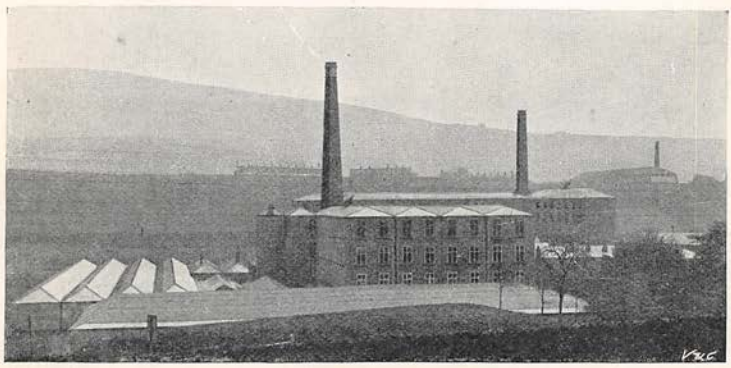
LIFE IN A LANCASHIRE COTTON MILL

By J. FOSTER FRASER

THE clatter of innumerable clogs is the distinguishing feature of Lancashire manufacturing towns. Most people who work in the mills wear clogs. The morning will hardly have got aired when you are awakened out of your second sleep by a noise like the rattle of musketry under your bedroom window. Men and women are going to their labours. The clogs are wooden soled, iron bound, and brass tipped. The brass nails run round the edge of the boot with the regularity of buttons up the breast of a page boy.

You may travel from Manchester to Rossendale through a country that is black and scarred, with scant grass and few trees; you may remark that the women nearly all wear tartan shawls thrown over their heads; it is possible that the men may remind you they are hard and clear-headed, and that for intelligence the Lancashire working man rivals a Cabinet minister: but when you endeavour to recollect what impressed you the most during a visit to Lancashire, those clogs will force themselves upon your memory with a persistence that is remarkable. When I came back to London, all other things I had seen and heard grew dim and hazy, and for days after I could hear nothing but the clatter-clatter of the clogs. It is possible, however, that with time and patience one may become used to the noise, just as some of us manage to live and think amid the rattle and the bustle of London life.



A COTTON MILL NEAR STALYBRIDGE.

Work in the cotton mills cannot be healthy, for I was particularly struck with the wan appearance of the people. The men looked asthmatical and the women were dwarfed. As soon as a child is able to read, write, and spell well enough to become a half-timer it spends the other half of its life in the mills.

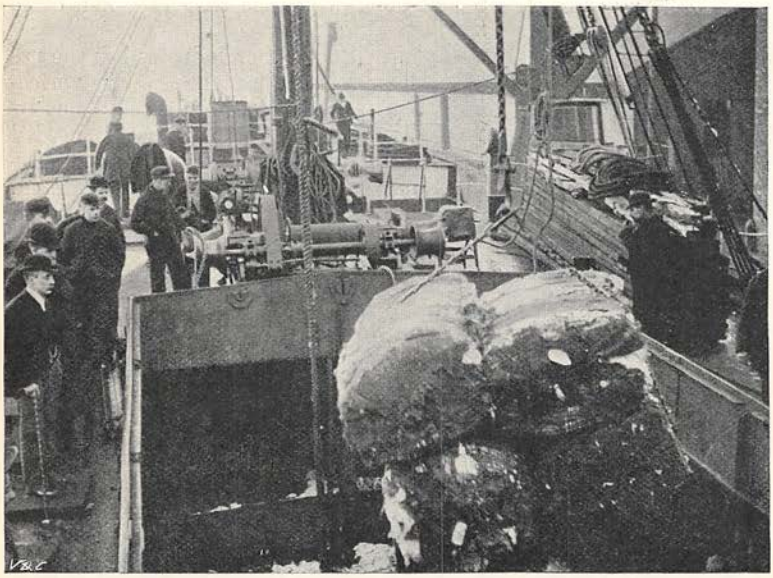
Perhaps in no other industry has the use of machinery been brought to such perfection. Everything seems to be done by machinery, so that all that is often needed is a boy and a girl to look on and superintend. Women labour is largely utilised. The men are engaged in other pursuits, such as cotton machine building. One of the most remarkable sights I have seen was the sudden flood of humanity I encountered one day at noon in Bolton, when the men rushed forth from one of these works to their dinner—impetuous, all eagerness, glad at the opportunity of putting down their tools for an hour.

From an adjoining mill came a stream of towsy-headed girls with their faces half hidden behind shawls, and carrying baskets which had contained their breakfasts. On Sundays these workgirls, however, burst forth into veritable butterflies. No more shawls or clogs for them! They must have hats of the latest fashion, gowns that are expensive and elaborate, and shoes as small as it is possible to wear. The wages earned are fairly good, and, working hard all the week through, they can well be pardoned

their display of finery at chapel on the Sunday.

Most of the mills in Lancashire are handsome, well-lighted structures, and it was my good fortune to see over several of them while in full swing. To these places is brought the raw cotton from Egypt and the Western world, much of it to find its way back in course of time in the form of the manufactured article. The best cotton is grown on the low-lying islands off the coast of Georgia, where the nip of frost is hardly ever felt. Every week thousands of tons are brought over to this country, though it does not all travel by way of the Manchester Ship Canal, as the Manchester people would like. But long before America was thought of, and probably when our ancestors were pigment-covered savages, the people of India grew cotton, and spun and weaved and dyed it. Then it was all done by hand, and one marvels how the Western European has not only caught up with the Asiatic, but has far excelled him. Of course, we all know about the spindles and the distaffs, which now only adorn entrance halls or antiquarian museums. There is something poetical about them which one cannot apply to the whirling, noisy, present-day machinery. It is my province to deal with the making of cotton as it now is in the Lancashire cotton mills; otherwise I think I could tell an interesting tale of the evolution of cotton machines. But these are eminently practical days, and a visit to some cotton mills provided excellent proof of how practical we really are—to stand amid a thousand looms, to hear the rush of thousands of shuttles, watching the working of a machine which goes about its duty and performs it with almost more than human ingenuity—this is an experience full of impressiveness and suggestion.

Let us try to imagine the amount of spinning there is. I am not far over the mark in saying there are nearly a hundred million spindles in the world, half of which are in Great Britain. It has been calculated that over sixty millions of money is invested in this country in spinning. These are rough and approximate figures, but they will convey some idea of Lancashire's importance in the industrial world.



UNLOADING COTTON ON THE MANCHESTER SHIP CANAL.

The principal works I visited were at Bolton; there I went over one of the largest cotton mills in the world, where the machinery is all of the latest, where there are 2,700 looms at work and about 2,600 folks employed.

The cotton in its raw state has to be cleaned by a process called "ginning"—that is, getting the seeds away from the fibre. Then the cotton is made up into bales, pressed into small compass by hydraulic presses, and sent over from America to the cotton mills in England. There is no waste in present-day manufacture, and the outcast seed which is not needed for sowing is crushed for its oil, to make into oil-cake for cattle food, or into material for paper manufacture, while the refuse that still remains is, most curious of all, turned into soap.

The bales of raw cotton as they arrive at the mill are as hard as blocks of wood. A special machine called an "opener" has, therefore, to be used. It has many rows of hungry-looking teeth, to which lumps of the compressed cotton are thrown and are speedily torn asunder. At the same time there is a strong blast of air blowing to carry away any

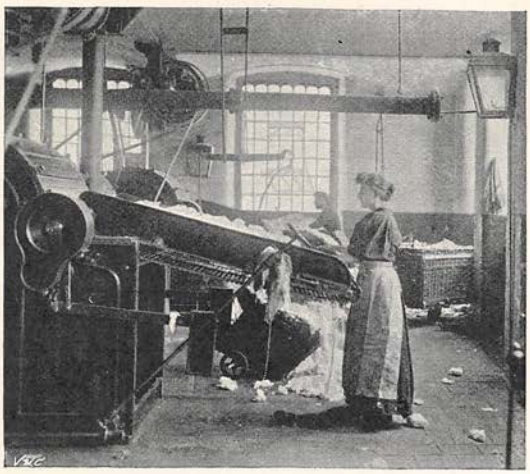
sand or dust. Then the cotton passes between rollers and is beaten until it loses its hardness and becomes soft in fibre.

At the same time the mixing of various kinds of cotton is carried on. This is important, and by judicious mixing yarn is obtained as strong as if only one good quality were used. The mixing is usually done by the attendant feeding the machine, which breaks up the cotton, with lumps of the material from different bales.

THE MIXING ROOM—COTTON UNDERGOING THE FIRST PROCESS.

Away is the cotton carried to the scutching machine, where it is further beaten and more dust got rid of. But the improved method now adopted is to draw the cotton from one machine to another by means of pneumatic suction. While passing through this scutcher the cotton is lapped—that is, it is rolled out several times, and is thus easier to handle than when in a loose condition.

Not yet, however, have the impurities been all removed. There are still broken seeds and leaf, and these have to be cleared away. This is done in a carding engine, which also arranges the fibre in a practically parallel order by combing it with a number of fine wire points. This carding engine has three cylinders, respectively called the main, the doffer, and the licker-in. The office of the licker-in is self-evident. As its teeth touch the cotton fed to it the fibres are loosened. The rapid roll of the cylinders and the sweep of the wire points lay the fibre in parallel form. It is interesting.



THE BLOWING ROOM.

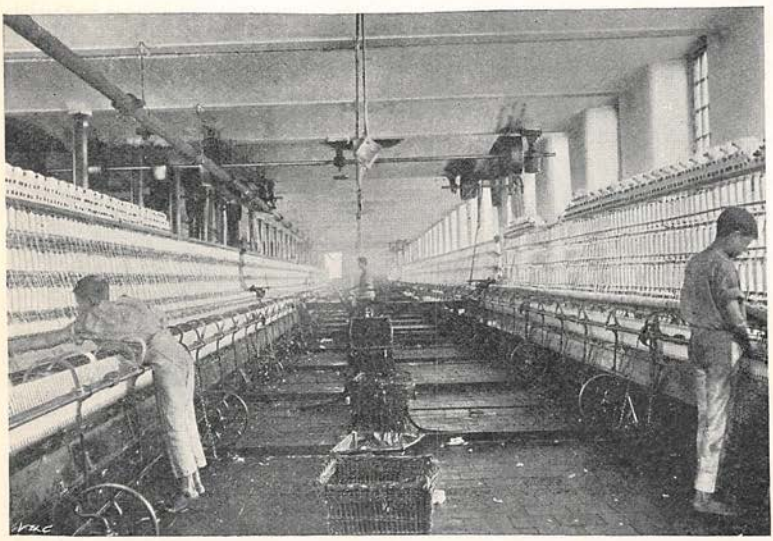
But combing is only carried out when the finer class of yarn such as is used for thread and lace is spun, and then only fibres of a certain length are retained, all the shorter ones being driven away. Here, indeed, is a marvel of mechanism. Without a rest, working with a regularity that no workman ever yet attained, and with no grumbling, this appliance gathers all the good fibres so that a thread of equal strength may be produced. All the fibres having been laid one way, they have to go through a drawing frame to be attenuated. The cotton is drawn over fluted rollers—but very gently, or the fibres would be torn asunder—and the tops of the rollers are covered with leather to give it a grip. Each roller has five or six deliveries, and as the cotton passes through it is subjected to a slight pull to draw it out.

Now it is ready for twisting, and the cotton changes its name to yarn. The twisting is started in the "slubbing" frame. But the twist is not much — only sufficient, indeed, to give it cohesion. The thread is further drawn, but so nicely adjusted is the drawing that it rarely breaks. The end is attached to a bobbin, upon which it is wound in successive layers.

And here is a novel process in connection with this slubbing. As the bobbins fill, the rapidity at which they travel gradually decreases. This is accomplished by a clever device known as "the sun and planet motion." There is a large wheel, with a couple of smaller wheels within it, and while

the smaller wheels turn at a uniform rate, the large wheel, driven by a pair of cones, travels at a decreasing speed. Thus while passing through the slubbing frame the cotton is drawn, it is twisted, and it is wound upon a bobbin.

Yet up to now the cotton is not ready for spinning. It has to be further twisted, and is rolled into hanks of a pound weight each and measuring 840 yards. After this the bobbins pass on to the spinning frame. The thread being drawn through rollers, it is reduced to the proper fineness, and a further twist is given to the yarn by the revolutions of the spindles. Then a piece of machinery called "the mule" takes the yarn in hand. It is the most complicated bit of mechanism I have ever seen; not the least remarkable thing about it is that it does several things at the same time. On it various qualities of yarn can be spun, either soft or hard, and twisted.



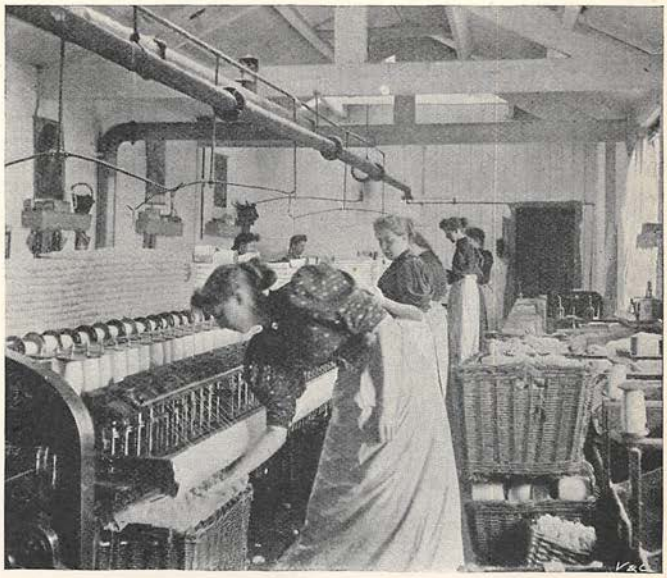
THE SPINNING ROOM.

In the weaving departments, where the material has not to go through a perfect string of evolutions before it reaches completion, I found much more that lent itself to the descriptive pen. Here again it was machinery, machinery everywhere; but machinery by the side of which one could stand and watch the threads being picked up and woven into prettily designed fabrics. And in weaving let me explain that two kinds of yarn are used. There is the warp yarn which is mounted on a loom for weaving, whilst weft yarn is thrown by a shuttle.

It is a pretty sight to see the girls superintending the running of the yarn from what are known as the winding cops on to the bobbins. Close at hand is a warping machine on which a number of bobbins are fixed, the number, of course, depending on the breadth and the closeness of the web. For fine webs thousands of threads are used—sometimes as many as eight thousand—but on the machine which I inspected at work there were 530. The bobbins are all ranged in a frame. It is delicate work, and not done in a few minutes, to bring all the ends together to be evenly rolled on a big roller. With smoothness and ease the machine runs and the girl attendant sits on a stool. Her chief duty is to replace broken threads. Each thread goes through a steel eye, and when the thread breaks the steel drops and the machine is instantly stopped. Thus the appliance, acting automatically, prevents the whole thing getting in a tangle. Hour after hour the threads run from the bobbins on to a beam, and, I was informed by the girl who had to keep her eye on the machine I inspected, there were 10,500 yards of thread on the particular beam before her.

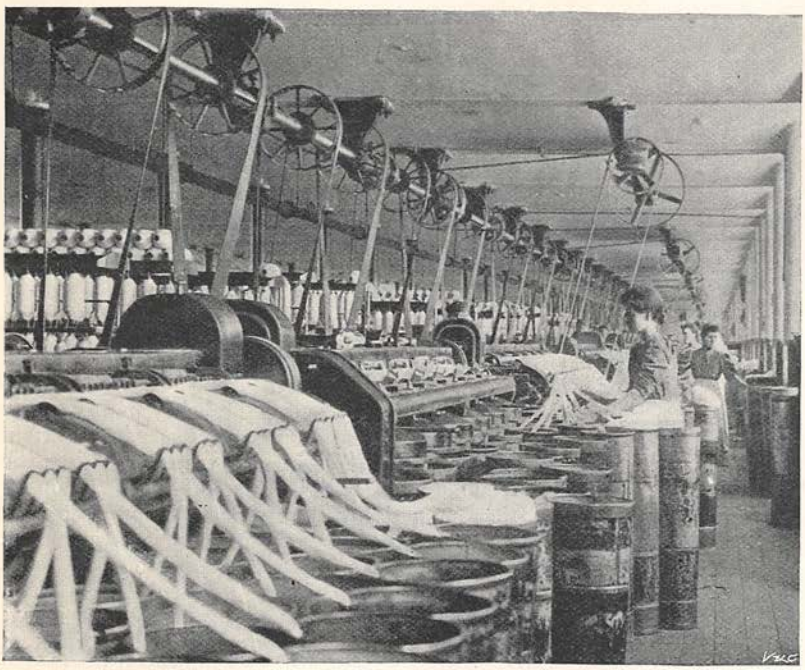
The beam is carried to an adjoining room, where the cotton is subjected to what about Bolton is called "slashing," but in the neighbourhood of Preston is termed "taping"—that is, it is run through a machine which has the effect of smoothing the surface of the threads and glossing them over. There are a couple of big, internally heated rollers. The threads are guided through what I was assured was nothing more than a mixture of sago flour acting as a size. I could well understand the anxiety of my guide for me to make no mistake about it being sago, for it is this sizing which gives a firmness to the texture. If the reader takes a piece of new and cheap cotton out of a shop and rubs it, a cloud of dust will rise. This is when the the sizing is other than sago—when, indeed, as is not

infrequently the case, some thirty or forty per cent. of the size is china clay, which gives the cotton a firmness in the touch of an ordinary purchaser that it really does not possess. The threads are conducted over hot steam cylinders to be dried, and there are numerous little bars to keep the thread well open the more readily to dry. There were 1,960 threads passing over the cylinder while I stood watching, and at every 19½ yards the threads were stamped automatically, this being the third of what is called "a cut"—namely, 58½ yards.



THE WINDING ROOM.

After this the rewound beam is taken into a room where women with some whiting and a twist of the finger and thumb fasten the ends of the thread of one beam on to the ends of the thread that has gone before. Thus the thread is drawn through healds, which is much simpler than having to thread every piece through them. The heald consists of eyes and loops, and leads on to the weaver's reed, very much like a great comb with very close teeth of brass—so close that as many as 120 are within an inch. Through each of these the thread has to be guided, and a boy whom I questioned as he was just finishing a task said he had drawn through 2,750 ends of thread in three hours. The ends are then carried forward to the cloth beam and the yarn is ready for weaving.



FRAME CARDING ROOM.

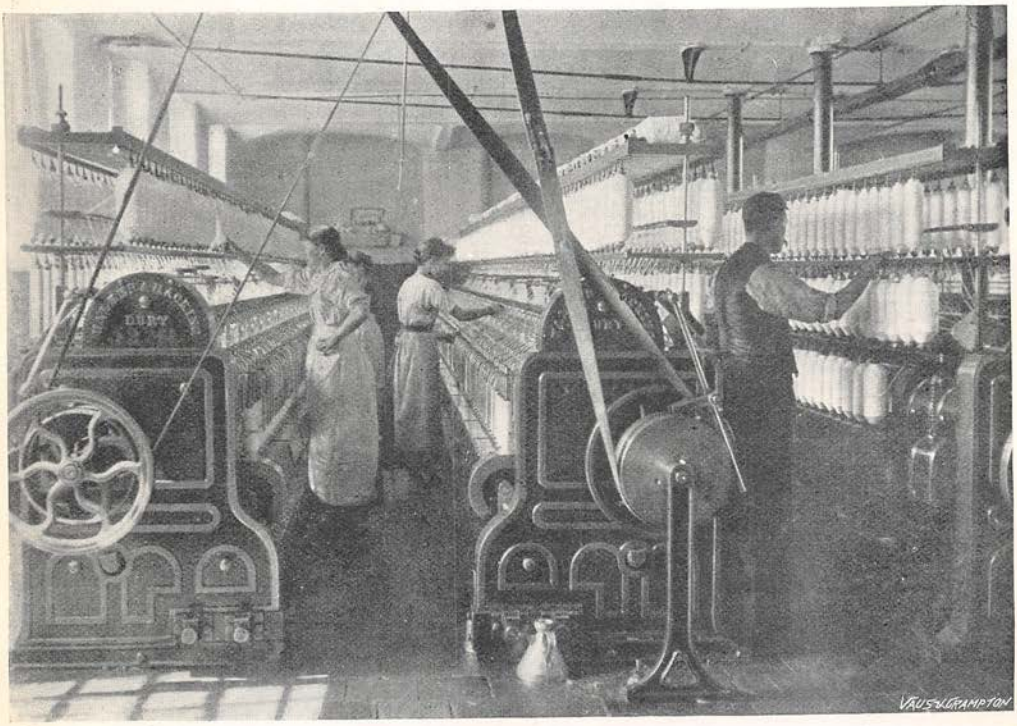
Never shall I forget the whirring noise that struck my ears when I entered a great room in which 1,200 looms were at work. It was an absolute impossibility to carry on any conversation, for even bawling at the top of one's voice into another man's ear was not sufficient to be heard.

Most people know that weaving, reduced to its elementary

state, is guiding horizontal threads in and out between alternate threads that are longitudinal. The way this is done is first of all by shedding, which divides the warp threads so that the shuttle with the weft may fly between them. There are two healds, and the working of these opens the alternate threads and allows the shuttle a free passage as it is thrown first one way and then another, and as quick as lightning. This throwing of the shuttle by machinery is very different from the old-time plan when the throwing was by hand. There is a self-acting appliance which instantly stops the machine when a thread is broken. This is accomplished by a contrivance called the "fork and grid" motion, which depends for its action on the lightly balanced prongs of a fork. These prongs come in contact with the weft every time the shuttle is cast across the apparatus. When the prongs fail to touch the weft, then a series of levers are set at work and the machine is brought to a standstill.

I am not exaggerating when I say I was completely astounded on watching what is known as the Jacquard loom. Its ingenuity is marvellous, for by its agency it is possible to produce complicated patterns as easily as plain cotton.

Let me endeavour to explain, though the complications are so many that it is extremely difficult. A pattern having been decided upon, a number of holes are cut by machinery in pieces of cardboard. For every variation of a thread a new card is needed. Thus it is a very small pattern indeed that only needs 200 or 300 cards to work it, whereas a big pattern will sometimes want as many as 15,000 cards. The perforated cards are all fastened to run over the machine like an endless rope. There are a number of hooks, above the cardboard, working up and down. When the hooks meet no obstruction, and pass through an aperture, they pull at a wire which moves the warp threads in a certain direction. So while the card is rotating, the hooks are working up and down, allowing the longitudinal threads to be intersected by the shuttle or not, just as it is arranged. As every successive card is presented, so a fresh combination is effected, and thus it goes on till the pattern be complete. I have seen a good many appliances and different machines at use in the industrial world, but never have I seen anything surpass in



IN THE FRAME ROOM.

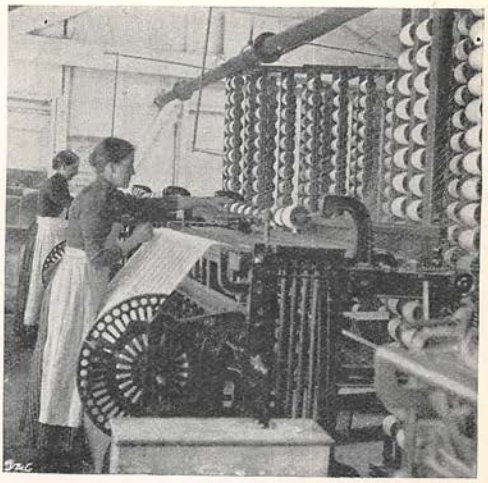
ingenuity the invention of Joseph Marie Jacquard, of Lyons.

When a piece of cloth is finished it is taken to the examiners, who certify it is correct, and then it is ready to be sent to other works to be bleached and printed. The day I spent in some mills at Bolton was full of instruction, the two thousand six hundred persons employed doing, it appeared to me, but a tithe of the work compared with what was accomplished by the wonderful sets of cotton-making machinery.

The spinning and the weaving of the cotton, and the working of a charming design, by no means leaves the material ready for the public market. There is a brown dirtiness about it which can only be removed by bleaching. Bleaching is done by separate firms, to whom the weavers send their cotton. We all know the old-fashioned —and to my thinking the best—means of bleaching—namely, exposing the cotton to the atmosphere. Now, however, a solution of chlorine does quickly what unassisted Nature takes several weeks to accomplish.

Here, again, in respect to bleaching, as in respect to everything else, all the work is done by machinery. It was considered a great thing when each piece of cotton could be bleached by chlorine. But this is far too slow, according to modern notions; so a thousand or more pieces are fastened end to end, and twenty or twenty-five miles of cotton is bleached at one and the same time.

THE REELING ROOM.



THE WARPING ROOM.

First of all comes the washing. The cloth is put into a cylinder, which wheels round quickly, and the various partitions knock the material about and so cleanse it. If the cotton goes on the market white, then it is not necessary to wash it so absolutely pure as it is when it is to be printed upon.

Pieces are then fastened together to the extent of many miles, a stamp being put on each to distinguish the owner. All over the surface of the cotton are little pieces of fluff, and unnecessary thread-ends which must be got rid of. This is usually done by running it over hot copper, underneath which a fire is burning. Sometimes, however, the singeing is done by a mixture of coal gas and air. The cloth is hurried past the flame at the rate of sixty yards a minute, and while passing at this speed the fluff and the threads are burned away.

This done the cotton is subjected to boiling. It is pressed into a vat through which pipes pass, and boiling water is forced through the cotton. After this it is thought well to give it another washing. When the water has been squeezed out the cotton is packed away in stills of hydrochloric acid for the space of several hours, to get rid of any lime or soap there may be in it.

Once more the cotton is boiled, and by this time, as it ought to be, it begins to show signs of becoming really white. Next, it is put in a solution of bleaching powder, to undergo what is called "chemicking." A good dose of sulphuric acid, followed up by more washing, makes the cotton about as white as it is ever likely to be.

All this time the cloth has been in a twisted condition, and the continual pulling

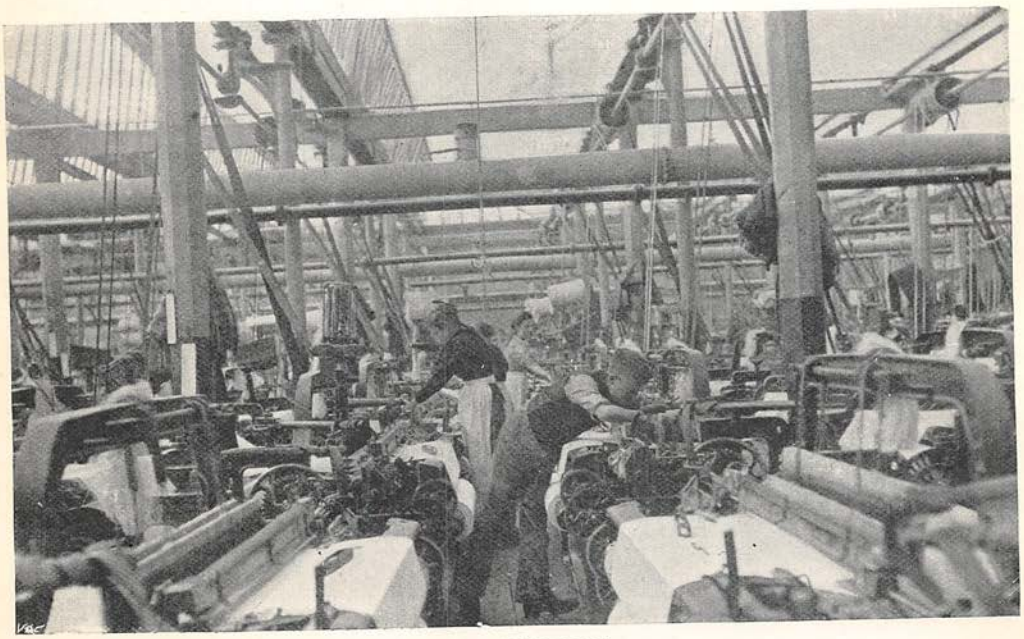
to which it is subjected contracts the width. This has to be put right, and if the hand will not do it, there is a machine which catches the cloth in the centre and pulls as it works out to the side.

The public must have things that look nice as well as those which are good. Accordingly, in the case of white calicoes, a finish has to be imparted. First the cotton passes through boiling water, then through calender rollers, which stretch and smoothe it. Then there is the starching, and the more starch there is the thicker seems the cloth and the better it is in the eyes of the ladies when they are out purchasing. All sorts of mixtures are used to give a thickness to the cotton. What they are composed of is a secret which bleachers do not care to have made public, although it should be pure starch.

Well, the cotton passes through a trough containing what we will suppose to be starch, and through rollers the pressure of which squeezes away the superfluous moisture, and then it is conducted between a number of steam-heated cylinders to be dried, going over and over the cylinders till it is dry in every part. A mild douse of water is next poured on it, and, passing through other rollers, it is hammered and beaten for some considerable time, as though it had inflicted an injury and needed punishment.

If the cotton is to have a glazed surface, then a second time is it calendered, and the gloss is imparted by the rollers through which it passes travelling at different speeds. Thus dry and polished the cotton is rolled by girls, a trade mark is affixed, a gilt-edged piece of paper is fastened at the end, and so it is made ready for the warehouse and the market whenever necessary.

Every woman knows what cheap prints are, but every woman does not know the infinite variety of processes through which the cotton, even after it is bleached, has to go before it finds its way into a shop to be sold at a ridiculously small price. The printing of calico is novel as well as interesting. When the design has been thought out, then the impression is engraved on a series of copper plates, it being, of course, necessary to have a different cylinder to print from for each colour or shade of colour. There are numerous ways of producing colours, but lack of space prevents my going into further details.



THE WEAVING ROOM.

The hard-headed northerners are ever on the watch for some slight improving change in the spinning, the weaving, the bleaching, and the printing of cotton. They guard their improvements jealously, for the race to the market is keen, and it is a case where no mercy is shown to the weak, who are rudely pushed to the wall.