



## COTTON AND WOOLLEN MACHINERY.

PROGRESS IN MODERN METHODS OF MANUFACTURE. — MODERN AND ANCIENT MATERIALS FOR PERSONAL CLEANLINESS. — THE INTRODUCTION OF MACHINERY TO WEAVING. — TRADITIONS OF THE DIVINE ORIGIN OF THE SPINNING-WHEEL. — EARLY USE OF THE DISTAFF IN THIS COUNTRY. — PUBLIC SPINNING-SCHOOLS. — ENGLAND'S JEALOUSY OF HER LOOMS. — SAMUEL SLATER. — ALFRED JENKS. — THE FIRST MILL IN PENNSYLVANIA. — BARTON H. JENKS. — HIS CAREER AS AN INVENTOR. — THE BRIDESBURG MANUFACTURING COMPANY. — COMPLETENESS OF THEIR APPLIANCES AND THE REPUTATION OF THEIR PRODUCTIONS.

THE methods of transportation in the modern world, which have replaced the galley with its oarsmen by the steamship driven by its powerful engines, or the train of pack-mules with the steam locomotive and its long lines of cars, are not more striking than the change introduced into the production of cloth, by which the old hand process of spinning and weaving has been replaced by those of machinery. Elsewhere in this volume allusion has been made to the moral effects produced by the increased production of material for clothing in modern times. Though there is no question that among the favored rich in antiquity, and even in the middle ages, stuffs of great richness and splendor were frequently used, yet among the mass of the people habits of personal cleanliness, which are so dependent upon a frequent change of clothing, were not possible.

With the tedious and slow process of hand spinning and weaving, and also with the want of an abundant supply of a cheap material like cotton, the people of those times had not the materials at hand for providing themselves with the clothing which the introduction of machinery has made accessible to all. The dress of the people was, therefore, mostly of woollen materials, which were worn much longer than we should now consider to be in accordance with the rules of hygiene. For women, particularly, the in-

roduction of cotton, and the improvements in machinery, have afforded a cheap and healthful material for their under-clothing, which has been made largely available. It may seem to many an innovation to insist upon the importance of the material conditions for the moral advance of the world, and it is only within quite modern times that the necessity of these has become even partially understood. Yet this method of investigating the facts of social progress is daily gaining ground with scientific students.

The introduction of machinery to weaving and spinning was made in England. The earliest method of spinning by hand was with the spindle and distaff. With very slight, if any modifications or improvements in these implements, this method continued in use for centuries. The looms, also, for weaving, were of a very primitive and rough description. Even with these appliances, however, very fine fabrics were produced, but at a cost of time and labor which placed them entirely beyond the reach of any but the very rich. The simple looms upon which the camel's-hair shawls are woven are, perhaps, the best representatives remaining now in use of the looms which were used by our ancestors. So great an innovation upon the spindle and distaff was the spinning-wheel regarded, that in early Anglo-Saxon and Irish traditions it was considered to have had a divine origin.

The simplest form of the spinning-wheel is supposed to have been brought from India, where it had long been in use, and in Germany, in the fifteenth century, it was improved by having the treadle applied to it. Dr. Taylor, in his "*Hand-Book of the Silk, Cotton, and Woollen Manufacture*," has given a version of the Irish legend of the divine gift of the spinning-wheel, as he took it from the lips of an Irish peasant woman.

In the eighteenth century, about 1767, Hargreaves invented the spinning-jenny, though, in a poem entitled the "*Fleece*," printed in this same year, the distaff and spindle are spoken of as being still in quite general use in Norwich and the county of Suffolk, from which portion of England many of the first settlers of this country came.

The following lines, in which the allusion occurs, may prove of interest :—

" And many still adhere  
To the ancient distaff, at the bosom fixed,  
Casting the whirling spindle as they walk ;  
At home, or in the sheep-fold, or the mart,  
Alike the work proceeds. This method still

Noricum favors and the Icenian towns ;  
It yields their airy stuffs an apter thread."

With Hargreaves's invention a new era opened for this branch of industry, and Arkwright, Crompton, and others, with their inventions, abolished the era of hand-labor, and laid the foundations for the methods now used for cloth making. There is no question that in the early days of the settlement of this country, the distaff and spindle were used, but they were soon superseded by the spinning-wheel. With the narrow-sighted policy which characterized her treatment of her colonies, England attempted to suppress, by legislation and in other various ways, the increasing manufactures of the seaboard states ; but despite the restrictions she placed upon the export of cloths made in America, the home demand was, yearly, more and more nearly supplied by the domestic production. In the early part of the eighteenth century there was an enthusiastic public sentiment in favor of fostering the colonial manufactures ; and a public meeting was held in Boston, presided over by Judge Sewall, in which a committee was appointed to report upon the propriety of "establishing a spinning-school or schools for the instruction of the children of the town." The movement resulted in the erection of a large brick building upon what is now Tremont Street, emblematically decorated with a figure, upon its façade, of a woman spinning. At its opening an immense crowd gathered, and the women of Boston, the rich as well as the poor, appeared in public on the Common, carrying their wheels, and displayed their dexterity in using them by public trials of skill. In 1737, by an act of the Assembly, a tax was laid upon private carriages and other luxuries, the proceeds of which were to be devoted to supporting this spinning-school. The movement spread throughout the colonies, and various efforts were made to foster the same industry by other local governments.

During the war for independence the population was dependent for its supplies of cloth of all kinds upon their own exertions, and after the revolution, motives of economy led to fostering this among other branches of domestic industry.

On account of the jealous strictness with which England guarded against the exportation of any of her improved machines for spinning and weaving, as well as the emigration of those skilled in their use, or capable of building them, there was great difficulty in getting them into America. It is said that models of Arkwright's

machines, which were made small enough to be concealed in a trunk, were seized at the custom-house, and confiscated. Despite these precautions, however, to prevent the spread of the use of machinery in other countries, the business was inaugurated in the United States, in 1787, by the establishment of a cotton factory in Beverly, Mass. Some of the handkerchiefs made here were still in existence a few years ago, and were of remarkably fine and solid texture.

In 1789, Samuel Slater, who, though still a young man, had served a regular apprenticeship to the business, and made himself thoroughly acquainted with the construction of the looms and spinning machinery then in use, came to the United States, and succeeded in building at Pawtucket, R. I., the machinery for a mill, which began operations on the 20th of December, 1790. This was the first use in this country of the Arkwright machines. In 1810, Alfred Jenks, who, as a pupil of Slater's, and afterwards as an assistant with him, had become thoroughly acquainted with the construction of cotton machinery, supplied the machinery for a mill near Philadelphia. Mr. Jenks had established a factory of cotton machinery at Holmesburg, which he afterwards removed to Bridesburg. He also supplied the machinery for other mills. His business having increased, Mr. Jenks removed his factory to Bridesburg, in 1820, in order to enjoy the greater advantages of this place for the shipment of his products, it lying upon the banks of the Delaware River, a few miles from Philadelphia.

When the demand for woollen machinery began, Mr. Jenks engaged also in its production, and furnished the machinery for the first woollen mill established in Pennsylvania, by Bethel Moore, at Conshohochen. In 1830 he invented a power loom for weaving checks, and by the various improvements he made in the machinery for spinning and weaving, established a reputation and laid the foundation for an extensive business.

For some years before his death the business was carried on under the direction of his son, Mr. Barton H. Jenks, who had been carefully educated, under his father's direction, as a machinist, and who had also displayed, from his earliest youth, great talents in this direction. During the course of his career, Mr. Barton H. Jenks has in his turn improved almost every portion of the machinery used in cotton and woollen machinery. From the process of ginning the raw cotton, in carding it, spinning and weaving it, each separate manipulation it undergoes has been

facilitated and improved by the machinery invented and patented by Mr. Jenks.

A few years ago the establishment at Bridesburg was incorporated by a special act of the legislature, and made a joint stock concern, with a capital of one million of dollars. Under the direction of Mr. Barton H. Jenks, who has remained the president of the company since its incorporation, the Bridesburg Manufacturing Company has maintained its reputation for the excellence of the machinery it produces, and is to-day as well organized and thoroughly equipped a manufacturing establishment as there is in the world. Not only has Mr. Jenks's inventive talent been applied to improving the machines which the works produce, and which are acknowledged to be the best of their kind known, both for their excellence of workmanship and the quality and quantity of the work they do, but he has also invented various machines by which the manufacture of the various parts of the cotton and woollen machines themselves is facilitated, and by which their requisite accuracy is assured beyond the hope of competition.

Under the direction of Mr. Jenks, who has displayed as much talent for organization as he has for invention, the Bridesburg Manufacturing Company has become one of the most important industrial enterprises in the country. It employs an average of over five hundred workmen, and the spirit with which it is directed is sufficiently shown by the fact, that many of them now in the employ of the company have remained in their present situations for periods of twenty and thirty years.

In the space of such an article as this it would be manifestly impossible to detail with minuteness the various appliances and improvements which have given the productions of the Bridesburg Manufacturing Company their deserved reputation, since there is not a process which cotton or woollen undergoes, in the course of its transformation from the raw state to cloth, which has not been the subject of careful study and ingenious improvement in the hands of Mr. Jenks. One of the most important improvements, among the various inventions made by Mr. Jenks, is the series of simple appliances by which he has perfected the step, the bolster, the bobbin, and the spindle. The trouble with the spindles formerly in use was, that the bobbin was apt to be forced down upon it, and, when in motion, would consequently work and become loosened, often flying off, and in all cases injuring the evenness and tightness of the thread, while, from the working of

the joints, the accuracy of the position of the bobbin was destroyed. These objections were obviated by making the set screw, which held the spindle to the step, work in a groove, rotating about it, so that when worn the relative position of the spindle would not be changed. The bobbin, too, is made of a hollow cylinder of wood, in which are collars above and below, arranged with slots; which hold the bobbin firmly to the spindle, while giving it just enough play to so arrange itself, when in motion, as to revolve upon its centre of gravity. However great, therefore, may be the speed of its revolution, like a boy's top when "it sleeps," as the boys say, it balances itself, and rotates without any oscillation. By these, and other simple modifications, which have been patented, but which could hardly be explained here without a more fully illustrated description than our space affords, the results attained in the spinning-frames made by the Bridesburg Company render them superior to any and all others. In the old spinning-frame, the greatest speed of revolution which can be reached is seven thousand in a minute, while these average ten thousand revolutions a minute. By the greater lightness, also, of the spindles, as thus constructed, weighing as they do less than one quarter as much as the ordinary spindle, and by the accuracy with which they are fitted, they can be run at almost double the speed, with about half the power needed for the spindles previously in use. Though at first this result may not appear so important, yet a little consideration will show that it is a matter of national importance. It amounts, practically, to providing the conditions for the production of the enormous supply of textile fabrics needed for the consumption of this country with one half the number of spindles of the old kind; and not only this, but with half the power; thus saving the necessity for the mining or transportation of the enormous quantity of coal which is now consumed to create the power for the countless mills engaged in making cloths of all kinds.

If he who has made two blades of grass to grow where formerly there was but one, deserves the gratitude of his fellow-men, what measure of the same should be accorded to him who has thus quadrupled the productive spinning capacity of the country, and thus provided the material conditions for quadrupling the consumption? Yet this is the result which the country really owes to Barton H. Jenks.