Loom. A machine in which yarn or thread is woven into fabric.

A woven fabric consists of yarns called the warp laid in one direction, and crossed by yarns laid transversely and known as the *woof*. The *warp* is also called the *chain*. The words *woof*, *weft*, *filling*, are synonyms.

The essential parts of a loom are, —

1. A frame in which the row of yarns forming the warp is held.

2. Leashes or harness which govern the decussation of the threads to form a shed for the *woof*.

Means for holding and actuating, when of the simplest description, may be said to be a *yarn-beam*, to pay off the yarn as the weaving proceeds ; a means for operating the *leashes*, by which alternate threads all across the warp are raised and their intermediates lowered, so as to make a decussation (Lat., *decussis* = *decem asses* or X) or crossing known as the *shed*, in which the *woof* is deposited ; a means for holding taut the web, so as to keep a proper strain on the warp. A *shuttle* or bobbin for the yarn is usual, but this is not absolute, as a ball of yarn or other filling can be, and is, rolled through the shed. In horsehair and slat looms, the stiff filling is drawn through by fingers, or thrust through, and in some narrow-ware and fringe looms the filling is put in by a rod which goes and returns.

Stripped of its familiarity, weaving is a very ingenious and remarkable process, and many must have been the essays before a serviceable fabric was produced. The preparation of the fiber, its spinning, winding, warping, and weaving, must have had a gradual growth, but with the commencement of historical notices of civilization we find nations in possession of the art.

Egypt excelled in fine linen for ages before Abraham ; and the inhabitants of India doubtless spun and wove their cotton before Osymandyas, whose

> "Vast and trunkless legs of stone
> Stand in the desert."

It is natural to conclude that the plants which yielded fiber in bolls, such as the cotton and asclepias, were the first to be utilized, as the uses of flax, hemp, and silk require peculiar preparatory processes. Bark, although used extensively by the natives of some of the islands of Polynesia, has not come into general use for raiment elsewhere ; but few trees yield a bark which will make clothing equal to the *tapa* cloth of the Fijis. This is made from the paper mulberry, which grows wild in Oceanica and Polynesia, as well as in parts of Asia. The Fiji group is near the equator, and was discovered in 1643 by Tasman, the Dutch navigator. There are 225 islands, 80 of which are inhabited by a population estimated at 250,000. Paper is also made of the same material (Broussonetia), and specimens are in the Patent Office and Agricultural Department Museum.

The *masi* cloth is made by the same islanders, of the bark of the *malo*-tree. The bark, as removed from the tree, is steeped in water, and beaten on a flat log with a grooved mallet. Two lengths of the wet stuff are beaten together at their edges, being

united by their gluten. Separate pieces are united by the starch of the *taro* and then dyed. The mode of uniting is exactly the same as that practiced with the strips of papyrus, as described by Pliny. See PAPER.

The Fijis are strangely cruel, ingenious, and versatile, being the manufacturers for the islanders of other groups, supplying them with canoes, spars, sails, pottery, mosquito curtains, cloth, *sinnet*, rope of *coir* or cocoa-nut husk.

In Captain Cook's time the inhabitants of the Pacific islands had no knowledge of *weaving*, though ingenious in *braiding*, *plaiting*, and *netting*.

Perhaps the earliest examples of weaving were baskets, hurdles, and mats, in which the intersections are exactly the same, though the mode of production is different.

The invention of the loom antedates all authentic history of the Chinese, Hindoos, and Egyptians, and chance references to woven goods are found at an early period of the Old Testament history, as in the case of the "vestures of fine linen" in which Joseph was arrayed by Pharaoh. (See FLAX; LINEN.) The references to woven goods in the Mosaic period are very numerous. The art of weaving was held to have been derived from the early sovereigns of the land; so great regard was felt for the inventor, that the work was generally thus associated.

Semiramis, the Assyrian queen, is credited with the invention of weaving. The Greeks represented Minerva with a distaff, as being the inventress of spinning. Homer refers to the products of the loom. The Egyptians credited it to Isis; the Mohammedans to a son of Japhet; the Chinese to the consort of the Emperor Yao (Noah); the Peruvians to Mamaoella, wife of Manco Capac, their first sovereign.

The modern Arabs and the Hindoos use a procumbent loom. The Bible notices of weaving refer to *loom-work*, *netting*, and *braiding*. 1. When Delilah wove into the web the seven locks of Samson's hair.

2. Where Isaiah pronounces a curse upon Egypt, which shall destroy all her vast works of irrigation and improvement, and "confound" those who live by weaving networks.

The Bible also refers to needlework and embroidery, in the mournful song of the mother of Sisera. See DAMASK.

The mode by which the weavers of India execute the *jamdanee* has been explained by Mr. Taylor as follows: —

"The Hindoo weavers place the pattern, drawn upon paper, below the warp, and range along the track of the woof a number of cut threads equal to the flowers or parts of the design to be made; then, with two small, fine-pointed bamboo sticks, they draw each of these threads between as many threads of the warp as may be equal to the width of the figure which is to be formed. When all the threads have been brought between the warp, they are drawn close by a stroke of the lay or batten; the shuttle is then passed by one of the weavers through the shed, and the weft having been driven home, it is returned by the other weaver."

Pliny accorded the invention of the loom to the Egyptians. The Israelites carried with them the art of weaving when they left Egypt, and in Leviticus (chap. xiii.) the warp and the woof of linen and woolen fabrics are fairly distinguished.

The finest of the linen mummy-cloths of the ancient Egyptians — specimens of which may still be found — have about 140 threads to the inch in the weft and about 64 in the warp.

The looms of Egypt are shown abundantly in the tombs, and the web was either horizontal or perpendicular; the former are shown at Beni Hassan, the latter at Thebes. The woof was sometimes pushed upward, sometimes downward. The product was check or plain. The shuttle was not usual, but the filling was pushed through the shed by a stick or hooked rod. Wilkinson says that some of the colored patterns of the Egyptian cloths were worked by the loom; and others are the result of dyeing and printing processes.

"Colored dresses," says Pliny, "were known in the time of Homer, from whom the robes of triumph were borrowed; and from the Phrygians having been the first to devise the method of giving the same effect with the needle, they have been called 'Phrygiones.' But to weave cloth with gold thread was the invention of an Asiatic king, Attalus, from whom the name 'Attalic' was derived; and the Babylonians were most noted for their skill in weaving cloths of various colors."

It reminds one of the "prey of divers colors of needlework on both sides," in the famous Hebrew song more than thirteen centuries before Pliny, and of the "goodly Babylonish garment" secreted by Achan from the spoils of Ai, 1,500 years before the erudite Roman made his miscellaneous collection of curiosities.

A specimen of an ancient Egyptian rug in the possession of Mr. Hays is described by Wilkinson as made of woolen threads on linen strings, having a central figure in white on a green ground, a border of red and blue lines, and the remainder of it a ground of yellow with figures and ornaments in red, white, and blue. This is but 11 × 9 inches, and may be needlework on linen canvas, with one set of linen strings pulled out, and it cannot be relied upon as illustrative of *loom-work*, though interesting as *embroidery*.

Rugs and mats were the earliest form of carpets, and the early notices of them are frequent and interesting. (See CARPET.) Pliny says: —

"Thick flocky wool has been esteemed for the manufacture of carpets from the very earliest times. It is quite clear from what we read in Homer, that they were in use in his time. The Gauls embroidered them in a different manner from that which is practiced by the Parthians. Wool is compressed, also, for making a felt, which, if soaked in vinegar, is capable of resisting iron even; and, what is still more, after having gone through the last process, wool will even resist fire; the refuse, too, when taken out of the vat of the scourer, is used for making mattresses, an invention, I fancy, of the Gauls."

"The *gausapa* [a thick cloth, shaggy on one side, and used for coverlets and cloaks] has been brought into use in my father's memory, and I myself recollect the *amphimalla* [napped on both sides] and the long shaggy apron [*ventrale*] being introduced; but at the present day, the *laticlave* [broad-striped] tunic is beginning to be manufactured into an imitation of the *gausapa*."

"Varro [50 B. C.] informs us that he himself was an eyewitness that, in the temple of Sancus, the wool was still preserved on the distaff and spindle of Tanaquil [wife of Tarquinius Priscus, 616 B. C., and a native of Etruria], who was also called Caia Cæcilia; and he says that the royal waved [watered] toga formerly worn by Servius Tullius [578 B. C.], and now in the temple of Fortuna, was made by her. Tanaquil was the first who wove the straight tunic [*tunica recta*, woven in a perpendicular loom]. Such as our young people wear with the white toga; newly married women, also. Waved [*undulata*, watered] garments were first the most esteemed of all, after

which those formed of various colors came into vogue. Fenestella informs us that togas with a smooth surface, as well as the Phrygian togas, began to be used in the latter part of the reign of Augustus. The *pretexta* had its origin among the Etrurians."

"The method of weaving with more than one thread was invented at Alexandria. These cloths are called *polimita;* it was in Gaul that they were first divided into checkers."

Pliny gives the Gauls good credit, — checker-work weaving, the reaping-machine, beer of malt, bread raised by yeast, sieves of horsehair, embroidered rugs; but all *trans Padanus* (Po) seems to have been Gaul with Pliny.

The Greeks and Romans had looms in which the warp was horizontal, and others in which it was vertical, so that the weaver *sat* at work. The box-wood shuttle was of the modern shape, pointed at each end, and had a cavity in which the woof-thread was wound on a stationary pirn or quill, or on a bobbin which revolved as the yarn unwound, and passed through a hole in the side of the shuttle.

The threads of the warp were decussated by a stick (*arundo*), which divided the threads alternately, and the respective sets were passed through the loops of the leashes (*liciæ*) of the harness; the leashes of a given set being attached to a straight rod called a *liciatorium*. The simplest form had one set of leashes, which alternately raised and depressed its set of threads above and below the intervening threads. The number of sets of leashes was increased according to the complexity of the pattern. The woof-thread was beaten up to compact the fabric by a sword (*spatha*) or a comb (*pecten*), like the modern *reed*.

The term *polimita*, signifying "many leashes," and the reference to it by Pliny, indicate that the Greek and Roman looms had harness in which the leashes were arranged in sets to weave twills or patterns, which the Latin terms *bilex*, *trilex*, and the Greek *dimitos*, *trinitos*, *polimitos*, alluding to the degree of complexity of the system, fully confirm.

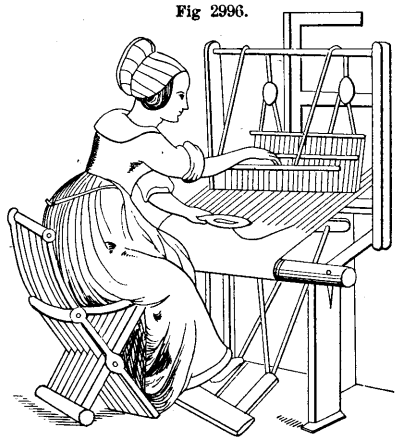
What the Gr. ἑξάμιτον, or *six-threaded*, may have been it is not easy to tell; but the word is used in connection with a sprig or ornament produced in the texture at regular intervals, and it is probable that it was a six-part harness, floating the woof to make a pattern. The name came down through the ages as ξάμιτον, Lat. *samitum*, O. Fr. *samet*, Ger. *sammet*, Sp. *xamete*, It. *sciamito*, and in our own archaic, —

> "So flashed and fell the brand Excalibur:
> But ere he dipt the surface, rose an arm
> Clothed in white *samite*, mystic, wonderful,
> And caught him by the hilt."

The arts of dressing flax and wool were known in Britain previous to the conquest by Cæsar, who states that the art of weaving was not known by the islanders. However this may be, an imperial manufactory of woolen and linen cloth for the use of the Roman army in Britain was established at Venta Bulgarum, since called Winchester. In Bishop Aldhelm's book, A. D. 680, in an essay on character, occurs a simile from the art of figure-weaving, in which he refers to a "web woven by shuttles, filled with threads of purple and many other colors, flying from side to side, and forming a variety of figures and images." A famous specimen of embroidery of this character is preserved in the Cathedral of Bayeaux. It is a piece of linen about 19 inches in width and 67 yards in length, containing the history of the conquest of England by William of Normandy. It is supposed to have been executed by Matilda, wife of William, and the ladies of her court. Its beauty is principally needlework.

The annexed cut is from Erasmus's book, the "Praise of Folly," and shows the lady of the house

Fig 2996.



A Ladye at her Loom.

at her loom. The cloth-beam, shuttle, and harness are clearly shown.

> "What need we name the sev'ral kinds of looms?
> Those delicate, to whose fair-colour'd threads
> Hang figur'd weights, whose various numbers guide
> The artist's hand: he, unseen flow'rs, and trees,
> And vales, and azure hills, unerring works."
>
> DYER, *The Fleece*, 1757.

Toward the close of the eleventh century, the weavers in the large towns of England were formed into guilds or societies.

In the reign of Richard I. (1197) a law was passed for regulating the fabrication and sale of cloth.

Edward III. encouraged the immigration of weavers and cloth-makers, but the art does not seem to have flourished in England as it did on the Continent, as wool continued to be a staple article of export.

During the persecutions of the Duke of Alva in Flanders, in the sixteenth century, many Flemish weavers settled in England, and introduced or promoted the manufacture of baizes, serges, crapes, and other descriptions of stuffs. The revocation of the Edict of Nantes in 1685 (granted to the French Protestants by Henry IV. in 1598, confirmed by Louis XIII. in 1610, and by Louis XIV. in 1652), by Louis XIV. drove from France many ingenious artisans, who carried with them to England and other countries the arts of silk working, making crystal glass, jewelry, etc.

In weaving plain cloth the threads which run lengthwise of the fabric constitute the *warp*. Those in the direction of the width are called the *weft*, *woof*, *shoot*, or *tram*.

The warp is divided into two parts, each containing an alternate thread, which are alternately raised and lowered, allowing the weft-thread to pass between them through a space termed the *shed*.

The principal working parts of the hand and power loom are the same, comprising a frame, at one end of which is the *beam* or *yarn roll*, on which the warp-threads are wound, and at the other the *cloth-beam* on which the finished cloth is wound. The means for paying off the yarn from one beam and winding the cloth on to the other are known as the *let-off* and *take-up* respectively.

Each half of the warp is alternately raised and lowered by means of the *healds* or *heddles*, threads

having loops at their lower ends and attached above to two horizontal rods connected by a pulley, the whole collectively constituting the *harness*, so that when one heald rises the other falls. Each warp-thread passes through one of these loops. The warp-threads also pass through the *dents* or teeth of a *reed* at the lower part of a movable swing-frame called the *lathe*, *lay*, or *batten*, which beats home and compacts the warp-threads as the work progresses.

The bottom of this frame has a projecting ledge, forming a path for the *shuttle* which contains a *cop*, on which the weft-yarn is wound.

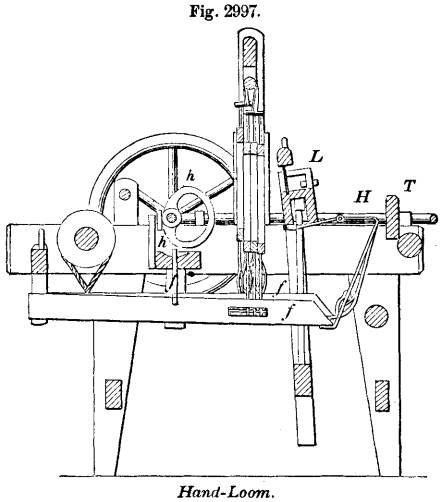
The shuttle in hand-looms is thrown across the race by hand or by means of the *fly*. When the latter is used the two ends of the shuttle-race are closed, so as to form a trough in which two pieces of wood, called *pickers* or *peckers*, are caused to move along wires. A string from each picker is attached to a handle which the weaver holds in his right hand, and by means of a smart jerk he propels the shuttle back and forth along the race. The weaver is seated at the end of the loom next the cloth-beam, and by pressing with his foot on one of two treadles he raises one of the *healds*, and with it one set of warp-threads. The shuttle is then thrown, passing through the shed between the two sets, and the weft-thread is driven home by the batten, which the weaver guides with his left hand. The other treadle is now depressed, raising the other set of warp-threads, the shuttle thrown back to its first position and the weft-thread beaten home as before. In this manner the weft-thread is caused to pass alternately above and below the threads of each of the two sets composing the warp until the work is completed. When a few inches of cloth are woven it is wound upon the cloth-beam.

In order to prevent the cloth from contracting in breadth before being wound on the cloth-beam, two pieces of wood with sharp-pointed ends, which are inserted in the selvage of the cloth, are employed. This stretcher is called a *temple*.

Previous to being wound on the yarn-beam, the warp-yarns require to be laid side by side in one plane. This is effected by a device called the WARPING-MILL (which see).

In Fig. 2997 is shown an improved hand-loom,

Fig. 2997.



Hand-Loom.

operated by a crank on the shaft *H*. The warp-roller is at the left and the cloth-roller at the right of the machine. The harness-frame carries four heddles, which are actuated by the revolution of the cams *h h*, acting on levers *f f* connected to the heddles. *L* is the shuttle-box on the lay, and *T* the breast-beam. A fly-wheel on the same shaft with the cams equalizes the motion. The cams are so arranged on the shaft as to act in the required consecution to produce the twill or pattern required, and by increasing the number of cams and heddles a variegated recurrent pattern of considerable complexity may be produced. The revolution of the crank gives all the motions of the machine, — heddles, shuttle, and batten. (See HAND-LOOM.) In other forms of hand-looms the motions are derived from the vibration of the batten.

A positive motion has been given to the shuttle in place of the fly motion, on several occasions. Once in Greenough's circular loom, and again in Lyall's reciprocating loom. In the latter case, the shuttle is conveyed through the shed by a carriage which is impelled by cords, which are wound upon a reciprocating drum beneath the frame. The carriage and the shuttle have rollers which move in contact with the yarn, so as to have a rolling but no rubbing action. The rotary motion of the rollers in the carriage is transmitted through the warp to the lower rollers of the shuttle, as the threads of the warp pass between the two.

The earliest power-loom on record was contrived by a French naval officer, M. de Gennes, and is described in the "Journal des Sçavans," 1678. The inventor claimed that a single mill could give motion to 10 or 12 looms, and that cloth could be made by their means much wider than by the ordinary loom then in use. It does not appear to have been a practical working apparatus, and never came into use.

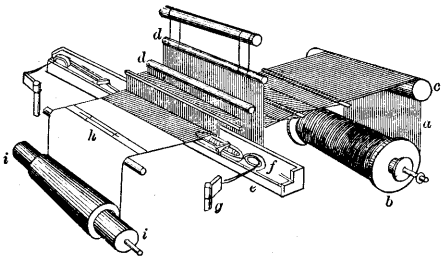
We are indebted to Dr. Edmund Cartwright for the first practical power-loom. He was a minister of the gospel, and unacquainted with mechanics; but had his attention turned to the subject by a remark, that when Arkwright's patents expired so many persons would go into the spinning business that no hands would be found to weave the cotton. He declares that his first attempt was a most rude piece of machinery. "The warp was placed perpendicularly, the reed fell with the weight of at least half a hundred weight, and the springs which threw the shuttle were strong enough to have thrown a Congreve rocket." It required the power of two men to work it. He secured his patent April 4, 1785. He then went for the first time to see how other people wove, and was astonished at the comparative clumsiness of his own contrivance. He went on improving, and took out his last patent 1787. He met with the trouble incident to great inventors, — an ignorant populace and rich pirates. He spent £30,000 in his endeavors to perfect his loom, and in 1808 received a Parliamentary grant of £10,000 for his great national services. On this sum he retired to a farm in Kent, and spent his declining years in comfort, occaionally trotting out his hobbies. He died in 1823, aged 80.

Steam was applied to his looms in 1807.

Fig. 2998 shows the working parts of a power-loom, the framing being omitted.

The warp *a* is wound upon the warp-beam *b*, and, passing over the roller *c*, is carried through the two healds *d d*, which alternately raise and lower the two sets of warp-threads, forming the shed for the passage of the shuttle. The shuttle is driven along the shuttle-race *e* by a kind of hammer *f*, worked by a lever *g* moving through a small arc of a circle. The finished cloth is kept tight by the temples *h*, a portion being wound on the cloth-beam *i i*.

Fig. 2998.



Working Parts of a Power-Loom.

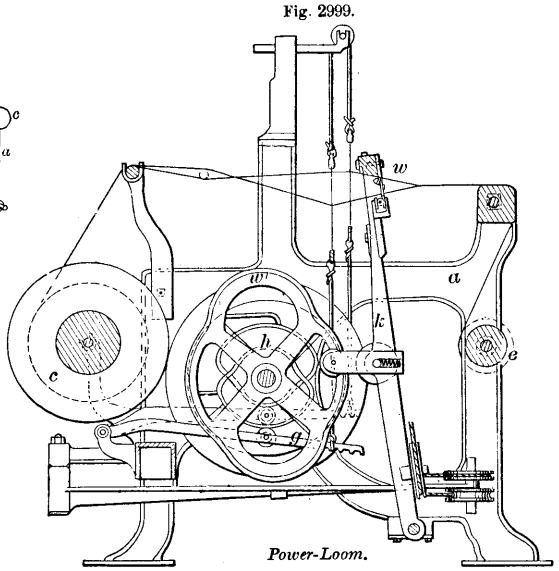
In the power-loom, five distinct actions are performed by steam-power.

1. Raising and lowering alternately the two sets of warp-threads.
2. Throwing the shuttle.
3. Driving up each weft-thread after the shuttle is thrown.
4. Unwinding the warp from the beam.
5. Winding the cloth on the cloth-roller.

An arrangement is also introduced for stopping the loom when a thread breaks, when the shuttle sticks in its passage, or when the yarn on the cop contained in the shuttle has run out. This may be effected in various ways, depending on the nature of the loom.

Fig. 2999 represents an improved power-loom. *a* is the frame, *c* is the warp-beam, and *e* the cloth-beam; *k w*, the lay. The heddles are actuated by cams *h* acting on the levers *g*, to which they are

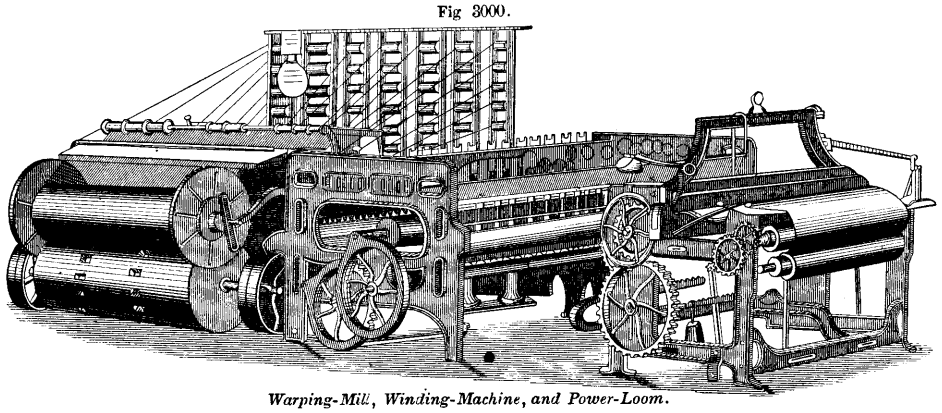
Fig. 2999.



Power-Loom.

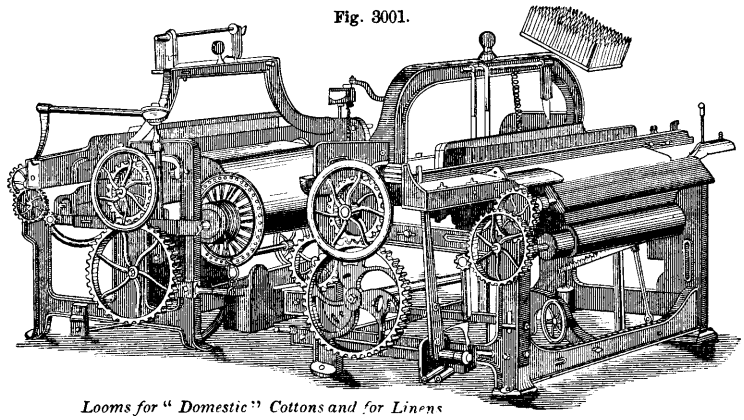
connected. On the same shaft is the scroll-cam *w*, in which traverses a roller imparting a vibratory motion to the lay, in which is a raceway for the shuttle.

Fig. 3000.



Warping-Mill, Winding-Machine, and Power-Loom.

Fig. 3001.



Looms for "Domestic" Cottons and for Linens

Fig. 3000 is a perspective view of a *warping-machine*, *winding-machine*, and a *loom* for light and medium cotton goods.

Fig. 3001 is a perspective view of two looms, one for "domestics" and heavy cotton goods, the other, on the right of the picture, for linens.

With the modern power-loom, the cost at Manchester of weaving a piece of cotton cloth 25 inches wide, 29 yards long, and 11 picks per ¼ inch, is estimated at 10¼ cents. One person can attend

to two or three looms, and each loom produces 26 pieces of such cloth per day.

On the old hand-loom of 1800, one man would attend to one loom, and would produce 4 pieces at an expense of 66 cents each.

In plain cloths the warp and weft threads are of about equal fineness. Yarns of two different sizes introduced into the web produce a sort of striping. When the warp and weft threads are of different colors a shot pattern is produced.

Striped patterns are formed by introducing at regular intervals the different colored threads required; checks, by inserting different colored threads at proper distances in the warp and crossing them in the weft by threads of the desired color in sufficient number to give the desired width.

In twills, each weft-thread does not cross alternate warp-threads, but only the recurrent third, fourth, fifth, or sixth, the required number being inserted through each heald. See TWILL.

Piled work, as velvet, velveteen, fustian, or piled carpet, is formed by introducing a third thread, previ-

Fig. 3002.

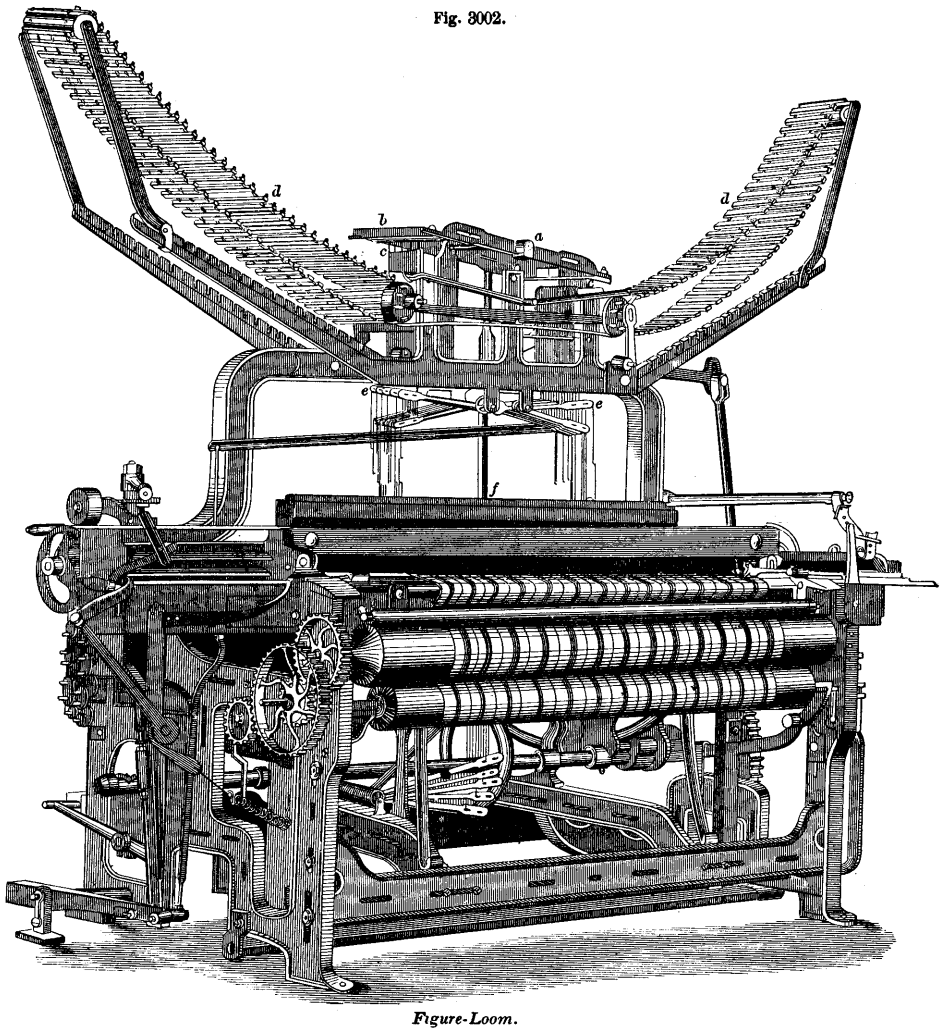


Figure-Loom.

ously looped by weaving it over wires the breadth of the fabric. In some kinds these are cut out with a knife, in others they are simply withdrawn from the loops.

One mode of making goods in patterns of colored figures is by means of a variety of shuttles, each carrying its own colored thread. These shuttles are arranged in a box which may be raised or lowered, so as to bring the required shuttle opposite to the picker which drives through the shed. This motion of the shuttle-box is obtained by means of a PATTERN-WHEEL or PATTERN-CHAIN (which see).

Figures, previous to the invention of Jacquard, were formed in the *draw-loom*.

In this, the warp-threads were arranged in separate groups so disposed as, in conjunction with the weft-threads, to form the figures. The proper succession of the weft-threads as to color, etc., was arranged by the weaver, several shuttles being employed, if necessary. For this purpose, a pattern-card was provided, to which the workman could constantly refer. Each set of warp-threads was attached to a handle by which they were drawn up at the proper time by an attendant called a *draw-*

boy. This involved liability to mistakes, deranging the pattern, and to obviate this a mechanical draw-boy was invented.

Jacquard's ingenious invention superseded this, producing an entire revolution in the art of figure-weaving.

Joseph Maria Jacquard was born at Lyons, 1752; invented his loom for weaving figured fabrics in 1801; and died at Orleans in 1834.

The action of the Jacquard in producing patterns upon fabric may be briefly described as follows: —

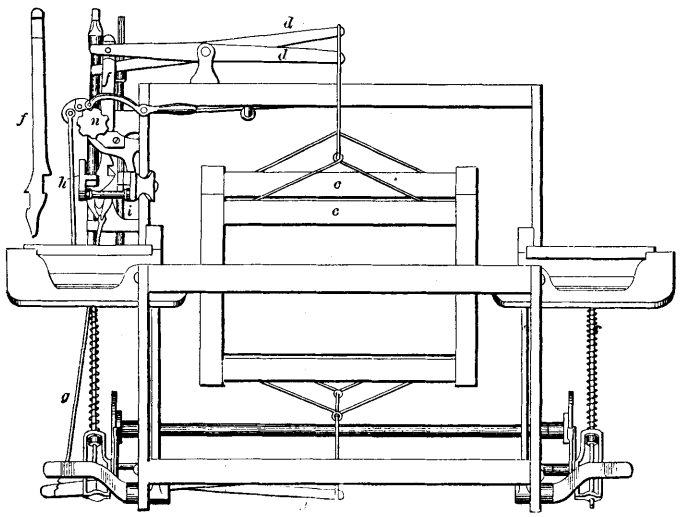
To the ordinary looms perforated cards are added, through which certain needles pass, causing the threads to rise and fall, according to the holes in the cards, thus reproducing upon the tissue in the loom the pattern which is perforated in the card. See JACQUARD LOOM.

Fig. 3002 is a view of an English power-loom for fancy weaving, having what is called a *dobby*, with the harness controlling mechanism.

The pattern-chains *d* are mounted in a frame at the top of the loom, and in their movement their pins act on vertical hooked wires or jacks *c*, connected with a series of coupled levers *e*, connected in turn with the harness-frames *f*. A rocking frame *a* at the top of the loom, provided at its opposite ends with cross or griff knives or bars *b*, engages the hooked wires selected by the pins of the pattern-chains, and raises the harness-frames necessary to produce the pattern. Plain and fancy twills, spots, satin checks, etc., may be produced. The loom also shows changeable shuttle-boxes.

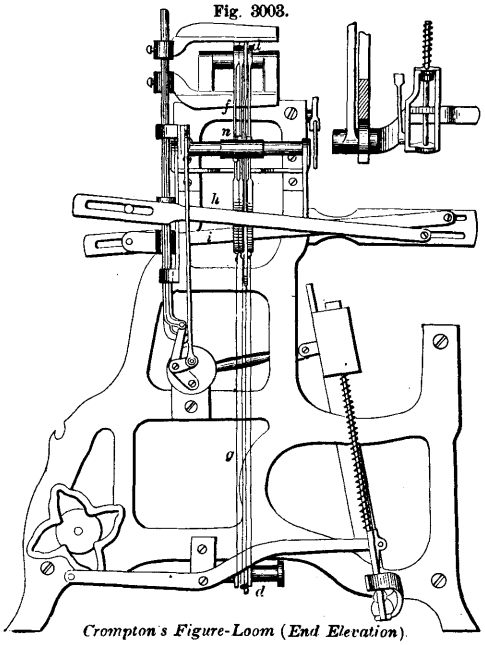
One example of Crompton's looms is given in Figs. 3003 and 3004, the former being an end elevation and the latter a front elevation.

Fig. 3004.



Crompton's Loom (Front View).

Fig. 3003.

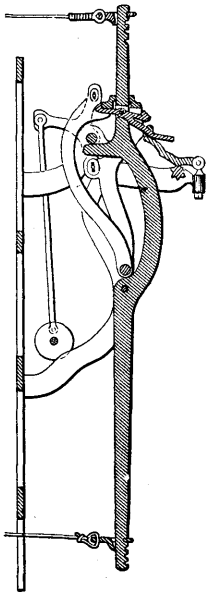


Crompton's Figure-Loom (End Elevation).

The harness-frames *c* are attached by cords or wires to horizontal top and bottom levers *d*, whose opposite ends are connected by means of notched jacks *f* and wires *g*. The notched jacks are moved by pins on a pattern-cylinder *n*, so that their notches are engaged by either the lifter or depresser *h i*, to raise or lower the harness-frames. This loom has also shifting shuttle-boxes, and the box-lever is moved by a star cam.

On the left of Fig. 3004, one of the jacks *f* is shown on an enlarged scale to exhibit the notches more clearly.

Fig. 3005.



Crompton's Loom (Shedding Motion).

In another variety of Crompton's loom (Fig. 3005), vertical levers pivoted at the side are connected at bottom and top to the heddle or harness-frames by cords, and notched jacks pivoted to such vertical levers and controlled by a pattern-cylinder are engaged by bars which move the levers and open the shed, these bars acting as lifters, depressers, and eveners. The figure shows the motion work merely.

In Short's loom for weaving fabrics of any width, the shuttles are carried through the shed by a belt having a continuous motion. This is supported on a carriage with small anti-friction rollers traversing the raceway when it is swung as a batten. A shuttle is engaged by a lug on the belt, and, after crossing the shed, deposited in a chan-

nel in the frame, when the belt engages another shuttle and carries it across in the opposite direction.

The number of patented inventions relating to looms and their appliances, both in this country and England, many of them of slight importance, is too great to give even a brief idea of here. Some of the more important will be found under their specific heads. See WEAVING.