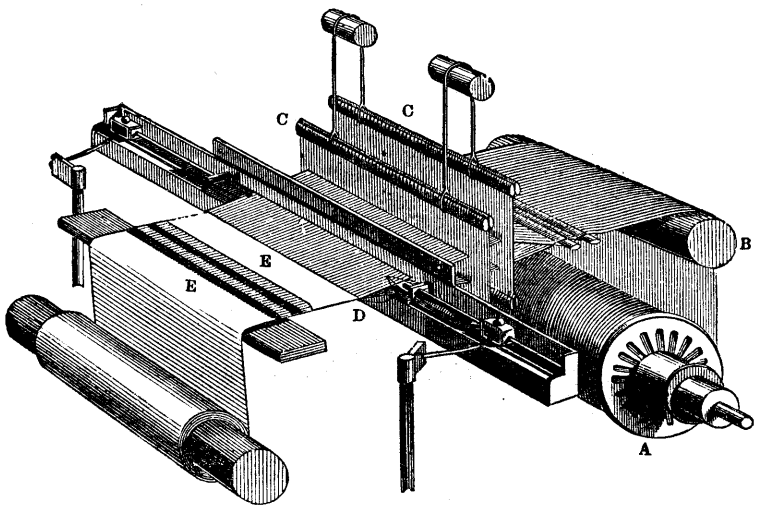
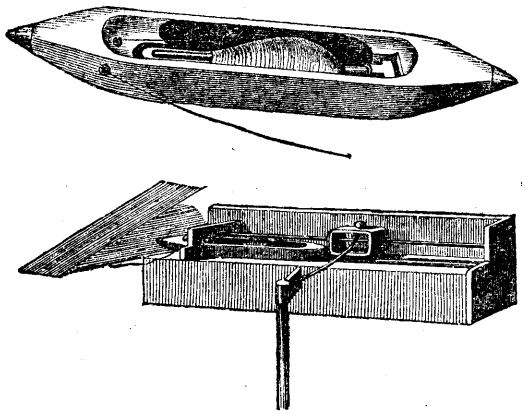
HISTORY OF A COTTON GOWN.—No. III.



[Power-loom.]

INSTEAD of endeavouring to explain all the complexities of a modern loom, we will confine ourselves to that part immediately connected with the throwing of the shuttle. A is a roller round which the parallel threads of warp are wound; these threads pass over another roller B, and pass through the vertical threads of two upright frames C C, called *treddles*. These treddles have the effect of separating the warp into two parcels, one of which is depressed while the other is elevated; the adjoining threads of the warp being alternately depressed and elevated. When the threads advance to the point D, just before they reassemble into one parallel layer, a shuttle (the point of which is just seen under the upper threads) is suddenly driven across from edge to edge of the warp, carrying with it *one thread of weft*, which becomes thus interlaced among the threads of the warp. A piece of mechanism called a *batten* then presses that thread of weft close up to those before made, and which form the completed portion of woven cloth E E. By reversing the motion of the treddles and of the shuttle, another thread of weft is formed in a similar manner, and so on continuously.

The shuttle is a kind of little boat, containing yarn



[Shuttle of Power-loom.]

wound on a spindle. As the shuttle moves onward the spindle revolves and unwinds the yarn, which passes out through a little hole in the boat. The lower half of the adjoining cut shows the mechanism by which the shuttle is driven between the divided threads of the warp.

In making calico, the shuttle of a power-loom generally travels to and fro across the warp about one nundred and twenty times per minute, thus making an equal number of threads of weft in the same time, and a complicated series of movements takes place between each two movements of the shuttle, having for their object to drive up the thread of weft to the cloth already woven, and to reverse the position of the divided parcels of warp, elevating those which were before depressed, and *vice versâ*.

If we examine a piece of calico or of muslin, or the material for a printed cotton gown, we perceive that the threads pass regularly over and under one another, that is, that the cross threads never pass over or under two *adjoining* threads of warp. But if we look at those fabrics which are called *twills*, we perceive a peculiar oblique ribbed appearance; this is caused by a deviation from the mode of weaving just spoken of; after passing under one thread of warp, the weft passes over two, three, four, or even as many as eight adjoining threads, which of necessity imparts a peculiar texture to the fabric. This is one of the means by which the manufacturer multiplies the variety of his goods; for many of the articles which obtain different names at our mercer's and linen-draper's, only differ from each other in the number of threads of warp that the weft passes over after having passed under one thread. In other cases these differences are combined with some peculiarities in the kind or quantity of cotton yarn employed; thus damask, dimity, diaper, fustian, jean, velveteen, corduroy, &c. are all *twills*, and are (some always, others occasionallly) made of cotton. The first three are woven in such a peculiar way, that the twill is made to form a *device* or *pattern*, instead of merely forming a ribbed appearance obliquely across the cloth; the weft, after passing under one thread, goes over from three to seven, according to circumstances, and the opening between the two divisions or parcels of warp is so managed as to lead to the production of a pattern, often very elaborate. The other fabrics we have mentioned are cotton twills, made of stout materials, and having a kind of nap or pile on the surface; this pile is produced by working up and sometimes cutting the loose glossy fibres of the cotton after the weaving is completed.

But these details respecting cotton fabrics generally, however interesting, would lead us to too great a length. We must confine ourselves to our cotton gown. The processes hitherto considered have led to the production of a piece of cloth, of a dirty white colour, and devoid of any pattern whatever. If warmth and comfort were the only

objects sought for in clothing, the services of the dress-maker might now immediately succeed those of the manufacturer. But such are not and never have been the limits in this respect; richness of colour and beauty of device have been objects of admiration in every age and country; and the cotton-manufacturer has not neglected to appeal to this taste.

One mode of producing both colour and pattern in woven cloth is to have the threads of the warp of two or more different colours; thus, ten threads white, then ten black, and so on throughout the two or three thousand threads that generally constitute the width of a piece of cloth; a white weft woven in among these would produce a black and white *striped* cotton. If the weft were of two colours, and the warp only one, the stripes would be *across* the cloth. If both warp and weft were variously coloured, a *checquered* pattern would be produced. It will be easy to conceive, from these three instances, how great variety of pattern might be produced when the colours, both of warp and weft, are more than two, and when changes are made in the number of threads which compose each alternation of colour.

But such a plan cannot, without a complexity of weaving apparatus that would lead to costly results, produce *flowers, foliage, scroll-work*, and similar small patterns. The object of manufacturers, therefore, was to devise the means of laying on a kind of paint or dye, which should impart to white cotton cloth any desirable pattern: if this pattern were only impressed on one side, the inconvenience would not be great, for most garments are seen but on one side. In 1676 a rude mode of impressing patterns on woven cloth was introduced into England from India. Upon this method successive improvements were made, until at length the art has been brought to great excellence. We cannot enter into the extensive subject of *dyeing*, by which a uniform colour is impregnated entirely through the fibres of woven cloth; suffice it to say, that cotton fabrics, like those of wool, &c., are dyed by being dipped into large vats containing colouring liquids.

Let us suppose that the piece of cotton which has engaged our attention, instead of being dyed one uniform colour, is to have a pattern printed on it. The first operation is to *singe* or burn off the loose downy fibres, which would considerably injure the appearance of the cloth if allowed to remain. This singeing is usually effected by passing the cloth with uniform velocity over a very hot iron: the fibres are burned off, but the movement is too quick to allow the cloth to be injured. The cloth is then *bleached* or whitened, for it must be remembered that the natural colour of the fibres, and the many processes they have to go through, impart to cotton cloth a yellowish cast, which is exemplified by the unbleached cotton occasionally received from India: the snowy whiteness of muslins and calicoes is considered an indispensable feature in them; and it is also deemed desirable in cotton about to be printed. The *Bleaching* in our first-rate establishments consists of no fewer than twenty-five distinct processes, and yet a yard of cotton can be bleached for less than one half-penny. But the part of these processes which is the more particularly connected with the removal of colour is that in which *bleaching powder* (chloride of lime) is dissolved in water, and applied to the cloth. One of the constituents of the powder is *chlorine*, a gas possessing the remarkable property of removing colour from almost every class of material, animal, vegetable, or mineral.

Cotton bleaching is the work of one class of persons, cotton or calico printing of another; the cotton to be printed has therefore to pass from the former to the latter. The colours which may be given to the cloth are of infinite variety, and are produced by various substances, such as cochineal, madder, Brazil wood, indigo, Prussian blue, Scheele's green, Saxon green, &c. In elucidation of the manner in which these colours are stamped on the cloth, we may say a word or two respecting *wood-cut* and *copper-plate* printing. *Wood-cuts*, such as those illustrating this article, are printed from wood-blocks on which the figure has been cut, those parts which represent the device being left prominent:—ink is spread on these prominent parts, and an impression obtained from them. But in *copper-plates* the device is *engraved*, that is, the lines which are to form the device are sunk instead of being left prominent; ink is spread over the whole plate, wiped off again from the level surface, and left in the engraved depressions, which impart the device to the paper. Now these processes almost exactly resemble the old and the new methods of calico-printing. According to the old plan, the device was cut upon a block of sycamore, the parts which were to make the impression being left prominent, but when the figure was very fine and complicated, the device was made of small pieces of copper, which were ingeniously driven into the block, and the interstices filled up with felt. In the more modern mode, the device is engraved on a plate or on a cylinder of copper. In the former of the two instances, the flat copper-plate is about a yard square, and after the colour has been applied to its surface, an elastic steel plate is made to pass over it, and remove all the colour from the surface. In the second instance the device is engraved on the surface of a large copper cylinder; and after the colouring and partial removal of colour, the rotation of the cylinder impresses the device upon the cloth, as the latter moves through under the cylinder.

Most of the colours will not remain permanent on the cloth unless the latter be previously dipped into some liquor of a binding quality; such a liquor is called a *mordant*, of which the principal is a solution of alum. This circumstance enables cottons to be printed in several ways. Sometimes the device is printed with an ink (if we may use the term) which is a mordant, and the cloth is then dyed or steeped in some particular colour: on washing the cloth, the whole of the colour washes out, *except* that part where the mordant had been used. In other cases a colouring substance is used, which has the property of uniting with the cloth without the aid of a mordant, but it is prevented from so uniting at some parts by printing a device with some peculiar substance called a *resist paste;* after printing with this resist paste, and then dyeing the whole piece of cotton, washing will remove the dye from those parts touched by the resist paste, but not from the other parts. It is obvious that a *pattern* is produced by both these means, but in a precisely opposite way. The former of the two methods produces a coloured pattern on a white ground; the latter a white pattern on a coloured ground. In either case, however, by a judicious choice of colours, of mordants, and of resist pastes, the whole extent of the cloth may be made to receive various colours, with no portion of white remaining visible.

We will briefly illustrate these remarks by speaking of a blue and white, and a red and white cotton. For the former the device is printed in a resist paste of sulphate of copper; the cloth is then dipped in a blue dye of indigo, and, after some other processes, washed; this washing removes the blue from the printed parts, and leaves them white, thus producing a blue and white pattern. In the second instance the device is printed with an alum mordant, and the piece is then dipped in a dye of *madder* or some similar red: subsequent washing removes the red from all those parts which have *not* been printed with the mordant, and thus a red and white pattern is produced. In the Bandanna cotton handkerchiefs, designed to imitate silk, the cloth is dyed of one uniform colour, and a device of spots formed by removing part of the colour, through a very peculiar application of chlorine, quite different from the process of calico-printing.

We have now manufactured the material for our cotton

gown, by tracing its progress from the state of a woolly fibre, to that of an ornamentally-coloured woven fabric from which garments may be made. The number of processes, the ingenuity employed, the amount of capital invested, the number of workmen, and the impulse given to the export trade of England, render the cotton manufacture of an importance quite unexampled in any other kind of manufacture at home or abroad. Were there not official evidence in support of the fact, it would perhaps be thought incredible that the value of our exports of manufactured cotton equals that of all *our other exports put together:* it is said now to amount to more than twenty-two millions sterling annually. As to the importance of the cotton manufacture in a *social* point of view, we would direct the reader's attention to the following judicious remarks from Mr. Baines:—"If the thought should cross any mind that, after all, the so-much-vaunted genius of our mechanics has been expended in the insignificant object of enabling men better to pick out, arrange, and twist together the fibres of a vegetable wool—that it is for the performance of this minute operation that so many energies have been exhausted, so much capital employed, and such stupendous structures raised, and so vast a population trained up, we reply, our object is not insignificant because the operation by which it is effected is minute. The first want of men in this life, after food, is clothing, and as *this* art enables them to supply it far more easily and cheaply than the old method of manufacturing, and to bring cloths of great elegance and durability within the use of the humble classes, it is an art whose utility is inferior only to that of agriculture. . . . . By supplying one of the great wants of life with a much less expenditure of labour than was formerly needed, it sets at liberty a larger proportion of the population to cultivate literature, sciences, and the fine arts. To this country the new inventions have brought a material accession of wealth and power."