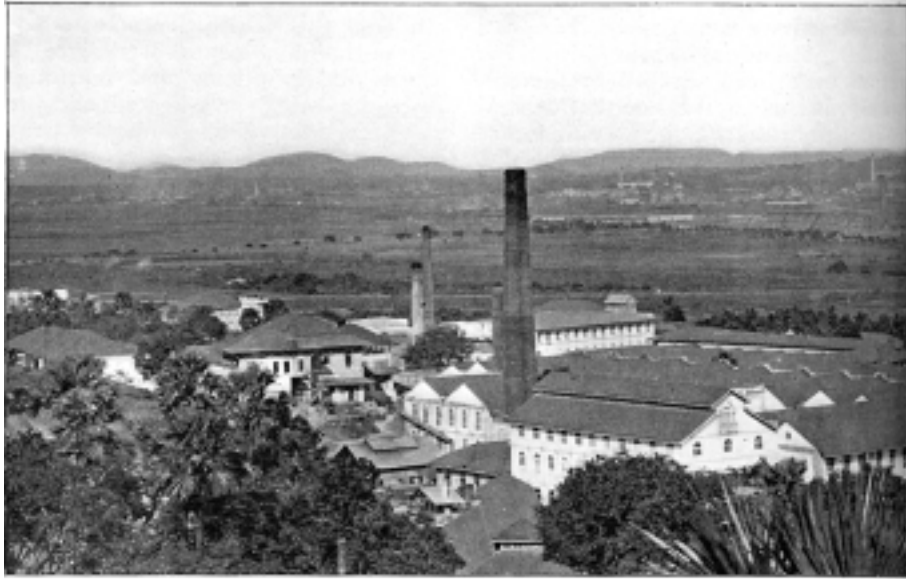


## THE COTTON INDUSTRY IN INDIA.

*By John Wallace.*



SOME OF THE BOMBAY MILLS.

THE story of the manufacture of cotton in India belongs to two totally distinct periods, which, although they overlap, demand separate consideration. The first period has its beginning in those remote mythological ages when gods and men walked the earth together, and while we have no direct evidence to show that cotton was the first fibre used in Asia for the preparation of clothing, there is a strong probability that, on account of the ease with which it could be collected and prepared for manufacture, it was the first material to be spun and woven into cloth within the *habitat* of the cotton plant.

Mr. H. Lee, F. L. S., has given to the world a very careful study of the history of the cotton plant in "The Vegetable Lamb of Tartary," a book

which contains a most interesting collection of fact and tradition that has in the course of ages grown around it. The earliest tradition is that of a tree in Scythia or Tartary, upon which grew seed pods, which, when they ripened and burst open, were seen to contain little lambs of whose soft white fleeces Eastern people wove material for their clothing. According to another version, a lamb of flesh and blood grew on the end of a stem, which was long enough to allow the animal to feed on the pasture around it.

Sir John Mandeville, according to Mr. Lee, was the first traveller to bring this story to England on his return from Eastern travel about the middle of the fourteenth century. Sir John claims not only to have seen, but also to have eaten of this lamb,—a story that was

quite in keeping with the taste and credulity of the time. He adds, in more credible vein:—"From that land men go towards the land of Bucharía, where are very evil and cruel people. In that land are trees that bear wool as though it were of sheep, whereby men make clothes and all things that are made of wool."

Cotton is mentioned by Nearchus, the admiral who brought the forces of Alexander the Great down the Indus, and who noted that "there were in India trees, bearing, as it were, flocks, or bunches of wool, and that the natives made of this wool garments of surpassing whiteness, or else their black complexions made the material whiter than any other."

Throughout the first period, and until quite recently, cotton was manufactured entirely by hand, and even at the present day hand spinning still exists in many parts of India, while hand-loom weaving, instead of dying out, has received, of late, a considerable impetus from the recent duties imposed in India on steam-woven cloths. It is worthy of note that modern machinery, while it has greatly cheapened the production of many kinds of yarn and cloth, has not exceeded in beauty and fineness the ancient products of Indian hand labour. Mr. T. N. Mukharji, in his "Art Manufactures of India," tells that two hundred years ago a piece of Dacca muslin, fifteen yards long by one yard wide, could be manufactured so fine as to weigh only 900 grains, or a little over two ounces. Its price was £40. He adds:—"The thread used for the best kind of muslins can, no doubt, be still spun by the women of Dhámráti, a village twenty miles north of Dacca, if they are sufficiently paid for their labour. Fifty rupees per ounce is not a heavy charge for such yarn. A piece of cloth, ten yards long by one yard wide, cannot be woven in less than five months, and the work can be carried on only during the rains, when the moisture in the air prevents the threads from breaking."

The chief difference by which the several qualities of Dacca muslin are dis-

tinguished consists in the number of threads in the warp; the finest qualities have 1800, the second, 1400, the threads being finer in proportion to their greater number. These fine qualities are distinguished by names such as *Sharbati* or "Sweet like Sherbet," *Shabnam* or "Evening Dew," *Abrawán* or "Running Water."

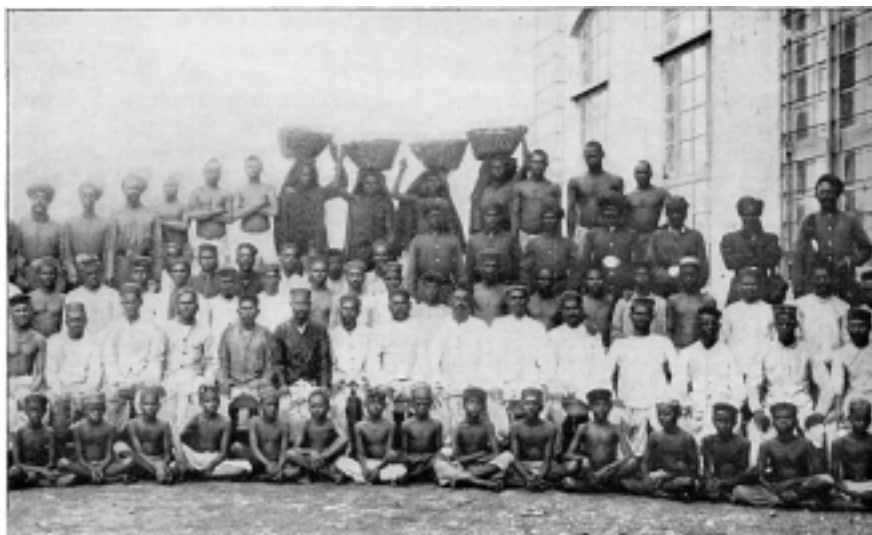
While fine spinning by hand is gradually going out of vogue, hand-loom weaving with machine-made yarn still holds its own in many specialties which cannot be produced in the rapid working power-loom. This is particularly the case with goods having special fancy borders or ornamental ends into which gold, silk, and coloured threads are introduced. Certain goods are woven in



INDIAN MILL OPERATIVES.

power-looms, with gaps of bare warp at fixed intervals, which are afterwards filled in by the hand-loom weaver with the required finish, as, for instance, on the end of the *Junggree*, which, when wound around the head, becomes a turban.

The native hand-loom weaver requires a certain amount of open space in which to prepare and size his warps. This



BOMBAY COTTON MILL HANDS.

space in cities increases his rent, and, in such a city as Bombay, helps to reduce his very scanty earnings. Better times seem now to be in store for him through an invention which prepares his warps at the spinning mill, and enables him to buy them ready-sized and prepared for his loom at a less cost than if he prepared them himself. The first machinery for this object has already been ordered for a mill in the Bombany Presidency, and it is expected to increase profits on yarn spinning in mills that do not weave.

Closely allied with the hand spinner, the Indian cotton gin, known as the *churka*, is of unknown antiquity and of the rudest construction. It consists of a pair of rollers, of wood or iron, about fifteen inches long and from half an inch to two inches in diameter. At times they are geared together at one end; at other times each roller is driven separately from opposite ends as in the illustration on page 221. The rollers are one above the other and, in the words of an operative, the rollers "eat the cotton and spit out the seeds" which their small diameter prevents them from seizing. No other machine separates the cotton with so little damage; but it is the slowest of all gins. Twelve or four-

teen pounds of cotton per day are considered good work.

Until the American Civil War in the sixties, cotton was packed in wooden screw presses to a density of 20 pounds per cubic foot and tied up with ropes. The screws were cut with a hammer and chisel out of the hardest available wood, and the nut was made in halves, of wood, and clamped together. Iron screws were next substituted, and numerous improvements followed one another in quick succession until to-day the Indian cotton bale, weighing 400 pounds, with a density about equal to that of water, is a model to the whole world. The hoops are continuous, and are not weakened anywhere by rivet holes. In damp weather a press, using water at a pressure of one ton per square inch, can turn out 32 bales per hour; but in dry weather, when the cotton is harsh and springy, only 28 bales per hour can be made, with water at one and three-quarter tons per inch in the rams. Air moistening has not yet been introduced into press houses in India.

The introduction of steam and textile machinery into India was not a gradual process as in Western Europe, where it followed the successive improvements

of the pioneers of the present industry. On the contrary, the modern cotton mill came fully developed, was built from English models, and fitted, down to its smallest details, with English machinery and stores; and as there was no industrial population ready to "mind" the machinery, agricultural labourers were drawn from the fields to the mill by the inducement of good pay. This source has continued, until the present day, to furnish the bulk of Indian mill operatives. The conversion of a field hand into a mill hand is facilitated in India by the fact that the coarser qualities of yarn are spun at nearly all the mills. They average 20s., which are equal to 16,800 yards to the pound of cotton. The finest yarn spun in any Indian mill is 80s., or 67,200 yards per pound, and is made from Egyptian cotton, imported for the purpose.

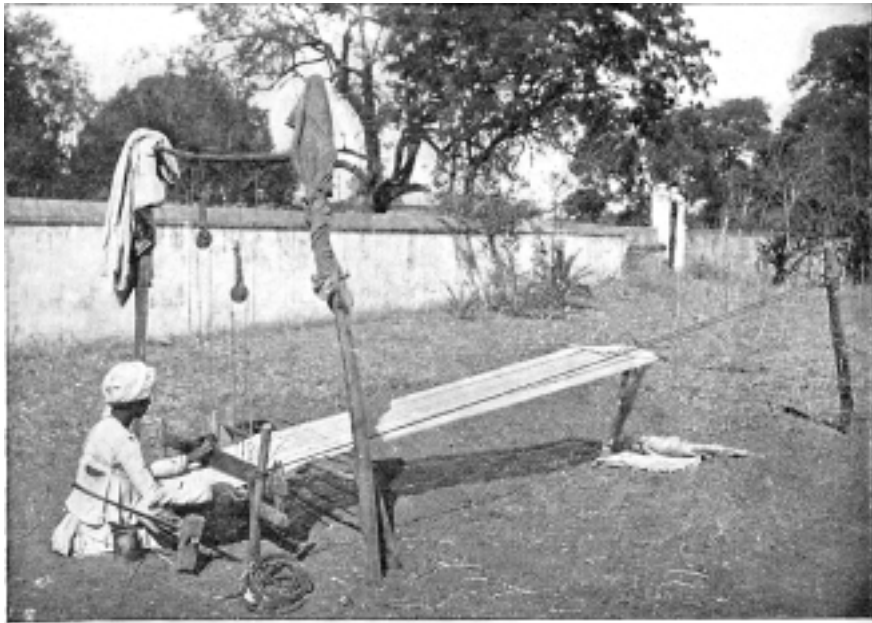
The cultivation of cotton in India resembles that of no other country, and is an outcome of the organisation and traditions of the people. One would expect that a total crop of 2,200,000 bales, averaging 400 pounds in weight,

would engage the attention of men of education and capital, as in America and Egypt. In India, however, cotton is produced by the poorest and least educated classes, who work on so small a scale as to permit the use of only the most primitive appliances. They give the minimum of manure, of water, and of labour to their crops.—everything deteriorates in their hands, and their chief merit seems to be that they can live in circumstances where other men would die. Their lives are frugal and laborious, but their "customs" demand extravagant festivals at marriages and funerals. They marry too young, with the most reckless disregard for means of subsistence, and their constant tendency is to overpopulate the land. Add to this a disposition to get into debt with its contingent expropriation, and the picture is complete.

It will be no matter for surprise, if, under these circumstances, the quality of Indian cotton should continue to deteriorate. The long staple varieties for which Guyerat was famous forty years ago are no longer to be had, and al-



PREPARING WARPS FOR THE HAND LOOM WEAVERS.



AN INDIAN HAND LOOM.

though the government has experimented for years at its model farms with a view to improving the mode of culture, no impression has been made on the native methods. This matter has for some years been the subject of appeal and warning from the *Indian Textile Journal* to the merchant and millowner, and recently Mr. I. M. Tata, a wealthy Parsee millowner, took the matter seriously in hand, and after visiting Egypt to study the method of cotton cultivation, he established experimental farms where long staple cotton is grown and irrigated in the manner that has proved so successful in Egypt. Should this venture prove successful, the culture of long staple cotton may, perhaps, attract the capital and intelligence which has made its success elsewhere, and may thus inaugurate a reform in agriculture that is most urgently needed in India.

According to official statements, the first cotton mill was started at Broach in 1851. Three years later the pioneer factory at Bombay was got to work by a Parsee, Mr. Cowasjee Nanabhoy Davar, with machinery from Messrs. Platt Bros.,

of Oldham, England. The mill had 20,000 mule spindles and proved a complete success under the title of the Bombay Spinning and Weaving Company. The building and its contents were, however, destroyed by fire in 1887.

There are now 148 cotton mills in India, with a total of 4,043,266 spindles and 37,021 looms, exclusive of handlooms, which have been estimated at 7,000,000. Bombay Island alone contains 67 mills, with 2,170,819 spindles, and 21,241 looms and employing 79,415 operatives.

The typical Indian mill is a plain three-story building for spinning, and a saw-roofed shed for weaving. In the interior of the country, where land is cheap, the whole building is a saw-roofed shed with a north light. This building, although cheap, has the disadvantage of being more affected by the changes of the weather than the storied mill. The fluctuations of temperature and of humidity are greater, rendering the cotton, at times, harsh and refractory in the dry season. This matter increases in importance as the spinning becomes finer, and it is complicated by

the necessities of ventilation, which tend to dessicate the cotton under treatment. When the relative humidity falls to 13 per cent., as it does at times in the interior, the development of electricity is so great in the machinery and belting as to render spinning almost impossible.

The great range of atmospheric humidity offers one of the chief difficulties of cotton manufacture in India. It varies from 13 to 98 per cent. Excessive moisture is met by warming the machines beyond the temperature of dew-point, and this often renders the mill too hot for the efficient working of the operatives. Several commissions have been held, and reports have been issued on the subject of mill ventilation,

ties. Their real talent is given to buying and selling.

An Indian cotton mill has rarely any architectural points of beauty. It is the cheapest building that will hold the machinery, and is more frequently than not a copy of some other mill, without inquiry into the defects of the model. This saves the charges of an architect,—a clear gain to the Indian owner. The mill operatives are Hindus or Mahomedans, the former predominating. These men, belonging mostly to the agricultural class, retain their interest in the land, and once in one or two years they leave the mill, for some months at a time, to return to the fields to which they devote their savings. Field labour is worth 2 annas a day,—



A NATIVE COTTON GIN.

but as no properly qualified men were engaged on the work no good has resulted.

The owners of mills in India are men whose education has been purely commercial. With rare exceptions they have no scientific knowledge, and good profits are so easily made that they eschew experiments and avoid novel-

roughly twopence,—while the mill pay amounts to 6 or 8 annas. But these men rarely remain at the mill after the age of forty. They return to die at their villages among their own people. This is one of the reasons why it is difficult to find hands for fine spinning. That is the vocation of a whole lifetime.



PRINTING CALICO BY HAND.

Women and men work apart in the mill, the former being employed on reeling, with a forewoman in charge. They are very independent and prompt to take offense, and if their physical appearance and dress on a holiday may be taken as an index of their condition, they cannot be said to suffer from the effects of poverty or overwork. A short-sleeved jacket is their only sewn garment, and they are completely clothed in a *sari*, which they wind about them with great skill, and wear with a grace that is natural to them.

The children, up to the age of five or six, go completely naked, and the furniture of a house consists of a box or two to hold clothes and valuables, a rough bed frame, covered with yarn netting, and a few cooking pots of metal or earthenware. They eat no meat and feed with their fingers as the Apostles did, sitting on the ground.

A forewoman earns from Rs. 20 to 30 per month; a girl, Rs. 6 to 7; and a woman, about Rs. 8 per month. Among the men, the "minder" of a roving frame will earn from Rs. 12 to 15, the boys, from Rs. 6 to 7, and the weavers, from Rs. 13 to 16. An adult can live well on Rs. 5 for food, and his rent for a single room will not exceed Rs. 3 per month; but it frequently happens that as many as eight men will join in the tenancy of a room ten feet square, in which case their individual contribution for rent will be 6 annas per month. They buy their food cooked, they need no fire, and clothes are not needed for warmth, but rather for decoration.

The cheapness of Indian labour is counterbalanced by the extra number of hands required for a given production. About three times the number are needed in Bombay to do the work as compared with England. A love of

noisy amusement, a lack of concentration, and of ambition, and a partiality for holidays, with or without leave, are the faults of the Indian workman, who, as he may loaf and beg for months at a time, if the fancy comes on him, is a very difficult man to manage. Had he the industry and address of the Chinaman or the Japanese, it is possible that a large proportion of the Egyptian cotton crop would be spun in India with the aid of Indian coal.

In the early years of the cotton industry coarse yarns and grey cloths were the only products of the mills. Dyeing was then added, and fancy weaving followed soon after, along with hosiery, and, to a limited extent, small wares. Calico printing has been tried with indifferent success, but hand printing, with blocks, is an old industry that has been practised for ages all over India.

Fancy weaving in cotton, dyeing, and finishing (including glazing and the raising of naps) are all followed successfully in India, and aniline dyes, under the instruction of German experts, are rapidly superseding the traditional purple pigments. On account of the high price of coal in Bombay, most of

it coming from England, the prime movers and boilers of the mills are kept in a very high state of efficiency. Compound engines are going out before the advance of triple, and even quadruple, expansion. High steam pressures are now the rule, and such is the completeness of the system of boiler inspection that explosions are practically unknown.

The future of the cotton industry in India is closely associated with a general improvement in the cultivation of the plant, until fine spinning can be maintained upon local staple. It seems also to involve a separation of the operative from agricultural pursuits which interfere seriously with his manual efficiency in the mill. This separation has actually begun in Bombay, Ahmedabad, and Broach, where some of the children of peasant operatives have ceased to have any interest in, or knowledge of, agriculture.

A third essential is the complete control of the mill atmosphere as regards humidity, temperature, and purity, so that they shall approximate in regularity to the other conditions of work, which have already been brought to a very high degree of uniformity.