

LOOM

Loom, a term originally meaning simply "tool," but now particularized so as to apply to a machine for weaving. The simplest form of the loom, still in use among semi-primitive tribes and up to the middle of the 18th century practically the only form, was the hand loom, a rectangular frame, from one side of which yarn is stretched to the opposite side, where it is so secured that the transverse threads may be passed by hand "over and under" the threads already stretched. Fig. 1

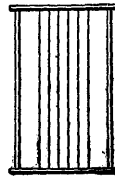


FIG. 1.

LOOM

shows the simplest form of this loom. The form in common use in civilization up to Cartwright's invention of the power loom in 1785 is merely this same actual frame set in a skeleton box (AAAA) in a horizontal position (Fig. 2). The end pieces of the actual frame are now rollers, so that the length of the piece of cloth is no longer necessarily less than the length of the frame. These rollers are the beam or yarn-roll (B), which is at the back of the loom, and upon which the warp threads are wound, and the cloth beam (C) to which the threads are fastened and which winds up the cloth as it is made. The threads of the warp, held tight by weights (b, b), pass through the eyes of the heddles (or healds), thus being separated to permit of the passage of the shuttle, and also through the reed. The shuttle in the hand-loom is thrown by the operator, and in the power loom by the picker-staff machinery; in either case it is made of hard wood, is pointed at either end and carries in a recess the quill or bobbin.

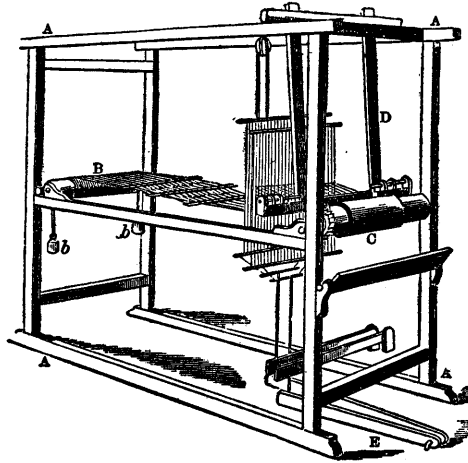


FIG. 2.

This hand-loom was first successfully improved, after the unfortunate attempts of De Gennes in 1678, by Edmund Cartwright, who undertook in 1785 to counterfeit by mechanical means the three simple motions of weaving. He had neither mechanical nor textile training, but his loom though cumbrous and awkward is essentially that now in use. The simplest modern loom differs essentially from the hand loom in that the warp yarn is no longer stretched direct from the yarn roll to the cloth beam, and these two parts are no longer placed at the same height from the base of the frame nor at so great a distance as before. The yarn runs upward from the warp-beam over the whip-roll, thence is carried through heald, heddle, or (the American term) harness, and through the reed, and down from the latter to the cloth roll. The advantage of this arrangement is greater stability and a distinct saving in space, the depth of the loom being materially decreased. With the old fashioned heddle only the simplest and most regular webs could be woven; for figured patterns the most effective mechanism is the Jacquard attachment, patented by a weaver of Lyons, Joseph Marie Jacquard, in 1801. This machine lends itself readily to use with any loom. It may be described as a means of forming the

shed and governing the heddle,—in fine, it takes the place of the weaver's fingers. A revolving drum or cylinder is so perforated as to catch some or all needles, which in turn govern a set of perpendicular hooks. These hooks guide the threads of the warp, so that the weaving is no longer of necessity simply "under or over." How many threads are to be skipped is determined by a perforated card-board, the perforations occurring where the thread of the warp is to lie above the filling; but if the warp-threads are not to be raised no holes are cut in the cards, the needles do not enter the cylinder, and the hook attached to the needle does not lift, by means of its neck-cord or loop of twine, the thread of the warp. A series of these cards, each with different perforations, makes an almost infinite combination of patterns possible, as each card makes a different shed.

The hand loom is still used for the manufacture of rugs and fine carpets, but the power loom, driven by various powers, electricity being the latest and in some ways the most economical, is used for almost any purpose. The ribbon-loom, for instance, weaves simultaneously a number of narrow pieces. Many attachments, invented in a long series, have continuously and wonderfully decreased the need of any supervision of the loom, making it more and more automatic: thus a shuttle protector automatically stops the machinery if the shuttle fails to fly all the way across the warp; the filling stop motion protects the machinery from running on uselessly when the filling breaks or runs out; and take-up, let-off, and warp-stop motions are further automatic devices. The highest pitch of automatic attachment is the Northrop patent, which is a hopper full of loaded bobbins; these are fed into the place of the empty bobbins as soon as the yarn is exhausted.

See Posselt, 'Textile Machinery' (1901) and 'Jacquard Machine Analyzed and Explained' (1893); and Barlow, 'History and Principles of Weaving by Hand and by Power' (1879).