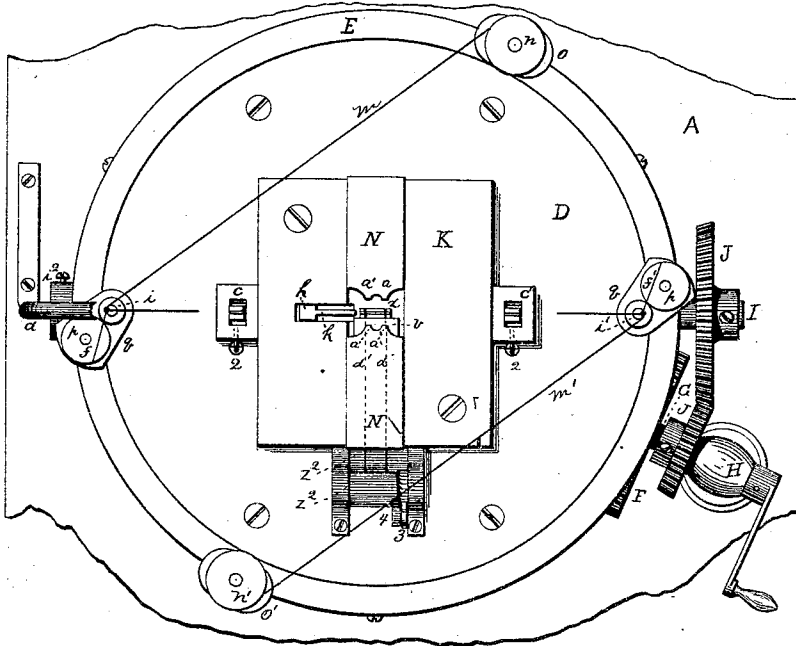
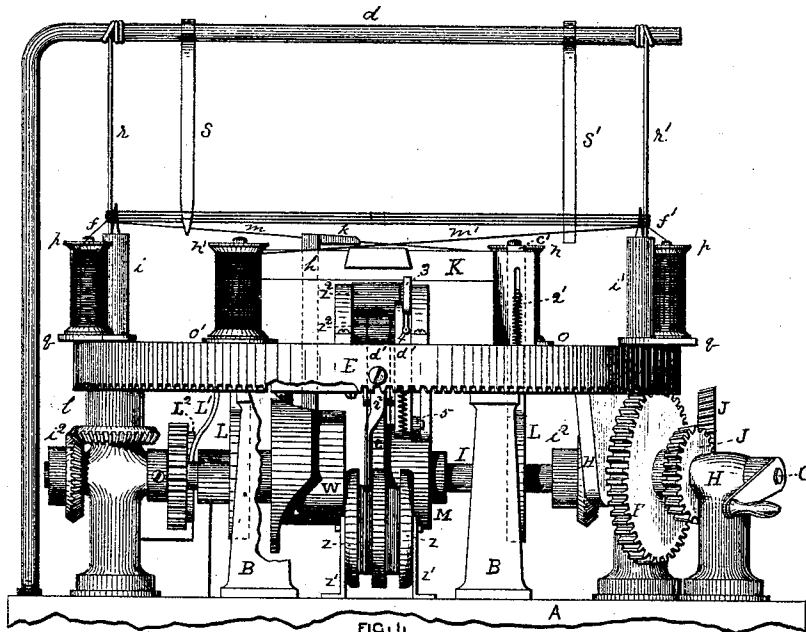


J. H. CROWELL.

Machines for Making Weavers' Harness.

No. 152,465.

Patented June 30, 1874.



WITNESSES:

J. H. Kendrick
E. P. Daniels

FIG. 2.

INVENTOR,

John H. Crowell

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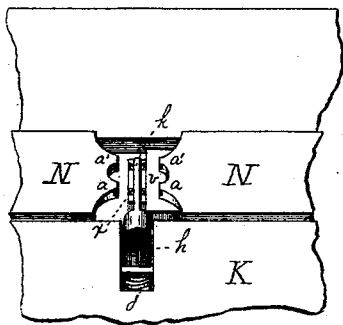


FIG. 3.

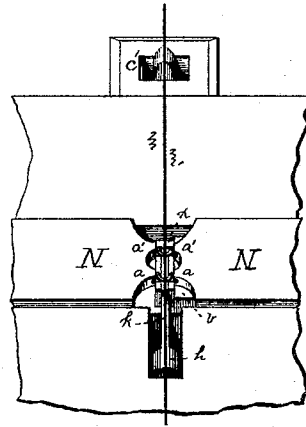


FIG. 4.

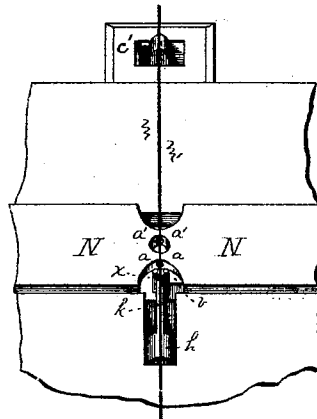


FIG. 5.

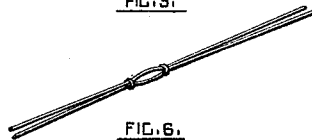


FIG. 6.

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UNITED STATES PATENT OFFICE.

JOHN H. CROWELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE
KENDRICK LOOM-HARNESS COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR MAKING WEAVERS' HARNESS.

Specification forming part of Letters Patent No. **152,465**, dated June 30, 1874; application filed
January 23, 1874.

To all whom it may concern:

Be it known that I, JOHN H. CROWELL, of the city and county of Providence, in the State of Rhode Island, have invented a new and Improved Machine for Making Weavers' Harness; and I do hereby declare that the following specification, taken in connection with the drawings making a part of the same, is a full, clear, and exact description thereof.

The object of my invention is to produce a machine which shall automatically make that description of loom-harness in which the eyes are formed by clasping two metallic bands at the requisite distance apart around the two contiguous twines which constitute the respective heddles of harness, as distinguished from those descriptions of loom-harness in which twines which constitute the heddles are knotted or otherwise concatenated to form the eyes.

My machine comprehends devices for laying two twines alternately across from side band to side band of the harness in successive convolutions, and, also, in combination therewith, devices for supplying the machine with wires suitable for the two clasps for each heddle, for cutting off the same into suitable lengths to form the clasps, for partially shaping the same, for inserting the heddle-twine in the partially-formed clasps, and for finally closing the clasps firmly upon the heddles. A special means, peculiar to the machine, is exhibited for selecting the leese of the harness.

In connection with these devices referred to for performing the above-named operations, there is also employed means which are common to other harness-making machines for crocheting the several heddles to the side bands, and for carrying along the harness as fast as each heddle is formed.

Figure 1 is a side elevation of my improved machine. Fig. 2 is a plan view. Figs. 3, 4, and 5 are enlarged perspective views of the cutters, formers, and dies, showing the manner of attaching the metal to the heddle-twines. Fig. 6 exhibits a heddle-eye.

A represents a base plate or platform, to which are suitably secured the columns B B B B, which, at their top ends, are attached to the circular plate D, Fig. 2. These two plates A and D are used for supporting the operat-

ing mechanism of the machine. The two twines *m m'*, to form the heddles, are carried by two spools, *n n'*, mounted on two spool-stands, *o o'*, which are constructed in any convenient form that will enable the twines to be given off from the spools. The spool-stands *o o'* are attached to the top of a crown gear-wheel, E, which revolves around the circular plate D. Motion is imparted to the crown gear-wheel E by a gear-wheel, F, on the primary shaft G, which latter is supported in the bearings H H, and receives motion from any competent prime mover. The two twines *f f'*, for binding or securing the heddles as they are successively formed to the bands, are carried by two spools, *p p*, mounted on spool-stands *q q*, which are revolved around studs *i i'* once during the formation of each heddle by means of the bevel-gear wheels *ll* engaging with the bevel pinion-gears *i' i'*, which latter are attached to the shaft I, which, in turn, is connected by gear-wheels J J to the primary shaft G. The two bands *r r'*, Fig. 1, of the harness are taken from spools, and led thence under friction pressure-springs, through hollow vertical studs *i i'*, and, finally, made fast to a sliding bar above the machine, adapted to slide on a vertical standard in a manner similar to that described in the drawings and specifications of Letters Patent issued January 2, 1855, to one Joseph S. Winsor, and numbered 12,175. In the present instance, to avoid confusion in the drawings, the spools for the bands are not shown; neither is the sliding bar for the side bands represented. As the heddles are formed in succession and secured to the bands, they are to be supposed to be drawn upward by the upward movement of the bar to which the bands are secured, and over the ends of the two rods *s s'*, Fig. 1, whose offices are to preserve the leese of the harness. These two rods *s s'* are located in the central vertical plane of the machine, with their upper ends attached to an adjustable arm. The lower end of the rod *s* is pointed, and has its point situated in the horizontal plane, and at the right of the top of the stud *i* the lower end of the rod *s'* is situated below the horizontal plane, and at the left of the top of stud *i'*.

$c\ c'$, Fig. 2, represent two pinchers or gripping-fingers, located one at the right and the other at the left of table K, whose office is to draw the heddle-twines down into the rudimentary heddle-clasps, hereafter to be referred to, and there hold them until the operation of closing the said heddle-clasps around the heddle-twines is accomplished. These pinchers have an intermittently vertically-reciprocating movement given to them by means of the cams L L, Fig. 1, secured to the shaft I. The return movement of the said pinchers $c\ c'$ is effected by the recoil of spiral springs 2 2. In addition to the intermittent reciprocal movement given to the pincher c , it also receives an oscillatory movement, which causes the heddles, as they are successively finished, to be disposed alternately upon each side of the rod s . This movement is effected by means of the cam L¹, Fig. 1, actuating the lever L², which latter is attached to the stock which holds the nipper c , and thus is produced what is known as the "leese" in the harness.

The two wires $d\ d'$, to form the clasps at the ends of the eyes of the heddles, are carried by two spools, $z\ z$, Fig. 1, mounted on a horizontal rod, the ends of which are supported in the standards $z^1\ z^1$. $z^2\ z^2$ represent a pair of rolls for feeding the wires $d\ d'$ to the cutters, and which have an intermittently rotary movement communicated to them by means of a ratchet, 3, pivoted to the bar 4, which latter is connected to lever 5, Fig. 1, bearing on the cam M, which is secured to the shaft I.

k represents a former, having its lower edge convex, and which, in connection with a corresponding concave die made in the end of vertical wire-cutter x , is for the purpose of shaping the wire blanks for the heddle-clasps into the form of a semicircle. The said former k is at the end of and at right angles to the vertical bar h , arranged in the central vertical plane of the machine, and which bar is actuated vertically and horizontally by means of the cam W, Fig. 1, in combination with two spiral springs arranged at right angles to each other, one of which is shown at j , Fig. 3. The cutter x is arranged in the vertical center of the machine, and has vertical intermittent movement communicated to it by means of a cam-shaped flange attached to the cam M.

v , Figs. 3 and 4, represents a stationary wire holder and guide for guiding and holding the wire in the proper place while being cut off by the wire-cutter x .

N N are slides arranged in guides on the top of the table K, and at right angles to a vertical plane through the studs $i\ i'$. The inside ends of the slides N N, Fig. 2, are, respectively, provided with sets of dies $a\ a$ and $a'\ a'$, the offices which the said dies perform being, first, that of holding the rudimentary heddle-clasps during the operation of having the heddle-twines placed into them, and, second, that of closing the said clasps around

the heddle-twines. The slides N N, with their respective sets of dies, have an intermittently-reciprocating movement communicated to them by means of the cams $t\ t$, Fig. 1, and levers $r^2\ r^2$.

The arm to which the side bands are to be attached having been moved to a position just above the plane where the heddles are formed, the bands $r\ r'$ are drawn off their spools under pressure-springs, through studs $i\ i'$, and thence to said arm. The heddle-twine m and binding-twine f are drawn from their respective spools and fastened to the band r ; the heddle-twine m' and binding-twine f' are also drawn from their respective spools and fastened to the band r' . The wire for forming the heddle-clasps is drawn from the spools $z\ z$, and up between the feed-rolls $z^2\ z^2$, and thence, through the table K, to and through the guide and holder v , to the cutter x .

The rollers $z^2\ z^2$ now feed the wires $d\ d'$ through the guide and holder v , so that they project from the said holder the required length for the heddle-clasps. The former k then takes a position directly over and nearly in contact with the projecting wires. The cutter x next moves upward, and having partially cut off the projecting wires it brings them into contact with the former k , which, in combination with the cutter x , in its continued cutting movement, crimps the wires into the form of semicircles. These wires are now ready to receive the heddle twines, as shown in Fig. 3. The dies $a\ a\ a'\ a'$ then move simultaneously up to the rudimentary clasps, and hold them in the position shown at Figs. 4 and 5, during which operation the nippers $c\ c'$ are made to rise and take hold of the heddle-twines $m\ m'$, which have been given off from the spools $u\ u'$ as the latter were revolved with the crown-gear E, which has made half a complete revolution, so that at this moment the said twines are in close contact throughout their extent across the machine, and each twine is in contact with the opposite band to which it was last attached. The nippers now draw the two twines $m\ m'$, constituting one heddle, into the partly-formed clasps, as shown at Fig. 4. The dies $a\ a\ a'\ a'$ simultaneously continue the motion which brought them in position to hold the rudimentary clasps, and close the said rudimentary clasps around the heddle-twines $m\ m'$, as shown in Fig. 5.

The next operation of the machine is to secure the heddle-twines as they continue to be held by the nippers to the bands $r\ r'$ by means of the binding-twines $f\ f'$. This is accomplished in the same manner as that shown in the Letters Patent granted to me for improvement in harness-machines, December 9, 1873. This last operation of securing the heddle-twines completes the construction of the heddle, which is still held by the nippers $c\ c'$. The nipper c is then made to oscillate either to the front or rear of the rod s , after which the two nippers let go of the heddle, which operation will cause the two twines forming

each heddle to be deposited at one end on one side of the corresponding rod *s*, and at the other end on each side of the other rod *s'*.

The heddles, as they are formed, are taken out of the plane in which they are formed by the upward movement of the sliding bar to which the bands *r r'* are attached, which upward movement is effected by a sliding bar in a well-understood way.

I do not limit myself to the precise construction and arrangement of the several devices described, but I mean to include all variations of form and arrangement which perform the same mode of operation by equivalent means.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The revolving annulus *E*, furnished with the spool-stands *o o'*, in combination with the spools *n n'*, for carrying the heddle-twines, with suitable devices, as described, for crocheting or otherwise attaching the heddles to the side bands of the harness, whereby the twines to form the heddles of the harness are laid in regular successive convolutions, substantially as specified.

2. In combination with suitable heddle-forming mechanism, the feeding-rollers *z z'*, the

cutter *x*, the crimper *k*, and the dies *a a'*, the same being, respectively, for feeding forward the wires to form the clasps; for cutting the same into proper lengths; for crimping the wires to cut into rudimentary clasps; for holding the latter while the heddle-twines are inserted; and, finally, for closing the clasps upon the twines, substantially as set forth.

3. The crimping-bar *h k*, arranged to move in vertical and horizontal planes, in combination with a vertically-moving cutter for crimping the wires into shape to secure the heddle-twines, and then retreating out of the path of the devices subsequently employed, to insert the heddle-twines in the partially-formed clasps, and close the latter upon the twines, substantially as described.

4. The pinchers *c c'*, in combination with the dies *a a'*, for inserting the heddle-twines into the partially-formed clasps, as described.

5. The oscillating pincher *c*, in combination with the leese-rod *s*, for selecting the leese of the harness, substantially as described.

JOHN H. CROWELL.

Witnesses:

J. H. KENDRICK,
E. P. DANIELS.