

-LOOM.

LOOM, the machine by which weaving is effected. The art of weaving is coeval with civilisation, therefore the loom may be reckoned amongst the earliest of man's inventions; yet, notwithstanding its vast age, very little improvement was effected in it until the invention of Dr Cartwright in 1787, who, without ever having seen a loom in his life before, constructed one to work by machine-power. In its simplest form, the loom is worked by hand; and notwithstanding the wonderful improvements which have been effected in the power-loom since its invention, there are still many fabrics manufactured by hand-loom in this and other countries.

In India, which most probably is the native country of the loom, and where silks of almost

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unrivalled beauty are made, the natives continue to use this machine in its most primitive form; two trees growing near together form their standing frame, and a few pieces of bamboo, together with some pieces of string, furnish all they want besides.

As the use of the loom will be fully explained in the article WEAVING, the construction only will be given here; but it is necessary, in order to make this clear, to explain the principle of weaving, in order to shew the work the loom has to do. In its simplest sense, weaving consists in passing one set of threads transversely through another set, divided into two series, working alternately up and down, so as to receive the transverse threads in passing, and interlock them, forming thereby a united surface out of the threads. The loom is made to assist the weaver in this operation after the manner shewn in fig. 1: A A A A is the frame of the loom, and is of no other use than to hold the working-parts in their proper position. The native of India supplies this usually by selecting, as before stated, two near-growing tree-stems, usually palms, in consequence of their straightness; these, with

two equal sets by raising up every alternate one, and inserting between them a smooth rod of wood,

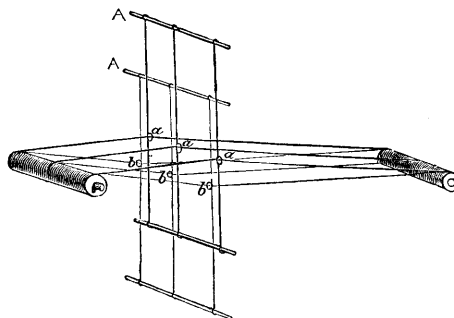


Fig. 3.

to prevent them entangling or returning to their former position. This separation takes place before the final fixing of the ends of the threads to the cloth-beam, because, previous to that, each thread must be passed through a small loop in a perpendicular thread called the heald, which hangs down from the rod A in fig. 3 (in which only six heald-threads and six warp-threads are shewn, for the sake of rendering the action clearer). There are always two sets of healds in the simplest form of loom, often many more; and in the case of plain weaving, the threads of the warp are divided alternately by the loops of each heald, so that if one heald is raised, it lifts every alternate thread of the warp, and if the other is depressed, it pulls down the opposite set of threads; thus, in fig. 3, the three threads of the warp are seen to pass through the three upraised threads of one heald by the loops a, a, a, and the three remaining threads of the warp pass through the depressed healds by their loops b, b, b; the united action of the two healds opens a space between the two sets of warp-threads similar to that shewn in fig. 4. This space is called the shed, and through it is thrown the shuttle which carries the thread of the weft; when the weft has passed through, the healds are reversed, and the lower warp-threads now become the upper ones. The threads, after each intersection, are driven up tight by the reed, which is a

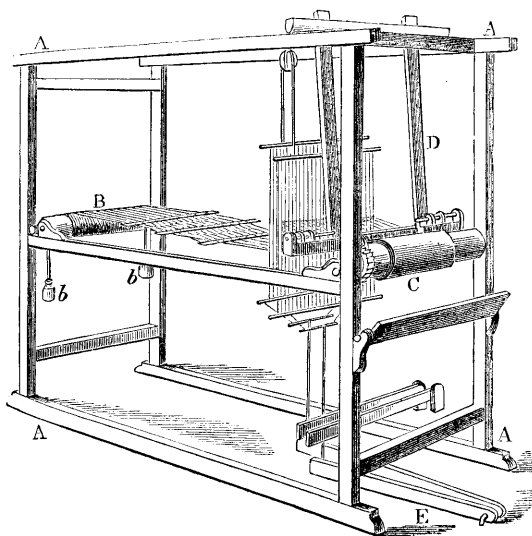


Fig. 1.

four stakes to support his warp, and two or three pegs to fix his heald-ropes, complete his arrangements.

At each end of the frame, two rollers are placed, B, C, so that they will readily turn on their axes; and from one to the other, the threads of the warp are attached, and kept tight by the weights b, b. The warp-threads are wound round the roller B, which

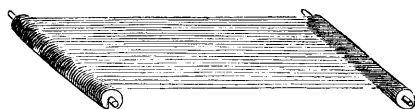


Fig. 2.

is called the *beam* or *yarn-roll*, only as much of each thread being left unwound as will reach to the other roller, C, which is the *cloth-beam*, to which the ends are fastened, and upon which the cloth is wound as it is woven. The warp so stretched is seen in fig. 2.

The next step is to divide the warp-thread into

narrow frame with transverse wires set sufficiently far apart for a single thread of warp to pass through each; it hangs to the frame called the batten, fig. 1, D. The movement of the batten is produced by

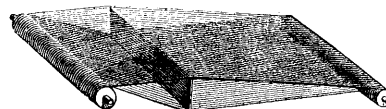


Fig. 4.

the hand of the weaver, whilst that of the healds is readily effected by the treadles E.

Many improvements have been made in this the simplest form of loom, but the chief has been in replacing the weaver's hand in the necessary operation of throwing the shuttle by a mechanical arrangement. Without this, the *power-loom* would not have succeeded. The shuttle (fig. 5) is usually made of box or some other hard wood; and the blunt points are covered with iron. Formerly, when used entirely by the hand, it was made much lighter and smaller than at present. Those now in use are

about a foot in length, and rather more than an inch square in the middle. The middle part is hollowed out into a small box, open on the upper



Fig. 5.

side. In this box the bobbin, on which the yarn or thread is wound, is placed, with its two ends on pivots, admitting of its being turned by the slightest strain on the yarn; the end of the yarn passes through a hole in the side of the shuttle, as seen in fig. 5; and as it is thrown backwards and forwards, the thread unwinds from the enclosed bobbin, and easily runs through the hole.

In the improved looms for power, and even in those still worked by hand, in special cases the

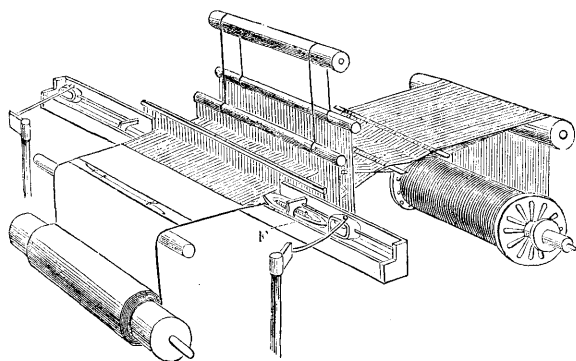


Fig. 6.

arrangement for projecting the shuttle backwards and forwards is very simple. On each side of the loom, exactly in a line with the *shed*, is a groove of about eighteen inches, in which the shuttle lies free; and there is a very simple arrangement by which a piece of leather and a strap are made to act like a sling on each side; and the grooves or *shuttle-races*, as they are called, guide the movement with such precision that the shuttle is sent flying through the shed from side to side with unerring exactness. This arrangement will be seen by reference to fig. 6, F, which is given to shew the great simplicity and compactness now attained in the power-loom, three of which can stand in the space occupied by one of the cumbrous machines formerly in use. There are few machines in use which have had more mechanical ingenuity displayed in their improvement than the loom; but as it is not the object of this article to do more than give the general principles upon which the machine works, the reader is referred for fuller information to the thick volume of the *Abstract of Patents for Weaving*, published by the Patent Commissioners.