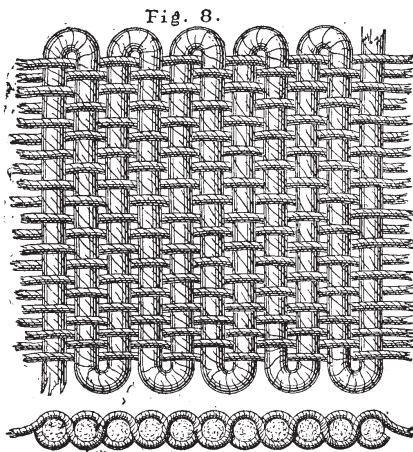


WEAVING.—No. IV.  
HAND-LOOM WEAVING.

THE process of weaving, whether performed in the hand or the power loom, depends upon the same principles, and the power loom is really an automatic imitation of the movement of the hand-loom weaver. The shedding of the warp, the throwing of the shuttle, and the beating together of the weft threads are in fact identical. The power loom, even when only adapted for plain weaving, is, owing to its various motions, a somewhat complicated machine, but when fitted for the purpose of weaving figured fabrics it becomes intricate. The richest and most delicate fabrics will probably always be woven in the hand loom, and it is in their production that the ingenious contrivances employed by the weaver can be best studied, and it will then be seen, by comparing the past with the present systems, how great has been the advancement of this art during the present century.

When the power loom became well established, and proved to be an efficient machine for weaving plain cloth, it was not allowed to remain long in the form it then had, for the improvements that had been made in hand-loom weaving, through the introduction of the Jacquard apparatus, were very shortly afterwards applied to the power loom also. It will therefore be more satisfactory for our purpose to illustrate the past and present methods of hand-loom weaving, both plain and figured, as well as some of the processes connected therewith. By so doing the general principles of weaving will not only be more conveniently described, but, at the same time, the course of the various improvements from step to step can be best followed.

Weaving is the art of interlacing threads or other fibres together in such a manner as to form cloth, ribbons, and other articles of a similar nature. If a piece of plain cloth or calico be examined, it will be found to consist of a number of threads placed parallel to each other, which are interlaced alternately by a single thread passing from side to side of the cloth. This separate thread is the weft thread, and has been inserted between the other threads, called the warp, by means of a shuttle. The alternate intersection of the warp and weft threads, therefore, constitute plain weaving, as represented at Fig. 8, which shows the combination

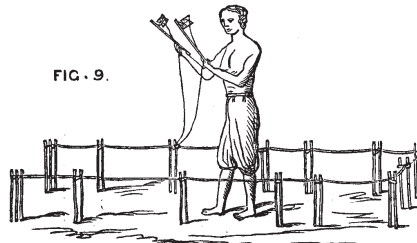


of the threads in plain cloth, as seen when magnified. The warp threads are usually much finer than the weft thread, and the fibres are generally spun together in a similar manner to a two or three-strand cord. On the contrary, the weft thread is but slightly spun, and usually consists of one strand only. By this means the weft is made soft and yielding, and is better adapted to fill the interstices of the cloth, whilst the warp thread is made firmer, and not only adds more strength to the cloth, but it is much better suited to undergo the process of weaving.

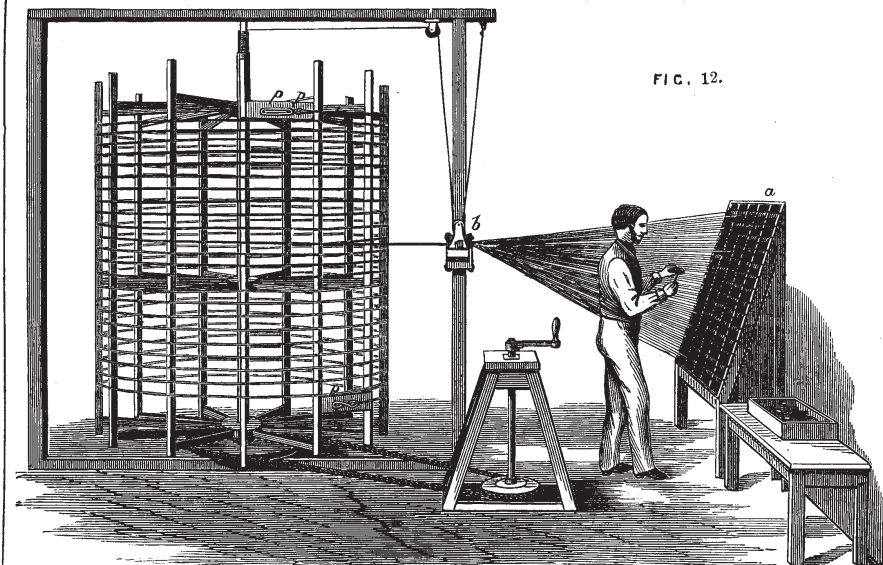
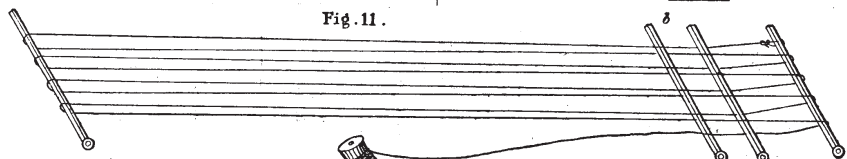
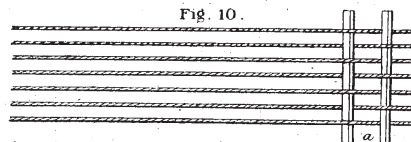
In the throwing or spinning of silk this difference of twisting is expressed by calling the weft thread "tram," which is the Latin name for weft; and the warp, owing to its excessive twist, is called "organzine," which term also corresponds to its peculiarity as before named.

The first process in weaving is to arrange and afterwards to place the warp threads in the loom. These differ in length and number according to the length, fineness, and width of the cloth. Before the

introduction of the warping frame, the process of warping was simply to place a few pegs at the required distance apart, and walk from one to the other, at the same time unwinding the threads from several bobbins or reels, until a sufficient number were collected together of the desired length. This method is still adopted in India, where sticks are fixed in the ground for that purpose, and the weaver taking two reels, one in each hand, passes alternately from one stick to the other, as represented in Fig. 9.



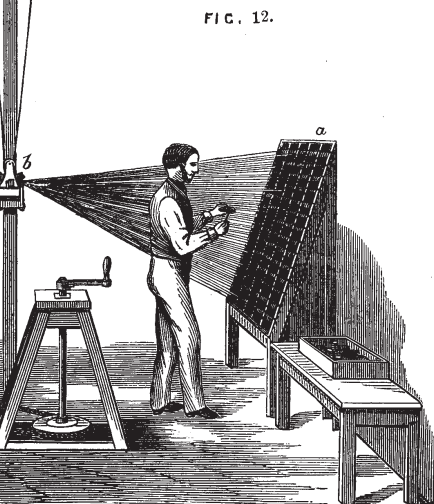
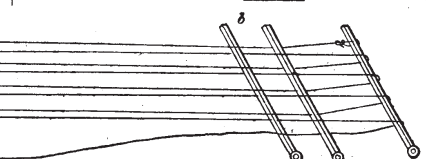
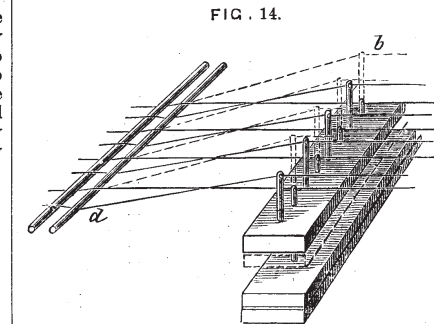
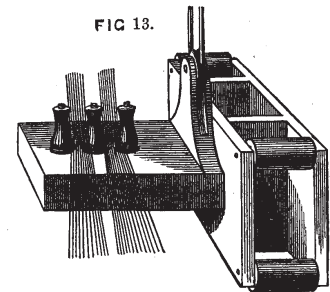
Warping, therefore, consists in arranging the threads according to number and colour, or in any special manner that may be necessary, and to keep them in their relative places after they have been so laid. This is effected by crossing the threads at one end of the warp alternately, and by means of a cord keeping them in that position. This will be seen by referring to *a* and *b*, Figs. 10 and 11, which show



the crossing of the threads over and under the pegs by each thread alternately. Before taking them off the pegs, if a cord be placed so as to occupy the places of the pegs, their relative order would always be kept, and the whole warp may then be rolled into a ball, or looped like a chain, as may be desired, without fear of disarrangement. This intersection or crossing of the threads is called the "lease" by weavers.

It will be apparent that in long lengths of warp, and composed, as in many instances they are, of thousands of threads, some other method must be adopted for warping. This is performed by means

of the warping mill or frame. The requirement being simply what is shown in Figs. 10 and 11, the action of the warping frame will be readily understood. Fig. 12 represents the machine, which is simply a large reel, and is turned by a winch and rope, as shown. A number of bobbins are placed in a frame, shown at *a*, and the threads from them are wound upon the reel.



In passing from the frame *a* to the reel the threads are concentrated at *b*, where they pass between rollers placed vertically, and sunk a short distance into the block upon which they stand (Fig. 13) so as to prevent the threads from passing beneath. In this method the cross is formed by passing the hand between the threads alternately under and over. Fig. 14 shows another plan where at *b* the threads are passed through a corresponding number of eyes, which are fitted into the block called the "heck." The heck is made to slide up and down the frame post by means of the cord to which it is attached, according as the cord is wound or unwound on the top spindle or

“gudgeon” of the warp frame, as shown. Now if there are 100 bobbins, or any other convenient number in the frame to wind from, a warp of any number of threads may be laid, as required, by turning the reel forwards and backwards the requisite number of times, which process lays the threads from one peg to the other, as performed by

comb is made with a loose cap (Fig. 18), so that the threads can be readily distributed through the teeth, or dents, of the comb, and the cap being made secure they are kept in position during the process of beaming. The warp is first wound upon the drum on which there is a friction brake. It then passes over rollers and through the comb and is

effected is very ingenious, and we shall describe it in detail presently.

We now come to the disadvantages attending the beam type of engine, and these may be fairly enumerated as follows: 1. The numerous joints through which the power is transmitted, namely, four in the parallel motion, two in the beam, two in the connecting rod, and two in the crank shaft: total ten. 2. Heavy foundation and strong engine

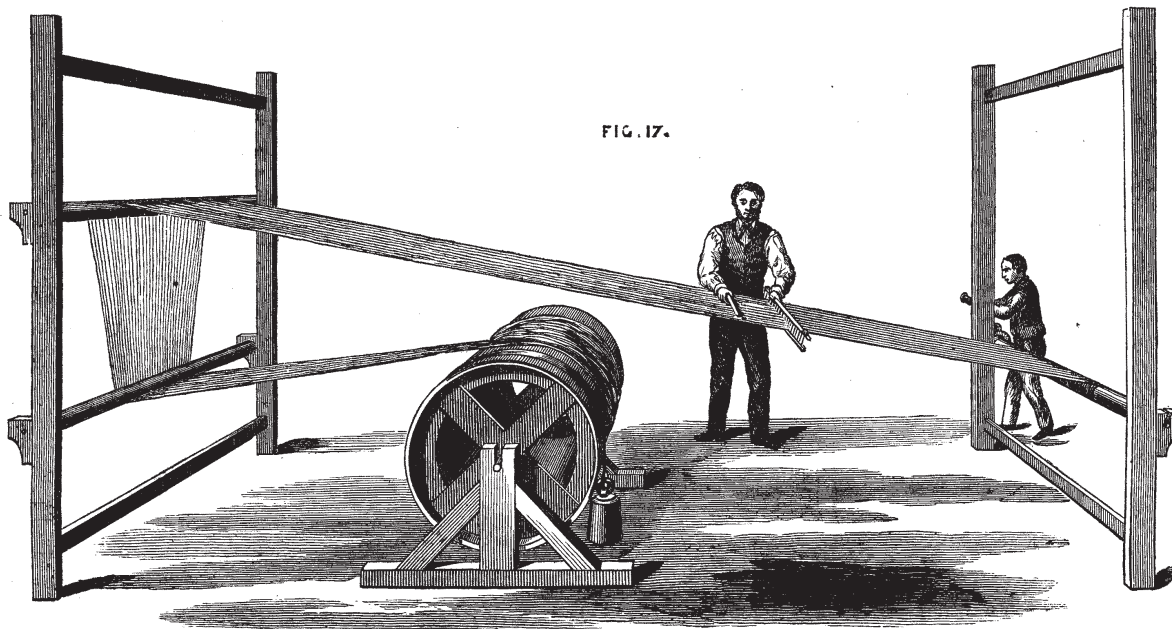


FIG. 17.



FIG. 18.

hand. The crossing of the threads, or making a lease, is effected by means of the eyes in the heck, which are shown, enlarged, at *z*, Fig. 14. They are shown fixed in two separate rails, each rail having every alternate eye fixed into it.

Now by raising and lowering one set of the eyes above and afterwards below the other, an opening is made between the threads corresponding to the position shown in Figs. 10 and 11, and they are by this means placed in a similar order upon the pegs P P of the warping frame.

The length of the warp is regulated by altering the position of the lower peg, from which the return movement is made.

The winding and unwinding of the cord round the spindle raises and lowers the heck block, and thus acts as a guider in distributing the threads upon the large reel, and keeps each additional layer in its proper place. The warp is then taken off the reel and wound up into a ball form, or looped in the form of a chain, as shown in Figs. 15 and 16, as

wound upon the warp beam, which is turned by a winch to which a chuck or other contrivance is connected for holding it.

Fig. 15.

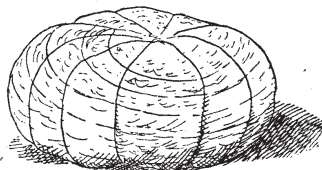
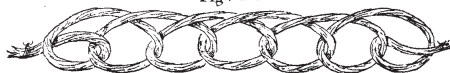


Fig. 16.



may be most convenient, until required for weaving. It has then to undergo the process of beaming and dressing, which consists in winding it upon the warp beam and making it ready for the loom.

Fig. 17 represents the method of placing the warp upon the warp beam, where it is shown to pass through a comb, which causes the threads to be spread evenly and parallel upon it. The