

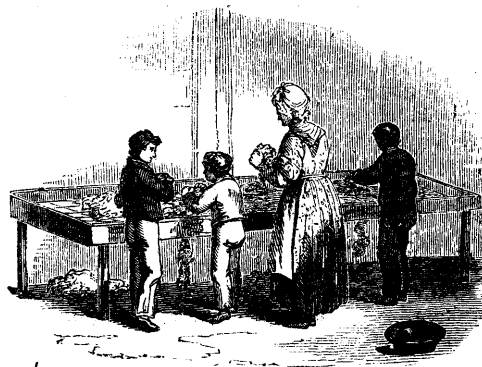
THE HISTORY OF A COTTON GOWN.—No. I.

THE habitual use of the things which surround us leads to two very opposite effects in different instances: in some, we become familiarly acquainted with almost every circumstance connected with them; while in others, the very familiarity with them in their complete state makes us forget or neglect the steps by which they arrived at it. It is probable that the *materials of clothing* lie in the latter predicament. If we say that nineteenth-twentieths of such materials have originally had the form of slender fibres, and have once possessed either animal or vegetable existence, we shall perhaps not be far from the truth; and yet such a statement would excite surprise in many. Our cottons, calicos, broad-cloths, worsteds, velvets, merinos, silks, linens, and all the extensive varieties of each of them, are prepared from one or other of *four* substances, viz.: the short fibres contained in the seed-pod of the cotton plant; a glutinous fibre elaborated from the body of the silk-worm; the woolly fibres which cover the back of a sheep; and a sort of fibrous bark covering the stem of the flax-plant. All these fibres, of which two kinds are procured from the animal and two from the vegetable kingdoms, are worked up by man into a fabric or extended substance, from which garments of every form and size can be made, and of a texture varying from that of a gauze veil to that of the thickest garment for rough weather. We will, on the present occasion, select one of these four classes of materials, viz., *cotton*, and endeavour to convey a general notion of the processes by which it acquires the forms so familiar to us.

The reader, by referring to 'Penny Magazine,' vol. i., p. 156, will find a description of the cotton-plant, and of the manner in which the cotton is gathered, partially cleaned, compressed, and packed in bags for shipment. We will take up the subject in continuation, and suppose the bales of cotton to be safely landed at Liverpool. As Manchester is the great seat of our cotton manufacture, Liverpool, the nearest port to it, has become the principal place at which cotton is landed from foreign countries. From thence it is conveyed to Manchester on the railway connecting the two towns, and placed in the hands of the manufacturers. Of the extent to which this intertraffic is carried on, we may perhaps have something to say hereafter.

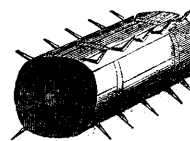
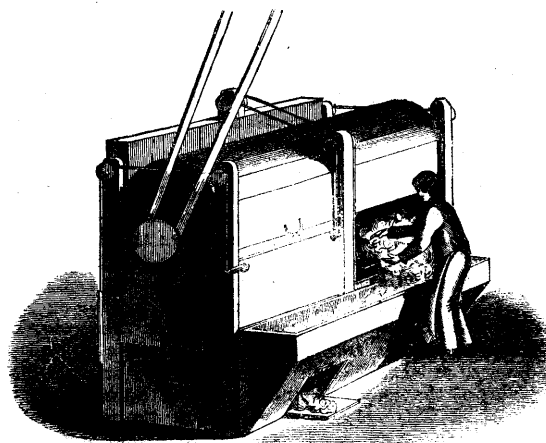
On opening the bale, then, the materials for our cotton gown are found to consist of whitish fibres, matted and clotted together in consequence of the severe pressure to which they have been subjected. But in order that the fibres may be united into one continuous thread or *yarn*, with which the weaver is afterwards to work, it is indispensable that they should be disentangled and straightened as much as possible. For this purpose the cotton is spread out, and subjected to a great variety of processes. In the first place, it must be *sorted*; for not only do cottons of different countries differ in quality, but that kind which is required to form the *warp* (or the long threads) of a piece of cloth is somewhat different from that selected for the *weft* (or cross-threads).

When the cotton is sorted, a task usually performed by women and children, it is then disentangled and freed from seeds and impurities by one or more of several processes called *cleaning*, *picking*, *scutching*, *willowing*, *blowing*, &c., some employed in one factory, some in another. The finest cotton is generally opened and picked out by hand-labour of women and children. It is placed on a table covered with a kind of net or mesh-work, and, after being lightly beaten with slender rods, the knots and other impurities are removed by the fingers. This is called *picking*. Another method is by *scutching*, in which the cotton, after being spread out on an elastic table, is beaten by a series of parallel rods, by which the clotted fibres are disengaged, and the cotton seeds and other impurities fall through the open meshes of the elastic table. But the most general mode of effecting the first



[Picking Cotton.]

disentanglement and cleansing of the cotton is by a machine called the *willow*, represented in the annexed cut. A cylinder (seen separately in the lower part of



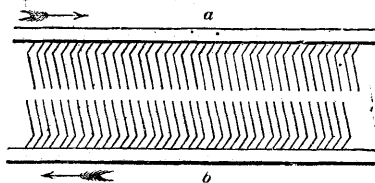
[Willowing Machine.]

the cut) has several teeth or spikes on its surface, and it revolves inside the machine in near communication with other spikes. A door is opened, and a boy puts in an armful of cotton, and closes the door again. The cotton is then thoroughly disentangled by being caught between the teeth during the rotation of the cylinder, and the seeds and impurities fall through a kind of sieve to the bottom of the machine. After it has been worked about for a few seconds, the boy opens the door, removes the cotton which has been disentangled and cleansed, and puts in a new supply. The inferior cotton wools are at the present day frequently *willowed* by a remarkable machine, which feeds itself, or draws in the cotton from a sort of stage placed close to it, thoroughly disengages it during the passage down or through the machine, and finally discharges it in a fine fibrous state at the bottom.

When the cotton has, by either of these modes, been disentangled and partially freed from impurities, it is subjected to the processes of *batting* and *blowing*, the object being to loosen still more the fibres of cotton, and to carry off the remainder of the dust through sieves. The *batting* (or *beating*) is produced by flat bars, carried rapidly round, which strike with their faces against the cotton fibres; while the *blowing* (or *sifting*) is effected by a sort of blowing-machine, or revolving fan, which removes the dust from the cotton. Where the very finest cotton (called *sea-island* cotton) is used, *batting* and *blowing* are often dispensed with.

The reader must now bear in mind, that what has been

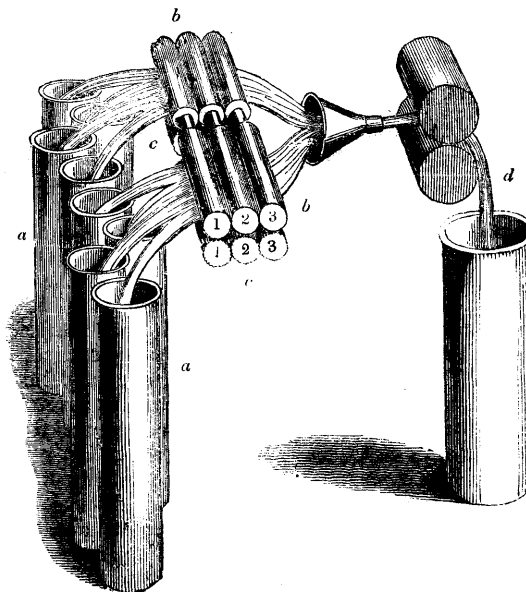
done to the cotton has *disentangled* and *cleansed* it, but not *straightened* the fibres; to effect this is the object of the next process, called *carding*. We all know how easily and effectually the hair may be straightened by the use of a comb or a brush. Now however intricate the cotton-manufacturer's *carding-engine* may be in appearance, its action is in reality midway between that of a comb and of a brush. A number of wires, formed and bent in a precisely similar manner, are inserted into a frame or block at one end, and present their sharp points at the other. This forms a kind of wire-brush; and upon being placed with the wires uppermost, a little cotton placed upon their points, and another similar wire-brush laid on the cotton, the movement in opposite directions of the two brushes will *brush* or *comb* out the fibres of cotton, and lay them in a parallel and smooth form. This mode of action will be clearly understood from an inspection of the annexed little cut, which may



be considered as representing a profile or section of the brushes. If some cotton be placed on the wires of the lower brush (*b*), the upper brush (*a*) be laid upon it, and both brushes be moved in the direction of the arrows, it is easy to comprehend that the teeth or wires will straighten and make parallel the fibres of cotton. This operation is called *carding*, and the two brushes are termed *cards*. Originally the cards were employed nearly in the form here represented; but about seventy or eighty years ago, the cotton-manufacturers, particularly Mr. Peel (the grandfather of the present baronet), Mr. Hargreaves, and Mr. Arkwright, succeeded in fixing the cards to the surface of a cylinder, and to a concave surface applied close to it. By making the cylinder revolve continuously, the cotton, which is placed upon its teeth, becomes combed out or carded in a very complete manner. By subsequent improvements made in those cylinder-cards, not only are the cotton fibres combed out straight, but they are at the same time collected together in a narrow flattish roll, called a *sliver*. The fibres of this sliver have just coherent strength enough to hold together. It will then be understood that the operation of *carding* produces three different changes in the appearance of the cotton: the first is, to comb out and parallelise the fibres; the second, to collect it into a sort of sheet so exquisitely fine as to have obtained for it from one writer the figurative title of "woven wind;" and the third, to collect it into a small narrow sliver, midway between a ribbon and a roll in appearance. The carding-engine of modern days, by which all this is effected, is an exceedingly elaborate machine. The cards contain usually about twenty teeth to an inch in length.

But delicate and beautiful as is the effect produced by the carding-engine, the fibres composing the slivers of cotton have still much to go through before they will be in a fit state for the spinners. In the first place, though the cards have straightened most of the fibres, they have had the effect of *doubling* some of them by catching them in the middle: these doublings must be rectified. Again, although the fibres are arranged tolerably parallel by the carding-engine, yet they are not sufficiently so for subsequent purposes. The sliver, likewise, although delicate, contains too many fibres in thickness: one hundred feet of it contain nearly one pound of cotton. To remedy all these defects is the office of the *drawing-frame*, one of the most beautiful of Arkwright's inventions. It straightens the doubled fibres; it lays them as parallel to one another as possible; it equalises the

quality of the cotton, by uniting many slivers into one, so as mutually to correct each other's defects; and lastly it draws out and elongates the spongy slivers or ribbons, so as to make them both narrower and thinner. All this is effected by drawing the sliver successively between three pairs of rollers, the two forming each pair being kept in close contact. The pairs are arranged side by side, so that after the sliver has passed between one pair, it is seized and forced through the second pair, and afterwards the third. Now if all these rollers revolved with equal velocity, the only effect produced on the cotton would be to flatten or stretch it out; but if the second pair revolve faster than the first, and the third faster than the second, it occasions the cotton to be *elongated* or *drawn out*. The second pair of rollers have a tendency to catch the fibres faster than they are liberated from the first pair, and therefore elongate them to make up the deficiency; the third pair act in like manner. And the very act of pulling or drawing the fibres in this way, also has the effect of straightening and laying them parallel. So important to the subsequent excellence of the woven cotton did Sir Richard Arkwright deem this process, that whenever any defective work was put out of hand, he used to impress on his workmen the injunction, "*mind your drawings*:" no good yarn could be spun unless the *drawing* of the slivers of cotton were properly performed. If one single sliver were attempted to be drawn until the suitable parallelism of its fibres were effected, the ribbon would soon become so excessively attenuated as to break; this is one of the reasons why many slivers are united into one during the process of drawing. The annexed cut will sufficiently show the more important parts of the



[Part of a First Drawing-Frame.]

[In this and the following cuts, those portions only of the machine have been given which are essential to the demonstration of the principles on which the several operations are performed. *a, a*, eight 'tubs' filled with 'ends' of cotton; *b, b*, six smooth wooden rollers covered with leather; *c, c*, similar set of fluted iron rollers. Rollers 1 move two-thirds slower than 3; and 2, at an intermediate rate. From this it results that the 'last end,' *d*, contains the substance of 512 of the 'ends' first drawn.]

operation. Several slivers, passing from a row of cans or 'tubs' in which they are deposited by the carding-engine, are caught between three pairs of rollers revolving with different velocities; they are then all united into one, brought into a small space by passing through a funnel, slightly compressed between a pair of rollers, and lastly received in a can. The operation of drawing is generally performed several times in succession.

After the slivers of cotton have passed through the

drawing-frame, they go through the operation of *roving*. The object of this is, to draw them out to a greater degree of thinness, and at the same time to impart to them a slight degree of *twist*, sufficient to enable them to be wound on small pieces of wood called *bobbins*; for in their parallel state they are too weak to allow of their being wound. This is performed by machines of various forms, called the *revolving can-frame*, the *tube-roving frame*, the *bobbin and fly-frame*, &c., some of which are very complicated. The cotton now obtains the name of *roving*, and some of the rovings are so fine, that one hundred feet of them will weigh but eight grains: the texture being uniform in every part.

We have thus traced the materials of our cotton gown through the processes of sorting, picking, beating, carding, drawing, and roving. The next paper will introduce us to the labours of the spinner.