. Hoboken, New Jersey; silk dress goods.
 1870. San Francisco, California; sewing-silk and fringe-silk.
 1871. Brooklyn, New York; silk laces.
 1872. College Point, Long Island, New York; ribbons.
 1874. Wortendyke, New Jersey; silk handkerchiefs and dress goods.
 1875. Town of Union, New Jersey; silk dress goods.</p> |
|--|---|

It has been already mentioned that the foundation of the present silk manufacture was laid in the making of sewing-silk; this is not only true of the business in general, it is part of the individual history of many leading concerns. Each of the successful enterprises has started from very small beginnings and with very slender resources. A close competition, at first with foreign, afterward with domestic rivals, has compelled experiment in new directions, and, coupled in most branches of the business with constantly changing fashions, has required frequent alterations and improvements in machinery. In the course of a recent attempt to ascertain the percentage of decline in the prices of silk goods during the last two decades of years, the writer constantly encountered the fact that very few of the kinds of goods in the market now are like those that were made ten years ago, and scarcely any are precisely comparable with those of 1860. Many of the experiments in making new goods met partial or complete failure at first, but were again and again renewed till the difficulties were overcome; and of these most interesting trials there is little record. For these and other reasons it is not practicable to state the exact dates when the various branches of the industry were first undertaken; but the following general statements may be of service:

The beginnings of the manufacture of sewing-silk by machinery have been already described; the production of "machine-twist"—a kind of thread suited for use on the sewing-machine, and first adapted to that purpose in February, 1852—gave a great impetus to this branch of the trade. Since then the sewings and twist manufacture, keeping pace with the rapidly-increasing use of sewing-machines, has wholly freed itself from foreign rivalry, but suffers from the keenest of home competition. Manufactures of spun silk (which now include almost every kind of silk goods) were begun at South Manchester, Connecticut, about twenty-five years ago. Ribbons began to be made to supply deficiencies in imported invoices as early as 1861; their manufacture here was much stimulated during the war of the Rebellion by the high price of gold, which checked their import. Plain gros-grain dress silks were made to some extent by different manufacturers before 1866, when the business was organized in New Jersey; its most rapid growth is since 1876. Brocaded silks and satins were attempted on a large scale earlier than plain gros-grain, and were produced in several factories when that was confined to a few. The business of printing Asiatic pongees preceded the regular manufacture of handkerchiefs, which was of slow growth till 1876, when it received a remarkable impulse from the Centennial Exhibition. Hair nets and spot nets were largely produced in 1868; a lace-covering for buttons was made on a lace-machine in 1869; these undertakings paved the way for the manufacture of silk laces, which was established at Brooklyn, New York, in 1871. The making of trimmings of all kinds forms a very large branch of the silk industry, but this high position has been acquired mostly within the last ten years, although certain classes of trimmings were produced before the present century, and have since been made continuously. Silk tapestry and the like are just emerging from the experimental stage, which velvet has not yet quitted.

Throughout the silk manufacture, the condition—or rather, the character—of the raw material is a potent factor. The machinery of American silk mills is driven at the highest speed compatible with good work. Such speed is often needed to catch the demand of a short-lived fashion; and it proves generally profitable by economizing labor. For use on the swiftest spindles and looms, raw silk of the most uniform character is required. For many years the Asiatic supply was unsatisfactory, while the European was too costly to be used at a profit. An important effort was made in 1840-'41 to secure the better preparation of China silk for this market. The chief point was to secure better reeling or re-reeling by means of a winding-frame moved by a crank, in place of direct winding by hand from stationary bamboo sticks. In re-reeling, also, the sizes of the fiber were to be sorted. Improved reels made by Mr. Rixford, and provided with a traverse attachment, were sent to China. Owing to oriental prejudices, the attempt was at that time unsuccessful. About thirteen years afterward the effort was renewed, and the first re-reeled China silk was brought to New York in 1854. For a while the work was well done, but the Chinese became careless about it, and the re-reeled silk deteriorated so much that its importation ceased. A third effort to secure better reeling in China was made in 1867 and met with more permanent success,^(a) though at best the work there falls far short of the highest standards. Imperfect reeling in the United States had destroyed the

market for our native silk and retarded our manufactures; imperfect reeling in China was for even a longer term the chief obstacle to improvement, all progress being hampered by defects in the raw material. Among the causes of rapid advance in the arts of manufacture during very recent years, improvement in the quality of raw silk, especially from Japan, holds a prominent place.

The use of Asiatic silk in this country began with the earliest successful manufacture, about 1829, the first importation of the material being in 1828. Eventually the receipts of raw silk became a correct index of the amount of silk manufacture in this country, but there was a period during which the import was nearly balanced by an export, the Asiatic silk from around Cape Horn merely passing through our ports on its way to Europe. For instance, the following were the values of imports and exports of raw silk from September 30, 1831, to September 30, 1836:

Year.	Import.	Export.
1831.....	\$88,557	\$134,376
1832.....	48,938	48,800
1833.....	135,348	66,456
1834.....	78,706	130,256
1835.....	10,715	4,114
1836.....	37,507	.....
Total.....	390,771	393,002

Before taking the import of raw silk as our guide to the amount of manufacture, we may consider a few statistics from other sources. The manufacture of sewing-silk in the United States in 1844 is reported as "396,790 pounds, exclusive of what was used and made in families; of that quantity 176,210 pounds were made in Connecticut".(a) There are good reasons for regarding these figures as greatly in excess of the actual production. The census of 1850 showed a much smaller amount of manufacture, and was doubtless nearer the facts, the totals given being of sewing-silk, value \$1,209,426; silk cloth, \$17,050; fringe, gimp, and tassels, \$583,000; total, \$1,809,476. In 1855 there were made in Massachusetts, in the three counties of Hampshire, Essex, and Norfolk, 44,000 pounds of sewing-silk, worth \$300,000. "That quantity was exclusive of fringes and tassels, made chiefly at Roxbury, to the value of \$433,000, and ribbons and dress trimmings to the value of \$38,000 by one establishment at Newton." As the silk manufacture of Connecticut was then larger than that of any other state, and there was a considerable amount in Pennsylvania and New Jersey, the value of the whole amount of silk goods made in that year certainly exceeded \$3,000,000. For the year ending June 30, 1860, the census returns give a total of silk goods valued at \$6,607,771. It is noteworthy that the number of pounds of sewings and twist is 89 per cent. of the whole number of pounds of raw silk said to be consumed as material, and that the latter is in excess of the estimated import. The value of silk goods made in 1870, according to that year's census, was \$12,210,662. The value in 1880, net, in finished goods, was \$34,519,723.

In the following table the imports of raw silk are given from 1843 to 1880, inclusive, according to the records of the United States bureau of statistics, as to value and number of pounds, except where the pounds are estimated; and the receipts of raw silk at New York and San Francisco are also presented in number of bales and cases since 1850, according to the records of the Silk Association of America:

Year.	Pounds.	Value.	Number of bales and cases at New York and San Francisco.	Year.	Pounds.	Value.	Number of bales and cases at New York and San Francisco.
1843.....	17,898	\$53,350	.....	1862.....	b132,460	\$489,526	1,008
1844.....	59,192	172,598	.....	1863.....	b250,740	1,018,468	2,067
1845.....	62,697	208,454	.....	1864.....	407,935	2,057,964	2,429
1846.....	68,998	216,647	.....	1865.....	290,021	1,192,870	2,093
1847.....	b100,034	250,086	.....	1866.....	567,904	3,437,900	3,977
1848.....	b180,319	354,973	.....	1867.....	491,983	2,469,001	2,252
1849.....	b144,204	384,535	.....	1868.....	512,449	2,921,573	4,938
1850.....	b120,010	401,385	.....	1869.....	720,045	3,318,496	5,046
1851.....	b144,144	456,449	.....	1870.....	583,589	3,017,958	5,263
1852.....	b119,604	378,747	1,540	1871.....	1,100,281	5,739,592	8,164
1853.....	b234,648	722,931	2,527	1872.....	1,063,800	5,625,620	9,203
1854.....	b305,523	1,099,339	5,604	1873.....	1,159,420	6,460,821	11,129
1855.....	b257,968	751,617	3,776	1874.....	794,837	3,854,003	7,862
1856.....	b304,994	901,234	4,425	1875.....	1,101,681	4,504,308	9,768
1857.....	b190,757	953,734	3,107	1876.....	1,354,901	5,424,408	11,660
1858.....	b422,658	1,542,195	5,037	1877.....	1,180,170	6,792,937	10,640
1859.....	b388,597	1,619,167	3,850	1878.....	1,182,750	5,103,084	10,190
1860.....	b297,877	1,340,676	5,241	1879.....	1,889,776	8,371,025	15,949
1861.....	b361,891	1,507,870	3,837	1880.....	2,502,236	12,024,690	21,741

a Census of 1860; Introduction, p. ci.

b Estimated from current prices; only the values being on record.

SILK MANUFACTURES OF THE UNITED STATES.

As it will be of interest to make some comparisons between the importation of silk goods and their manufacture, tables are herewith given of the imports. The first of the tables is from the records of the United States bureau of statistics, by fiscal years, giving the values of the whole imports of silk manufactures into the United States since 1825. Nine or ten per cent. of these imported goods in the earlier years was exported. The second table gives values of the same classes of imports by calendar years at the port of New York, and it may be accepted as representing for those years 95 per cent. of the whole:

Imports of silk manufactures by fiscal years.

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1825..	\$10,271,527	1832	\$9,094,566	1839	\$21,638,828	1846	\$8,827,307	1853	\$30,492,024	1860	\$32,961,120	1867	\$18,357,052	1874	\$23,996,782
1826..	8,104,837	1833	9,174,199	1840	9,526,988	1847	10,821,723	1854	24,785,652	1861	23,657,269	1868	16,908,633	1875	24,330,023
1827..	6,545,245	1834	2,000,949	1841	15,256,907	1848	14,562,743	1855	24,366,556	1862	7,558,376	1869	22,288,060	1876	23,745,967
1828..	7,008,614	1835	16,507,983	1842	9,415,370	1849	13,791,232	1856	30,226,532	1863	12,890,760	1870	23,870,142	1877	21,830,150
1829..	7,048,628	1836	22,862,177	1843	2,063,410	1850	17,679,137	1857	27,800,319	1864	20,597,723	1871	32,941,001	1878	19,837,972
1830..	5,774,010	1837	14,115,171	1844	7,088,406	1851	25,829,692	1858	21,229,358	1865	8,439,145	1872	30,448,618	1879	24,013,398
1831..	10,904,303	1838	9,812,338	1845	8,713,226	1852	21,623,640	1859	28,080,360	1866	23,508,606	1873	20,890,035	1880	32,188,690

Imports of silk manufactures at the port of New York by calendar years.

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1851.....	\$23,548,774	1856	\$20,081,416	1861	\$12,298,863	1866	\$22,902,804	1871	\$33,890,719	1876	\$21,192,386
1852.....	22,519,223	1857	27,465,192	1862	10,942,938	1867	16,434,524	1872	32,677,749	1877	19,922,741
1853.....	33,039,081	1858	17,632,843	1863	14,761,186	1868	18,903,232	1873	24,379,322	1878	20,042,730
1854.....	27,031,659	1859	31,877,863	1864	14,621,202	1869	22,004,312	1874	23,292,551	1879	25,830,829
1855.....	23,269,544	1860	34,390,321	1865	18,393,693	1870	26,781,275	1875	23,168,118	1880	33,395,460

The following table is presented in order to show specifically the classes of silk goods imported during the past ten years, and facilitate comparison between imports and manufactures as to different kinds of articles:

Imports of silk manufactures at the port of New York, in the calendar years, specifying articles.(a)

Articles.	1880.	1879.	1878.	1877.	1876.	1875.	1874.	1873.	1872.	1871.
Total	\$33,305,460	\$25,830,820	\$20,042,730	\$19,022,741	\$21,192,386	\$23,168,118	\$23,292,551	\$24,379,322	\$32,677,749	\$33,899,719
Dress silks	17,665,038	15,104,026	11,834,931	11,978,185	12,707,192	12,639,307	10,581,299	9,764,050	11,080,001	13,650,246
Satins	267,920	262,672	50,219	26,795	41,403	107,501	259,766	205,524	334,403	312,060
Crapes	443,238	435,662	372,231	397,905	504,277	470,806	641,380	577,575	459,727	409,287
Pongees	8,205	1,996	394	2,617	.....	10,126	2,629	561	.....	451
Flashes	468,219	125,487	101,198	73,777	85,668	125,722	127,045	221,421	309,485	367,159
Velvets	2,044,139	1,976,133	1,510,240	1,049,305	1,384,450	1,151,427	1,087,131	888,148	1,512,500	1,793,906
Ribbons	3,563,848	2,180,260	1,829,838	1,689,413	1,837,537	2,084,271	3,180,647	4,740,040	8,397,009	7,815,744
Ences	1,540,892	1,059,909	921,265	1,158,689	1,248,740	1,030,055	1,708,181	1,960,672	2,218,452	2,153,989
Embroideries .....	.....	.....	2,020	.....	.....	699	1,224	2,644	985	2,625
Shawls	20,677	11,179	5,519	5,611	5,831	71,981	151	5,345	9,236	14,889
Gloves	228,838	126,284	112,941	41,189	29,812	46,622	23,571	40,396	17,337	31,188
Cravats	93,339	115,441	101,049	55,777	50,271	411,689	136,730	115,663	173,742	135,382
Handkerchiefs	64,077	54,688	48,761	40,932	40,294	117,368	38,754	25,862	23,357	39,837
Mantillas .....	.....	.....	.....	.....	573	.....	.....	.....	.....	.....
Vestings .....	.....	.....	.....	.....	2,427	3,008	2,467	53,431	66,621	54,817
Hose	118,838	89,997	48,955	34,123	55,618	46,790	26,958	42,323	34,836	30,209
Sewings	230,072	194,103	50,632	81,764	16,557	11,867	37,898	31,611	51,030	105,565
Braids and bindings	1,046,868	1,343,760	935,933	1,143,737	964,883	1,200,555	1,038,320	1,083,906	1,044,044	992,913
Silk and worsted fabrics	199,854	156,293	136,085	136,194	165,714	421,791	476,561	599,967	707,176	1,064,137
Silk and cotton fabrics	4,751,946	2,652,228	1,981,899	1,992,033	2,034,823	2,312,654	3,876,052	4,064,077	6,253,392	4,566,028
Silk and linen fabrics	943	651	660	3,720	10,316	3,680	3,897	5,511	78,726	389,289

a Compiled by the Secretary of the Silk Association of America, 44 Howard street, New York.

In comparing the foregoing tables with the statistics of production, it should be noticed that the imports are simply the invoiced values, to which must be added the duties, importers' profits, and other expenses of importation, before the market value here can be ascertained. Making these allowances, it appears probable that the proportion of silk goods in this country, to the whole amount used, is slowly rising, as follows:

Percentage of silk goods made in the United States as compared with whole consumption of such goods in the country.

	Per cent.
In the fiscal year 1860.....	13
In the fiscal year 1870.....	23
In the calendar year 1874.....	28
In the calendar year 1875.....	34
In the calendar year 1876.....	35
In the calendar year 1877.....	32
In the calendar year 1878.....	36
In the calendar year 1879.....	39
In the fiscal year 1880.....	38

If the foreign invoices are much undervalued, the foregoing calculations must be largely modified. For instance, if the undervaluation of silk goods imported in the census year amounted to twenty per cent., the manufacture of such goods in the United States was only one-third of the consumption.

Within a few years there has been a greater and swifter growth than usual in certain lines of silk manufacture, while the remainder has simply held to its annual average. This is shown in the tables that follow; the first giving the figures of production for different kinds of goods; the second and third representing graphically that production, and the importations of specified articles. In the graphic charts the scale is uniform, permitting direct comparison:

Production of finished goods in the United States.

Silk manufactures.	1874.	1875.	1876.	1877.	1878.	1879.	1879-1880.
Total.....	\$16,262,157	\$21,269,081	\$21,201,480	\$16,613,743	\$20,791,055	\$20,983,600	\$34,519,723
Machine twist.....	4,848,839	5,535,754	6,301,059	4,126,460	4,393,237	5,891,300	0,007,735
Sewing silk.....	917,800	885,079	951,400	349,498	400,123	778,250	776,120
Floss silk.....	43,000	42,568	35,423	32,690	87,710	166,935	225,025
Dress goods.....	1,400,000	1,412,500	1,350,535	1,712,083	2,460,115	3,896,525	4,115,205
Satins.....					482,420	1,100,175	1,101,875
Tie silks and scarfs.....	387,987	982,587	679,668	109,950	288,160	547,675	600,675
Millinery silks.....	775,974	1,686,127	1,119,444	1,119,081	1,007,125	977,495	891,955
Broad goods, not above enumerated.....					236,400	538,655	627,595
Handkerchiefs.....	313,516	905,115	927,000	1,924,165	2,108,330	3,583,125	3,881,590
Ribbons.....	2,776,836	4,815,485	4,526,556	3,927,496	4,143,245	5,535,205	6,023,100
Laces.....	103,000	164,000	220,000	156,500	247,285	406,300	437,000
Braids and bindings.....	308,790	333,100	315,000	220,400	460,260	828,255	990,685
Fringes, dress and cloak trimmings.....	2,008,805	2,592,501	2,821,594	2,181,135	2,842,615	3,590,800	4,950,275
Cords, tassels, passementerie, and millinery trimmings.....	869,601	870,000	900,090	727,045	808,320	930,540	1,806,575
Upholstery and military trimmings.....	408,000	492,613	554,036	404,700	596,145	947,405	1,392,355
Coach laces and carriage trimmings.....		35,652	24,500	18,040	18,420	23,470	37,510
Fur, hatters and undertakers' trimmings.....					27,690	62,810	59,805
Embroideries.....					24,079	54,900	
Silk value in upholstery and mixed goods.....					54,386	123,750	519,643
Foulards.....	500,000	450,000	472,000	200,000			
Silk hose.....		6,000	3,200	4,500			

SILK MANUFACTURES OF THE UNITED STATES.

CHART OF SILK MANUFACTURE IN U. S. SINCE 1874,
SHOWING INCREASE OR DECREASE OF ANNUAL VALUE PRODUCED.

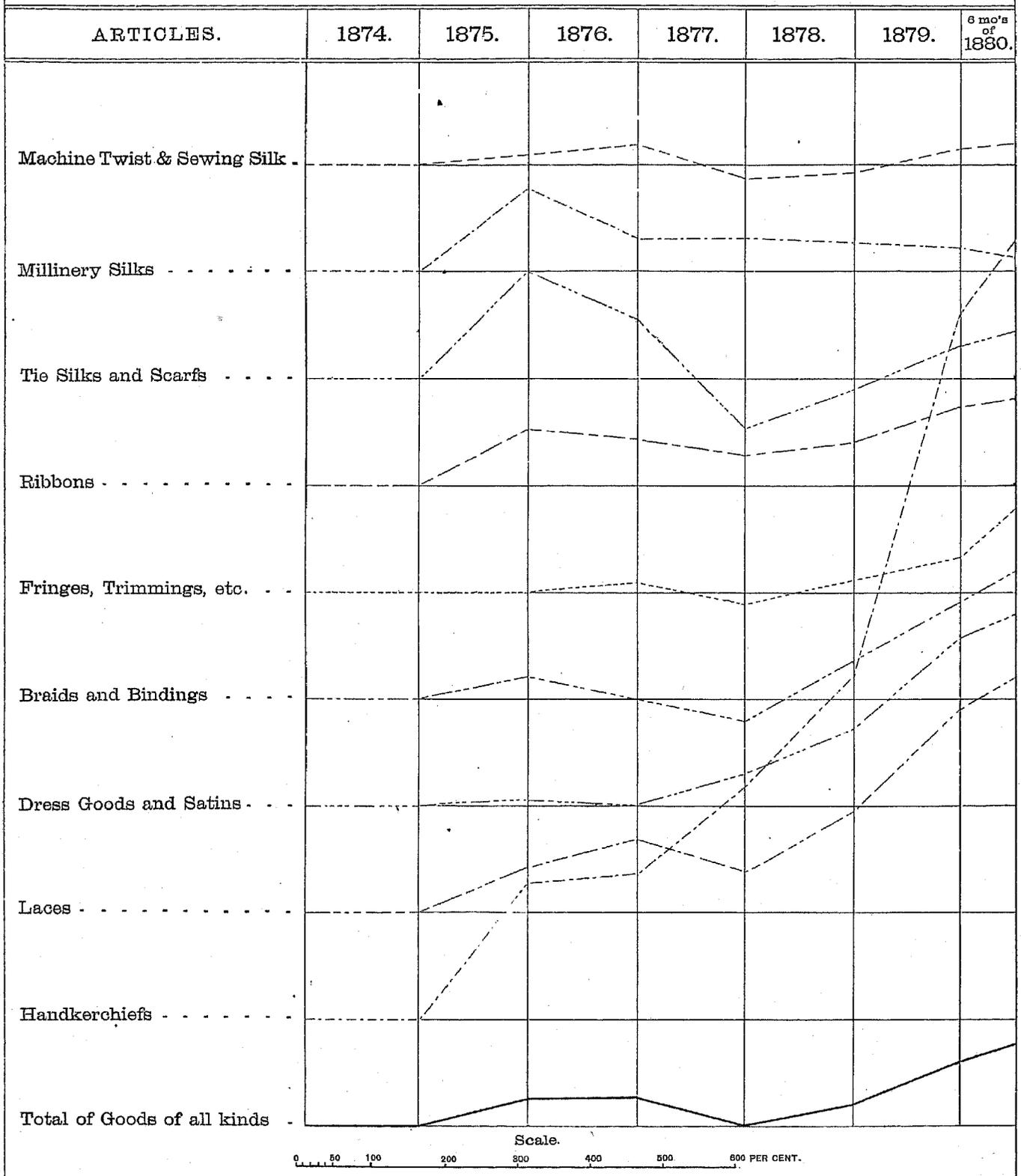
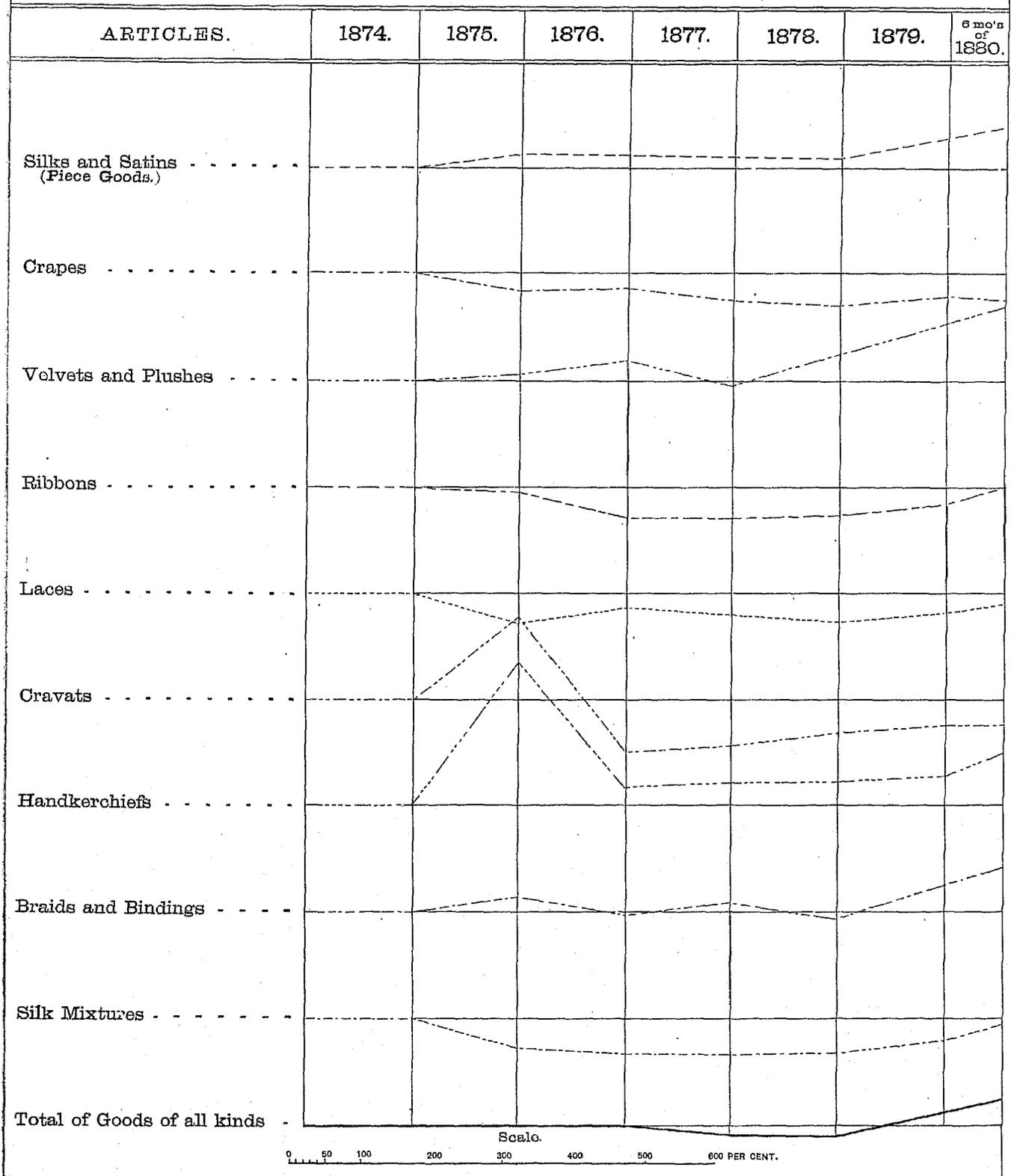


CHART OF IMPORTS OF SILK MANUFACTURES SINCE 1874,
SHOWING INCREASE OR DECREASE OF ANNUAL VALUE IMPORTED.



SILK MANUFACTURES OF THE UNITED STATES.

The following are summaries of the census returns of silk manufactures for the years 1850, 1860, 1870, and 1880:

Silk manufacture, 1850.

Articles.	Establishments.	Hands employed.			Capital.	Wages.	All materials.	Products.
		Total.	Males.	Females.				
Total	67	1,723	508	1,220	\$678,300	\$207,416	\$1,093,800	\$1,809,470
Sewing-silk	27	820	295	524	428,350	152,712	848,945	1,200,420
Silk cloth	2	8	3	5	5,000	1,776	11,235	17,050
E fringe, gimp, and tassels	38	880	205	681	244,850	142,928	233,680	583,000

Silk manufacture, 1860.

States.	Establishments.	Hands employed.			Capital.	Wages.	Materials.		Products.	
		Total.	Males.	Females.			Raw silk.	All materials.	Sewing-silk and twist.	All products.
The United States	130	5,435	1,685	3,850	\$2,920,980	\$1,050,224	462,005	3,901,777	409,429	6,007,771
Connecticut	22	1,137	288	840	997,900	155,700	151,191	821,807	145,845	1,301,400
Maryland	3	85	22	13	35,800	9,336	.....	18,121	.....	30,800
Massachusetts	20	781	234	547	330,700	191,720	89,000	814,970	63,900	1,297,050
New Hampshire	2	23	5	18	9,000	3,780	0,000	28,000	5,440	30,480
New Jersey	9	716	160	556	207,600	111,492	121,634	631,725	107,310	969,700
New York	44	1,159	405	754	323,980	268,624	20,140	644,911	25,444	1,154,296
Ohio	4	25	11	14	11,300	5,732	.....	14,300	.....	41,200
Pennsylvania	85	1,550	460	1,099	1,010,700	303,780	66,000	927,943	61,500	1,767,845
Vermont .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Silk manufacture, 1870.

States.	Establishments.	Steam-engines.		Water-wheels.		Machines.					Hands employed.				Capital.	Wages.	
		Horse-power.	Number.	Horse-power.	Number.	Reelers.	Looms.	Looms, hand.	Spindles.	Spoolers.	Winders.	Total.	Males above 16.	Females above 15.			Youth.
The United States	80	1,122	48	785	45	30	1,251	188	12,040	2,427	3,038	6,049	1,734	3,520	1,386	\$9,231,180	\$1,942,286
Connecticut	23	401	11	300	20	.....	255	.....	.....	170	199	1,703	466	1,003	234	1,414,130	569,425
Maryland .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts	9	75	6	90	7	.....	5	.....	.....	84	520	453	97	286	76	412,000	154,800
New Hampshire	1	.....	.....	20	1	.....	.....	.....	.....	4	2	15	5	10	.....	5,000	1,000
New Jersey (a)	28	425	10	246	11	.....	308	188	8,840	2,071	2,251	2,790	733	1,162	895	2,166,500	625,816
New York	14	135	8	121	5	.....	216	.....	.....	69	63	739	154	413	172	800,590	262,345
Ohio .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	10	80	7	.....	.....	80	407	.....	3,200	27	61	936	260	655	15	1,429,000	326,400
Vermont	1	.....	.....	8	1	.....	.....	.....	.....	2	2	13	13	.....	.....	4,000	2,400

States.	Materials.					Products.						
	Raw silk.	Silk yarn.	Chemicals.	Other materials.	All materials.	Silk goods.	Silk ribbons.	Machine-silk.	Spool-silk.	Silk thread.	Other products.	All products.
	Pounds.	Pounds.	Dollars.	Dollars.	Dollars.	Yards.	Yards.	Pounds.	Pounds.	Pounds.	Dollars.	Dollars.
The United States	684,488	48,456	209,224	853,766	7,817,550	1,026,422	3,224,264	376,031	127,500	19,000	3,880,357	12,210,662
Connecticut	175,830	.....	81,674	407,727	2,040,834	636,282	447,664	145,702	36,790	.....	.....	3,814,845
Maryland .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,402,500
Massachusetts	101,650	.....	46,500	23,900	937,000	.....	160,000	82,800	68,000	.....	.....	1,402,500
New Hampshire	2,000	.....	350	14,350	.....	.....	2,000	.....	.....	.....	.....	25,000
New Jersey	259,727	22,440	43,800	90,555	2,678,161	352,100	1,294,600	55,529	13,400	.....	2,182,794	3,998,664
New York	111,848	.....	.....	24,805	1,211,385	.....	22,000	77,900	7,500	.....	644,573	1,826,073
Ohio .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	82,429	26,016	30,700	306,664	919,024	38,040	1,300,000	6,500	.....	19,000	1,053,060	1,632,900
Vermont	1,000	.....	200	145	7,805	.....	.....	.....	1,000	.....	.....	10,380

a Two establishments, using 2 water-wheels of 4 horse-power, employing 42 females and 8 youths, and \$12,000 capital, paying \$11,020 wages, using \$507,014 materials, producing \$528,700, included in "Silk, sewing, and twist", are excluded from this table, as they do not manufacture, but simply wind sewing-silk and twist.

Silk manufacture, 1880.

States.	Number of establishments.	Capital.	Number of hand-loom on broad goods.	Number of hand-loom on narrow goods.	Number of power-loom on broad goods.	Number of power-loom on narrow goods.	Number of spindles winding, cleaning, and doubling.	Number of spindles spinning and twisting.	Number of spindles braiding.	Value of machinery.	Value of buildings.	Greatest number of hands.	Average number of hands.			Hours in day labor.		Total amount paid in wages during the year.
													Males above 16 years.	Females above 15 years.	Children and youth.	May to November.	November to May.	
Total.....	382	\$19,125,300	1,620	1,524	3,103	2,218	104,218	262,312	81,607	\$5,227,500	\$3,830,000	34,521	9,375	10,396	5,566	.....	.....	\$9,146,705
California.....	5	164,300	.....	24	.....	.....	200	150	754	62,000	16,400	185	20	106	25	10	10	41,400
Connecticut.....	28	4,436,500	2	10	448	155	35,353	53,472	.....	1,247,550	746,000	3,706	785	1,990	653	10	10	1,026,530
Illinois.....	5	82,000	.....	51	.....	13	.....	.....	.....	30,000	25,000	404	67	135	57	9 1/2	9 1/2	72,195
Kansas.....	1	9,500	.....	.....	.....	.....	.....	.....	.....	1,000	2,500	2	1	.....	1	10	10	250
Maine.....	1	30,000	.....	.....	.....	.....	728	512	.....	9,000	3,000	60	9	46	5	11	11	10,190
Maryland.....	4	20,900	.....	39	.....	.....	.....	.....	.....	10,000	3,500	82	12	50	14	9	9	11,000
Massachusetts.....	22	1,306,190	62	91	.....	88	13,514	16,936	11,000	303,950	194,100	2,068	353	1,225	188	10	10	521,725
Missouri.....	1	4,000	.....	2	.....	.....	730	680	.....	1,000	500	5	3	2	.....	10	10	750
New Hampshire.....	1	8,000	.....	.....	.....	.....	350	300	.....	2,000	1,000	13	2	5	1	10	10	2,500
New Jersey.....	106	6,952,325	1,444	153	2,017	939	76,037	184,746	33,420	2,290,000	984,100	13,031	4,096	5,360	2,493	10	10	4,177,745
New York.....	151	4,696,775	85	906	543	552	27,707	39,564	22,784	906,000	1,483,000	10,484	2,405	5,450	1,769	10	10	2,590,025
Ohio.....	6	24,700	.....	22	.....	.....	.....	.....	.....	12,000	4,000	142	21	73	41	9 1/2	9 1/2	12,550
Pennsylvania.....	49	1,379,900	36	226	95	471	9,497	15,744	6,864	287,000	422,000	3,360	1,000	1,870	319	10	10	678,120
Rhode Island.....	1	7,500	.....	.....	.....	.....	.....	.....	.....	5,000	1,000	15	1	7	.....	10	10	1,600
Vermont.....	1	2,000	.....	.....	.....	.....	90	203	.....	1,000	500	4	.....	2	.....	10	10	125

States.	Value of raw silk and silk materials consumed.	Value of other textile materials consumed.	Value of dye-stuffs, chemicals, and oils consumed.	Value of fuel consumed.	Value of all other materials and supplies consumed.	Gross value of materials and supplies; total.	Silk material twice included in foregoing column.	Net value of materials and supplies; total.	Gross value of manufactured products.	Silk products twice included in foregoing column.	Net value of manufactured products, i. e., finished goods.
Total.....	\$10,208,683	\$1,400,480	\$828,314	\$173,283	\$858,041	\$22,467,701	\$3,808,535	\$18,569,166	\$41,039,045	\$6,513,322	\$34,510,723
California.....	66,418	3,500	3,532	2,355	5,170	80,995	14,585	66,400	159,175	23,470	130,705
Connecticut.....	3,025,325	12,000	115,040	41,693	117,148	3,311,206	395,190	3,016,016	5,881,000	442,925	5,438,075
Illinois.....	73,820	9,500	.....	.....	42,575	125,895	.....	125,895	244,150	.....	244,150
Kansas.....	150	.....	.....	.....	.....	150	.....	150	540	.....	540
Maine.....	59,290	.....	620	235	1,250	61,395	25,000	36,395	81,585	50,485	31,100
Maryland.....	11,630	2,980	1,150	.....	.....	15,760	.....	15,760	35,415	.....	35,415
Massachusetts.....	1,730,870	161,815	64,725	15,775	17,330	1,990,515	121,000	1,869,515	3,764,260	273,167	3,491,093
Missouri.....	580	.....	.....	.....	50	630	.....	630	2,500	.....	2,500
New Hampshire.....	11,000	.....	300	225	100	11,625	2,750	8,875	15,000	6,300	8,700
New Jersey.....	8,664,835	83,400	482,472	78,548	369,281	9,078,536	2,502,400	7,176,136	17,122,230	4,271,185	12,851,045
New York.....	4,333,485	730,530	109,430	24,167	134,192	5,331,804	533,600	4,798,204	10,170,140	802,115	9,368,025
Ohio.....	14,845	2,075	.....	.....	2,575	19,495	.....	19,495	53,110	.....	53,110
Pennsylvania.....	1,207,795	394,680	50,975	10,265	167,270	1,830,985	404,000	1,426,985	3,491,840	698,675	2,853,165
Rhode Island.....	7,500	.....	.....	.....	.....	7,500	.....	7,500	10,000	.....	10,000
Vermont.....	1,140	.....	50	20	.....	1,210	.....	1,210	2,100	.....	2,100

Quantities of silk, in products, in 1880.

States.	Sewings and twist.	Broad goods and handkerchiefs.	Ribbons and laces.	Trimnings and small goods.	States.	Sewings and twist.	Broad goods and handkerchiefs.	Ribbons and laces.	Trimnings and small goods.
	Pounds.	Yards.	Yards.	Pounds.		Pounds.	Yards.	Yards.	Pounds.
Total.....	821,523	10,856,284	30,129,951	710,149	Missouri.....	.....	.....	.....	65
California.....	9,500	.....	.....	4,650	New Hampshire.....	1,300	.....	.....	300
Connecticut.....	394,981	2,253,070	8,541,235	695	New Jersey.....	25,580	6,975,655	8,794,100	50,405
Illinois.....	.....	.....	.....	12,220	New York.....	88,765	1,427,439	10,302,696	403,330
Kansas.....	.....	.....	3,600	.....	Ohio.....	.....	.....	.....	2,187
Maine.....	4,225	.....	.....	.....	Pennsylvania.....	23,110	101,000	1,015,000	192,824
Maryland.....	.....	.....	.....	1,784	Rhode Island.....	.....	.....	.....	1,900
Massachusetts.....	273,816	99,120	573,320	39,789	Vermont.....	251	.....	.....	.....

SILK MANUFACTURES OF THE UNITED STATES.

Summary of silk production. Finished goods for the year ending June 30, 1880.

Sewing-silk	\$776, 120
Machine twist	6, 007, 735
Floss silk	225, 025
Dress goods	4, 115, 205
Satins	1, 101, 875
Tie silks and scarfs	606, 675
Millinery silks	891, 955
Other broad goods	627, 595
Handkerchiefs	3, 881, 590
Ribbons	6, 023, 100
Laces	437, 000
Braids and bindings	999, 685
Fringes and dress trimmings	4, 950, 275
Cords, tassels, passementerie, and millinery trimmings	1, 866, 575
Upholstery and military trimmings	1, 392, 355
Coach laces and carriage trimmings	37, 510
Undertakers', hatters', and fur trimmings	59, 805
Mixed goods and silk values therein	519, 643
United States	<u>34, 519, 723</u>

Silk manufacture in counties producing goods to the value of \$1,000,000 annually.

State and county.	Number of factories reported.	Capital (real and personal) invested in the business.	Number of looms.	Gross value of manufactured products.	Net value of manufactured products, i. e., value of finished goods.	Total amount paid in wages during the year.
United States.....	288	\$15, 371, 575	7, 462	\$32, 906, 000	\$27, 688, 170	\$7, 531, 505
CONNECTICUT.						
Hartford county	3	3, 215, 000	549	2, 709, 500	2, 571, 820	638, 760
Tolland county	9	560, 000	37	1, 627, 145	1, 443, 060	168, 800
MASSACHUSETTS.						
Hampshire county	4	437, 400		1, 457, 300	1, 410, 800	203, 625
NEW JERSEY.						
Hudson county	17	753, 300	1, 060	2, 045, 000	2, 028, 400	485, 500
Passaic county	82	5, 660, 525	3, 238	14, 164, 465	10, 003, 905	3, 335, 045
NEW YORK.						
New York county	126	3, 431, 450	1, 700	7, 800, 250	7, 596, 720	2, 070, 535
PENNSYLVANIA.						
Philadelphia county	47	1, 313, 900	760	3, 162, 340	2, 627, 665	620, 620

In the present census the returns show a total of "capital" amounting to \$19,125,300. If the assumption be made that the money used in carrying on the business, apart from plant and fixtures, is turned over three times in the year, the following estimate may be offered:

One-third of \$9,146,705, the year's expenditure for wages	\$3, 048, 902
One-third of \$22,467,701, the year's cost of materials and supplies	7, 489, 234
Fixed capital in machinery	5, 227, 500
Fixed capital in buildings	3, 836, 600
Estimate for total fixed and floating capital	<u>19, 602, 236</u>
Giving a result within 2½ per cent. of the returns.	

The number of hands reported as the "average" employed, is usually taken from the pay-roll, and no allowance is made for irregularities and absences. The actual number constantly employed is fully ten per cent. below the reported average. A careful study of the returns on this point has justified this conclusion. The rates of wages paid to different classes of operatives during the year ending June 30, 1881, are given in the following table:

Rates of wages per week to specified operatives.

Designation of operatives.	Sex.	Average rate.	Usual rates.	Designation of operatives.	Sex.	Average rate.	Usual rates.
Raw silk winder	F.	\$5 25	\$5 00 and 6 00	Hand-loom weaver.....	F.	\$8 44	
Raw silk cleaner.....	F.	3 37	3 00	Power-loom weaver (a).....	M.	11 43	\$12 00
Raw silk doubler.....	F.	5 18	5 00 and 5 50	Do.....	F.	7 94	
Raw silk spinner.....	M.	5 57	8 00	Lace-machine operator.....	M.	14 75	
Do.....	F.	4 87		Braid-machine operator.....	M.	16 00	
Raw silk twister.....	M.	5 08	6 00	Braider.....	F.	5 41	
Do.....	F.	5 07	6 00	Passementerie spinner.....	M.	17 73	
Raw silk reeler.....	F.	4 50		Do.....	F.	12 00	
Soft silk doubler.....	F.	4 00		Fringe-knotter.....	F.	5 30	
Soft silk winder.....	F.	6 35	6 00	Tassel-maker.....	F.	5 29	
Soft silk spooler.....	F.	4 96		Finisher.....	M.	13 59	
Soft silk warper.....	M.	10 71		Designer (b).....	M.	24 71	
Do.....	F.	7 02	8 00	Card-cutter (c).....	M.	11 68	
Quiller and quill winder.....	F.	4 00		Dyer (d).....	M.	12 77	12 00 and 15 00
Soft silk beamer.....	M.	12 11	12 00 and 15 00	Engineer.....	M.	12 33	
Do.....	F.	7 72	7 00 and 9 00	Machinist.....	M.	12 40	
Soft silk warp twister.....	M.	13 96	12 00 and 15 00	Loom-fixer.....	M.	15 87	
Hand-loom weaver (a).....	M.	14 15	12 00, 15 00, 18 00	Laborer.....	M.	8 73	6 00 and 9 00

a There is a very great difference in the size of looms for different kinds of goods. The highest rates to power-loom weavers are paid to those employed on the large looms used in fringe and trimming manufacture.
 b The designer is sometimes also the superintendent.
 c The card-cutter is sometimes also the designer.
 d The chief dyer receives from \$20 to \$30.

The net value of raw silk and silk materials consumed in manufacture is \$15,310,148. The gross value, as given in the returns, consists of the following items:

2,690,482 pounds raw silk, valued at	\$13,497,203
Silk material twice included in returns.....	3,898,535
Waste silk, pierced cocoons, and imported organzine, tram, French twist, etc.....	1,812,945
Total.....	19,208,683

Silk material is "twice included" when, for instance, it appears first as "raw silk", in the returns of a throwster, and secondly as "thrown silk" or "fringe silk", being again reported as raw material in the return of a weaver or fringe-maker. The number of pounds of raw silk accounted for in the returns is 2,690,482, which agrees very fairly with the import of the fiscal year, 2,562,236, the stock on hand being somewhat lighter at the close than at the beginning of the year.

Silk products twice included are deducted from the gross production, leaving a result which it will be noticed exactly agrees with the value of finished goods as given by the returns. The reasons for this deduction are similar to those which apply to the values of raw materials. While the total production, as represented by reports amounting to \$41,033,045, covers only a real value of product amounting to \$34,519,723, it should be noted that the products of partial manufacture go for the most part to be finished in counties and often in states other than those where they originate. Hence in many cases the gross production of a county or state more nearly represents its industry than would the value of its finished goods. For instance, the gross production of Passaic county, New Jersey, \$14,164,465, is much nearer the total value of its industry than \$10,003,905, the value of its completed goods, because the greater part of the thrown and fringe silk produced in Paterson, New Jersey, is not made into goods there, but goes elsewhere, chiefly to New York city; and the same is true, to a great extent, of the added value from spooling, winding, dyeing, and refinishing; those processes being largely applied in New Jersey to goods belonging in other states.

The values of the finished goods are given at the selling prices in their chief markets, and without deduction for expenses of selling. No questions were asked or answered in the returns as to such expenses, nor as to profit and loss, freight to market, taxes, interest on capital, and depreciation of materials, goods, buildings, or machinery.

Mr. John E. Atwood, of Stonington, Connecticut, has, by request, contributed a letter on the history of silk machinery, which is herewith subjoined:

STONINGTON, CONNECTICUT, September 27, 1881.

About fifty years ago nearly all the silk produced and manufactured in the United States was reeled by hand in a rude manner and spun on hand-wheels, each attendant operating a single spindle only. The substitution of machinery near that time, driven by water or steam power, soon superseded the old methods. Like nearly everything of the kind at that period the earlier appliances for the manufacture of silk were primitive in character. This industry has been affected by a series of advances of more or less importance, among which may be mentioned the application of the friction-roll for a take-up motion in spinning, the use of the railroad machine for doubling and twisting, the three-cord matcher for doubling and matching; also a matcher and evener combined for doubling, and finally an improved process for stretching the twisted silk, that has superseded most of the previous steps by cheapening and improving the product.

In the meantime many minor advantages have been introduced, while steady progress has been made in style and workmanship, inasmuch that the modern plant for silk manufacture would hardly seem to be related to the earlier specimens.

These observations apply more particularly to the silk industry up to a very recent period. Within the last two or three years, however, there has been a marked advance at least in the machinery and appliances for throwing silk. These changes are of a radical type and of such superior merits as to work a complete revolution in their sphere of operations. These last steps in the line of improvement apply to both departments of silk throwing, commencing with a most superior guide system, and include important features in winding, redrawing, doubling, reeling, soft silk winding, spinning, etc. While the machinery is far superior to the former styles, at the same time it costs much less for a plant to turn out a given production.

A brief statement as regards the spinning frame, the most important of the series, may not be out of place here.

This machine, unlike its rivals, is adapted for both the sewing and the weaving departments. It contains the new guide system; it has practical self-balancing spindles that will bear a maximum velocity of 10,000 revolutions per minute, and run much better than the common spindles will at 5,000. The spindles are self-oiling, neat, and waste no oil, and require to be oiled but once in from three to six months. The bands will last much longer on this frame. The machine is a model of neatness and convenience. It can be operated with less expensive labor, has several minor advantages, and has a radically new method for driving the spindles. It is very economical of space, the last edition being only 10 inches from the center of the spindles on opposite sides, while it costs less for spindles than any other.

If we stop to survey the progress made at this point we find that one operative will spin more silk and do it much better than 2,000 could a half century ago; the room occupied would be only about one-four-hundredth part as much, and the cost of the machinery about one-twentieth.

In addition to the foregoing statements concerning the progress in machinery it may be desirable to notice the increased use of power-looms. The following statistics have been compiled from the census returns, and show the numbers in use in the years 1875 to 1880, respectively:

Number of power-looms in use in 1875, 1,605; in 1876, 1,941; in 1877, 2,340; in 1878, 2,862; in 1879, 3,690; in 1880, 5,321.

The number of Jacquard attachments reported in returns was 3,189. A great variety of other machinery is in use in the manufacture; 4,117 "other machines"—that is, other than looms or Jacquards—were reported in the returns, and this probably falls short of the full number.

Since the period of the *Morus multicaulis* speculation the raw silk raised in this country has at no time been an observable element in the material used by manufacturers. Trustworthy statements of the annual amount obtained in that era of excitement were not then published; the accounts of what might be done or what was expected taking the place of statistics. A writer who seems to have been more conservative than the majority estimated the annual production in 1841 at 30,000 pounds.^(a) After the blight of the mulberry in 1844, a long period elapsed in which there is no record of anything more than trifling experiments in producing silk, except an indefinite account of a considerable quantity of cocoons obtained at and near New Orleans and shipped to Europe about the year 1860. The cultivation of the mulberry was begun in California in 1854; silkworm eggs were received there in 1860; in 1865 about 250 pounds of cocoons were obtained, and the product reached 1,900 pounds in 1868. The enterprise arrived at its highest point in 1870, when more than a million mulberry trees were growing in the state. The production of silkworm eggs for export to Europe was attempted on a large scale, and one company raised from 7,000 to 8,000 ounces.^(b)

This industry was encouraged by an act of the California legislature in 1865-'66, giving a bounty of \$250 for planting 5,000 mulberry trees and \$300 per 100,000 cocoons. The operation of the law proved unsatisfactory and it was soon repealed. An attempt to pass a new act "to encourage silk culture and manufacture" was defeated in the California senate in 1872. The speculation in silk-raising "raged with unabated fury for several years, inflicting severe losses. It is at present almost extinct in California in consequence of the reaction against this mania."^(c)

An inquiry was attempted by the writer to ascertain the amount of raw silk raised in the United States during the census year ending June 30, 1880. It was soon determined that the expense of making such an investigation thoroughly would be more than the result could be worth. The only instances of the use of native silk in manufacture were at Williamsburgh, Kansas, and at Salt Lake City, Utah. The latter experiment proved financially a failure, the raw silk costing much more than the Asiatic product. It may, however, be stated in a general way, without pretension to accuracy, that the amount of reeled silk produced in Utah territory during the year was less than 1,000 pounds; the amount in Kansas was less than 500 pounds, and the product in no other state was more than half as much. Missouri and North Carolina probably came next in amount of cocoons raised, and after those states Pennsylvania and New Jersey, the quantities produced there and in scattered localities throughout the country being inconsiderable.

^a The Silk Record: Edmund Morris, Burlington, New Jersey, December, 1841.

^b Le Cocon de Soie: by E. Duseigneur-Kléber; Paris, 1875, p. 84.

^c Report of the United States Commissioner of Agriculture for 1878, p. 495.

INDEX TO SILK MANUFACTURE.

	Page.		Page.
American silk mills, machinery of	18	Georgia, bounties offered in 1749 for proficiency in the art of silk reeling in	9
Asiatic pongees, manufacture of	18	Georgia, importation of Italians in 1736 for the advancement of the silk culture in	9
Asiatic silk and its use in the United States	19	Georgia, introduction of the silk industry in	5
Aspinwall, Nathaniel, his exertions in 1790 to extend the planting of the mulberry in Pennsylvania, New York, and New Jersey, and his part in the introduction of silk culture in Connecticut	13, 14	Georgia and South Carolina, encouragement extended by the British parliament to promote the growth of the silk industry in	11
Atwood, Mr. John E., letter of, on the history of silk machinery	27, 28	Georgia, scale of premiums offered for the encouragement of silk culture in, in 1751	11
Average number of hands employed	26	Georgia, silk production in	10
B.		H.	
Bavarian Protestants, silk culture at Ebenezer, Georgia, by ..	9	Hands employed, average number of	26
Bounties authorized by state legislatures for the encouragement of silk culture	15, 16	Hanks, Rodney, and Horatio, mill of, at Mansfield, Connecticut, for the manufacture of sewing-silk by water-power	14
C.		Handkerchiefs, manufacture of	18
California legislature and its encouragement to silk culture ..	28	Hartlib, Samuel, essays of, on the production of silk, 1652-1655	4
Capital used in silk manufacture according to the census returns	26	Horstmann, William H., manufacture of silk trimmings by, at Philadelphia in 1815	14
Congress, publications of, relating to silk culture	15	I.	
Congress and the silk culture	15	Italians, importation of, for the advancement of the silk culture in Georgia in 1736	9
Connecticut, commencement of the manufacture of spun silk at South Manchester, in	18	J.	
Connecticut, machinery in use in the silk factories at Mansfield, in	17	Johnson, Sir Nathaniel, and his early endeavors to establish silk culture in South Carolina	6
Connecticut assembly, premiums offered by the, in 1783, for the encouragement of silk culture	13	L.	
Connecticut, silk culture in	13	Laces, silk, commencement of the manufacture of, in 1790, at Ipswich, Massachusetts	14
D.		Law, John, efforts of, to establish silk culture in Louisiana in 1718	7
Domestic silk, early difficulties encountered in the manufacture of, through defective reeling	14	Lombe, Sir Thomas, and his silk-throwing mill at Derby, England	6
Dyeing, spinning, and silk manufacturing in Boston, by William Molineaux	13	Louisiana, attempted introduction of silk culture in, by John Law, in 1718	7
E.		M.	
Ebenezer, Georgia, silk culture at	9	Machinery in use in 1830 in the silk factories at Mansfield, Connecticut	17
England, and her encouragement to colonists who engaged in the work of silk culture	2	Machinery of American silk mills	18
England and the introduction of broad silk weaving in 1620 ..	4	Machine twist, and the influence of its production	18
England, and the measures adopted for the cultivation of the mulberry-tree under James I.	2	Manufacture in America, English legislation in 1750 for stopping	12, 13
English legislation in 1750 for stopping manufacturing in America	12, 13	Manufacture of dress silks	18
F.		Manufacture of Asiatic pongees	18
Finished goods, table showing the production of, in the United States	21	Manufacture of domestic silk, early difficulties encountered in the, through defective reeling	14
France, the silk industry in, in the early part of the 17th century	1	Manufacture of handkerchiefs	18
Franklin, Dr. Benjamin, efforts of, to introduce silk culture in Pennsylvania	12		

	Page.	S.	Page.
Manufacture of sewing-silk	13		
Manufacture of sewing-silk, primitive modes used in	14	Saltzburghers of Ebenezer, Georgia, and their raw silk ex- portations prior to the Revolution.....	11
Manufacture of sewing-silk in the United States in 1844	19	Silk, Asiatic, and its use in the United States.....	18
Manufacture of silk	1	Silk culture and Congress.....	15
Manufacture of silk, capital used in, according to the census returns.....	26	Silk culture, England's encouragement to colonists who en- gaged in the work of	2
Manufacture of silk fringes and tassels in New York, growth of the.....	17	Silk culture, bounties authorized by the state legislatures for the encouragement of.....	15, 16
Manufacture of silk goods, improvement in the	17	Silk culture, encouragement of, by the California legisla- ture.....	28
Manufacture of silk in counties producing goods to the value of \$1,000,000 annually	26	Silk culture, inquiries of Richard Rush relating to	15
Manufacture of silk laces	18	Silk culture at Ebenezer, Georgia, by Bavarian Protestants..	9
Manufacture of silk-mixed fabrics in South Carolina by the French Huguenots.....	6	Silk culture, documents published by Congress relating to...	15
Manufacture of silk, statement showing dates of starting the, in various localities.....	18	Silk culture in Connecticut	13
Manufactures of silk, summaries of, in the United States for the years 1850, 1860, 1870, and 1880	24, 25	Silk culture in Connecticut, Nathaniel Aspinwall and his part in the introduction of.....	13
Manufacture of silk trimmings at Philadelphia in 1815, by William H. Horstmann	14	Silk culture in Pennsylvania.....	11
Manufacture of spun silk at South Manchester, Connecticut, commencement of the.....	18	Silk culture in Pennsylvania, efforts of Dr. Benjamin Franklin to introduce	12
Mansfield Silk Company	14	Silk culture, premiums offered by the Connecticut assembly in 1783 for the encouragement of.....	13
Marshall, John, encouragement extended to, by the United Society for Promoting American Manufactures (Phila- delphia) on account of his invention of machinery for throwing and twisting silk.....	13	Silk, domestic, early difficulties encountered in the manufac- ture of, through defective reeling	14
Massachusetts, commencement of silk lace manufacture at Ipswich, in, in 1790.....	14	Silk enterprises, interruption to, caused by the Revolution- ary war	12
Massachusetts, silk production in, in 1837, statistics of	17	Silk fringes and tassels, growth of the manufacture of, in New York	17
Miner, Mr., of Pennsylvania, introduction of silk culture to the attention of Congress by, in 1825.....	15	Silk goods, improvement in the manufacture of.....	17
Molineaux, William, and the spinning, dyeing, and manu- facturing of silk in Boston	13	Silk goods, percentage of, made in the United States as compared with whole consumption of goods in the country	21
Morus multicaulis trees, prices commanded in sales of the...	17	Silk industry during war of independence.....	13
Morus multicaulis trees in the United States.....	15	Silk industry, early efforts made for the introduction of the, in America	1
Mulberry trees and their cultivation in Virginia in 1623; leg- islative enactment requiring them to be planted, under penalty, with the premium for every pound of reeled silk produced	3	Silk industry, efforts made to establish the, in Virginia	2
Mulberry trees, experiments of Dr. Ezra Stiles in the planting of	13	Silk industry, encouragement extended by the British parlia- ment to promote the growth of the, in Georgia and South Carolina	11
Mulberry tree, the, measures adopted in England for the cultivation of, under James I	2	Silk industry in France in the early part of the 17th century..	1
Mulberry tree, the, and the profits attending its cultivation ..	16	Silk industry, introduction of the, in Georgia	8
N.		Silk industry, rewards offered to colonists in Virginia who en- gaged in the	5
Negroes, employment of, in silk-raising	6	Silk inventions at different periods in the United States....	16
New Jersey, silk-raising in, at Burlington	16	Silk lace, commencement of manufacture of, in 1790, at Ips- wich, Massachusetts	14
New Jersey, Pennsylvania, and New York, the exertions of Nathaniel Aspinwall in 1790 to extend the planting of the mulberry tree in	14	Silk lace manufacture.....	18
New York, growth of the manufacture of silk fringes and tassels in	17	Silk machinery, letter on the history of, by Mr. John E. Atwood	27, 28
New York, New Jersey, and Pennsylvania, the exertions of Nathaniel Aspinwall in 1790 to extend the planting of the mulberry tree in	14	Silk manufacture.....	1
P.		Silk manufacture, capital used in, according to the census returns	26
Pennsylvania, New York, and New Jersey, the exertions of Nathaniel Aspinwall in 1790 to extend the planting of the mulberry tree in	14	Silk manufacture, chart of, in United States since 1874, show- ing increase or decrease of annual value produced	22, 23
Pennsylvania, silk culture in	11	Silk manufacture in counties producing goods to the value of \$1,000,000 annually	26
Pinckney, Mrs., success of, in silk raising and spinning	7	Silk manufacture, statement showing dates of starting, in various localities	18
Power-looms, increase in use of	28	Silk manufactures, summaries of, in the United States for the years 1850, 1860, 1870, and 1880.....	24, 25
R.		Silk manufacturing, dyeing, and spinning in Boston, by Will- iam Molineaux	13
Raw silk, table showing values of imports and exports of, from September 30, 1831, to September 30, 1836	19	Silk mills, American, machinery of.....	18
Revolutionary war, interruption caused by, to silk enter- prises	12	Silk-mixed fabrics in South Carolina, manufacture of, by the French Huguenots.....	6
Rush, Richard, inquiries of, relating to silk culture	15	Silk production in Massachusetts, in 1837, statistics of.....	17
934		Silk production in 1650, essay on, by Edward Williams	4
		Silk production in 1652-'55, essays on, by Samuel Hartlib	4
		Silk production in Georgia	10
		Silk production, summary of.....	26
		Silk publications, list of the most noted	15

	Page.		Page.
Silk, quantities of, in products, in 1880	25	Silk weaving, broad, and its introduction into England in 1620	4
Silk-raising, employment of negroes in	6	Silkworms, introduction of, into America	1
Silk-raising, scale of premiums offered for the encouragement of, in Georgia in 1751	11	Spinning, dyeing, and manufacturing, silk, in Boston, by William Molineaux	13
Silk raising and spinning, success of Mrs. Pinckney in	7	South Carolina and Georgia, encouragement extended by the British parliament to promote the growth of the silk industry in	11
Silk-raising in Burlington, New Jersey	16	South Carolina, the early endeavors of Sir Nathaniel Johnson to establish the silk culture in	6
Silk-raising, speculation in, and its consequences	28	South Carolina, the manufacture of silk-mixed fabrics by the French Huguenots in	6
Silk, raw, and silk materials consumed in manufacture, net and gross value of	27	Stiles, Dr. Ezra, experiments of, in the planting of mulberry trees	13
Silk, raw, earliest quotation of, in America	3, 4	Summary of silk production	26
Silk, raw, exportations of, by the Saltzburghers of Ebenezer, Georgia, prior to the Revolution	11	Summaries of silk manufactures in the United States for the years 1850, 1860, 1870, and 1880	24, 25
Silk, raw, statement showing the amount of, exported from North and South Carolina to Great Britain between 1731 and 1755	7	T.	
Silk, raw, table showing the imports of, from 1843 to 1880, inclusive	19	Tapestry, silk, and its condition	18
Silk, raw, table showing values of imports and exports from September 30, 1831, to September 30, 1836	19	Tree speculators	17
Silk-reeling, bounties offered in 1749 in Georgia for proficiency in the art of	9	V.	
Silks, dress, manufacture of	18	Virginia and the cultivation of mulberry trees in 1623; legislative enactment requiring them to be planted, under penalty, with the premium for every pound of reeled silk produced	3
Silk, sewing, manufacture of	13	Virginia, efforts made to establish the silk industry in	2
Silk, sewing, manufacture of, by water-power at the mill of Rodney and Horatio Hanks, at Mansfield, Connecticut	14	Virginia, rewards offered to colonists in, who engaged in the silk industry	5
Silk, sewing, manufacture of, in the United States in 1844	19	W.	
Silk, sewing, as a circulating medium	14	Wages, rates of, per week, to specified operatives	27
Silk, sewing, the primitive modes used in the manufacture of	14	Williams, Edward, essay of, on the production of silk in 1650	4
Silk, spun, commencement of the manufacture of, at South Manchester, Connecticut	18		
Silk tapestry and its condition	18		
Silk trimmings, manufacture of, at Philadelphia in 1815, by William H. Horstmann	14		

REPORT

ON THE

COTTON MANUFACTURES OF THE UNITED STATES.

BY

EDWARD ATKINSON,
SPECIAL AGENT.

LETTER OF TRANSMITTAL.

BOSTON, MASS., *January 1, 1883.*

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor to submit herewith a report upon the cotton manufactures of the United States.
Very respectfully,

EDWARD ATKINSON,
Special Agent.

THE COTTON MANUFACTURE.

It may be suitable to begin a general report, to be submitted with the census statistics, of the present condition of the cotton manufacture by repeating the last paragraph of the special report containing the statistics, as follows :

At the Atlanta cotton exposition of 1881 were to be found five women from the mountain section of Georgia spinning and weaving coarse cotton fabrics by the use of the hand-card, the spinning-wheel, and the hand-loom. They were representatives of a large section of the United States and of a very considerable population, variously estimated at from 200,000 to 300,000 in number, who have not been reached until lately by the railroad, or been able to avail themselves of modern arts to any extent. At the measure of their work, two carders, two spinners, and one weaver could produce eight yards of coarse cotton cloth in a day of ten hours. The same number of persons employed in the modern cotton factories can, by the use of machinery, with far less arduous labor, produce 800 yards of the same cloth, or one hundredfold as much.

Of the whole force engaged in the specific cotton manufactures of this country, numbering 172,000, about 160,000 are employed in making woven goods and yarns for our home consumption. It would take 16,000,000 persons to make the same number of yards by means of hand work, and the cloth would be of a far different kind; more durable, it is true, but coarse and unsightly. When it is remembered that the larger portion of the present population of the globe is now clothed in cotton fabrics made by hand, and that even those who use machine-made fabrics are served as yet with only one-quarter to half as much cloth as the people of this country average in a year, the future field for industry and for commerce in this department may be imagined, but cannot be proved by statistics or by any deductions from the census data.

The modern cotton factory has been developed within a century, having been made possible by the inventions of Arkwright, Crompton, and Cartwright, and by the application of steam to the working of the factory. The progress of a century might be observed within a two days' journey from Washington. The hand machines of which the carders, spinners, and weavers of the mountain section are still making use, although prehistoric in their kind, are yet of the same type as those which are now used in China, and which have been used there for more centuries than the record of history yet covers; they are the same as those in use in the rest of Asia, by means of which the people, numbered by hundreds of millions, are served; they are the same as those pictured upon the walls of the pyramids, and like what are now used in Africa for her unnumbered hordes; they are the same as those which may be found in all parts of South and Central America.

The world uses at this time probably about the equivalent of 12,000,000 bales of cotton of American weight, of which the United States produce one-half, and Egypt, South America, and India almost all the rest. The portion of this crop which is listed in the commercial tables, and which is worked upon modern machinery, numbers a little over 7,000,000 bales; the rest is never counted in commercial tables, and is worked on hand machines, such as have been described.

Various tables have been made giving approximate estimates of the consumption of cotton per head of population, notably in some of the English statistical reports. In one, compiled a few years since, the estimate reached 3 pounds per head, on an assumed population of 1,400,000,000; it cannot exceed 4 pounds. In this country it is over 15 pounds per head.

The actual annual cotton crop of the world cannot be ascertained with precision, but an approximate estimate can be made. The commercial crop, or what may be called the portion which is worked by complex machinery contained in the factories of Europe and America, is accurately known. The most complete estimate is contained in the annual statement of Thomas Ellison, of Liverpool, from whose most recent report of spindles the following data are taken. A considerable increase of spindles has been added since this report was made :

In the following statement we give an approximate account of the quantity of cotton consumed in each country in Europe and the various groups of countries in Asia, Africa, America, and Australia. The population figures represent thousands (86,260 = 86,260,000); the quantities of cotton and cotton goods represent millions of pounds (142.5 = 142,500,000 pounds). There are three columns of quantities: First, the raw cotton spun in each country; second, the weight of goods and yarns imported into each country from Great Britain; and, third, the total of these two. The table also shows the per capita consumption in each country of raw cotton, of goods, etc., imported from England, and the aggregate of both. The population of Russia includes that of Asiatic Russia. In the column of "Goods, etc., imported from Great Britain" there is a blank opposite Switzerland, because the shipments are sent via other countries. A large part of

COTTON MANUFACTURES.

the Swiss production goes to Turkey and to various continental countries. Part of the production of Holland goes to Java, and part passes to Germany, Switzerland, etc. Belgium also forwards largely to the interior of the continent. The exceptionally large consumption of cotton in the United States is owing to the smaller per capita consumption of wool and flax compared with Europe. Moreover, the figures include goods imported.

Countries.	Population.	RAW COTTON CONSUMED.		GOODS IMPORTED FROM GREAT BRITAIN.		TOTAL CONSUMPTION.	
		Pounds.	Per head.	Pounds.	Per head.	Pounds.	Per head.
The world.....	1,403,396	3,163.0	2.26	1,041.7	0.74	4,205.3	2.98
Russia.....	86,260	142.5	1.65	2.6	0.03	145.1	1.68
Sweden and Norway.....	6,201	24.8	3.94	8.0	1.27	32.8	5.21
Denmark.....	2,023	.....	.....	5.0	2.47	5.0	2.47
Germany.....	42,727	249.1	5.83	65.2	1.52	314.3	7.35
Austria.....	37,331	101.3	2.71	7.9	0.21	109.2	2.92
Holland.....	4,130	13.8	3.34	43.0	10.41	56.8	13.75
Belgium.....	5,330	43.2	8.00	17.4	3.20	60.6	11.35
Switzerland.....	2,776	42.5	15.30	.....	.....	42.5	15.30
France.....	36,908	230.0	6.23	19.9	0.54	249.9	6.77
Spain and Portugal.....	21,275	79.9	3.75	25.7	1.21	105.6	4.06
Italy and Malta.....	26,948	52.8	1.96	51.1	1.50	103.9	3.85
Greece.....	1,450	.....	.....	6.9	4.75	6.9	4.75
Turkey, Roumania, etc.....	15,353	.....	.....	27.0	2.40	37.0	2.40
	288,806	979.9	3.39	289.7	0.99	1,269.6	4.38
Russia.....	86,260	142.5	1.65	2.6	0.03	145.1	1.68
Rest of continent.....	202,546	237.4	4.11	287.1	1.41	1,124.5	5.52
Great Britain.....	34,180	195.7	5.72	.....	.....	195.7	5.72
Total Europe.....	322,986	1,175.6	3.63	289.7	0.89	1,465.3	4.52
Turkey, Persia, etc.....	24,540	.....	.....	38.0	1.54	38.0	1.54
India.....	250,000	295.0	1.18	330.0	1.32	625.0	2.50
China.....	435,000	1,000.0	2.29	100.0	0.23	1,100.0	2.52
Japan.....	33,620	65.0	1.98	20.0	0.59	85.0	2.52
Siam, Java, etc.....	12,500	.....	.....	30.0	2.40	30.0	2.40
Total Asia.....	755,600	1,360.0	1.79	518.0	0.60	1,878.0	2.48
Egypt and North Africa.....	17,000	.....	.....	34.0	2.00	34.0	2.00
West, South, and East Africa.....	13,000	.....	.....	28.0	2.15	28.0	2.15
Interior of Africa.....	200,000	.....	.....	.....	.....	.....	.....
Total Africa.....	230,000	.....	.....	62.0	0.26	62.0	0.26
United States and Canada.....	48,850	628.0	12.85	22.0	0.45	650.0	13.30
Central and South America and West Indies.....	43,250	.....	.....	135.0	3.12	135.0	3.12
Total America.....	92,100	628.0	6.82	157.0	1.70	785.0	8.52
Australia.....	2,650	.....	.....	15.0	5.66	15.0	5.66

Official reports show that the consumption of cotton goods in India is about 2½ pounds per head per annum. We have assumed that a similar rate of consumption obtains in China and Japan. Russia imports some cotton from her Asiatic possessions. The quantity varies considerably. In 1861 it was only 150,000 pounds of 36 pounds each; during the American war it rose to 750,000 pounds; since then it has fallen off. Some cotton is grown and manufactured in the interior of Africa, but it is impossible to say how much. We cannot take the population as a basis, as estimates of that range from 150,000,000 to 400,000,000. We have adopted 200,000,000 in addition to the estimate of the number of inhabitants on what may be termed the margin of the continent. Some native cotton is also consumed in Turkey and in the various countries of South America. The entire production of cotton in the world may be estimated as follows:

Imported into and consumed in Europe.....	Pounds.	2,217,000,000
Consumed in the United States.....	628,000,000	
Native consumption in India, China, etc.....	1,360,000,000	
Total as above.....	4,205,000,000	
Native consumption in Turkey.....	20,000,000	
Native consumption in Africa, one pound per head.....	200,000,000	
Native consumption in South America, etc.....	40,000,000	
Received by Persia from Bokhara, etc.....	15,000,000	
Total crop of the world.....	4,480,000,000	
Equal to bales of 400 pounds.....	11,200,000	

of which about one-half is grown in the United States, and one-half of the whole is spun in Europe.

I would not fully accept Mr. Ellison's estimate, especially in reference to China, a country of which a large and densely-populated portion is in a temperate zone where the winters are severe. Hence the estimate of only 2½ pounds per head would be quite insufficient, as this is the average consumption of India, where a breech-cloth constitutes the entire dress of by far the largest part of the population. Gentlemen who have long dwelt in China—one holding high official position—concur in my estimate of 5 pounds per head.

Since the foregoing computation of the spindles of the world was made a considerable increase has been added. I am therefore of the opinion that at the rate of 5 pounds per head for the Chinese, with increased consumption elsewhere, the present consumption of the world would be nearly or quite 12,000,000 bales of the American commercial weight of 480 pounds each, of which the United States now produce about one-half. At the present average per acre the cotton of the world could be produced in this country on less than 25,000,000 acres, or upon a trifle over 40,000 square miles; but this would be at the rate of less than half a bale to the acre. Improved methods and intelligence applied to farming are bringing the uplands of the United States up to an average practically of one, two, and even three bales to the acre at less cost than was ever before known, while other improvements in method and social order are bringing the bottom lands of the Mississippi and of other parts of the South to more than an average of a bale to the acre. The seventeen crops of cotton which have been grown since the end of our civil war outnumber the seventeen ante-war crops by almost 17,000,000 bales, or at the rate of 1,000,000 bales a year increase. When the same intelligence which is now being applied in many places shall be widely extended, and the intensive system of farming shall have been generally adopted, our whole present crop of 6,000,000 bales may be grown upon only one acre in one hundred of the area of the cotton states; and the whole crop of the world might then be grown upon only two acres in one hundred of the same area.

What is cotton; why does it spin; and who can compete with us in the production of the fiber? Cotton is the wing of the seed of one of the plants belonging to a variety of which the Hibiscus and Mallow are well-known specimens growing elsewhere. It is indigenous in many parts of the world, both in tropical and temperate regions, but the useful sorts are those which grow in the southern parts of the temperate zone.

A tree cotton is found in the tropics, producing a fiber very silky in appearance, resembling in structure the fiber of the *Asclepias*, but useless, like the latter, for spinning purposes, for want of the form and structure which make it possible to spin the cotton of commerce. A vine cotton may be found in some of the West India islands. In China and Japan are found varieties producing a short, clean, and very white staple, practically useless except it be spun and woven by hand. In India many varieties are to be found, commonly known as "Surats", a name which belongs to a district, but which is often applied to all East Indian cotton. East Indian cotton is, as a rule, short in fiber and rough in its character, adhering closely by it send to the seed, and is therefore difficult to remove, except with great waste. There is, however, one exception to this rule: in the Dacca province a long and fine staple is grown, which is produced by a class of people with whom its cultivation is an hereditary employment, and from which the fine muslin known as "woven wind" is manufactured.

In Africa are to be found several varieties; but the only kind known to commerce is the cotton of Egypt, next in quality to our sea-island staple. Aside from this the cotton of Africa is short and woolly. There are large areas of land, formerly irrigated, but now desert, upon which a million or more bales of the most valuable cotton could be annually grown if Egypt were well governed and labor had its true reward.

In Brazil a considerable quantity of useful cotton is now produced, but slavery stands in the way of any great increase or improvement of the staple. There are vast tracts of land on the Paraguay and Parana rivers capable of producing the best varieties; but as yet these places lack good government and that security to property which can alone assure adequate labor and good cultivation. The same may for the present be said of Mexico; but the conditions are so rapidly changing in that country that Mexico may yet become an important factor in the cultivation of the cotton crop of the world.

Cotton has been raised in Asia Minor, Turkey, Italy, and the islands of the Pacific; in fact, the area of land adapted to its growth in some degree is practically unlimited; but the area which produces the most useful varieties is at present substantially limited to the southern portion of the United States.

No treatment of the manufacture of cotton can rightly begin without giving the reason why cotton spins.

Nature begins to twist each fiber upon its own axis, else man could make no use of it. It is the only fiber, either vegetable or animal, with the exception of silk, which can be worked without any preparation or machine just as it comes from the boll or fleece. It can be imagined how some Indian woman in central Asia first gathered the fiber as it hung from the boll, twisted it with her fingers into a strand, as one may now do; then, holding it by the middle with her teeth, doubled it and made a strong, rough cord; and then, making a bobbin of a bit of bamboo reed, and tying the ends of the cord to other reeds, interlaced them, and made the first web of cotton cloth. Any one can do this to-day with cotton, and it would be difficult or impossible to perform this work with any other fiber.

The next step in the process might have been the one which is even now practiced in making the finest fabric ever spun and woven in the world—the Dacca muslin, previously referred to, and known as the "woven wind".

The cotton is separated from the seed by a hand machine known as the *churka*, of which the modern roller gin is but a modification; and no invention has ever yet displaced the roller gin in the treatment of the finest fiber, like that of Dacca and the sea-island cotton of America.

Next may have been the application of the fish-bone to the carding of the fiber, which is still in use, and of which the modern card is but a modification. Twisting upon a distaff, in the same way as the cotton is spun in India and flax in Italy, may be the next step in the progress of the art, and at last the weaver may have constructed such a loom of reeds as is pictured upon the walls of Babylon, while the weaver, sitting under a palm-tree, as she does to-day in India, and weaving only in the early morning, when the dew makes the handling of the fiber possible, may have brought the art slowly and gradually to the perfection of the "woven wind".

In the whole treatment of cotton as it is now practiced in the finest factory of modern kind there is but one original invention; all else is but a change or modification of these pre-historic methods. That one invention was the one which Sir Richard Arkwright borrowed from a previous inventor and put in use about a century ago, namely, the extension of the strand prior to the twisting by the spindle. This was accomplished by the use of several pairs of rollers, one placed in front of the other, and those in front working at a higher speed than those behind. Yet Sir Richard Arkwright's invention itself is imperfect; and whoever discovers a substitute for the leather covering of the top rolls which are used in this process may add from 5 to 10 per cent. to the capacity of every spindle and loom now in use in the world.

It has been said that nature begins to twist the fiber in the boll. In its immature condition it is a simple cylinder folded and *not* twisted, containing watery sap, and held in place by the outer covering, or boll, until it matures; and when the seed is mature the watery sap dries up or condenses upon the walls of the cell, gives to it a twist or convolution like a corkscrew or a shaving as it comes from the plane, and imparts to it such elasticity that it bursts the outer shell, or boll, and hangs with the seed attached to it, ready for the wind to scatter it in the field.

The only other original invention ever applied to the cotton fiber was that of Eli Whitney, whose saw gin, afterward improved and developed by Carver, made the preparation of cotton for the spinner quick and at the lowest cost. It may be said of this invention that while it gave the world at the lowest cost a supply of the cheapest fiber yet applied to the use of man, it perpetuated slavery by nearly a century, caused the greatest civil war ever known in modern times, but is still an unscientific method of treatment, justified only by the quantity rather than by the quality of its work.

The process of what is called manufacturing the cotton fiber into yarn and cloth begins with the process of ginning, which must of necessity be carried on near the field where the cotton is grown. It is the most important department in the whole series of operations to which the cotton fiber must be subjected; and as yet there has been less of science and art and less of the modern system of division of labor applied to this department than to any other. Under the former system of labor cotton was grown mainly upon large plantations, each of which contained within itself all the tools and implements necessary to put the cotton into a bale. The "cotton-gins", as these engines were called, by which the fiber is separated from the seed, were a part of the tools of the farmer and of the planter. Great changes have occurred since the end of our civil war. The present condition of the art may be described as follows, being the result of an investigation lately made for me by an agent, with a view to business enterprises:

In describing the various ginning establishments as they exist at present we shall divide them into three general classes, according to the source of power used to operate them, viz:

1. Ginneries run by horse- or mule-power.
2. Ginneries run by steam.
3. Ginneries run by water-power.

We shall only deal with the first two classes, as the third class is far from common.

Class 1 is the commonest of all, and is universally used when the farmer does the ginning only for himself and one or two neighbors. With the larger planter the gin is used simply as any other tool in the preparation of his crop, and he does not attempt to make it a source of profit. This, however, is only the case on the large plantations of the South and Southwest. Among a community of small farmers—that is, farmers who raise not over 30 bales of cotton each in a season—there are always a number of public ginneries, which gin for anybody who comes along. These ginneries are not usually farther apart than a mile or two on the average, and they gin only a few hundred bales in a season. Ginneries of this kind are almost invariably of the first kind, *i. e.*, operated by horse- or mule-power. This class of ginning establishments may be divided, as to its arrangements, into three parts:

1. The gin-house.
2. The lint-room.
3. The press, or "screw", as it is invariably called.

The gin-house is a common two-story, gable-roofed frame building, of very rough construction. The lower story is open on all sides, forming a sort of shed for the reception of farming implements during the summer or other months when the running-gear is idle. The upper story is inclosed on the sides, and contains only the gin or gins, the rest of the floor space being used for the cotton in the seed and for the seed itself. The cotton in the seed is brought from the field in wagons and unloaded into the upper story by being carried up an outside ladder in baskets. It is then piled up on the floor until fed to the gin, which is done by hand. In the times of slavery every gin-house had in front of the door a large platform, on which wet cotton, or cotton picked early in the morning, was spread to dry. Unfortunately these platforms for drying cotton are no longer to be found. The seed as it comes from the gin is piled up in another part of the floor until it is desired to remove it.

The power is derived from the motion of four mules, one being attached to each one of four levers seen projecting beyond a large crown wheel. This motion is communicated by means of a small gear wheel to a horizontal shaft, and thence by means of a belt to the

gin on the floor above. All the parts of this contrivance are of wood, except the teeth of the gears, and are of very rude construction. This is the usual form of running-gear used at all the gin-houses throughout the country, where the ginning is not done by steam- or water-power, and is the most common of all.

The lint-room varies in size from one-third to the full length of the end of the gin-house to which it is attached. The lint cotton is thrown by the brush cylinder of the gin through a flue into this room. Strange to say, the lint-rooms are not brushed or swept out from one season to another, or from one decade to another, for that matter. The dirt may accumulate an inch in depth on the floor and walls, but no broom is ever carried into this room from year to year. What encouragement is there, therefore, to be careful in picking cotton when it is to be ginned in such places?

The ordinary type of press used is known as the old "buzzard-wing" press. The box is made of rough, unplanned boards, the screw is of wood, rudely chiseled out, and the whole construction is of the rudest and most primitive kind. The power is applied by means of long levers, which extend on either side. To these levers mules are hitched and slowly driven around in a circle, thus forcing the huge follower block down upon the cotton until the required pressure is obtained. The press-box is filled with cotton by carrying it from the lint-room in baskets, a negro standing in the box and trampling it down as it is put in. The small roof at the top moves with the whole, and frequently there is another roof lower down, forming a sort of little shed, in which is the box. Under this shed in *ante bellum* times the baled cotton was stored until shipped. The press usually stands about 50 feet from the lint-room of the gin-house, and all the lint has to be carried to the press at this distance, through mud and dirt, in all weathers.

Such is a fair account of the buildings and machinery for preparing cotton for the factory, formerly used almost exclusively throughout the South, and still the kind most frequently met with. More crude and wasteful devices for the manipulation of cotton in the first instance, considering the importance of the work to be done, could not be found in India or China.

The stages through which ginneries of this class passed to the improved steam ginnery, like one in Montgomery, Alabama, are interesting to note. The rudest part is the buzzard-wing screw, standing 50 feet from the lint-room. This was the first to go under the new régime, and an improved press was put inside the gin-house. The invention of the condenser next made the lint-room unnecessary, and when steam-power was applied the old clumsy running-gear was thrown away.

These improvements bring us to the second class of ginneries, those operated by steam.

Among the second class of ginneries we find those public ginneries which are run solely for the profits of the business, and which are generally placed in some little village in the neighborhood of a trade center.

These ginneries handle from 400 to 1,000 bales in a season, and the cotton is frequently hauled to them from considerable distances. Connected with the ginnery and run by the same engine is frequently a flour-mill or grist-mill, which serves for a business for that portion of the year during which no ginning is done. At centers where large quantities of cotton are shipped to factors ginneries find it profitable to have a picker-room, where poorly packed and injured cotton is unpacked, assorted, and repacked in new bagging and ties—a profitable branch of the work. In establishments of this class the presses used are always of an improved kind, of which a very large variety are in use. They all depend for their action either upon a screw or screws, or upon a combination of levers, with the exception of the press in use at Keplinger's steam ginnery in Montgomery, which was operated entirely by means of gear wheels and a rack. Most of these improved presses are run by hand, a few only being operated by steam. The buildings of these establishments are great improvements on the old plantation gin-houses; the machinery is better and more carefully attended, and altogether the methods of and facilities for handling the cotton are vastly superior to those in vogue upon the farms.

Whether the cotton is turned out in any better condition in the end is a matter of doubt. The facts and circumstances seem to indicate that while the cotton in being ground and packed is handled with more expedition, the application of steam-power to gins has really injured the staple. During the ginning season the public ginneries are always crowded, each man desiring to have his cotton ginned immediately and to return home. The proprietor of the ginnery is interested in getting a large number of bales to gin, and hence works his machinery with a view to accommodating his customers rather than with any idea of turning out good and uninjured staple, which his customers do not appreciate.

The ginner, therefore, runs his machinery at the highest possible speed, and also gins the seed as closely as possible, in order to make a large yield of lint. If the truth were known, all "nepped" and overginned cotton could most probably be traced to steam ginneries.

In these steam ginneries the type of engine used varies considerably, being either portable, semi-portable, or stationary. In the portable and semi-portable engines we find the engine and boiler all in one, the engine surmounting the boiler. The capacity of this type of engine is limited to about ten horse-power, so that for establishments which require more power a small stationary engine is used. These engines are of cheap construction, and are most commonly placed alongside of the boiler in an open or partly open shed attached to the gin-house. The boiler is frequently entirely uncovered, the only setting being to put it up on some brick supports a few inches above the ground.

The steam-pipes and all conveyors or reservoirs of steam are entirely unprotected by sheathing or otherwise, and indeed there is but small incentive to the economical use of steam in a region where fuel is so plenty and so cheap.

The improved steam ginnery of to-day has, then, neither the buzzard-wing press nor the lint-room. In place of these an improved press is put in the gin-house, and the condenser has done away with the lint-room.

The seed-room, into which the seed is carried by a mechanical device, occupies a position similar to that of the old lint-room. The old, clumsy running-gear and mules are gone, and are replaced by the expeditious little steam-engine. Add to these feeders for the gins and cleaners for the seed-cotton, and we have the latest and best-appointed ginnery, but *only one containing all these improvements has been seen by us.*

The kinds of gins used are so various that it has not been possible for us to classify them as to merits. The gins seen most often were the Carver, Pratt, and Gullett. In ginneries of the first class there is usually one gin, turning out from 2 to 3 bales a day, and it is generally either a 40 or 60 saw gin. In ginneries of the second class there are generally two 60-saw gins, turning out from 12 to 18 bales a day.

In conclusion, we may say that it appears to us that all the improvements have been in the direction of handling the cotton more easily and expeditiously in and about the ginneries. *The idea of improving the staple by scientific ginning has not been seized upon to any perceptible extent. On the contrary, there is reason to believe that better staple comes from the old plantation ginnery than from the improved steam ginnery.*

Beside what we have already said upon this point, the persons who operate the engine and other machinery in connection with the steam ginnery are, as a rule, unaccustomed to running machinery, and can see no advantage in steam-power except that ginning could be done with it much faster. In the old ginneries there was no occasion for hurry. It was known that the capacity of a 40-saw gin was about 2 bales a day, and whether more or less was ginned made no material difference.

This was, however, the record of the census year, and is already out of date. Since that time great changes have occurred, and vast progress has been made in this most important department. Machines for cleaning the cotton in the seed and preparing it for the cotton-gin, which had hardly been heard of before the Atlanta cotton exposition of 1881, have been introduced and sold in large numbers. Cotton-ginning establishments, in which as much art and science have been applied as in those of Egypt, established by English capitalists, have been set up in several places, and the old methods, by which the cotton has been depreciated after it had been picked, are rapidly going out of use. Cotton is also in a great measure becoming the product of intelligent farmers dwelling upon healthy uplands, and by improvements which have been introduced during the last few years its cultivation has been carried farther north in latitude and higher up on hill and mountain slopes than was ever thought to be possible in former days.

The great Appalachian chain of mountains, extending from the northeast to the southwest, marks a line on which the moisture brought in by the great Gulf Stream is condensed, falling in frequent showers, but seldom in heavy storms, over the Carolinas, Georgia, and Alabama, on whose uplands healthy homes for white cotton farmers are being established almost without limit. To the west of this chain the great valley of the Mississippi and its tributaries, bordered by bottom-lands of untold fertility, offers the boon of great crops to compensate for the less healthy conditions of climate; and to these rich river bottoms colored laborers, who are more free from danger of malaria, are trending in ever-increasing numbers.

In Texas the melting snows of the far-distant Rocky mountains, flowing into the arid regions of the northern part of the state, burst forth from the ground as rivers fully grown, lending moisture to the soil over vast areas, even before the rivers appear in great springs. Throughout this vast area, fitted for the cultivation of the cotton-plant, the soil is filled with the shells of minute infusoria, that serve in part as the source of the inorganic material which is needed in very great quantity to produce the cotton-plant. Over all this vast area is found a climate which is not tropical, and in the largest part of this area white men, as well as blacks, can live in comfort and health. The mean summer temperature of the upland cotton country is not as high as that of the lower parts of Philadelphia or other parts of Pennsylvania, while the extremes of heat in Saint Louis, Missouri, are greater than in New Orleans, Louisiana.

To Italians, French, Spanish, and the inhabitants of southern Germany, who are accustomed to the climate of warm countries, these portions of the South offer homes and work where a comfortable subsistence can be gained more quickly than elsewhere in this country, and where there is more than the average opportunity to create wealth.

The use of the seed is adding profit to the production of the fiber; but this does not form a part of the work now in hand.

In the departments of manufacture which must be found near the field—ginning, baling, and pressing cotton—there is yet a vast field for invention and improvement, in which but a beginning has been made. In the treatment of the seed, the extraction of the oil, and the conversion of the remainder into food, great improvements have been made. There is yet another field for profit in the conversion of the plant itself to purposes of food for animals, and the investigation of this subject has just begun. The fiber takes from the soil for each bale of 500 pounds only 5 pounds of inorganic elements. The oil may also be removed, and yet the fertility of the soil will not be touched. But not only in the cottonseed cake, but in the root, stalk, stem, and burr and hull of the plant, there is 5 per cent. of the phosphates of potash and lime, magnesia, and other inorganic materials—200 to 225 pounds to each bale of cotton are to be found in the plants from which the bale is made, or about 40 per cent. of its weight.

When all the parts of the plants are worked, as they may be, either into fodder or directly into fertilizers, the cotton-field may become richer every year; and land which has only produced one bale to eight acres, like Farish Furman's farm in Georgia, will be brought in a few short years to two or three bales to the acre.

We may next treat the subject of the cotton manufacture in the factory.

The cotton manufacture of the United States may be now considered more firmly established than ever before. The method on which the business is conducted in the United States varies greatly from that of any other country; and this difference arises mainly from a difference not only in the habits and customs of the people, but also in their condition and intelligence.

The home market is the most important one, and may long continue to be so, although the export demand for our fabrics now takes from 7 to 8 per cent. of our annual product, and is likely to increase.

In contrast with the cotton manufacturer of Great Britain, our principal rival, we are therefore called upon to meet the demands of an intelligent class of customers living under substantially uniform conditions and varying but little in their requirements. Hence we are not called upon for the great variety of fabrics that must be supplied by Great Britain. In consequence of this demand for a great variety of fabrics the work of the cotton manufacture of England is much more divided than with us. With the exception of a few large establishments, working mainly to supply the home market, few goods are known in England by the name of the factory in which they are made, nor are they sold under the name of the manufacturer; but to a very large extent the yarn is spun in one establishment, woven in another, and finished in a third. The gray cloth is sold to the warehouseman, or to the merchant, to be stamped and packed by him, or to be dyed, bleached, or printed under his direction. If English

goods had been sold under the name and stamp of the manufacturer, as cotton goods are in the United States, perhaps the substitution of clay for cotton might not have been carried to so great an extent. In the United States cotton goods are spun and woven in the same factory, and, whether sold in the gray or bleached, they are almost all stamped and marketed under the name of the factory in which they are made. Each factory, therefore, has its reputation to sustain, and whether the fabric be coarse or fine it is the effort of every one to make it good of its kind.

The same rule applies to printed calicoes. These are marketed under the name of the works in which they have been printed, and the reputation and permanent existence of these works rest upon uniformity in quality, excellence in color and style, and constant progress in the art of design.

We may not claim to be more honest than our rivals, but it is a great error to suppose that it is permanently profitable to make an article that is not what it purports to be. A cotton fabric may be of a low grade, and may be intended to sell at a low price, but yet it is not profitable to substitute clay for cotton; the fabric, whatever it is, has its name and reputation, and must be true to them, or else the demand for it will sooner or later cease. Even goods that are made for linings, and that need to be starched and stiffened in order to be used, must have a uniform quality in the fabric itself to hold a permanent place in our market. Dyed goods that require to be woven on heavily-sized warps cannot, except by rule, be loaded with sizing. If an attempt is made to introduce an article in which clay has been added to make it heavier, it is immediately detected, because the use of sewing-machines is almost universal, and the clay in the fabric heats the needle and exposes the fraud.

In stating those conditions under which the manufacture of cotton is conducted in the United States for the home demand it is not intended to imply that the use of a foreign substance to give additional weight to a cotton fabric is, of necessity, a fraud. For instance, there is a very large demand in China for materials for the grave-clothes of corpses, and for this use "earth to earth, and dust to dust" may be considered a legitimate rule, even if the earth is conveyed in the fabric which is nominally made of cotton. Some of the finest cotton fabrics yet made in the United States, which closely resemble silk, are used mainly for lining coffins.

The principal market for our own fabrics is found among the thrifty working people, who constitute the great mass of our population.

It has therefore happened that, although we have not until recently undertaken the manufacture of very fine fabrics, the average quality of the fabrics that we do make is better than that of any other nation, with the possible exception of France. It is for the wants of the million that our cotton factories are mainly worked, and we have ceased to import staple goods, and shall never be likely to resume their import. On the other hand, we may for a long period continue to import the finer goods that depend mainly on fashion and style for their use, and that are purely articles of luxury. As has been stated, the substantial fabrics that constitute the main part of our cotton manufacture, and that are used by the masses of the people, are of the best of their kind, with the possible exception of those made in France. The French peasantry are a sagacious and truly economical race, and will not buy a poor fabric if they can get a good one; hence the cotton fabrics for their use are of a very substantial kind, and are much more free from adulteration than those of any other country in Europe. The common cotton fabrics of England, Belgium, and Germany could hardly be sold in the United States at any price.

The finest printed calicoes of France and England may be the best of their kind; but the printed calicoes for the use of the multitude, and which constitute the really important branch of this department of the manufacture, are of much better quality in the United States than in Europe, and are also of finer colors and of more varied styles.

In fact, one of the chief obstacles that it has been necessary to overcome in the introduction of unbleached American cotton fabrics in the English market, and in other markets heretofore supplied by England, has been their apparently open texture, owing to the absence of heavy sizing. In the United States the sizing used upon the warp, and which is necessary in order to weave it, is made from corn or potato starch, free from any substance intended to make it heavier. In the gray cloth the sizing, therefore, constitutes only $2\frac{1}{2}$ to 5 per cent. of the weight, and when the fabric is washed it shrinks more in measure than it loses in weight; hence a square yard washed and dried without stretching will be heavier than a square yard taken directly from the loom.

In England, on the other hand, even the pure sizing is made from wheat-flour, which is very glutinous; and the fabrics thus woven, even where no adulteration is intended, lose from 10 to 12 per cent. of their weight on the first washing. These pure goods are, however, made chiefly for the home consumption of the richer classes of England. The greater part of the English cotton fabrics exported or used by the working classes are loaded with from 10 to 40 per cent. of clay and other substances. The art of sizing has been highly perfected in England, and has been made the subject of very numerous patents; and, as the use of clay and flour to the extent of 100 pounds to each 100 pounds of cotton-warp yarn involves great danger of mildew, many ingenious chemical applications have also been patented to serve as antiseptics, such as chloride of zinc, chloride of calcium, common salt, white vitriol, etc. These various antiseptics are compounded with flour, gypsum, soapstone, china clay, and other heavy substances in various ways. The English text-books upon the art of sizing are instructive and suggestive, especially in respect to the rules for the purchase of the most glutinous kinds of flour and for the detection of adulteration in the flour, it being obvious that unless the flour is pure and well adapted to the purpose it would be necessary to use cotton instead of clay to make up the weight of the fabric.

It will, of course, take a good deal of time to accustom buyers to the more open texture of cotton fabrics in which no clay is used; but as time passes American fabrics are being steadily substituted for those previously used by foreign nations, especially in China.

Since the year 1860 the cotton manufacture of the United States has been exposed to greater vicissitudes than any other important branch of national industry, and the wonder is not that there should have been some disasters, but that it should have survived at all in the hands of its original owners. In 1860 the whole number of spindles in the United States was 5,235,000. From 1857 to 1860 the cost of constructing a spinning and weaving factory on medium fabrics woven of No. 25 yarn was from \$16 to \$20 per spindle (the number designates the number of skeins of 840 yards of yarn each in one pound). The value of a bale of cotton of 480 pounds was from \$40 to \$50. Then came the combined effects of war, paper money, and scarcity of cotton. At one period more than two-thirds of the cotton machinery of the United States was stopped; the value of a bale of cotton rose to over \$900, and the price of some kinds of goods was seven to eight times the present price. A little later new mills were constructed which cost from \$30 to \$40 per spindle.

At the date of the census the number of spindles operated in the specific manufacture of cotton fabrics was 10,653,435; but the spindle has changed in its productive power, and each spindle of 1880 was much more effective than that of 1860. The value of the bale of cotton was again from \$40 to \$50; the standard printing-cloth, which reached 33 cents a yard during the war, was worth 4 cents; the No. 25 mill for spinning and weaving could be built for from \$14 to \$18 per spindle; our export of cotton fabrics was more in value and much more in quantity than in 1860, and the only check to its steady and profitable increase was the renewal of the home demand. Such have been the changes and fluctuations; yet, despite them all, not one spindle in ten has passed from the ownership of the person, firm, or corporation in whose possession it was in 1860, except in the regular process of bequest or voluntary sale.

During the period of inflation or of great vicissitude the attention of the managers of the property was of necessity devoted to other matters than the improvements and minute savings in which the profit of the business now consists; but during the last few years very great improvements have been made, and the lesson of economy and saving has been learned. The best example that can be cited may be found in the record of one great factory working upon coarse and substantial fabrics, and consuming more than 20,000 bales of cotton a year. Sixty per cent. of its product is sold for export to various parts of the world. The proportion of operatives to each 1,000 spindles has been decreased 43 per cent., or from 26½ to 15. The wages of women, who constitute more than two-thirds of the operatives, has been increased 33 per cent. The cost of making the cloth, aside from the material used, has been decreased 21 per cent.

In 1860 the average product of one operative, working one year, was 5,317 pounds; in 1880, 7,928 pounds of drill, such as is exported to China. Assuming 5 pounds, or about 16 yards, as the annual requirement of a Chinaman for dress, in 1860 one Lowell operative, working one year, clothed 1,063 Chinese; in 1880 one could supply 1,586. It will be obvious that no hand spinning and weaving can compete with this product of machinery; yet the machine-made fabrics of Europe and America combined have as yet reached only six or eight in a hundred of the Chinese. How soon the rest will be clothed in cotton fabrics made by machinery from American cotton, therefore, depends but little on whether the wages of the Lowell factory girl be \$4 or \$6 per week, but rather on what exchangeable products the Chinese can produce better or cheaper than we can. The more tea, silk, sugar, and other commodities we buy from them, the more cotton fabrics and other products in which we excel will they buy from us.

It has been held that the cotton of America must be more and more used, both in America and elsewhere, and that, as time goes on, almost every other kind, with the exception of the cotton of Egypt, must give place to it. To what extent may the same pre-eminence be secured for the cotton fabrics of the United States in the markets of the world that we have secured in respect to the cotton fiber?

In the consideration of this branch of the subject our attention must be given to the present condition of competition between the mills of the middle and eastern states with the mills of Great Britain.

In respect to the eastern states, the cotton factories of Lowell, in Massachusetts, Manchester, in New Hampshire, Biddeford and Lewiston, in Maine, may be considered in their relation to the factories of Manchester, Stockport, Preston, and Bolton, in England. For the purposes of this comparison it may be assumed that there can be no permanent advantage of one set of mills over the other in respect to the quality and perfection of the machinery. At any given time some advantage may be claimed and admitted on either side in some special department of the mill; but every invention or improvement will sooner or later be adopted on both sides, and the supremacy in the art of converting cotton into cloth must ultimately fall to that country or section which possesses the advantage in respect to the conditions offered to the operatives and in proximity to the source of the raw material.

The best conditions of life for the operatives, and the best prospect of improving their condition and that of their children, are of the gravest importance. The factors in this problem are education, shelter, subsistence, and opportunity for other kinds of work. In respect to education, the common-school system of the United States assures a thorough training free of cost, and in the principal towns and cities free education is carried to the point of preparing the pupil to enter a university.

In respect to subsistence, the factories of New England are 3,000 miles nearer the wheat-fields and grazing grounds of the West than those of Lancashire; and, so long as Europe buys food of America, our own mills must have the advantage of proximity to the western prairies. In respect to the rents of dwelling-houses, there cannot long be any difference, if there is any at present, because the materials for construction are most abundant in America. Opportunity for other work than that of the factory must continue for many generations, and until this continent is peopled.

In comparing our power to compete with England we may claim advantages of one kind, and in comparing with the nations of continental Europe we may claim advantages of another kind, in some respects of a different order. In competition with England it is often claimed that our chief advantage lies in a certain alleged versatility and power of adapting means to ends, and in great quickness of perception on the part of working people in respect to the advantages to be gained by the adoption of new processes or inventions. If we have this advantage, there must be special causes for it in the influences that are brought to bear upon the operatives and artisans who do the work; for a very large proportion of them are foreign-born, or are the children of foreign immigrants. Why should they work with any more zeal or judgment here than in the countries whence they have come? Why are Irish and French-Canadian factory hands to be relied on for more steady work, larger product, better discipline, and more cleanly and wholesome conditions of life than the operatives of England, Belgium, and Germany? To me it appears evident that these advantages, so far as they exist, are due mainly to the following circumstances:

First. Our system of common and purely secular schools, attended by the children of rich and poor alike.

Second. Manhood suffrage.

Third. The easy acquisition of land.

Fourth. The habit of saving small sums, induced by the establishment of savings-banks throughout the manufacturing states.

Fifth. The absence of a standing army, and the application of the revenue derived from taxes on the whole to useful purposes.

In respect to the first of these influences, the public-school system, the foreign observer generally takes notice only of the quality of the instruction given, and, though he may find something to praise, he finds also much to blame. He finds in many cases the instruction bad and the subjects often ill-chosen, and he wonders at the misdirection of a force that might be so much more wisely applied. What he fails to notice is that the school itself, entirely apart from its instruction, is the great educator of the children who attend it. The school is, first of all, no respecter of persons: the stupid son of a rich man, led in every class by the son of a mechanic, cannot in after-life look down on him as an inferior, whatever the conventional position of the two may be; or, if the rich man's son has brains as well as fortune, the poor man's son can never attribute to fortune only the lead that he may take in after-life. The school is thoroughly democratic, and each pupil learns in it that it depends on himself alone what place he may take in after-life, and that, although society may be divided into planes, there is no system of caste and no barrier in the way of social success, except the want of character and ability to attain it. The associations of the common school utterly prevent anything like servility in the relation of classes in after-life; and although it is sometimes made a little too manifest that "one man is as good as another, and a little better", on the part of those who are more eager than discreet in their effort to rise, yet, on the whole, the relation of the various classes, which must in the nature of things always and everywhere exist, is that of mutual respect, and anything like the old-world distinctions of caste and rank would seem about as absurd to one as to the other. The common school is the solvent of race, creed, nationality, and condition.

In another way the discipline of the school affects the processes of manufacture. In the schools, cleanliness, order, and regular habits are enforced, with deference to the teachers and respect for authority; and, in these later years, this is coupled with the teaching of music and drawing in all the principal towns and cities. When children thus trained are removed to the mill or the workshop habits of order and cleanliness, with some esthetic taste, are already established. Nothing strikes an American manufacturer with so much surprise as the extreme untidiness of the large textile mills of England and the dreariness of the factory towns. In this respect, however, it must be confessed that the managers of the New England mills are greatly aided by the absence of smoke, the coal commonly used being anthracite. Much surprise is often expressed by our foreign visitors at the amount of decoration permitted in the fitting of stationary and locomotive engines and in much of our machinery; but, bad as the taste displayed may sometimes be, it is nevertheless a fact that such engines or machines are better cared for and kept in better repair than where no individuality, so to speak, is permitted. On one of our great railways the attempt was not long since made to dispatch the locomotives as they happened to arrive at the central station, sometimes with one and sometimes with another engine-driver; but the immediate and great increase in the repair account caused the corporation to return very soon to the customary plan of giving each driver a particular locomotive, with which he may be identified.

The instruction of the school also gives every pupil a superficial knowledge, if no more, of the geography and resources of the country, which the universal habit of reading newspapers keeps up. Hence comes the almost entire absence of any fixed character in the labor of the country: every boy believes that he can achieve success somewhere else, if not at home. No congestion of labor can last long. The war and the succeeding railway mania

combined concentrated population at certain points to a greater extent than ever happened before, and it has taken more than five years to overcome the difficulty; but within these five years a million or more new inhabitants in Texas, half a million or more in Kansas, and probably two or three millions added to the population of Nebraska, Colorado, Minnesota, and the far Northwest, indicate that the evil has already found a remedy.

It is already apparent that a very slight increase in the demand for skilled workmen in certain branches of employment would not easily be met in the eastern states except by drawing upon England and Germany. During the years of depression, the cessation of railway building and the use of the excess of railway plant existing in 1873 has caused the dispersion of a large portion of the trained mechanics and artisans who then did the work of supplying this demand, but these are not the men who have crowded the eastern cities and caused the apparent excess of laborers out of work. Such men have gone back to the land, or in the new states and territories have found other ways in which to apply their skill and energy, and they will not return. It may be that the greatest danger to the manufacturers of England will not be in our competition in the sale of goods in neutral markets, but in our competition for the skilled workmen and artisans who make these goods when we offer them equal or higher wages and better conditions of life in the work that will very soon need to be done to supply the increasing demand in our own country.

The patent system may here be cited also as a factor in our industrial system. It has been carried to an almost absurd extreme, so that it is not safe for any one to adopt a new method, machine, or part of a machine and attempt to use it quietly and without taking out a patent lest some sharp person, seeing it in use and not published, shall himself secure a patent and come back to the real inventor with a claim for royalty.

Manhood suffrage, subject as it is to great abuses, and difficult as it has made the problem of the self-government of great cities, where voters do not meet each other, as in the town-meeting, face to face, but where the powers of government are of necessity delegated to men of whom the voters can have little personal knowledge, yet works distinctly in the direction of the safety, stability, and order of the community. Outside of two or three of the very largest cities, where there are concentrated great masses of illiterate citizens, it would be difficult to find a case of serious abuse of the power of taxation, except in the South, since the war, and even there the evil is now mainly abated.

The easy acquisition of land throughout the country, under simple forms of conveyance, registered in every county, gives a motive to economy, and induces habits of saving that are of supreme importance in their effect on society. In the town in which I live—and in which I can remember the coming of the first Irishman who became a land-owner—out of about one thousand owners of real estate over two hundred are of Irish birth or extraction. The richest one among them came from Ireland, in 1846, a steerage passenger. He now pays taxes on property of the value of \$50,000, almost all in real estate. His son is superintendent of the repairs of highways, and is one of the most efficient members of the school committee.

During the last thirty years the factory population of New England has passed through three phases. First came the sons and daughters of the New England farmer; but as the sewing-machine and other inventions opened new demands for women's work, women of American birth passed out to easier or better paid employments, while the men took up other branches requiring more individual skill. These places were taken mainly by Irish, with a few Germans and English. But as the Irish saved their earnings, and as the New England yeomen emigrated to the richer lands of the great West, they passed out of the mills to buy up the deserted farms of the poorer northeastern states, where, by their persistent industry and manual labor, they achieved success and gained a position which satisfied them, but with which the native New Englander is no longer contented. Their places in the mills are now being more and more taken by the French Canadians, who, in their new conditions and surroundings, show little of the stolid and unprogressive character which has kept them so long contented on their little strips of land on the Saint Lawrence river. In the very air they breathe they seem to imbibe a new and restless energy, while the intelligence shown by their children in the schools augurs well for their future progress. On the whole, the simplicity of our system of land tenure, and the ease with which small parcels may be obtained, must be rated among the most important factors in considering our possible advantage over other countries.

Next in our list comes the savings-bank. In 1875, out of the 1,652,000 inhabitants of Massachusetts, 720,000 were depositors in savings-banks to the amount of \$238,000,000. During the late years of depression the deposit has decreased somewhat in amount, but the decrease has been chiefly owing to the withdrawal of money for other investment, especially in United States bonds. There have been some failures of banks and some losses, as might well have been expected, but they have been less than in any other branch of business; and the savings-bank system stands firmly based on well-earned confidence, and offers an easy means of saving the smallest sums to every man, woman, and child in the state. At the present time the deposits in the savings-banks of Massachusetts amount to about \$240,000,000, owned by about 750,000 persons.

To these causes of quick adaptation to any conditions that may arise, or to any necessity for the application of new methods or devices, may be added the custom, which has almost the force of law, of an equal distribution of estates among the children of the testator. *Tools to him who can use them* is the unwritten law; and neither land nor

capital can remain long in the possession of him who cannot direct or use them wisely. Liberty to distribute is esteemed as important a factor in our body-politic as liberty to accumulate, even though the liberty may sometimes lead to the apparent waste of great fortunes.

Finally, it must be held that our freedom from the blood-tax of a standing army, and the fact that the proceeds of taxation are, on the whole, usefully and productively expended, are among our greatest advantages; and this is asserted with confidence, notwithstanding the misgovernment of some great cities and of several of the southern states. What are these failures but proofs of the general confidence of the people in local self-government? Great frauds and great abuses can only happen where integrity is the common rule; and where each man distrusts his neighbor, or each town, city, or state distrusts the next, the opportunity for fraud or breach of trust cannot occur. The use of inconvertible paper money during many years has not been without its necessary malign result upon the character of the people, and the newspapers are filled with the fraud and corruption that have come to light; but no newspaper has ever yet recorded one fact that offsets many frauds: In the great Boston fire, one of the Boston banks lost not only every book of account, but every security and note that was in its vaults, amounting to over \$1,250,000. On the morning after the fire its officers had no evidence or record by which any of the persons or corporators who owed it money could be held to their contracts; yet, within a very short time, duplicate notes were voluntarily brought in by its debtors, many of whom knew not whether they could ever pay them, because the fire had destroyed their own property, and the known ultimate loss of that bank from the burning of its books and securities was less than \$10,000.

Our army is but a border police. Although its officers are held in honor and esteem, military life is not a career that very many seek, and as time goes on it will become an occupation less and less to be desired. Thus we are spared not only the tax for its support, but the worse tax of the withdrawal of its members from useful and productive pursuits. It is in this respect that we claim our greatest advantage over the nations of continental Europe. What have we to fear from the competition of Germany, if we really undertake to beat her in the neutral markets, which we can reach as readily as she can? For a little while the better instruction of the merchants in her technical and commercial schools may give her advantage, but that can be overcome in a single generation, or as soon as the need is felt with us, as it is now beginning to be felt. After we shall have supplied our present want of technical education, the mere difference between the presence of a great army on her soil and its necessary support and the absence of such a tax on us will constitute the difference on which modern commerce turns. When the traffic of the world turns on half a cent a yard, a cent a bushel, or a half-penny a pound on the great staples, no nation can long succeed in holding a traffic that is handicapped with a standing army. The protection of Germany from our competition in neutral markets may be offset in our yet more dangerous competition for men. The German already knows Texas, and in the one block of 60,000 square miles of land by which the state of Texas exceeds the area of the German empire we offer room and healthy conditions of life for millions of immigrants; and if they come in sufficient numbers, they can raise on that single square of land as much cotton as is now raised in the whole South, that is to say, 5,000,000 bales; and as much wheat as is now raised in the whole North, that is to say, 400,000,000 bushels, and yet subsist themselves beside on what is left of this little patch that will not be needed for these two crops.

It will be obvious that even the least imaginative cannot but be moved by the influences that have been designated, and that versatility and readiness to adopt every labor-saving device will not only be promoted, but will be absolutely forced into action, when such vast areas are to be occupied, and when even the dullest boy is educated in the belief that he also is to be one of those who are to build up this nation to the full measure of its high calling. We may not dare to boast, in view of all we have passed through; but we know that slavery has been destroyed, and that the nation lives stronger, truer, and more vigorous than ever before. We know that it has been reserved for a democratic republic to be the first among nations that, having issued government notes and made them a legal tender, has resumed payment in coin without repudiation or reduction of the promise. We know that we have paid nearly a half of our great national debt already, and that the rest is now mainly held by our own citizens. We believe that within the lives of men of middle age now living the nation will number one hundred millions, and that, in whatever else we may be found wanting, we cannot long be kept back in our career of material prosperity, which shall be shared with absolute certainty by every one who brings to the work health, integrity, and energy.

If there is any force in this reasoning, our competition with other manufacturing countries, in the supplying of neutral markets with manufactured goods, will not be compassed by the low rates of wages paid to our factory operatives or to the working people engaged in our metal works and other occupations, but first by obtaining and keeping such an advanced position in the application and use of improved tools and machinery as shall make high wages consistent with a low cost of production; secondly, by our ability to obtain the raw materials at low cost. Every employer knows that among employes who are paid by the piece it is the operative that gains the largest earnings whose production costs the least, because under the control of such operatives the machinery is most effectively guided during working hours. As it is with single operatives, so it is with large masses; if well instructed, and working under the incentives to industry and frugality that have been named, their large product will earn for them ample wages, and yet result in a low cost of labor to the employer. Such workmen never have

any "blue Monday". The workman who in this country habitually becomes intoxicated is soon discharged, and his place is filled by one who respects himself and values his place too much to risk his position in dissipation.

Competition with England in supplying the markets of Asia, Africa, and South America with cotton goods is now perhaps the best criterion by which to gauge our ability to compete in other branches of manufacture. It has been often assumed in England that the increasing shipments of cotton goods from this country have been forced by necessity, and merely consisted of lots sold below cost, as a means of obtaining ready money; but there is no ground whatever for this general assumption, even though some small shipments may have been made at first with this view. Our export of cotton fabrics amounts as yet to but 7 or 8 per cent. of our production, and is but a trifle compared to that of Great Britain; but it is not made at a loss, and it constitutes a most important element in the returning prosperity of our cotton-mills. The goods exported are mostly made by strong and prosperous corporations, paying regular dividends, and consist mainly of coarse sheetings and drills, which are sold by the manufacturers to merchants, who send them to China, Africa, and South America in payment for tea, silk, ivory, sugar, gums, hides, and wool. They are not made by operatives who earn less than the recent or present rates of wages in England, but in most departments of the mills by those who earn equal wages, or even more. This competition had been fairly begun before the late war in this country, but it is now continued under better conditions. The mills of New England, owing to through connections by rail, are now relatively much nearer the cotton-fields than they were then. Prior to 1860 substantially all the cotton went to the seaports of the cotton states, and from there the cost of moving it to the North or to Liverpool varied but little; but at the present day a large and annually-increasing portion of the cotton used in the North is bought in the interior markets, and is carried in covered cars directly to the mills, where the bales are delivered clean, and much more free from damage and waste than those which are carried down the southern rivers on boats and barges, dumped upon the wharves, and then compressed to the utmost for shipment by sea.

In proof that this advantage is an actual one, the following example may be cited: A contract has just been made for the transportation of a large quantity of cotton from Texas to Liverpool at the rate of \$1 10 per 100 pounds, the proportion assigned to the land carriage being 70 cents, to transshipment in Boston and to the steamship 40 cents; the rate of marine insurance is three-eighths of 1 per cent., and the cost of handling in Liverpool, and transportation to Manchester, not less than a quarter of a cent per pound. Bargains may be made to bring cotton from the same point in Texas to the principal factory cities of New England at the rate assigned to the land carriage, namely, 70 cents per 100 pounds. This cotton is brought from the interior towns of Texas to Boston, and cannot be carried to Liverpool by way of Galveston or New Orleans so cheaply, else it would not come this way. Assuming the bale to weigh 500 pounds, at 10 cents a pound we have the following comparative cost:

LOWELL.		Per bale.	Per cwt.
Cost of cotton in Texas, 500 pounds, at 10 cents, including all local charges.....		\$50 00	
Freight to Lowell in a covered locked car, in which the cotton is protected from rain, mud, and other causes of waste, at 70 cents per 100 pounds.....		3 50	
Total.....		53 50	\$10 70
LANCASHIRE.			
500 pounds, at 10 cents, including all local charges.....		\$50 00	
Freight from Texas to Liverpool, at \$1 10 per 100 pounds.....		5 50	
Insurance at three-eighths of 1 per cent. on \$56.....		21	
Transshipment in Liverpool, and freight to Lancashire, one-fourth of a cent.....		1 25	
Total.....		56 96	\$11 39
Advantage of Lowell over Lancashire.....		3 46	69

There may be changes in the rates, but it does not seem probable that the relation of the land to the ocean rate can be much changed, and it would therefore appear that the New England manufacturer will have a permanent advantage in the price of American cotton of any given grade, varying from 6 to 8 per cent. as the price of cotton may vary from 12 to 9 cents per pound; and this advantage may be equal to 15 or 25 per cent. in ability to pay wages, as the cost of labor varies from a quarter to a third in the total cost of coarse and medium goods, such as constitute the chief part of the demand of the world.

It may be said that this proves too much, and that the cotton spinners of the southern states will have the same relative advantage over New England. Let this be freely admitted: We are treating the question of the future supremacy of the United States in the manufacture as well as in the growth of cotton, and if the future changes in population, wealth, and condition of the different sections of this country shall in the future cause the increase of spindles, especially in coarse fabrics, to be planted in the healthy hill country of northern Georgia, eastern Tennessee, and the Carolinas, it will simply be the greater evidence that natural laws are paramount. If Georgia has twice the advantage over Lancashire that New England now possesses, it will only be the fault of the people of Georgia if they do not reap the benefit of it.

It has been stated that our present rates of wages in our cotton factories are higher than they were in 1860, and with our increasing prosperity they will tend to advance; but at the same time the cost of the labor in the finished fabric has been reduced by the greater productive power of the machinery. The fabrics upon which by far the largest part of the spindles and looms of the country are operated may be divided substantially into the following classes:

1. The printing-cloth, 28 inches wide and 7 yards to the pound. The cost of mill labor in making this fabric, including the salaries, wages, or earnings of every one employed, is now less than one cent, or a half-penny, a yard.
2. The heavy sheeting, 36 inches wide, and the heavy drill, 30 inches wide, each weighing from $2\frac{3}{4}$ to 3 yards to the pound. The cost of mill labor in making these fabrics is about $1\frac{1}{2}$ cents per yard.
3. Shirtings and sheetings, 30 to 36 inches wide, Nos. 20 to 30 yarns, each weighing from 3 to 4 yards to the pound. The cost of mill labor in these goods is from $1\frac{1}{2}$ to 2 cents per yard.
4. The fine sheeting or shirting, from 30 to 40 inches wide, Nos. 30 to 40 yarns, weighing from 3 to 4 yards to the pound. The cost of mill labor in these goods is from $1\frac{1}{2}$ to 3 cents per yard.
5. Fabrics of a similar kind to the above, from 1 to 3 yards wide.
6. Heavy cotton duck, cotton grain-bags, cotton hose, and other special articles.
7. Blue denims, stripes, tickings, brown denims and duck, and other heavy colored goods, substantial ginghams, cottonades, and other fancy woven fabrics of medium or heavy weight.

These seven classes comprise more than 95 per cent. of our cotton fabrics in weight; to them are to be added lawns, woven fabric of light weight for dresses, and spool-cotton.

In respect of one-half of these fabrics, being those of the heavier grade, our proximity to the cotton-field, computed at not less than half a cent per pound, oftener three-quarters, will enable the New England manufacturer to pay from 15 to 20 per cent. higher wages and yet to make the goods, other things being equal, at the same cost as his competitor in Lancashire. On a large portion of the other kinds this advantage in the cost of cotton would be from 10 to 15 per cent.

The natural advantages cannot work immediate results; the ways and means of a great commerce cannot be improvised in a year, hardly in a generation. Much depends on the wisdom of our legislators in framing the acts under which our taxes are collected, whether customs or excise, and yet more upon our adherence to a specie basis in our currency; but in the long run the only reason why we shall not assume a constantly-increasing share in the cotton manufacture of the world will be the free choice that our country offers for other occupations of a more profitable or more desirable kind.

Reference has been made to the small proportion of fine spinning in the United States. Within the last few years great progress has been made in spinning and weaving fabrics of Nos. 60 to 100, such as lawns and fine dress goods, and also in spinning fine yarn for spool-cotton. In the latter direction yarns as fine as No. 120 are now spun on the ring spinning frame, a machine invented in this country and more used than any other for warp spinning, and now being adopted in Europe. Yarns as fine as 550 are spun on mules for three-cord sewing-cotton, and for experiment much finer counts have been reached. It has often been alleged that fine yarns could not be as well spun in the United States as in England, owing to the dry and electrical conditions of the atmosphere during a considerable part of the year. This difficulty has existed in some degree, although not so as to preclude fine work if it had been profitable to undertake it; but as far as this difficulty existed it has lately been entirely removed by the invention of a very simple and inexpensive apparatus for moistening the air with the finest spray of pure cold water, by which method the air of a spinning- or weaving-room may be kept at any desired degree of humidity in the driest day, so that the adverse effect of electricity is entirely overcome.

Whenever the condition and extension of our market will warrant the undertaking, there is now no obstacle to our manufacturing any variety of cotton fabric that is in demand, either coarse or fine.

While it may not be worth while to give historical statistics in relation to the cotton manufacture of this country in the present report, a few words may well be devoted to changes in the work, which have conduced not only to the welfare of the people, but to the welfare of the operatives also.

When the cotton manufacture was first established in the United States water-power was considered essential to the work, and as a rule the location of mills was limited to narrow valleys, or places where there was room only for mills of several stories in height. The first mills built were very considerable structures for their time, but they were low-studded, badly lighted, and were heated by stoves; and in these mills the operatives were compelled to work under arduous conditions (owing to the imperfection of the machinery) thirteen to fourteen hours a day. These narrow structures were in some places built seven stories in height. All the plans were made with reference to this form of structure, whether the mill was to be operated by water-power or by steam, until quite a recent period. In 1860 the "normal" cotton-mill (so to speak) had become a factory four or five stories high, about 60 feet wide, varying in length according to the amount of machinery, high-studded, well lighted, thoroughly well ventilated, and heated by radiation from steam-pipes.

In 1866 the machine for sizing yarn, known as the "slasher", was first imported, displacing the machine known as the "dresser". In the use of the slasher one man and a boy working in a thoroughly well-ventilated room, at a moderate degree of heat, took the place of seven or eight men who had been previously employed in the same work in a room which was of necessity kept at over 100° F., the atmosphere saturated with sour starch. This change

removed the only really objectionable kind of work from the cotton factory. In the earlier mills the apparatus for the removal of dust from the factory was very imperfect, but to-day every room, even including those in which the cotton is opened, is substantially free from dust; and it happens that the degree of heat and of humidity required for the best work of the cotton factory is one which conduces in great measure to the health of the operative, perhaps a little warmer than may be desirable.

At the present time another change is in progress. The use of water-power is becoming less, its development for the purposes of sale having never proved profitable. The power thus developed has been a valuable auxiliary in the working of the factory, but as a matter of investment the development of land and water power together have almost without exception failed to be profitable.

The great progress in the construction of the steam-engine and in the economy of fuel is steadily working toward a change to steam as the principal motive power for the cotton factory. An incidental advantage in this change is that the factory may be placed nearer to the principal markets, where it can be more conveniently supervised and more easily reached. The use of steam also renders a choice of location perfectly feasible; and the model factory, one or two stories high, may be placed upon a level plain, and can be more easily lighted and ventilated and more economically operated than when any other form of building is used. Under these new conditions better dwellings for the operatives, less crowded, can also be provided, and in every respect the work can be conducted under better conditions.

At the present time the hours of labor in New England, where most of the cotton manufacturing is done, vary from ten to eleven hours per day. This great change has been brought about by a gradual comprehension of the best conditions both for the laborer and for the capitalist, and without much regard to legislation. It is probable that ere long ten hours will be the limit of factory work throughout New England, either by process of legislation or through the conviction on the part of employers that any longer hours are not profitable—a conclusion to which many have already come.

A great change has also in the progress of time been effected in the dwellings in which the factory operatives live, in part tending toward better conditions, in part to worse conditions. On the whole, there has been less average progress in this direction than in the construction and operation of the mills themselves. The choice of position, however, which is now given by the greater use of steam gives better opportunities for scattering the dwelling-houses over a wider area at little cost.

A more abundant supply and choice of food has been effected in this as in all other branches of work, to the great benefit of the operatives, by the consolidation and more effective service of railroads. The average work of a male operative over sixteen years of age in a textile factory will earn enough in a day to pay for the transportation of meat and bread for one year one thousand miles, or from Chicago to Lowell, Lawrence, or Fall River. So far as cost is concerned, the great fields of the West and the factories of the East are in closer proximity than if the factory depended for its food upon its own immediate neighborhood when served only by wagon-roads. The same changes which have so greatly reduced the railway charges between east and west are now taking place between north and south. The charge for moving cotton is becoming less year by year, and it will soon matter little where the cotton factory is placed, so far as distance between the field and the factory is concerned. The choice may be made so as to secure the stimulus of a moderately cold climate in which indoor labor is more to be desired than outdoor, in which the humidity of the atmosphere is measurably uniform or is not subject to extremes, and where the facilities for repairs on machinery are close at hand, and the population is sufficiently dense to assure an adequate and constant supply of operatives—mills which are much isolated always working at a disadvantage.

Great changes of a beneficial kind can now be foreseen in the application of electricity to the lighting of the factory. The developments in this direction are also such that, whatever the relative cost of the electric light as compared to gas may be, it is yet so beneficial in other respects that no factory manager can well afford to dispense with it, not only because of the more perfect work which its use assures, but because the choice of the operative in selecting the place in which to work will render the use of the electric light almost a matter of necessity.

In conclusion, it may be said that the progress in the art of manufacturing cotton fabrics in the last forty years has been very great, distinctly sustaining the rule which affects all the arts to which modern machinery can be applied, namely, that, in proportion to the effectiveness of capital in the form of machinery and the freedom with which it may be applied, the cost of production is lessened and the consumer is served more cheaply; while, on the other hand, the wages of the operative are increased, the conditions of work made better, and the identity of interests between labor and capital are established.

It may be said that in the absence of any artificial obstructions to traffic between states or nations the truest guide to the place where the lowest cost of production is compassed may be found by ascertaining where the wages of labor are the highest and the conditions of life the best; that at that point the lowest cost of production must be found, for this reason: both wages and profits are derived from the sale of the thing produced; hence it follows that where the natural conditions of production are best, the machinery most effective, and the labor the most intelligent and skillful, the product will be largest at the least effort to those who do the work, and when the division of this product is made under the conditions of absolutely free competition the relative proportion which capital can secure to itself will be least, even though its absolute share be greater and greater as the years go on; but the

share which the laborer will receive will increase year by year, both absolutely and relatively. As capital increases the absolute sum of profits is greater, but the relative share of the product secured by capital becomes less. The increase of capital and its effective use by skilled laborers assure a larger production, and the workman obtains a larger share of a larger product measured in kind or in wages paid in money. In the cotton-mill, as well as in many other arts, special skill is required, but perhaps less general intelligence; therefore a lower grade of operatives may be employed from time to time as the machinery becomes more automatic, but at a steadily-increasing rate of wages. Invention may, therefore, be said to enable all conditions of men to attain a higher plane of material welfare, and as one class passes from the factory to other occupations which offer better conditions of life new improvements enable those who could not do the factory work before to undertake and carry it on. Thus it has been in the past, since the farmers' daughters of New England left the factory in which, with much longer hours of work, they earned only about one-half the wages now paid; but those who have succeeded them could not then have been capable of doing the work at all which they now so easily accomplish.

TABLE I.—STATISTICS OF SPECIFIC COTTON MANUFACTURES.

States.	No. of establishments.	Capital.	Number of spindles.	Number of looms.	Average number of yarn.	NUMBER OF EMPLOYÉS.										Wages of operatives.	
						Total.	Operatives.				Mechanics, watchmen, and laborers.		Officers and clerks.				
							Male.		Female.		Male.		Male.		Female.		
							16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	16 and over.	Under 16.	15 and over.		Under 15.
The United States.	756	\$208,280,346	10,653,435	225,759	.....	174,059	49,748	15,042	84,539	13,213	9,937	65	2,075	17	10	4	\$42,040,510
EASTERN STATES.																	
Maine	24	15,292,078	685,924	15,971	24	11,864	3,149	820	6,481	606	709	.....	104	1	.....	.....	2,936,640
New Hampshire	30	19,877,084	944,653	24,290	26	16,529	3,917	858	9,594	839	1,187	.....	131	1	2	.....	4,290,060
Vermont	7	936,096	55,081	1,180	28	735	176	84	350	87	24	.....	14	.....	.....	.....	161,748
Massachusetts	175	72,291,691	4,236,084	95,321	28	61,844	18,700	4,346	31,496	3,213	3,480	11	594	3	1	.....	15,838,571
Rhode Island	115	28,047,331	1,764,569	29,609	36	21,474	6,600	2,244	9,199	1,683	1,355	3	299	1	.....	.....	5,320,303
Connecticut	82	20,310,500	936,376	18,261	37	14,739	5,363	1,678	5,434	1,231	771	7	234	6	11	4	3,632,630
Total	439	156,754,690	8,632,087	184,701	.....	127,185	37,995	10,030	62,554	7,653	7,526	21	1,370	12	14	4	32,170,861
MIDDLE STATES.																	
New York	36	11,399,638	561,658	12,403	33	9,305	2,414	937	4,201	1,148	523	4	75	3	.....	.....	1,994,755
New Jersey	17	3,807,750	232,221	3,180	32	4,222	1,006	374	2,291	329	174	5	43	.....	.....	.....	1,156,961
Pennsylvania	50	10,331,985	425,301	8,488	17	9,957	2,918	1,104	4,454	971	421	11	74	1	3	.....	2,502,688
Delaware	8	874,570	46,188	622	20	707	210	109	362	83	27	.....	6	.....	.....	.....	192,727
Maryland	10	4,600,816	125,708	2,425	10	4,086	1,035	476	1,877	463	191	.....	44	.....	.....	.....	766,129
Total	139	31,014,759	1,891,164	27,318	.....	28,367	7,583	3,000	13,185	2,994	1,336	20	242	4	3	.....	6,013,260
SOUTHERN STATES.																	
Virginia	8	1,190,100	44,340	1,322	16	1,112	235	140	530	135	39	.....	27	.....	.....	.....	169,789
North Carolina	49	2,855,600	92,585	1,790	14	3,343	687	304	1,727	429	107	8	111	.....	.....	.....	430,659
South Carolina	14	2,770,100	82,334	1,676	11	2,053	503	148	772	437	158	.....	35	.....	.....	.....	330,844
Georgia	40	6,348,637	198,656	4,493	14	6,349	1,437	655	2,951	748	416	8	134	.....	.....	.....	1,135,184
Florida	1	11,000	816	.....	10	33	16	10	2	.....	4	.....	2	.....	.....	.....	5,000
Alabama	16	1,246,500	49,432	863	11	1,490	299	198	631	235	85	.....	42	.....	.....	.....	239,998
Mississippi	8	1,122,140	18,568	644	12	722	132	85	313	120	44	1	27	.....	.....	.....	133,214
Louisiana	2	195,000	6,006	120	8	108	30	14	41	10	9	.....	4	.....	.....	.....	12,572
Texas	2	50,000	2,648	71	8	71	33	7	10	9	7	.....	5	.....	.....	.....	2,466
Kentucky	3	360,006	9,022	73	9	352	104	72	81	61	20	.....	4	.....	.....	.....	63,850
Tennessee	16	1,145,600	35,736	818	13	1,044	214	94	502	129	69	7	28	1	.....	.....	161,071
Arkansas	2	75,000	2,015	28	10	64	12	13	17	14	4	.....	4	.....	.....	.....	7,336
Total	181	17,375,897	542,048	11,898	.....	16,741	3,671	1,740	7,587	2,327	962	24	423	1	.....	.....	2,760,936
WESTERN STATES.																	
Ohio	4	670,000	13,328	42	8	484	106	20	320	11	18	.....	2	.....	1	.....	104,500
Indiana	4	1,090,000	33,396	776	15	720	151	60	391	64	42	.....	12	.....	.....	.....	162,820
Illinois	2	240,006	4,860	24	8	237	51	44	88	38	9	.....	6	.....	1	.....	47,885
Missouri	3	890,000	19,312	431	12	515	95	93	207	88	25	.....	7	.....	.....	.....	97,680
Michigan	1	20,000	5,100	181	20	88	29	8	38	6	5	.....	2	.....	.....	.....	16,800
Wisconsin	1	200,000	10,000	400	19	271	53	34	149	22	8	.....	5	.....	.....	.....	67,209
Minnesota	1	5,000	1,708	24	.....	22	2	.....	12	6	2	.....	.....	.....	.....	.....	6,400
Utah	1	20,000	432	14	11	29	12	1	8	4	4	.....	.....	.....	.....	.....	2,100
Total	17	3,135,000	88,186	1,842	.....	2,366	499	266	1,213	239	113	.....	34	.....	2	.....	505,403

a From this number deduct 2,115 officers and clerks whose salaries are not computed in wages. This leaves a total of 172,544 operatives, of which 59,685 are men, 15,107 boys, 84,539 women, and 13,213 girls. 955

COTTON MANUFACTURES.

TABLE I.—STATISTICS OF SPECIFIC COTTON MANUFACTURES—Continued.

States.	MATERIALS.				PRODUCTS.		
	Cotton consumed.			Value of all materials.	Goods manufactured.		Value of products.
	Bales.	Pounds.	Cost.		Pounds. (a)	Yards. (a)	
The United States	1, 570, 344	750, 343, 981	\$86, 945, 725	\$102, 206, 347	607, 264, 241	2, 273, 278, 025	\$192, 000, 110
EASTERN STATES.							
Maine	112, 381	54, 185, 061	6, 234, 901	7, 320, 152	44, 352, 098	144, 368, 075	13, 319, 368
New Hampshire	157, 073	76, 386, 499	8, 029, 003	10, 140, 904	63, 881, 540	244, 145, 533	17, 953, 403
Vermont	7, 404	3, 562, 088	458, 607	508, 207	2, 150, 108	16, 160, 245	855, 864
Massachusetts	574, 857	273, 718, 889	31, 167, 154	35, 994, 109	219, 160, 105	971, 118, 234	72, 289, 518
Rhode Island	167, 480	81, 137, 172	10, 457, 770	12, 291, 437	60, 905, 642	264, 855, 013	22, 875, 111
Connecticut	169, 703	52, 384, 171	6, 281, 939	8, 029, 127	42, 285, 517	173, 324, 667	16, 069, 771
Total	1, 129, 498	541, 373, 880	63, 169, 434	74, 200, 026	432, 744, 610	1, 813, 478, 967	143, 363, 030
MIDDLE STATES.							
New York	64, 614	31, 656, 594	3, 981, 106	4, 652, 745	25, 649, 456	136, 336, 871	8, 260, 836
New Jersey	21, 069	9, 950, 609	1, 319, 422	2, 018, 175	8, 275, 260	32, 989, 737	4, 548, 275
Pennsylvania	83, 697	40, 311, 809	4, 749, 428	6, 105, 700	34, 457, 323	82, 846, 813	11, 021, 054
Delaware	7, 512	3, 236, 184	427, 855	527, 205	2, 807, 909	8, 644, 028	871, 007
Maryland	51, 537	24, 166, 232	2, 780, 715	2, 887, 933	22, 324, 511	29, 453, 807	4, 682, 114
Total	228, 720	100, 321, 428	13, 258, 526	16, 191, 758	93, 574, 519	289, 762, 256	20, 389, 286
SOUTHERN STATES.							
Virginia	11, 461	5, 087, 519	601, 796	640, 391	4, 339, 476	15, 704, 126	1, 040, 062
North Carolina	27, 642	11, 832, 641	1, 125, 984	1, 463, 645	9, 646, 380	15, 027, 745	2, 554, 482
South Carolina	33, 624	15, 601, 005	1, 723, 187	1, 808, 300	12, 251, 272	29, 982, 440	2, 895, 760
Georgia	71, 389	33, 757, 199	3, 591, 554	4, 019, 073	27, 733, 153	60, 540, 712	6, 481, 894
Florida	350	166, 250	16, 000	18, 095	134, 000	.....	25, 000
Alabama	14, 702	7, 271, 791	729, 292	783, 711	6, 154, 470	9, 957, 519	1, 228, 019
Mississippi	6, 411	2, 881, 853	301, 226	337, 149	2, 461, 022	6, 163, 916	679, 093
Louisiana	1, 358	644, 000	68, 018	72, 470	166, 496	749, 536	89, 776
Texas	246	119, 986	11, 280	14, 827	99, 880	42, 000	21, 000
Kentucky	4, 650	1, 882, 234	188, 856	253, 818	1, 722, 500	.....	418, 286
Tennessee	10, 436	4, 944, 270	508, 305	553, 761	3, 874, 016	9, 890, 681	874, 717
Arkansas	680	340, 000	25, 000	33, 305	255, 000	.....	50, 000
Total	182, 349	84, 528, 757	8, 890, 408	9, 999, 145	68, 858, 265	148, 053, 675	16, 356, 598
WESTERN STATES.							
Ohio	5, 323	2, 506, 182	258, 198	280, 692	1, 993, 182	.....	637, 000
Indiana	11, 558	6, 364, 887	679, 911	651, 434	5, 238, 020	11, 060, 887	1, 155, 029
Illinois	2, 261	1, 099, 130	110, 969	142, 183	917, 694	.....	210, 861
Missouri	6, 309	3, 082, 132	336, 984	376, 081	2, 200, 027	4, 762, 623	522, 080
Michigan	600	300, 000	36, 000	41, 000	250, 000	1, 000, 000	70, 000
Wisconsin	3, 173	1, 541, 707	180, 072	194, 556	1, 814, 864	5, 189, 014	328, 389
Minnesota	400	200, 000	22, 000	30, 000	160, 000	.....	40, 000
Utah	54	25, 788	3, 223	3, 472	13, 120	25, 603	7, 037
Total	29, 768	15, 119, 916	1, 627, 357	1, 725, 418	12, 086, 847	21, 978, 127	2, 981, 196

a In the consideration of the footings of the aggregate yards and pounds of cotton fabrics, whether considered by counties or by states, it must be remembered that while all specific cotton fabrics may be rated by the pound, it by no means follows that there will in all cases be a statement of yards to correspond to that number of pounds, for the reason that very large quantities of yarn and thread are made which are sold by the pound and never bought or considered by the unit of the yard. Hence the footing of pounds may be considered as the resultant of the use of the given quantity of cotton; the footing of yards merely of that part of the cotton manufacture which is woven and sold by the measure of the yard.

TABLE II.—STATISTICS OF SPECIAL MILLS.

[Mills employed in working raw cotton, waste, or cotton yarn into hose, webbing, tapes, fancy fabrics, or mixed goods, or other fabrics, which are not sold as specific manufactures either of cotton or wool. Some work both fibers, but belong more in the class of cotton manufactures than in the class of wool manufactures.]

Sections.	No. of establishments.	Capital.	Number of spindles.	Number of looms.	Number of operatives.	COTTON CONSUMED.		Wages and salaries of operatives.	Value of production. (a)
						Bales.	Cost.		
Eastern states	70	\$3, 970, 803	15, 348	897	3, 169	9, 006	\$518, 745	\$877, 097	\$5, 539, 192
Middle states	161	6, 616, 645	34, 922	2, 894	9, 271	27, 784	1, 600, 358	2, 593, 931	12, 700, 128
Southern states	11	381, 500	9, 972	234	317	693	30, 916	63, 024	235, 295
Western states	7	255, 500	.....	.....	171	3, 114	179, 366	34, 947	325, 658
Total	249	11, 224, 448	60, 242	4, 025	12, 928	40, 597	2, 338, 385	3, 573, 909	18, 860, 273

a The excess of value of product above ordinary manufactures of cotton is to be attributed mainly to the fact that the cotton used forms but a small part of the material in many cases.

INDEX TO COTTON MANUFACTURES.

	Page.		Page.
A.			
Africa, cotton consumption of..... table..	2	Japan, cotton consumption of..... table..	2
America, cotton consumption of..... table..	2	Java, cotton consumption of..... table..	2
Antiquity of hand-spinning machines.....	1	L.	
Asia, cotton consumption of..... table..	2	Laborers, conditions and habits of.....	9, 10
Australia, cotton consumption of..... table..	2	Laborers, number of.....	15
Austria, cotton consumption of..... table..	2	Looms, number of.....	15
B.			
Belgium, cotton consumption of..... table..	2	M.	
C.			
Canada, cotton consumption of..... table..	2	Malta and Italy, cotton consumption of..... table..	2
Capital invested in business.....	15	Materials, value of.....	16
Central America, cotton consumption of..... table..	2	Middle states, cotton manufactures in.....	15, 16
China, cotton consumption of..... table..	2	N.	
Clerks employed in manufactories.....	15	Norway and Sweden, cotton consumption of..... table..	2
Competition with England.....	12	O.	
Consumption of cotton per head of population.....	1	Officers and clerks in manufactories.....	15
Cost of labor in various cotton manufactures.....	13	Operatives, conditions and habits of.....	9, 10
Cotton consumed in the United States..... table..	16	P.	
D.			
Dacca muslin.....	3	Portugal and Spain, cotton consumption of..... table..	2
Denmark, cotton consumption of..... table..	2	Products of cotton manufacture.....	16
E.			
Eastern states, cotton manufactures in.....	15, 16	R.	
Egypt, cotton consumption of..... table..	2	Review of the past twenty years.....	8
Ellison, Thomas, extract from annual report of.....	1, 2	Russia, cotton consumption of..... table..	2
Employés, number of.....	15	S.	
Employés, conditions and habits of.....	9, 10	Siam, cotton consumption of..... table..	2
England, competition with.....	12	Sizing.....	7
Establishments, number of.....	15	South America cotton consumption of..... table..	2
Europe, cotton consumption of..... table..	2	Southern states, cotton manufactures in.....	15, 16
F.			
France, cotton consumption of..... table..	2	Spain and Portugal, cotton consumption of..... table..	2
Freight (Lowell and Lancashire)..... table..	12	Spindles, description of.....	8
G.			
Germany, cotton consumption of..... table..	2	Spindles, number of.....	15
Gin, cotton (Eli Whitney's invention).....	4	Spinning, development of.....	3, 4
Ginneries classified by power.....	4, 5	"Surats".....	3
Great Britain, cotton consumption of..... table..	2	Sweden and Norway, cotton consumption of..... table..	2
Greece, cotton consumption of..... table..	2	Switzerland, cotton consumption of..... table..	2
H.			
Holland, cotton consumption of..... table..	2	U.	
I.			
India, cotton consumption of..... table..	2	United States and Canada, cotton consumption of..... table..	2
Italy and Malta, cotton consumption of..... table..	2	W.	
J.			
K.			
L.			
M.			
N.			
O.			
P.			
R.			
S.			
T.			
U.			
V.			
W.			
X.			
Y.			
Z.			

REPORT

ON

WOOL MANUFACTURE IN ALL ITS BRANCHES.

BY

GEO. WM. BOND,
SPECIAL AGENT.

LETTER OF TRANSMITTAL.

BOSTON, MASS., *September 22, 1882.*

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor herewith to present the tables giving the statistics of the wool manufacture for the census year ending May 31, 1880.

Yours, very respectfully,

GEO. WM. BOND,
Special Agent on Wool Manufacture.

REPORT ON WOOL MANUFACTURE.

The accompanying tables embrace the statistics (1) of the manufacture of wool alone, or of wool mixed with other materials, by the use of wool-carding machinery; (2) of the manufacture of the same by the combing process, known as the worsted manufacture; (3) of the manufacture of textile fabrics by the felting process; (4) of the manufacture of carpets; (5) of the manufacture of wool hats; (6) of the manufacture of hosiery and other knit goods of wool or other materials.

The number of establishments reported in all these industries is 2,689, viz: On woollen goods, 1,990; on felted fabrics, which in 1870 were reported with the woollen goods, 26; on worsted goods, 76; on carpets, 195; on wool hats, 43; and on hosiery and knit goods, 359.

In 1870 returns were given from 2,891 woollen-mills. For 1880 the returns, as before stated, were only 2,016 mills on woollen and felt goods.

After diligent search there were found 814 establishments, almost all of which were reported in 1870, that were either out of existence or for some cause were not running during the census year of 1880.

Of late years the manufacture of woollen goods has been a very close business, and has required the best appliances and the closest attention to make it profitable. Formerly, many small establishments were scattered over the country, mostly in the wool-growing regions, of which a large portion ran only a part of the year, with poor machinery, perhaps making several kinds of goods on the same sets of machinery; but these could not compete with well-appointed factories, devoted to their several specialties.

There are also included in the returns of the 1,990 establishments on woollen goods, 570 which were only carding-mills, 233 others which use not over 5,000 pounds of wool or other fibrous materials, and 188 which used from 5,000 to 10,000 pounds per annum. The entire consumption of these 991 establishments for the year was but 4,546,348 pounds.

The majority of the 814 mills before referred to were of this character, but there were among them many mills of larger capacity, which had been burned, changed into other departments of manufacture, or, for other reasons, were idle.

The census year of 1879-'80 was a year of varying prosperity in almost every branch of the woollen manufacture. It opened with a languid demand for products, but in the autumn the speculative spirit which then characterized transactions in almost all kinds of merchandise created an active demand for nearly all classes of goods. The stocks in market were soon exhausted, and contracts were largely made for goods of nearly all descriptions in advance of their manufacture. The stocks of wool were light and prices low in Europe. Large orders were sent abroad for wool, and there were also increased importations of woolsens. Early in 1880 those who had contracted with the manufacturers found that the demand of the country for woolsens was not up to their anticipations, and many are reported to have repudiated their contracts. By April the demand for wool, raw and manufactured, ceased almost entirely. Thus the wool machinery, which for the first quarter was but moderately run, for the next two quarters was pushed almost to its fullest capacity, and, at the close, was again slackened.

The demands of fashion make such changes in the styles of woollen goods from one decade to another that a close comparison of results is not practicable. Still, the returns show that, notwithstanding the reduced number of establishments, the products of manufacture have materially increased in every department.

The value in the aggregate, excluding wool hats, which were not reported with woolsens in the previous census, was \$258,736,344. In 1870 the value reported was \$217,668,826, but as the dollar was then worth only 81½ cents, this amount was only equal to \$177,400,093. All descriptions of woollen goods did not in 1880 bear values equivalent to the relative value of the dollar; some were as high for gold in 1880 as they were for currency in 1870, while for others the value in 1880 was lower by more than 30 per cent.

WORSTED GOODS.—In 1870 several concerns which are not now carried on were reported as being engaged in minor branches of this manufacture.

WOOL MANUFACTURE.

CARPETS, OTHER THAN RAG.—The decrease in the number of establishments for the manufacture of carpets is attributed to a cause similar to that on woolen goods. The number of hand-loom manufacturers varies with the demands of trade, but they can only occasionally compete with those using the power-looms.

HOSIERY AND KNIT GOODS.—In addition to what is reported in the accompanying tables, there will be found in the tables given in the report on the cotton manufacture 4,047,075 dozen cotton hose and half-hose and 479,023 dozen cotton shirts and drawers, valued at \$4,900,277, making the aggregate value of these goods \$34,067,504. Even this large sum probably falls short of the whole manufacture, as much is done by single machines scattered over the country, which cannot easily be reached.

The total amount of raw material reported as consumed was (by pounds):

Description.	Domestic wool.	Foreign wool.	Camel's hair.	Mohair.	Buffalo hair.	Hair of other animals.	Cotton.	Shoddy.	Total raw materials.
Total of all industries	222,091,531	73,200,698	1,583,119	159,678	671,027	5,664,142	48,000,857	52,163,926	404,434,078
Woolen goods	177,042,238	20,482,007	1,234,004	84,080	556,601	3,940,923	24,744,064	46,583,983	274,069,570
Worsted goods	25,461,511	15,687,815	207,065	31,598	.....	510	1,757,842	190,800	43,337,150
Felt goods	4,204,806	799,067	70,000	.....	71,000	1,657,000	1,181,500	2,400,849	10,300,222
Wool hats	6,107,471	1,864,139	3,911	.....	7,436	.....	185,400	1,368,562	9,536,019
Carpets, other than rag	2,029,318	34,008,252	46,300	4,000	30,840	65,700	.....	90,469	36,274,879
Hosiery and knit goods	8,146,137	448,758	21,770	40,000	5,150	.....	20,131,151	1,523,203	30,310,238

The attempt was made to ascertain not only the amount of scoured wool consumed, or rather the amount of wool in condition to be carded, but also the weight of the same, both domestic and foreign, as it originally came to market. The figures, however, do not accurately represent the full quantity of either domestic or foreign, because many manufacturers purchased their wool scoured, and reported the same quantity in the column of scoured wool and in that of wool as purchased. It is estimated that from 10,000,000 to 15,000,000 pounds should be added to the quantity of domestic wool reported, and from 2,000,000 to 3,000,000 pounds to the foreign, to reach the true consumption.

SUMMARY OF THE MORE IMPORTANT RESULTS OF ALL WOOL MANUFACTURING INDUSTRIES

Industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.				Total amount paid in wages during the year.	Value of materials.	Value of products.
			Total.	Males above 16 years.	Females above 15 years.	Children and youths.			
Aggregate for all industries	2,680	\$159,091,869	161,557	75,450	66,814	10,284	\$47,389,087	\$164,371,551	\$267,252,013
Woolen goods	1,000	90,095,564	86,504	46,978	29,372	10,154	25,836,392	100,845,611	160,606,721
Worsted goods	70	20,374,043	18,803	6,435	9,473	2,805	5,683,027	22,013,023	33,549,942
Felt goods	26	1,958,254	1,524	1,203	233	88	439,760	2,530,710	3,619,052
Wool hats	43	3,615,330	5,470	3,222	1,459	789	1,893,215	4,785,774	8,516,569
Carpets, other than rag	195	21,468,587	20,371	10,104	8,570	1,697	6,835,218	18,984,877	31,792,802
Hosiery and knit goods	369	15,579,591	28,885	7,517	17,707	3,661	6,701,475	15,216,951	29,167,227

STATISTICS OF WOOL MANUFACTURE.

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS
WOOLEN GOODS.

States and Territories.	Number of establishments.	Capital.	MACHINES.						LOOMS.							
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woollen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woollen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of ingrain power-looms.	Number of knitting-looms.
The United States.....	1,900	\$90,005,504	5,901	764,006	48	13,500	24	6,175	15,046	620	17,579	1,767	528	2	49	34
1 Alabama	14	28,900	15	1,200							10					
2 Arkansas	25	85,550	29	2,800					7		34					
3 California	9	1,076,590	60	7,240					201		20	3				
4 Connecticut	78	7,907,452	435	59,055					1,384	50	1,228					
5 Delaware	5	352,559	18	1,700					26		99	1				
6 Georgia	82	180,733	42	3,713							88					
7 Illinois	53	1,327,553	106	10,678					181		193					
8 Indiana	81	2,273,705	160	18,445			1	75	150		660	4				
9 Iowa	34	553,500	56	4,420					51		108	7				
10 Kansas	5	131,925	9	892					24		15	2				
11 Kentucky	98	890,753	154	14,737					15		493	5				
12 Maine	93	3,876,028	261	30,530					1,045		58					
13 Maryland	14	333,760	30	2,870					20		91	13				
14 Massachusetts	167	24,680,782	1,356	175,859	20	6,000	20	5,500	5,202	162	2,377	1,765				
15 Michigan	30	558,800	51	4,680					41		126					
16 Minnesota	13	190,500	21	2,236					46		13					
17 Mississippi	8	331,500	15	1,035					5		116					
18 Missouri	98	726,150	120	13,275					42		149	2				
19 New Hampshire	58	4,510,271	203	37,304					1,186		320	28				
20 New Jersey	27	2,530,125	136	27,065					600		444	98				
21 New York	159	8,266,878	483	50,735	2	600	3	600	1,153	68	591	2	80		20	
22 North Carolina	49	293,100	57	5,320					7		23					
23 Ohio	122	1,316,340	182	14,000					126		412	34				
24 Oregon	10	566,800	21	2,225					53		3					
25 Pennsylvania	324	18,780,604	938	172,463	10	4,300			1,485	88	7,895	265	2	22	34	
26 Rhode Island	50	3,448,700	492	54,028	16	2,000			1,100	261	1,313					
27 South Carolina	11	7,900	11	790												
28 Tennessee	106	418,664	98	8,450					17		150					
29 Texas	1	97,500	2	250					10		2					
30 Utah	11	382,000	21	1,560					22		91	1				
31 Vermont	44	2,320,161	145	16,798					533		163					
32 Virginia	48	456,750	54	5,035					60		73	11			1	
33 Washington	1	40,000	2	250					8		4					
34 West Virginia	55	293,170	72	5,313					30		134	15				
35 Wisconsin	48	1,349,954	75	6,390					143		77					

WOOL MANUFACTURE.

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS.

KNITTING-AND SEWING-MACHINES.		SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employes.	Wages and salaries of all employed during the year.
Number of knitting-machines.	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	Male.		Female.		Male.		Female.		Male.		Female.			
				16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.		
379	348	1,720,820	35,926	42,437	6,496	29,940	3,024	3,256	18	23	2	1,285	14	3	86,504	\$25,836,392	
		160		13		5									18	3,337	1
1		1,300		58	6	21	1	4							90	13,226	2
138	10	18,740		612	15	108	4	68				28			835	334,318	3
8	11	152,004		4,024	454	1,048	234	197				98	1		6,956	2,342,035	4
		4,306		108	23	59	8	3							261	108,504	5
		2,224		61	23	45	2	5				6			142	25,070	6
2		20,092		455	63	364	57	37				35	1		1,042	266,225	7
22	1	36,886		756	208	587	99	51				39	1		1,741	462,681	8
12		11,025		258	59	132	15	38	6			16			499	117,791	9
4		2,636		68	10	40	8					3			124	25,825	10
3	2	14,110		336	169	253	48	27				29			823	166,189	11
1	22	68,192		1,523	186	1,109	84	124				69			3,095	1,044,606	12
		6,580		156	26	106	16	12				3			313	59,491	13
7	110	461,776	11,696	11,922	1,368	8,269	891	952				272	6	1	23,621	7,457,115	14
15		10,688		192	23	114	7	5				6			347	76,240	15
1	7	3,552		91	44	78	6	8				7			229	46,108	16
	2	3,734		88	41	61	4	11	1			12			218	53,100	17
15	2	12,622		353	110	144	22	33	1			26			689	109,877	18
24	40	126,671		2,057	245	1,360	133	154		1		77			4,027	1,181,738	19
2	14	31,719		1,649	299	996	239	134		1		44	1		3,363	966,384	20
2	30	141,026	1,068	2,056	450	2,121	286	272	5	7		83			6,130	1,774,143	21
1	2	2,374		166	14	59	1	9				5			185	23,195	22
55	7	33,950		638	129	413	58	46	2			38			1,324	256,214	23
9	2	4,248		149	6	33	11	7				10			218	86,688	24
45	54	295,025	7,142	7,723	1,635	6,809	853	621	1			147			17,689	5,254,928	25
2	4	169,524	15,120	3,611	645	2,637	506	298	2	11	2	103	6		8,121	2,480,907	26
				11				1				1			18	1,173	27
		6,860		210	31	111	11	22				17			402	67,063	28
		960		25		8		3							36	25,700	29
	2	5,422		117	30	79	18	10				23			277	68,108	30
	1	46,264		997	99	780	31	164		3		20			2,084	544,136	31
		8,486		212	15	95	4	15				24			365	71,720	32
		400		17	2	8	1					1			29	4,000	33
10		8,081		194	21	96	10	19				13			353	44,161	34
	4	16,689		371	37	378	6	16				39			847	214,993	35

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

States and Territories.		MATERIALS.									
		Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camels' hair and noils consumed.	Value.	Mohair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.
The United States		Pounds. 20,482,607	Pounds. 177,042,288	Pounds. 109,724,213	\$67,880,250	Pounds. 1,234,004	\$892,419	Pounds. 84,080	\$50,887	Pounds. 556,601	\$25,284
1	Alabama.....		135,366	112,866	46,240						
2	Arkansas.....		189,000	174,000	70,050						
3	California.....	20,000	3,554,850	1,384,750	748,750	5,000	2,000			20,000	600
4	Connecticut.....	2,009,609	14,370,716	8,501,546	6,383,081	30,017	13,654				
5	Delaware.....	203,206	633,677	483,278	291,138	20,084	11,822				
6	Georgia.....		366,274	310,074	120,990						
7	Illinois.....		3,003,740	1,888,989	1,143,210						
8	Indiana.....	10,000	4,350,456	2,004,856	1,381,545						
9	Iowa.....		1,407,510	801,360	384,820						
10	Kansas.....		394,000	188,000	89,720						
11	Kentucky.....		1,688,663	1,230,075	562,662						
12	Maine.....	1,040,498	7,907,848	5,026,144	3,113,028	3,500	1,600	17,304	5,191	5,161	388
13	Maryland.....		794,050	505,050	270,052						
14	Massachusetts.....	7,391,993	48,748,041	28,094,931	18,968,327	678,706	148,251	29,270	14,266	960	81
15	Michigan.....		869,025	556,617	307,703						
16	Minnesota.....	20,000	537,580	350,000	131,095						
17	Mississippi.....		404,033	319,881	167,612						
18	Missouri.....		1,811,695	1,327,100	589,080						
19	New Hampshire.....	838,875	10,080,301	5,638,583	3,600,522	1,500	300	32,297	29,229		
20	New Jersey.....	269,761	5,394,377	3,262,450	2,008,063	24,749	11,175				
21	New York.....	1,003,324	11,068,800	7,035,083	4,634,876	140,695	59,308	4,700	1,410	40,300	2,748
22	North Carolina.....	80,000	496,145	466,424	216,050						
23	Ohio.....	105,000	2,380,424	1,680,473	845,092						
24	Oregon.....		985,250	472,200	197,785						
25	Pennsylvania.....	5,005,271	28,559,097	22,011,974	11,099,912	163,476	30,917			487,520	21,152
26	Rhode Island.....	2,198,726	17,151,957	9,520,553	6,886,833	100,337	52,039	500	760	556	67
27	South Carolina.....		48,950	46,950	19,120						
28	Tennessee.....		883,338	805,836	330,761						
29	Texas.....		175,000	70,000	37,500						
30	Utah.....		566,900	313,000	120,715						
31	Vermont.....	161,404	3,441,737	1,719,580	1,170,939	5,500	1,203			2,098	298
32	Virginia.....	5,000	857,812	649,175	325,602						
33	Washington.....		160,000	100,000	40,000						
34	West Virginia.....		602,399	509,403	213,019						
35	Wisconsin.....		2,066,188	1,322,812	771,643	509	150				

WOOL MANUFACTURE.

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS—Continued.

MATERIALS—continued.													
Hair of other animals consumed.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used on woollen goods.	Value.	Cotton warp used on worsted goods.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.
Pounds. 3,940,923	\$212,762	Pounds. 24,744,964	\$3,395,569	Pounds. 40,583,953	\$7,014,100	Pounds. 17,550,212	\$4,374,985	Pounds. 3,517,580	\$897,211	Pounds. 1,485,909	\$372,022	Pounds. 2,495,050	\$3,139,746
						10,000	2,000						
		8,400	820	300	45	22,200	7,835						
		218,526	31,222	94,150	12,319	9,500	2,950						
32,700	2,770	1,510,515	209,199	6,335,103	1,013,757	1,423,992	403,995					714,860	947,245
		30,100	3,620	846,778	77,915	25,000	5,000					3,026	4,270
		27,918	2,278			106,500	24,950						
		39,341	4,851	83,007	24,697	75,190	25,763						
		294,629	37,121	345,656	76,421	537,147	101,410			10,000	5,250		
		100	25	865	154	18,497	4,844						
		10,000	1,100	2,000	300	13,200	3,225						
		288,263	32,820	117,151	32,430	379,181	124,996						
371,742	33,484	569,331	84,447	1,153,144	290,792	995,131	240,564			300	200		
250	20	0,000	700	255,200	46,200	11,589	2,418						
273,140	18,010	4,776,690	505,731	11,107,285	1,075,556	3,144,565	869,695	1,424,371	375,703	182,461	130,083	526,272	680,421
		2,100	369	37,163	13,766	3,117	747	93	24				
				18,000	5,400	6,265	2,006						
		72,148	7,811			133,743	32,150						
		4,100	418	4,000	694	111,127	28,180						
		833,104	97,150	3,105,890	339,360	831,410	222,478					21,220	21,387
110,000	8,700	557,106	51,894	2,375,856	361,968	655,396	146,499			33,000	32,100	70,000	89,000
636,065	43,237	1,439,289	176,649	1,556,767	252,073	523,497	63,411			30,422	16,101	102,575	179,403
				12,444	1,804	113,464	25,630						
75,000	11,250	108,000	15,190	134,063	37,588	162,824	44,651						
		5,000	1,000	1,000	400	1,000	500						
2,241,526	99,591	11,601,450	1,846,156	14,926,242	1,533,070	6,522,579	1,575,747	2,092,116	521,124	1,155,916	636,239	964,043	1,094,330
			1,809,078	228,268	1,059,782	437,679	1,135,061	316,385	1,000	300	65,000	52,000	92,445
		44,000	4,440	55,433	18,315	136,416	37,982						
		2,300	496	1,000	149	29,397	7,398						
		310,201	38,958	2,280,150	416,324	330,209	97,055					609	590
599	100	57,000	8,784	60,500	14,230	47,170	10,972						
		3,000	480	33,819	8,981	1,000	400						
		21,215	3,572	85,235	9,981	29,740	12,870						

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

States and Territories.	MATERIALS—continued.						
	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
The United States	\$1,758,408	Number. 142,250	\$371,236	Tons. 359,709	\$1,401,467	\$6,550,224	\$100,845,011
1 Alabama.....	500	110	115			500	40,361
2 Arkansas.....	2,830	1,195	1,965			2,427	85,072
3 California.....	72,975	2,312	11,273	6,470	37,100	78,350	907,530
4 Connecticut.....	457,656	15,721	50,019	26,540	139,720	555,291	10,176,987
5 Delaware.....	13,139	360	864	1,033	4,553	35,064	443,285
6 Georgia.....	3,100	800	1,350			3,397	105,065
7 Illinois.....	59,329	3,049	5,952	10,608	21,609	47,337	1,332,798
8 Indiana.....	60,442	5,855	12,464	10,865	26,723	123,014	1,823,390
9 Iowa.....	23,677	1,349	3,760	2,861	8,775	9,677	435,747
10 Kansas.....	9,480	330	1,280	380	1,151	905	197,251
11 Kentucky.....	15,736	6,343	4,430	5,143	14,005	65,227	852,405
12 Maine.....	237,701	15,531	41,854	3,556	10,475	219,368	4,294,042
13 Maryland.....	15,455	242	610	736	3,680	9,933	340,724
14 Massachusetts.....	1,737,744	20,523	60,007	92,789	405,807	1,042,881	27,339,583
15 Michigan.....	14,823	3,031	6,246	800	2,673	10,203	350,014
16 Minnesota.....	5,195	1,055	2,202			9,369	155,867
17 Mississippi.....	8,660	2,292	3,015			2,398	211,646
18 Missouri.....	22,800	4,007	3,325	2,501	9,501	22,453	681,711
19 New Hampshire.....	200,476	16,173	40,028	7,043	39,193	304,601	4,093,700
20 New Jersey.....	180,165	351	817	20,753	64,071	213,593	3,192,955
21 New York.....	299,482	4,331	9,528	26,241	90,465	393,604	6,212,835
22 North Carolina.....	3,639	1,035	1,873			6,102	255,707
23 Ohio.....	52,704	4,425	8,805	7,793	21,413	49,730	1,084,823
24 Oregon.....	19,423	1,515	3,675			4,700	227,486
25 Pennsylvania.....	717,715	2,334	4,576	91,760	319,136	1,630,039	21,185,304
26 Rhode Island.....	354,331	10,373	35,093	30,510	140,054	517,530	9,133,429
27 South Carolina.....		300	300			35	19,455
28 Tennessee.....	11,904	3,279	5,436	280	2,046	12,170	423,054
29 Texas.....	2,475	653	1,960			2,590	44,435
30 Utah.....	8,203	338	2,371	174	1,300	6,639	147,223
31 Vermont.....	75,192	4,397	15,300	6,357	27,120	169,442	2,012,490
32 Virginia.....	11,363	1,456	3,351	154	688	6,937	333,030
33 Washington.....	5,500	180	350	20	150	6,000	52,000
34 West Virginia.....	13,623	750	1,276	2,259	3,183	4,921	245,843
35 Wisconsin.....	41,053	4,330	11,032	2,133	7,715	34,727	392,793

WOOL MANUFACTURE.

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS—Continued.

Value of production at whole sale.	PRODUCTS.													
	Blankets.	Horse blankets.	Carrriage robes.	Cloths, cassimeres, doo- skins, diagonal, and suitings.	Beavers and overcoat- ing.	Horse clothing.	Blanketing.	Cloaking.	Felted cloth.	Coverlets.	Flannels.	Jeans.	Kersey.	Lincey.
	Pairs.	Number.	Number	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Number.	Yards.	Yards.	Yards.	Yards.
\$100,606,721	1,083,671	1,114,827	58,485	73,440,525	7,095,024	616,157	22,393	1,350,206	120,904	1,336,006	70,923,196	29,533,950	2,570,374	4,731,007
63,745												40,080		
127,430	1,125			7,500							21,500	113,500		50,000
1,634,858	77,500	4,300		558,719	52,792						1,432,737			
16,892,284	4,344			9,013,909	1,530,037					1,300,300	2,007,571	850,000	157,007	260,000
665,253				835,140									8,121	
230,300				45,000								454,588	8,219	125,000
1,896,460	18,794			681,013							1,342,050	163,857		12,000
2,720,347	6,650			166,505							2,081,331	2,092,563	106,060	3,429
670,904	12,405			149,687							681,108	75,134	1,000	
211,525	8,809			18,000							224,000	46,480		
1,204,988	808			4,225							11,000	2,450,484		15,200
6,686,073	140,810	39,715	17,323	2,828,379	260,259	76,623		225,000			3,139,730		4,500	
488,398	905			157,275					800		25,703		650,407	1,587
45,090,203	135,436	496,000	29,214	20,989,486	2,052,181	432,000		705,199	60,000		30,749,892			
481,517	227			323,566							100,054	1,200		
253,378	28,647		3,898	2,132							64,321	12,400		
290,605	2,000			647,036								63,606		11,874
930,961	17,936		2,000	39,234							138,208	352,283		64,930
8,113,830	310,544	97,000	1,630	3,156,686	363,962	61,833		314,126	2,090		8,564,625			
4,084,067	62,868	71,552		3,414,478	319,068			14,000			1,178,910	120,000		
9,871,973	43,966	305,500		4,526,721	163,743	51,601			12,104		7,256,837		80,000	
233,100				48,000							1,500	12,000	208,090	8,000
1,478,189	10,818			85,509				50,000	55,000		462,070	625,673		700
549,630	12,992			134,239			22,393	612			162,684			
32,341,291	121,120	100,600		11,860,332	1,463,219			45,000		29,766	7,453,890	19,143,006	1,243,847	3,491,253
75,410,450				10,965,523	545,579						1,678,506	2,013,326		530,000
24,075														
620,724	2,337			8,440							18,450	644,036		64,493
80,500				86,000										
279,424	651			26,095	300						203,128	56,908	3,817	71,609
3,217,807		5,110		1,516,401	337,504			359			1,065,209			
577,968	1,488	60		412,370	1,430			5,000			18,979	81,050	93,353	17,356
70,900														
356,986	4,057			46,668							141,317	101,206	5,600	22,332
1,480,069	393	100		677,257	200						617,200	17,050		1,200

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

States and Territories.	PRODUCTS—continued.											
	Waterproofcloaking and repellants.	Satinets.	Tweeds.	Shawls.	Cashmerettes.	Balmorals.	Cotton yarn.	Woolen yarn.	Woolen rolls.	Cottonades.	Dress goods.	Cashmere.
The United States	Yards.	Yards.	Yards.	Number.	Yards.	Dozen.	Pounds.	Pounds.	Pounds.	Yards.	Yards.	Yards.
1 Alabama.....									90,990			
2 Arkansas.....			6,000	100				5,000	82,000			
3 California.....			22,086	13,900				1,000				
4 Connecticut.....	602,571	2,409,067	817,003					233,947	11,211			
5 Delaware.....								500	8,600			
6 Georgia.....			20,000					36,000	96,900			
7 Illinois.....		5,249	28,490	34,842				377,068	101,787			
8 Indiana.....	1,000	34,817	17,700					884,001	55,513			
9 Iowa.....	1,200	13,600	13,267		1,390			853,629	30,772			
10 Kansas.....		5,000						15,500				
11 Kentucky.....								179,092	306,073			
12 Maine.....	1,681,568	25,062		30,000				28,975	299,928			
13 Maryland.....		400			1,913			9,200	10,900			
14 Massachusetts.....	375,948	12,449,844	544,025	222,534				400,262	1,006			2,910,050
15 Michigan.....		4,335						162,899	37,250			
16 Minnesota.....		1,500						35,000	76,014			
17 Mississippi.....		2,500	14,724	2,000				41,085	19,700			
18 Missouri.....	400	1,400	500					510,055	310,933			
19 New Hampshire.....	375,267	32,000	132,521		1,301,426			8,350	40,300			
20 New Jersey.....	275,084	710						348,562				
21 New York.....	76,337	6,600	871	370,318				384,219	224,747			
22 North Carolina.....	10,000							58,650	214,010			
23 Ohio.....		40,637	5,427		952	200		696,166	89,230			
24 Oregon.....				2,648				6,738	22,000			
25 Pennsylvania.....	4,013	28,976	291,824	392,875	246,106	141,000	1,420,968	19,421,516	527,096	1,717,600	4,771,140	
26 Rhode Island.....		200,000		111,712				769,700		104,000		
27 South Carolina.....									46,950			
28 Tennessee.....		23,300	3,000	1,000				159,005	337,961			
29 Texas.....												
30 Utah.....	21,700		3,200		2,000			43,484	24,900			
31 Vermont.....	305,000	1,335,300						36,750	32,772			
32 Virginia.....		4,100						39,819	112,280			
33 Washington.....												
34 West Virginia.....	8,243	3,719	1,350		3,756			163,539	104,415			
35 Wisconsin.....	99,826	1,000	61,457	52,050		3,100		177,446	83,697			

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WORSTED GOODS.

States.	No. of establishments.	Capital.	MACHINES.						LOOMS.						
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woollen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woollen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of knitting-looms.
The United States ..	76	\$20,374,043	259	55,105	269	86,701	19	5,650	47	1,063	58	7,231	189	4,905	18
1 Connecticut	3	232,000	22	2,700	0	1,275			30		58				
2 Massachusetts	23	6,105,247	96	22,704	75	31,850	11	2,550	12	1,296		3,103		1,200	
3 New Hampshire	2	2,628,584	23	3,400	17	7,000	4	1,800				1,350			
4 New Jersey	2	45,000	5	1,500	4	1,200						30			
5 New York	6	1,679,157	6	700	30	6,130	1	400		24		902		150	
6 Ohio	1	67,000			2	500						66			
7 Pennsylvania	28	4,950,639	44	11,316	83	24,406	1	200		486		650	159	550	
8 Rhode Island	11	4,507,416	63	12,725	52	14,400	2	700	5	157		1,100		3,005	

States.	MATERIALS.													
	Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camel's hair and wools consumed.	Value.	Mohair and wools consumed.	Value.	Hair of other animals consumed.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.
The United States ..	15,687,815	25,461,511	26,834,635	\$15,235,878	207,005	\$40,341	31,598	\$10,458	519	\$237	1,737,842	\$211,293	190,800	\$31,300
1 Connecticut	200,000	1,180,000	690,000	602,000									100,000	2,000
2 Massachusetts	9,376,043	4,811,217	9,758,253	4,143,522	190,000	36,000	11,598	6,958	519	237	5,400	1,000	22,300	6,300
3 New Hampshire	1,520,700	1,792,961	2,103,861	941,340	16,565	4,141								
4 New Jersey	30,000	35,000	45,000	30,000										
5 New York	875,000	1,862,000	1,788,000	979,899			2,000	1,000						
6 Ohio		150,000	120,000	45,000			5,000	2,500						
7 Pennsylvania	1,415,710	10,100,404	7,134,876	5,456,104			8,000	6,000			500,000	60,000		
8 Rhode Island	2,270,362	5,520,929	4,604,045	3,038,004	500	200	5,000	3,000			1,252,442	150,293	68,000	23,000

States.	Value of production at wholesale.	WOOLEN GOODS PRODUCTS.		WORSTED GOODS PRODUCTS.						
		Cloths, cassimeres, and doeskins.	Woolen yarn made and sold, not used at mill.	Coatings.	Dress goods.	Upholstery goods.	Alpaca.	Serges.	Picture cord.	Terry.
The United States ..	\$38,549,942	Yards. 200,000	Pounds. 1,540,493	Yards. 2,875,672	Yards. 63,833,341	Yards. 205,000	Yards. 1,000,000	Yards. 530,741	Pieces. 250,000	Yards. 214,000
1 Connecticut	1,597,227								250,000	
2 Massachusetts	10,466,016		594,177	997,600	37,323,450			368,524		
3 New Hampshire	2,694,232		233,210		15,093,805					
4 New Jersey	110,000									
5 New York	2,321,900			281,946	855,400		1,000,000	135,324		
6 Ohio	101,250				450,000					
7 Pennsylvania	10,072,473	200,000	654,106	656,132	4,072,850	205,000				214,000
8 Rhode Island	6,177,754		59,000	940,000	6,027,827			26,803		

WOOL MANUFACTURE.

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WORSTED GOODS.

SEWING-MACHINES.	SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employes.	Wages and salaries of all employed during the year.	
	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	Male.		Female.		Male.		Female.		Male.		Female.			
				16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.			Under 15.
57	20,604	219,454	5,443	1,086	9,473	1,800	829	8				163	1			18,803	\$5,683,027
12	2,600	5,000	239	45	150	22	25					3				490	172,256
6	4,044	76,647	1,531	245	3,340	385	232					50				5,783	1,870,030
3	672	10,880	343	33	919	74	143					19				1,531	512,881
3		2,000	70	18	35	37	20									180	22,200
21		20,092	403	104	874	192	50					15				1,707	565,952
15		1,250	44	21	32	4	4					3				108	23,400
15	6,080	58,235	1,492	307	2,378	642	145					36				5,000	1,473,958
15	7,268	45,360	1,321	253	1,730	444	201	8				37	1			4,004	1,222,350

MATERIALS—continued.

Cotton warp used on woolen goods.	Value.	Cotton warp used on worsted goods.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used. (c)	Total value of all materials.
Pounds.		Pounds.		Pounds.		Pounds.			No.		Tons.			
262,000	\$80,062	5,086,952	\$1,505,989	410,574	\$271,255	2,100,532	\$2,418,086	\$563,660	2,132	\$6,497	72,779	\$303,421	\$1,319,151	\$22,613,628
20,000	0,000	2,508,549	860,824	18,000	5,000	368,000	560,600	25,080	900	2,475	1,500	9,480	52,020	1,258,655
		1,207,430	171,590		10,000	904,857	925,258	81,528	168	713	14,520	75,285	311,851	6,465,476
						2,721	4,536	214,322	791	2,430	4,970	25,781	218,068	1,582,226
						25,000	40,000				95	417	70,417	70,417
		290,000	121,000			50,044	55,555	30,547	150	375	8,778	29,348	130,562	1,318,376
		40,000	16,000					2,100			486	1,506	2,500	69,606
192,000	00,062	405,365	197,689	312,574	236,235	604,880	670,637	101,441	1	0	21,649	70,706	412,589	7,277,489
50,000	14,000	535,708	188,787	30,000	20,000	145,000	155,500	110,642	122	498	20,772	95,898	191,561	3,941,383

WORSTED GOODS PRODUCTS—continued.

Knitting.	Suitings.	Worsted shawls.	Italian cloths.	Brading or braids.	Rep.	Tapestry.	Elastic frills.	Worsted yarn made and sold not used at mill.	Lastings.	Noils, shorts, etc.	Cloaking.	Value of all products not heretofore named.
Yards.	Yards.	Number.	Yards.	Dozen.	Yards.	Yards.	Yards.	Pounds.	Yards.	Pounds.	Yards.	Dollars.
2,230,221	302,168	574,267	1,357,444	2,612,691	9,000	329,000	103,000	9,650,000	910,553	4,238,295	16,107	\$965,512
962,520	336,000			881,188				300,000		300,000		63,867
								3,037,909		1,388,863		
								368,135		503,079		
								30,000		9,000		
1,263,818	25,000		835,560					251,571	445,356	416,066		
4,388	1,168	574,267			9,000	329,000	103,000	4,577,846		889,767	16,107	8,750
			521,944	1,731,503				1,009,448	465,197	721,520		892,895

a Including 5,000 pounds silk yarn, value \$28,500; 20,000 pounds shoddy yarn, value \$10,000.

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

FELT GOODS.

States.	Number of establishments.	Capital.	MACHINES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.		Total number of employes.	Wages and salaries of all employed during the year.	MATERIALS.					
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Male.		Female.		Male.		Female.		Male.				Female.		Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.
					16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.			15 and over.	Under 15.				
The United States	20	Dollars. 1,958,254	122	20,160	1,061	71	233	17	106	36	1,524	Dollars. 430,760	Pounds. 709,067	Pounds. 4,204,806	Pounds. 2,733,706	Dollars. 1,624,871
Connecticut	2	405,754	30	3,500	116	39	11	8	174	53,595	87,177	365,781	436,806	224,496
Maine	1	100,000	3	1,000	33	2	11	.....	6	.....	.....	.....	2	.....	.....	54	14,326	40,000	30,000	54,000	35,000
Massachusetts	11	820,000	53	14,050	411	18	37	2	24	.....	.....	.....	20	.....	.....	512	163,440	340,000	2,050,000	1,321,000	698,500
New Hampshire	1	12,000	1	250	18	18	4	1	.....	.....	.....	.....	.....	.....	.....	41	7,000	20,000	20,000	30,000	20,000
New Jersey	6	313,000	15	5,310	219	10	21	5	28	.....	.....	.....	3	.....	.....	230	86,170	131,440	906,000	478,400	365,450
New York	4	157,500	12	1,950	109	3	46	0	25	.....	.....	.....	3	.....	.....	195	35,289	90,450	77,025	113,500	83,425
Pennsylvania	1	150,000	8	2,500	155	20	75	.....	12	.....	.....	.....	.....	.....	.....	262	80,000	.....	750,000	300,000	200,000

MATERIALS—continued.

States.	Camels' hair and wools consumed.		Buffalo hair and wools consumed.		Hair of other animals consumed.		Cotton used on cards.		Shoddy used or waste not including that made in mill.	Value of chemicals and dye-stuffs.	Cords of wood.	Coal.	Value of all other materials used.	Total value of all materials.			
	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.									
The United States	70,000	7,500	71,000	5,840	1,657,000	40,010	1,181,500	114,060	2,400,849	333,207	150,921	4,024	13,878	14,915	63,559	126,204	2,530,710
Connecticut	.....	.....	.....	.....	.....	.....	.....	.....	350,649	44,639	14,701	.....	.....	2,355	8,155	21,194	819,325
Maine	5,000	1,000	.....	.....	.....	.....	12,000	1,400	95,000	19,000	3,076	714	2,142	100	700	4,026	67,538
Massachusetts	65,000	6,500	42,000	2,840	400,000	6,500	718,000	69,710	1,617,500	270,875	57,774	750	2,581	5,715	31,000	45,250	1,198,539
New Hampshire	.....	.....	.....	.....	.....	.....	.....	.....	10,000	1,500	4,800	600	2,400	.....	.....	720	29,420
New Jersey	.....	.....	20,000	3,200	944,000	27,010	271,000	21,890	301,000	36,070	36,800	55	625	4,445	13,230	11,920	516,195
New York	.....	.....	.....	.....	253,000	6,560	130,500	15,660	23,700	2,133	8,080	2,505	6,130	1,050	4,215	29,750	155,893
Pennsylvania	.....	.....	.....	.....	.....	.....	50,000	6,000	.....	.....	25,000	.....	.....	1,250	6,250	12,750	260,000

PRODUCTS.

States.	Value of production at wholesale.	Cloths, cassimeres, and doeskins.	Beavers and overcoatings.	Felt skirtings.	Rubber shoe linings.	Felt cloths.	Felt for ladies' hats.	Saddle felts.	Trimming and lining felts.	Table and piano covers.	Hair felting.	Value of all products not heretofore named.
The United States	\$3,619,652	275,000	336,160	3,093,000	1,688,880	1,642,485	65,800	23,500	205,208	60,979	1,202,950	\$258,084
Connecticut	429,490	.....	33,360	.....	291,880	208,280	.....	.....	.....	.....	.....	.....
Maine	120,000	.....	16,000	.....	.....	.....	64,000	4,500	23,000	4,000	.....	.....
Massachusetts	1,627,320	275,000	286,800	1,208,000	1,251,000	420,000	.....	15,000	68,000	6,400	600,000	61,000
New Hampshire	50,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50,000
New Jersey	685,386	.....	.....	650,610	146,000	54,660	1,800	4,000	114,208	14,579	475,750	93,010
New York	257,450	.....	.....	174,990	.....	14,525	.....	.....	.....	36,000	187,200	54,065
Pennsylvania	450,000	.....	.....	1,000,000	.....	850,000	.....	.....	.....	.....	.....	.....

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOL HATS.

States.	Number of establishments.	Capital.	Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of sewing-machines.	OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employes.	Wages and salaries of all employed during the year.
						Male.		Female.		Male.		Female.		Male.		Female.			
						16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.		
The United States..	43	\$3,615,830	362	19,144	825	3,050	512	1,459	277	183				30				5,470	\$1,893,215
Connecticut	3	625,000	31	2,226	18	208	21	211	35	4								539	188,202
Maine	1	40,000	10	700	7	44	20	20	2	8				1				95	31,506
Massachusetts.....	6	430,325	43	3,600	22	546	86	214	15	21				11				883	313,935
New York.....	10	1,723,005	197	8,100	215	1,486	297	724	180	01				16				2,794	1,041,405
Pennsylvania.....	23	797,500	81	4,518	63	706	88	290	45	9				11				1,149	317,987

MATERIALS.

States.	Foreign wool in the condition purchased during the year.	Domestic wool in the condition purchased during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camels' hair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Cotton used on cards.	Value.
	Pounds.	Pounds.	Pounds.	\$.	Pounds.	\$.	Pounds.	\$.	Pounds.	\$.
The United States..	1,864,189	6,107,471	3,597,279	\$2,644,293	3,911	\$1,875	7,436	\$3,015	185,400	\$21,870
Connecticut	110,500	555,817	291,727	213,534						
Maine	5,108	50,557	41,894	24,363						
Massachusetts.....	651,400	1,240,100	815,000	532,000						
New York.....	928,131	2,979,880	1,422,768	1,213,162	3,911	1,875	7,436	3,015	185,400	21,870
Pennsylvania.....	169,000	1,281,117	1,025,800	661,234						

MATERIALS—continued.

States.	Shoddy used, or waste, not including that made in mill.	Value.	Value of chemicals and dyes-stuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
	Pounds.	\$.	\$.	Number.	\$.	Tons.	\$.	\$.	\$.
The United States..	1,368,582	\$370,963	\$173,040	296	\$1,478	30,227	\$109,507	\$1,450,133	\$4,785,774
Connecticut	54,063	22,526	12,862	47	188	2,063	12,549	271,317	532,976
Maine	54,645	20,446	2,789	93	279	835	1,700	31,248	80,825
Massachusetts.....	179,500	49,200	34,271	20	100	4,070	17,315	196,214	829,100
New York.....	584,604	157,771	99,252	60	350	15,780	53,182	755,144	2,308,221
Pennsylvania.....	495,750	121,020	23,866	76	501	6,879	22,761	205,210	1,034,652

WOOLEN GOODS PRODUCTS.

States.	Value of production at wholesale.	Cloths, cassimeres, and doeskins.	Wool hats.	Felt linings.	Saddle felt.	Felt skirts.	Straw hats.	Value of all products not heretofore named.
	\$.	Yards.	Dozen.	Yards.	Yards.	Yards.	Dozen.	\$.
The United States..	\$8,516,569	699,428	1,391,862	8,194	109	3,176	9,358	\$153,218
Connecticut	1,003,892		143,878					
Maine	161,730							151,730
Massachusetts.....	1,438,041		146,503					
New York.....	4,205,080	699,428	656,836	8,194	109	3,176	9,358	1,488
Pennsylvania.....	1,717,826		444,650					

WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS
CARPETS, OTHER THAN RAG.

States.	Number of establishments.	Capital.	MACHINES.						LOOMS.					
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woollen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of ingrain power-looms.	Number of tapestry looms.
The United States	195	\$21,468,587	285	73,275	64	30,850	91	10,950	6	75	3,995	756	1,873	547
1 Connecticut	2	3,085,000	25	7,500	14	6,000	1	200			10	84	295	
2 Maine	1	300												
3 Maryland	1	10,000									12			
4 Massachusetts	7	4,637,646	74	16,960	18	10,550	46	9,000		75		250	260	161
5 New Jersey	2	103,000	5	1,000			5	400	6		30	0	33	20
6 New York	10	6,422,158	132	32,440	10	3,500	34	9,350			149	68	273	360
7 Pennsylvania	172	7,210,483	49	15,375	22	10,800	5	1,000			3,704	345	1,012	

States.	MATERIALS.											
	Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camele's hair and noils consumed.	Value.	Mohair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Hair of other animals consumed.	Value.
	Pounds.	Pounds.	Pounds.		Pounds.		Pounds.		Pounds.		Pounds.	
The United States	34,008,262	2,029,318	23,563,210	\$6,975,129	46,300	\$8,808	4,000	\$700	30,840	\$2,354	65,700	\$5,250
1 Connecticut	4,001,000	1,362	3,436,636	907,834								
2 Maine												
3 Maryland		28,500	20,000	11,400								
4 Massachusetts	10,252,159	62,845	6,173,475	1,622,630								
5 New Jersey	223,800		175,000	58,188								
6 New York	10,598,254	504,884	8,098,331	2,390,164	46,300	8,808	4,000	700	30,840	2,354	25,700	2,850
7 Pennsylvania	8,039,039	1,431,727	5,659,274	1,975,913							40,000	2,400

States.	PRODUCTS.								
	Value of production at wholesale.	Brussels carpet.	Ingrain carpet, 2-ply.	Ingrain carpet, 3-ply.	Venetian carpet.	Tapestry carpet.	Velvet carpet.	Wilton carpet.	Arminster carpet.
		Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.
The United States	\$31,792,802	4,077,190	21,986,434	862,394	1,984,201	9,441,195	60,000	157,629	309,360
1 Connecticut	2,500,559	704,783	1,553,047	296,904				67,845	18,021
2 Maine	1,200		1,300						
3 Maryland	50,000		68,000						
4 Massachusetts	6,337,629	1,884,723	1,579,479	79,539		1,998,634		50,784	
5 New Jersey	179,500		16,000						
6 New York	8,419,254	568,208	1,514,315	355,000		5,642,561			196,735
7 Pennsylvania	14,304,660	919,476	17,254,293	180,980	1,984,201	1,800,000	60,000	39,000	87,720

WOOL MANUFACTURE.

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

CARPETS, OTHER THAN RAG.

SEWING-MACHINES.	SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employes.	Wages and salaries of all employed during the year.	
	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	Male.		Female.		Male.		Female.		Male.		Female.			
				16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.			Under 15.
11	82,853	82,256	9,177	910	8,565	787	855	.....	5	.....	72	.....	.....	.....	20,371	\$0,835,218
.....	4,256	12,358	587	85	708	171	98	.....	.....	.....	10	.....	.....	.....	1,654	565,654
.....	.....	.....	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	9,900	.....
.....	7,860	20,918	1,305	35	2,250	18	261	.....	.....	.....	30	.....	.....	3,908	1,223,302	4
.....	840	1,232	96	35	65	23	24	.....	.....	.....	.....	.....	.....	243	48,000	5
8	8,592	20,748	1,590	278	3,154	278	280	.....	5	.....	17	.....	.....	5,602	1,952,391	6
8	11,305	15,000	5,524	477	2,384	297	102	.....	.....	.....	15	.....	.....	8,889	3,035,971	7

MATERIALS—continued.

Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used. (c)	Total value of all materials.
Pounds.		Pounds.		Pounds.		Pounds.			No.		Tons.			
90,469	\$12,442	9,544,214	\$1,799,046	8,985,162	\$2,597,182	4,091,115	\$2,858,199	\$1,860,439	707	\$3,809	60,641	\$250,581	\$3,092,248	\$18,084,877
5,188	585	258,035	54,607	147,000	43,050	40,500	24,300	127,283	253	1,275	7,804	37,022	250,248	1,446,109
.....	.....	.....	.....	1,000	350	300	250	150	3	15	3	20	.....	785
42,000	5,000	20,000	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,000	32,000
.....	.....	1,106,901	222,405	.....	1,540,076	1,096,866	251,473	202	1,241	12,260	68,128	687,930	3,950,073	.....
.....	.....	76,000	15,500	.....	.....	.....	10,300	15	57	320	3,280	22,100	100,425	.....
1,400	1,000	1,855,427	342,506	89,300	21,707	222,450	132,268	321,644	161	737	18,191	74,136	1,145,486	4,453,410
41,880	5,857	6,227,761	1,160,628	8,747,862	2,532,075	2,287,789	1,604,515	658,589	143	574	21,554	76,945	974,889	8,992,385

PRODUCTS—continued.

Cottage carpet.	Dutch carpet.	Rag carpet.	Druggets.	Rugs.	Knobs, shoris, etc.	Lastings.	Serges.	Worsted yarn made and sold, not used at mill.	Woolen yarn made and sold, not used at mill.	Value of all products not heretofore named.
Yards.	Yards.	Yards.	Number.	Number.	Pounds.	Yards.	Yards.	Pounds.	Pounds.	
241,220	12,000	157,005	40,000	47,530	288,614	107,452	55,748	1,134,143	1,205,240	\$384,181
.....
.....	.....	10,090	.....	.....	288,614	107,452	55,748	536,220	.....	153,086
.....	.....	.....	40,000	27,000	.....	.....	.....	.....	.....	.....
.....	.....	38,500	.....	3,130	.....	.....	.....	327,057	.....	1,095
241,220	12,000	108,505	.....	17,400	.....	.....	.....	220,866	1,265,240	175,000

a Including 6,559,550 pounds shoddy yarn, value \$559,133.

WOOL MANUFACTURE

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

HOSIERY AND KNIT GOODS.

States.	Number of establishments.	Capital.	MACHINES.				LOOMS.						KNITTING- AND SEWING-MACHINES.		SPINDLES.		
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufactures.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woolen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woolen goods.	Number of hand-loom.	Patent power-frames.	Seaming- and crocheting-machines.	Number of knitting- looms.	Number of knitting-machines.	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.
The United States.	350	\$15,579,501	592	94,640	3	1,100	89	20	96	64	16	55	1,624	12,659	4,569	140,733	2,200
1 Connecticut	14	1,966,481	79	9,500				1			16	55	317	720	340	15,074	
2 Illinois	14	105,800	3	450									6	433	48	680	
3 Indiana		45,000												183	5		
4 Iowa		2,200												7			
5 Maine		500															
6 Maryland		250															
7 Massachusetts	57	1,407,375	38	3,500						6			539	813	257	9,023	
8 Michigan	11	147,889	4	609										521	9	920	
9 Minnesota		8,600												10	2		
10 Missouri		29,400												68			
11 New Hampshire	24	1,224,000	68	7,830				1		18			128	992	118	17,540	
12 New Jersey	33	804,570	23	4,179										343	75	6,043	
13 New York	75	5,334,876	320	59,975									103	1,311	1,953	71,008	
14 Ohio	23	137,000												368	4	60	
15 Pennsylvania	106	3,743,793	35	5,600		3	1,100	87	20	73	58		492	6,769	1,653	15,970	2,200
16 Rhode Island		6,000												32	7		
17 Vermont	1	492,000	22	2,925										69	94	3,365	
18 West Virginia		5,000												1			
19 Wisconsin	4	10,010												19	4		

MATERIALS—continued.

States.	Mohair and wools consumed.	Value.	Buffalo hair and wools consumed.	Value.	Merino yarn used.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used.	Value.
The United States.	Pounds. 40,000	\$16,000	Pounds. 5,150	\$518	Pounds. 67,501	\$22,970	Pounds. 20,131,151	\$2,480,733	Pounds. 1,523,263	\$233,823	Pounds. 279,950	\$66,025
1 Connecticut							1,591,207	102,714	169,413	20,094	300	75
2 Illinois							6,500	835			600	250
3 Indiana												
4 Iowa												
5 Maine												
6 Maryland												
7 Massachusetts							333,000	39,090	8,000	2,000	172,000	41,500
8 Michigan							40,000	4,800	10,000	3,000		
9 Minnesota												
10 Missouri												
11 New Hampshire			5,000	500			1,002,793	135,028	180,000	55,592	26,050	6,150
12 New Jersey			150	13			487,026	64,074	15,552	2,839		
13 New York	40,000	16,000					15,625,791	1,929,533	1,062,011	129,603		
14 Ohio												
15 Pennsylvania					67,561	22,970	633,290	73,694	68,850	10,834	81,000	18,050
16 Rhode Island												
17 Vermont							406,539	49,305	2,525	822		
18 West Virginia												
19 Wisconsin												

PRODUCTS

States.	Value of production at wholesale.	Woolen half-hose.	Woolen hose.	Mixed half-hose.	Mixed hose.	Cotton hosiery.	Shirts and drawers.	Leggins.	Gloves.	Mittens.	Gaiters.	Hoods.
The United States.	\$29,167,227	Dozens. 238,111	Dozens. 1,216,274	Dozens. 627,234	Dozens. 2,653,099	Dozens. 2,491,243	Dozens. 2,671,712	Dozens. 41,683	Dozens. 48,462	Dozens. 199,889	Dozens. 43,310	Dozens. 64,880
1 Connecticut	2,432,271			192,000	15,000		253,275					
2 Illinois	484,124	16,004	122,035			49,650		620	100	207		
3 Indiana	158,206	11,550	41,075			1,500		2,500				
4 Iowa	2,008											
5 Maine	3,000	730										
6 Maryland	720											
7 Massachusetts	2,433,596	29,025	54,622	3,933	212,060		31,000	12,700	26,832	106,293	6,500	6,550
8 Michigan	377,249	30,500	24,500	47,640			3,000	1,250		9,750	150	300
9 Minnesota	10,000											
10 Missouri	85,000	26,500	10,500					25		300		
11 New Hampshire	2,362,779	78,000	47,500	253,715	283,295		29,400		50	24,700	36,000	
12 New Jersey	361,181		800	20,296		10,000	67,455	4,000		2,500		
13 New York	9,899,540	34,000	398			80,000	2,205,385	19,533		22,539	118	732
14 Ohio	413,325	25,025	177,247			900		50		4,775		13,050
15 Pennsylvania	8,935,147	8,240	737,069	100,650	2,136,844	2,309,193		1,005	21,480	28,300	542	44,198
16 Rhode Island	38,000						71,404					
17 Vermont	595,270											
18 West Virginia	2,600		350				1,216					
19 Wisconsin	18,317	37	208							20		

WOOL MANUFACTURE.

BRANCHES, FOR THE YEAR ENDING MAY 31, 1880.

HOSIERY AND KNIT GOODS.

OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employes.	Wages and salaries of all employed during the year.	MATERIALS.					
Male.		Female.		Male.		Female.		Male.		Female.				Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camel's hair and wools consumed.	Value.
16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.								
6,681	1,424	17,099	2,281	647	6	180	8	28,885	\$0,701,475	Pounds. 448,758	Pounds. 8,146,137	Pounds. 5,927,692	\$3,821,183	Pounds. 21,779	\$10,846				
554	138	1,187	220	71	1	34	1	2,211	664,293	126,174	975,561	587,113	377,371	21,779	10,846				
150	22	471	54	9	0	1	0	707	92,325		60,000	60,000	21,000						
20	15	201	42	3	0	0	0	284	24,700										
3	1	3	1	0	0	0	0	6	400										
1	1	20	1	0	0	0	0	21	801										
717	100	2,413	111	48	1	26	1	3,411	100										
52	13	705	163	15	1	13	1	902	608,067	7,266	1,081,418	674,000	446,760						
6	4	4	1	0	0	2	0	12	92,324		150,000	90,000	60,000						
3	1	114	1	0	0	0	0	12	2,819										
501	64	1,098	51	20	0	10	0	118	19,300										
300	45	604	101	7	0	4	0	1,753	536,117	76,000	1,680,332	1,118,078	755,903						
1,094	445	4,470	552	331	2	10	4	1,070	239,761	5,400	169,784	113,552	82,266						
50	21	574	97	3	0	64	0	7,858	2,036,076	186,323	2,362,643	2,084,734	1,373,524						
2,181	550	5,563	814	125	1	745	0	745	84,868										
3	1	24	8	2	0	31	7	9,272	2,175,913	47,592	1,235,126	837,373	498,353						
180	0	227	9	0	0	1	0	89	8,400										
1	1	0	0	1	0	0	0	393	101,037		401,393	242,833	206,006						
6	20	2	2	1	1	1	1	4	700										
								28	3,364										

MATERIALS—continued.

Cotton yarn used.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyes.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
Pounds.	\$	Pounds.	\$	Pounds.	\$	\$	Number.	\$	Tons.	\$	\$	\$
8,074,137	\$1,091,740	3,753,566	\$2,853,722	750,255	\$758,803	\$831,060	8,344	\$28,416	42,980	\$181,253	\$2,104,800	\$15,210,951
10,834	6,014	59,925	40,025	14,582	22,101	33,467	723	2,931	4,650	22,928	269,783	1,013,949
105,800	31,400	220,800	179,405	10,000	8,400	1,050	350	600	160	424	47,531	290,895
30,000	9,000	70,300	32,850	5,200	6,800		30	120	135	510	4,000	163,260
		1,536	1,554									1,554
		2,000	1,800									1,800
		504	500									500
347,700	82,015	502,511	409,220	88,619	102,994	71,422	147	469	3,362	20,718	178,800	1,394,748
1,500	405	154,800	127,460	5,000	5,500	7,200	1,121	2,610	153	593	15,050	226,627
		5,000	4,000	400	500						500	500
11,300	2,882	36,800	33,160	4,500	4,750		19	93			760	41,575
73,436	19,187	96,500	76,300	2,500	3,800	72,999	4,800	18,009	722	4,742	101,390	1,249,600
		108,300	56,150	3,100	3,850	4,079			2,446	7,689	36,489	258,043
538,714	127,945	538,467	327,943	46,150	59,999	169,579	1,065	3,264	17,000	76,690	857,928	5,072,058
6,000	1,200	241,850	214,265	3,850	6,450		10	17	260	900	18,751	241,538
6,940,053	1,710,501	1,682,127	1,288,250	585,145	533,109	247,605	8	28	12,945	39,967	500,727	4,924,138
		22,750	13,650			350			75	388	450	14,838
		1,200	1,500	500	500	23,184	71	275	994	5,704	72,582	359,038
		1,400	1,700									1,700
		7,100	8,600	700	950	125					50	9,125

PRODUCTS—continued.

Scarfs.	Waistcoats.	Cardigan jackets.	Fancy jackets.	Nubias.	Usters.	Shawls.	Fancy knit goods.	Yarn, worsted and woolen.	Yarn, woolen.	Sacques.	Boat and shoe lining.	Waists.	Coverlets.	Skirts.	Value of all products not here before named.
Dozens.	Dozens.	Dozens.	Dozens.	Dozens.	Dozens.	Dozens.	Dozens.	Pounds.	Pounds.	Dozens.	Yards.	Dozens.	Number.	Doz.	\$
47,178	20,745	105,321	58,522	72,050	12,389	49,545	19,383	25,000	195,000	925	453,350	2,800	1,550	62	\$1,546,713
								25,000	45,000						90,000
															52,700
															3,400
20		1	9												
1,628	525	20,875	1,680	7,235		14,042	2,000			550	453,350				206,500
75	500	45	20							50					4,600
															10,000
5,150		1,000	51,225							25					60,500
2,750		85,705			149		718					2,800			1,175
					600										2,800
37,557	10,400	46,785	5,588	64,815	10,340	85,208	17,125		150,000				1,500	62	1,168,418
					1,200		25								
		50													629

INDEX TO WOOL MANUFACTURE.

	Page.		Page.
Alpaca	11, 12	Felt, saddle	14, 15
Balmorals	10	Felt skirtings	14
Beavers	9, 14	Felt, trimming and lining	14
Binding	11	Flannels	9
Blanketing	9	Gaiters	18
Blankets	9	Gloves	18
Blankets, horse	9	Hair of other animals	2, 7, 12, 14, 16
Braiding or braids	13	Hats, straw	15
Buffalo hair and noils	2, 6, 14, 15, 16, 18	Hats, wool	15
Bunting	11	Hoods	18
Camel's hair and noils	2, 6, 12, 14, 15, 16, 19	Hose and half-hose, mixed	18
Capital employed in business	2, 4, 12, 14, 15, 16, 18	Hose and half-hose, woolen	18
Cards, sets of, and daily capacity	4, 12, 14, 15, 16, 18	Hosiery, cotton	18
Carpets:		Italian cloth	13
Axminster	16	Jackets, cardigan	19
Brussels	16	Jackets, fancy	19
Cottage	17	Jeans	9
Dutch	17	Kersey	9
Girthen	11	Knit goods, fancy	19
Ingrain, three-ply	11, 16	Knitting-machines	5, 18
Ingrain, two-ply	11, 16	Laborers	5, 13, 14, 15, 17, 19
Rag	11, 17	Lastings	13, 17
Tapestry	16	Leggins	18
Velvet	16	Letter of transmittal	iii
Venetian	16	Lining, dress	11
Wilton	16	Lining, felt	14, 15
Cashmere	10	Lining, knit, boot and shoe	19
Cashmerettes	10	Lining, rubber-shoe	14
Cassimeres	9, 12, 14, 15	Linsey	9
Chemicals and dye-stuffs	8, 13, 14, 15, 17, 19	Looms	4, 12, 16, 18
Clerks	5, 13, 14, 15, 17, 19	Materials	2, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 19
Cloaking, woolen	9	Mechanics	5, 13, 14, 15, 17
Cloaking, worsted	13	Mittens	18
Clothing, horse	9	Mohair and noils	6, 12, 16, 18
Cloths	9, 12, 14, 15	Noils, shorts, etc.	13, 17
Coal	8, 13, 14, 15, 17, 19	Nubias	19
Coatings, worsted	11, 12	Officers	5, 13, 14, 15, 17, 19
Combing-machines, and daily capacity	4, 12, 16, 18	Operatives	5, 13, 14, 15, 17, 19
Cotton, used on cards	2, 7, 12, 14, 15, 18	Overcoatings, woolen	9, 14
Cotton warp	7, 13, 17, 18	Overcoatings, worsted	11
Cottonades	10	Piano-covers	14
Coverlets	9, 19	Picture-cord	12
Doeskins	9, 12, 14, 15	Products	2, 9, 12, 13, 14, 15, 16, 17, 18, 19
Dress goods, woolen	10	Report on carpets, other than rag	2
Dress goods, worsted	11, 12	Report on hosiery and knit goods	2
Druggets	17	Report on wool manufacture	1, 2
Elastic frills	13	Report on woolen goods	1
Employés	2, 5, 13, 14, 15, 17, 19	Report on worsted goods	1
Establishments, number of	2, 4, 12, 14, 15, 16, 18	Reps	11, 13
Felt cloth	14	Robes, carriage	9
Felted cloth	9	Rolls, woolen	10
Felt for ladies' hats	14	Rubber-shoe linings	14
Felting, hair	14	Rugs	17

	Page.		Page.
Sacques	19	Tweeds	10
Salaries	2, 5, 13, 14, 15, 17, 19	Ulsters	19
Satinets	10	Upholstery goods	12
Scarfs	19	Wages	2, 5, 13, 14, 15, 17, 19
Serges	12, 17	Waists, knit	19
Sewing-machines	5, 13, 15, 17, 18	Watchmen	5, 13, 14, 15, 17
Shawls, knit	19	Waterproof and repellants	10
Shawls, woolen	10	Wood	8, 13, 14, 15, 17, 19
Shawls, worsted	11, 13	Wool	2, 6, 12, 14, 15, 16, 19
Shirts and drawers	18	Wristers	19
Shoddy	2, 7, 12, 14, 15, 17, 18	Yarn manufactured:	
Shorts, noils, etc	13, 17	Cotton	19
Skirtings, felt	14, 15	Mixed woolen and worsted	19
Skirts	19	Woolen	10, 12, 17, 19
Spindles	5, 13, 17, 18	Worsted	11, 13, 17
Suitings, woolen	9, 12	Yarn used:	
Suitings, worsted	11, 13	Cotton	19
Summary of the more important results of wool manufac- ture	2	Merino	18
Table-covers	14	Shoddy	13, 17
Tapestry	13	Silk	13
Terry	12	Woolen	7, 13, 17, 19
		Worsted	7, 13, 17, 19