2 Sheets Sheet 1.

E. B. Hastings,

Loom.

No. 111,343. Patented Jan. 31. 1871.

Fig. 1.

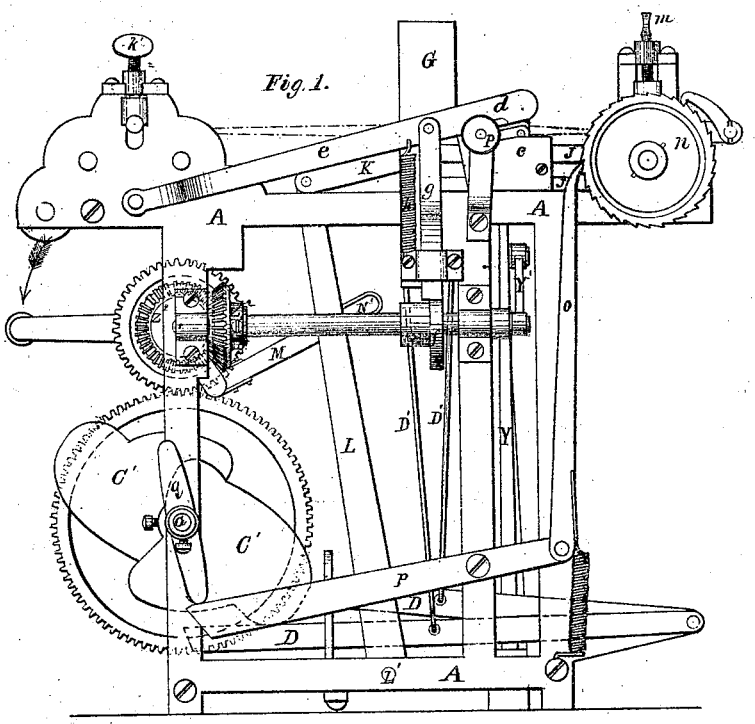
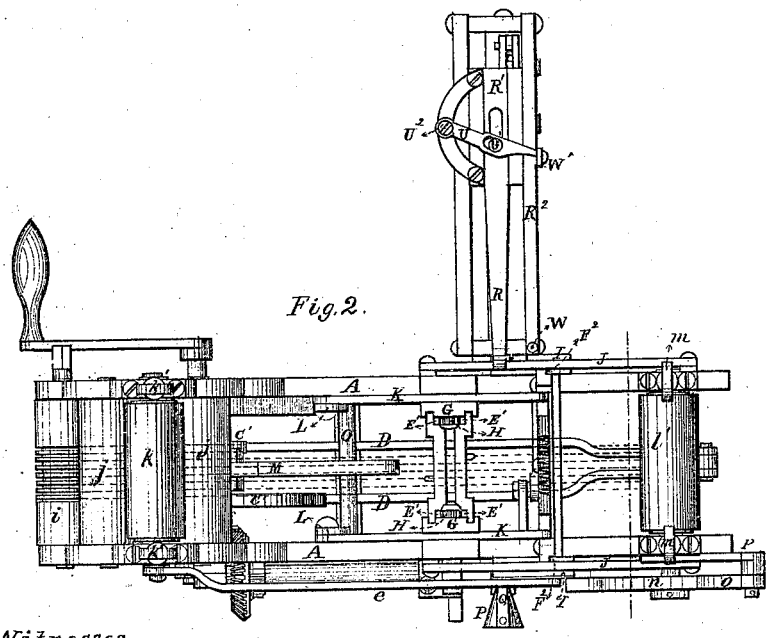


Fig. 2.



Witnesses.

N. P. Lombard

G. E. Whitney

Inventor.

Emory B. Hastings

2 Sheets, Sheet 2.

E. B. Hastings,

Loom.

No. 111,343. Patented Jan. 31, 1871.

Fig. 3.

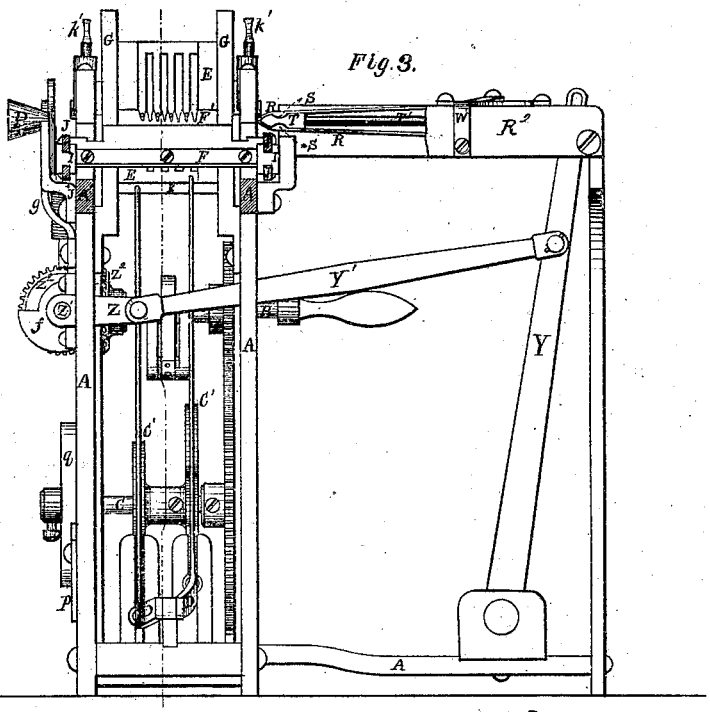


Fig. 6

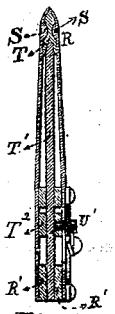


Fig. 4.

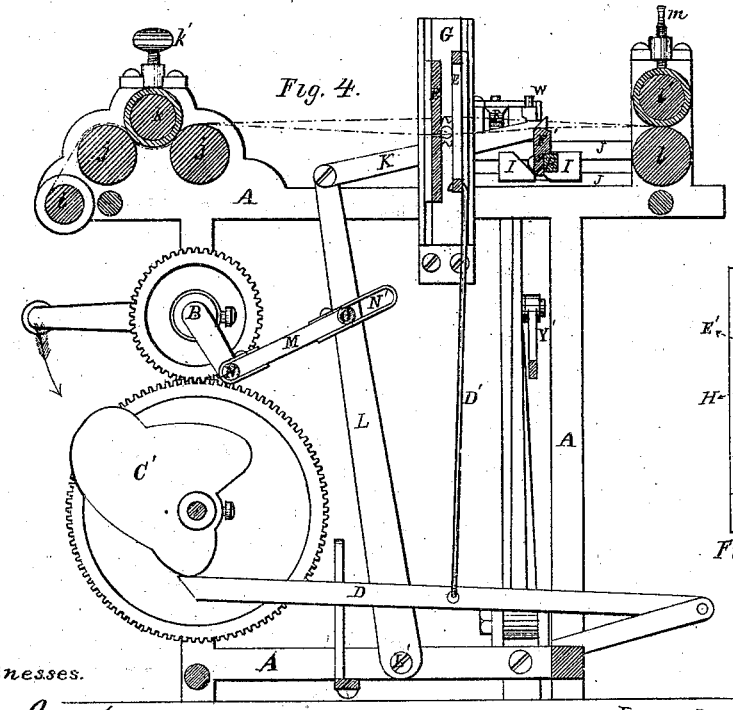
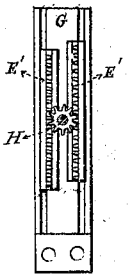


Fig. 5.



Witnesses.

N. G. Lombard

D. C. Whitney

Inventor.

Emory B. Hastings

United States Patent Office.

EMORY B. HASTINGS, OF PALMER, MASSACHUSETTS, ASSIGNOR TO HIMSELF, EDWIN SAWYER, DANIEL L. THOMPSON, AND CHARLES A. PERLEY.

Letters Patent No. 111,343, dated January 31, 1871.

IMPROVEMENT IN LOOMS.

The Schedule referred to in these Letters Patent and making part of the same.

I, EMORY B. HASTINGS, of Palmer, in the county of Hampden and State of Massachusetts, have invented certain Improvements in Looms, of which the following is a specification.

My invention relates to certain modifications in the construction of looms to adapt them to the weaving of fabrics which have warps and wefts of considerable rigidity, such, for instance, as strips of palm-leaf, rattan, &c., which have to be deposited in the fabric in separate and detached lengths because of their rigidity, their shape, and their want of continuity, which prevent them from being introduced into the shed like a continuous flexible yarn, or from forming a good selvage.

Of this character is the fabric composed of a light yarn warp and a weft of narrow strips of palm-leaf, of which "Shaker hoods," so called, are made; also, the fabric woven from strips of rattan or cane for chair-seating, and fabrics composed of yarn warps and a weft of reeds, straw, or other similar substances.

The loom shown and described is intended to weave such goods by power, both when the wefts are served to the loom singly by the hand, and when the wefts are served in a continuous strip so that the supplying of the weft to the loom will be automatic, in which case the weft is cut into separate lengths as it is introduced.

My improvements relate, in the first place, to the mechanism for supplying and introducing the weft into the shed, and consists—

First, in the combination of a trumpet-mouthed guide to receive the end of the weft, made with a large opening at the outer end to readily receive the end of the weft, and tapering to the small end, which is of a form corresponding to the shape of the weft, so that the end of the weft is accurately presented to the nipper, and is also prevented from twisting until it is delivered into the shed; and having a spring or other equivalent device for imposing upon the strand of weft a sufficient pressure to keep the end to be seized in position when it is released by the hand of the operator, and also to produce a drag upon the weft when it is drawn in, to keep it straight; and the shears for cutting off a length of weft, while it is held by the nippers, from a piece of indefinite length.

Second, in the combination and arrangement of the nipper for drawing in the weft, the guide for presenting the weft to the nipper, and the shears for severing the length of weft while held by the nipper, when the shears are actuated by the mechanism shown, or its equivalent, which will operate the shears independently of the movements of the lay and nipper, so that the severing of the weft can be done at any time in its progress and whatever may be the position of the lay.

Third, in the combination and arrangement of the bed-blade of the shears with the mechanism shown, or its equivalent, by which the bed-blade will be removed from the position in which it co-operates with the movable blade to cut off the weft, so that it will be out of the way of the nippers when they approach the end of the weft to seize it while held in the guide.

Fourth, in the manner of constructing and operating the nipper, as will be described.

Fifth, in the use of a comb in the place of a reed, the teeth of which are inserted between the warps behind the weft, and by a forward motion carry the weft to its proper position in the fabric; and by a reversed motion the teeth are withdrawn from the warps, leaving the shed free for the passage of the nippers while the comb is making its backward movement in a manner to be described.

Sixth, in connecting the leaves of heddles to give their movements in opposite directions, by means of racks on the ends of each leaf, which engage with the opposite sides of a pinion placed between them.

Seventh, the combination of the nipper and the cams for operating the heddles or harness so that their motion will be arrested when the shed is closed, and bring the warps upon the weft when it is drawn in, and hold it until it is taken by the comb, and then resume their motion to open the next shed.

Description.

In the drawing—

Figure 1 is a side elevation of so much of the loom as exhibits my improvements.

Figure 2 is a plan of the same.

Figure 3 is an end elevation.

Figure 4 is a vertical longitudinal section.

Figures 5 and 6 are separate views of some of the parts.

A is the frame of the loom.

B is the crank or lay-shaft.

C is the cam-shaft, upon which are mounted the cams C′, which, through the intervention of the levers D and rods D′, operate the leaves of heddles E.

These cams are of the form shown, which move the heddles by two movements in the same direction, with an interval of rest between the movements at the time that the warps are brought together.

The leaves of the heddles E are made rigid and as shown. Each leaf may be made of one piece of metal forming a grid, with the eyes or mails formed in the bars.

The object of making the leaves rigid is to guide the warps laterally, so that they will be truly presented to the action of the weft-comb or lay F, to be described.

Each leaf of heddles slides vertically in grooves in fixed guides G, on the frame, as seen in fig. 4.

Upon the inside of each leaf at each end is a rack, E′, which engages with the pinion H, which is mounted upon a fixed axis in the guide-frame G, by which arrangement the simultaneous movement of the heddles in opposite directions is effected.

The lay F is formed like a comb, the teeth of which project upward, and is attached to the upper side of the rocking bar F^1, which oscillates upon bearings at each end in the slide-box I, which slide in horizontal guides J, upon each side of the frame.

The rocking movement of the bar F^1 is produced by the action of the connecting-rods K, which carry the comb back and forth by reason of their attachment to the upper edge of the rocking-bar F^1, so that, as the connecting-rods reciprocate, they first rock the bar until it is arrested by one of the stops F^2, and then push the bar and slide-blocks along to the end of their stroke.

The connecting-rods K are attached to the tops of the vibrating-levers L at each side of the loom, which have their fulcrums at L′, in the lower part of the frame.

They receive their motion by means of the slotted connected rod M, from the crank N on the crank-shaft B.

The outer end of the connecting-rod M is made with a slot, N, which embraces the cross-bar O, which connects the levers L.

By the operation of this slot a portion of the motion produced by the crank N is lost, and the comb F and its adjuncts remain for a time at rest at each extremity of their motion.

P is a trumpet-mouthed guide, through which the strands of weft are presented to the nipper R, which draws them into the shed.

The opening at the outer end of the guide P is made large, so as to readily insert the end of the strand, but the inner end is made to nearly fit the size of the strand.

Upon the upper side of the guide, at the inner end, the metal is cut away to receive the spring Q, which rests upon the top of the strand and holds it with a slight force, sufficient to keep the strand in a position to be seized by the nipper R without holding it by the hand.

The nipper R is made with two blades or jaws of steel, of the form shown in figs. 3 and 6, which are attached to the stock R^1 which slides back and forth in guides in the frame R^2 a sufficient distance to draw the forward end of the weft through the shed.

The blades of the nippers are forced together by their own elasticity, and they are separated by forcing in the block T endwise between them, so that the thicker parts of the block shall come between the projections S S upon the insides of the blades.

The block T is attached to and operated by the rod T^1, which extends back through the stock R^1, as is shown. This rod is connected with the lever U, upon the top of the stock R^1, by the block T^2 and the screw U^1, as seen in figs. 2 and 6. The fulcrum of this lever is at U^2, upon a bracket, *u*, attached to the stock R^1.

The outer end of this lever, as the stock moves back and forth, comes in contact with the stops W W′, which are attached to the frame R^2, as shown, to open the nipper at the proper times to receive and deliver the weft.

The stop W′ is made to be adjusted to the length of the weft, or to the position of the nipper at which it is desired to release the weft from it.

The reciprocating motion is given to the stock R^1 and nipper R by means of the lever R, to the upper end of which the stock R^1 is connected, and the connecting-rod Y′, from the crank Z upon the shaft Z^1, which receives an equal motion from the lay-shaft B by means of the miter-gears Z^2 upon said shaft.

To the slide-block I is attached the bed-plate *c* of the shears; and the movable blade *d*, which co-operates with the same, is attached to the lever *e*. This lever and blade *d* are raised by the cam *f* upon the shaft Z^1, by means of the sliding rod *g*; and when this rod leaves the outer end of the incline of the cam the lever *e* and blade *d* drop, and their velocity is accelerated by the spring *h*, which causes the blade *d* to sever the strand of weft instantly.

The point at which the cutting off shall take place in drawing in the weft is determined by the setting of the cam *f* upon its shaft so as to let the blade *d* fall at any desired point in the motion of the nipper.

i is the warp-beam or roller, which is provided with as many scores or compartments as there are warps to be used, and in which the several warps are wound if they are composed of yarn.

j j are the warp-delivering rollers, which control the delivery of the warps. The warps are held by compression between these rollers and the rubber-coated roller *k* which lies between them, and is pressed upon both by the set-screws *k′*, which rest upon the boxes in which said roller revolves. This arrangement of the let-off rollers is intended to control the delivery of the warps whether they are wound upon the beam *i* or not, which might be the case in weaving with warps made of strips of rattan.

l l′ are the take-up rollers. They are set so as to receive the woven fabric directly between them, the lower roller *l* occupying the position of a breast-beam; and the fabric is delivered from these rollers to be reeled up or otherwise disposed of as may be found most convenient.

When it is desirable to use a "positive take-up," it is preferable to make the lower roller solid. The upper roller *l′* is made with a thick covering of India rubber, and is forced upon the lower roller by the set-screws *m* which rest upon its boxes.

The rollers are turned to take up the fabric as woven by the ratchet *n*, pawl *o*, and lever *p*, from the double throw-cam *q* on the cam-shaft C, in a manner similar to what is usually done in looms.

The use of the rubber coverings for one or both of the "take-up" and "let-off" rollers adapts them particularly to the weaving of fabrics which have the warps or wefts made of unyielding material such as are intended to be used in this loom, as the soft rubber surfaces of the rollers allow the unequalities of the surface of the warps or fabric to imbed themselves in the rubber and take a firm hold of the rollers by being simply compressed between them, and without injury to the goods or requiring them to be bent around the rollers, as is usually done to keep them from slipping, while the resilience of the covering restores it to its cylindrical shape as soon as the goods are out of contact with it. For this reason the rubber coverings should have considerable thickness.

Many of the details of construction, which are similar to those usually employed in looms, are not shown or described, as they do not constitute any part of my invention; nor are my improvements confined to any particular construction of those old parts, but may be used with a variety of forms of them; and I have therefore shown only so much of the operative parts of a loom as explains the construction and operation of my improvements.

The operation of the loom is as follows:

The warp being properly placed in the loom, the end of the weft, which in this case is supposed to be of indefinite length, is inserted in the guide P. The heddles open the shed, and the nipper advances through it until the end of the lever U meets the stop W, which draws the block T backward relatively to the nipper, between the projections S S on the blades of the nipper, and opens them so that the blades pass above and below the end of the weft that projects from the guide P.

At this point the block T will have passed by the projections S S, which will allow the blades to spring together and seize the end of the weft. The nipper then moves back, drawing the weft through the guide under the slight resistance of its spring, until there is sufficient length of weft between the nipper and shears for the width of the fabric. At this instant the rod *g*, which raises the shear-blade *d*, drops from the outer end of the incline of the cam *f* and instantly cuts off the length of weft, while the remaining part of the strand is held in the guide by the spring Q.

By this time the heddles will have made the first part of their movement and closed the warps upon the weft and nipper-blades which hold the weft straight and in place after it is cut off.

The nipper continues its movement with the length of weft until its forward end is drawn through the shed, at which time the lever U will have encountered the stop W′, which will again force the block T between the projections S S upon the blades of the nipper and open it, and release the weft, while the nipper passes on to complete its stroke.

When the weft is deposited in the shed, the levers L and rods K will have commenced their forward movement; and their first effect is to turn up the comb from its backward-inclined position to a vertical one, when its further rotation is arrested by the stop F^2 with its teeth standing upright between the warps, and behind the length of weft just deposited. The continuation of the movement of the rods K carries the comb forward in this position, with the weft before it, and deposits it in the fabric.

By this time the shed will be opened and the nipper again enters it, and the comb commences to go back; and its first movement is to rock backward until it meets the stops F^2 on the slide-blocks I, which carries the teeth of the comb out of and below the warps, and then carries the comb back below the warps and nipper and beyond the latter, when it is ready to repeat the operation.

By this means I am enabled to move the nipper by a continuous crank motion, which gives much greater rapidity to the operation of the loom than when the nipper is worked by a cam with interrupted motions; and also gives great ease to the working of the parts, and great simplicity in construction.

In weaving with wefts which have been previously cut to length, the shears *d* would not be used; but each strand would be inserted into the guide P by the hand of an attendant. But in weaving with rattan, the strands of which are several times longer than a single weft, or where the strands are spliced together so as to make a continuous strand, the shears would be used and the supply of weft would be automatic.

Claims.

What I claim as my invention is—

1. The combination of the guide, having a spring for producing pressure upon the weft to hold it therein, and the shears for cutting off the weft while it is held by the nippers, when all are constructed and arranged substantially as described.

2. The combination and arrangement of the nipper, the shears, and the guide, when the shears are operated by the mechanism shown, or its equivalent, so that the shears will cut off the proper length of weft before it is entirely drawn in by the nipper, substantially as described.

3. The combination and arrangement of the bed-blade of the shears with the block I, by which the blade is moved out of the way of the nipper when it seizes the weft, and returns to co-operate with the movable blade at the proper time, substantially as described.

4. The combination of the lever U and stops W W′ with the nipper, when all are constructed and arranged substantially as described.

5. The combination of the nipper and its adjuncts with the crank for operating the same, which works independently of that which operates the comb, through the intervention of the intermediate devices or their equivalent, substantially as described.

6. The comb for beating up the weft, having both the reciprocating and rocking motions, constructed and operating substantially as described.

7. The combination of two leaves of heddles having racks upon each end of them, as described, and an intermediate pinion that engages with both of them, substantially as described.

8. The combination of the nipper and double throw-cams, and accessory mechanism for operating the heddles or harness so that the motion of the heddles or harness will be arrested when the warps are closed upon the weft, and then continued to open the next shed, substantially as described.

Executed August 29, 1870.

EMORY B. HASTINGS.

Witnesses:

N. C. LOMBARD,

G. E. WHITNEY.