

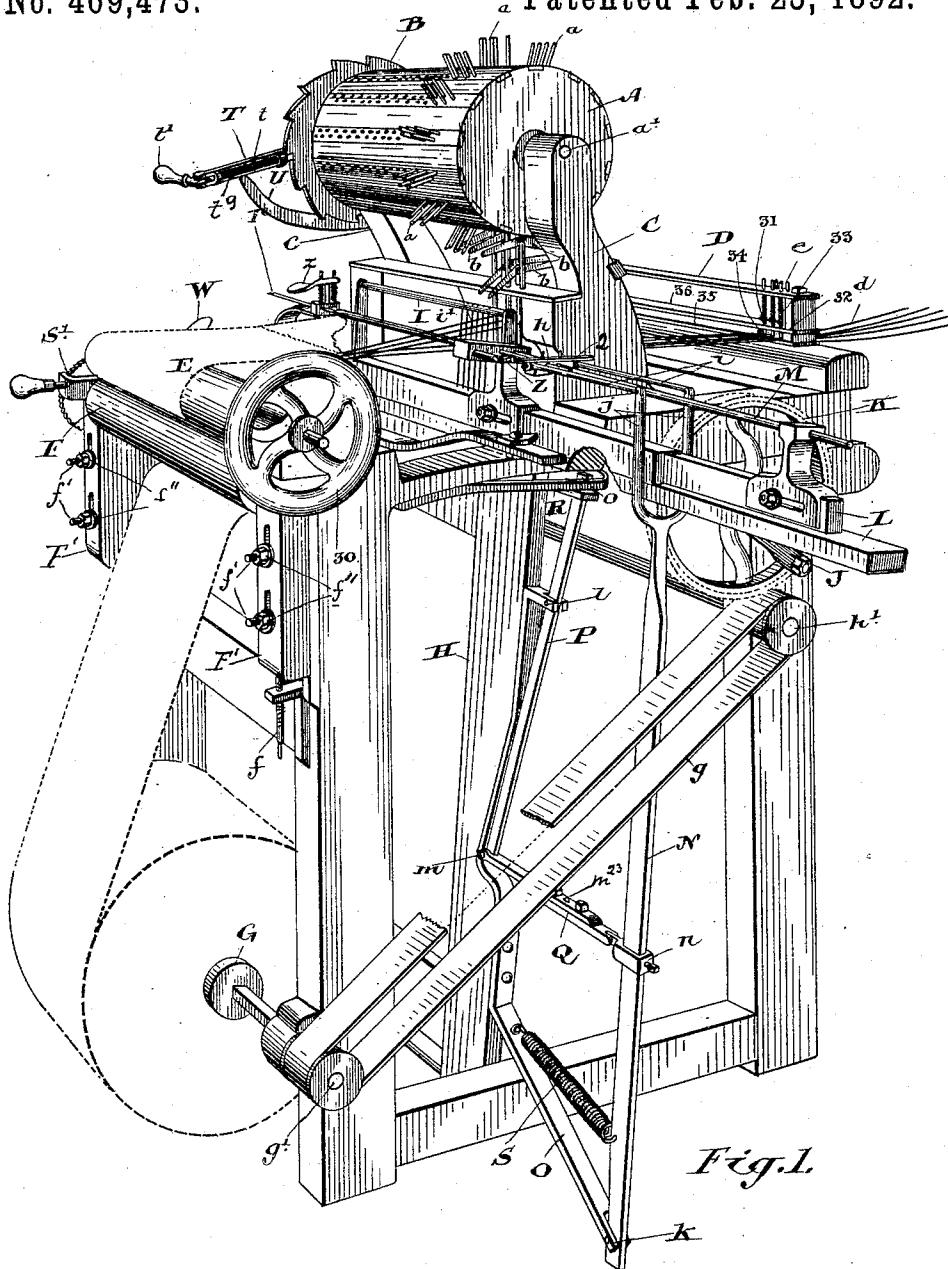
(No Model.)

4 Sheets—Sheet 1.

A. HAY.
LOOM FOR WEAVING CANE, &c.

No. 469,473.

Patented Feb. 23, 1892.



Witnesses.

F. B. Feshenstenhaugh.

W. S. McMillan

Inventor.

Archibald Hay.

By Donald G. Ridout & Co
Attys

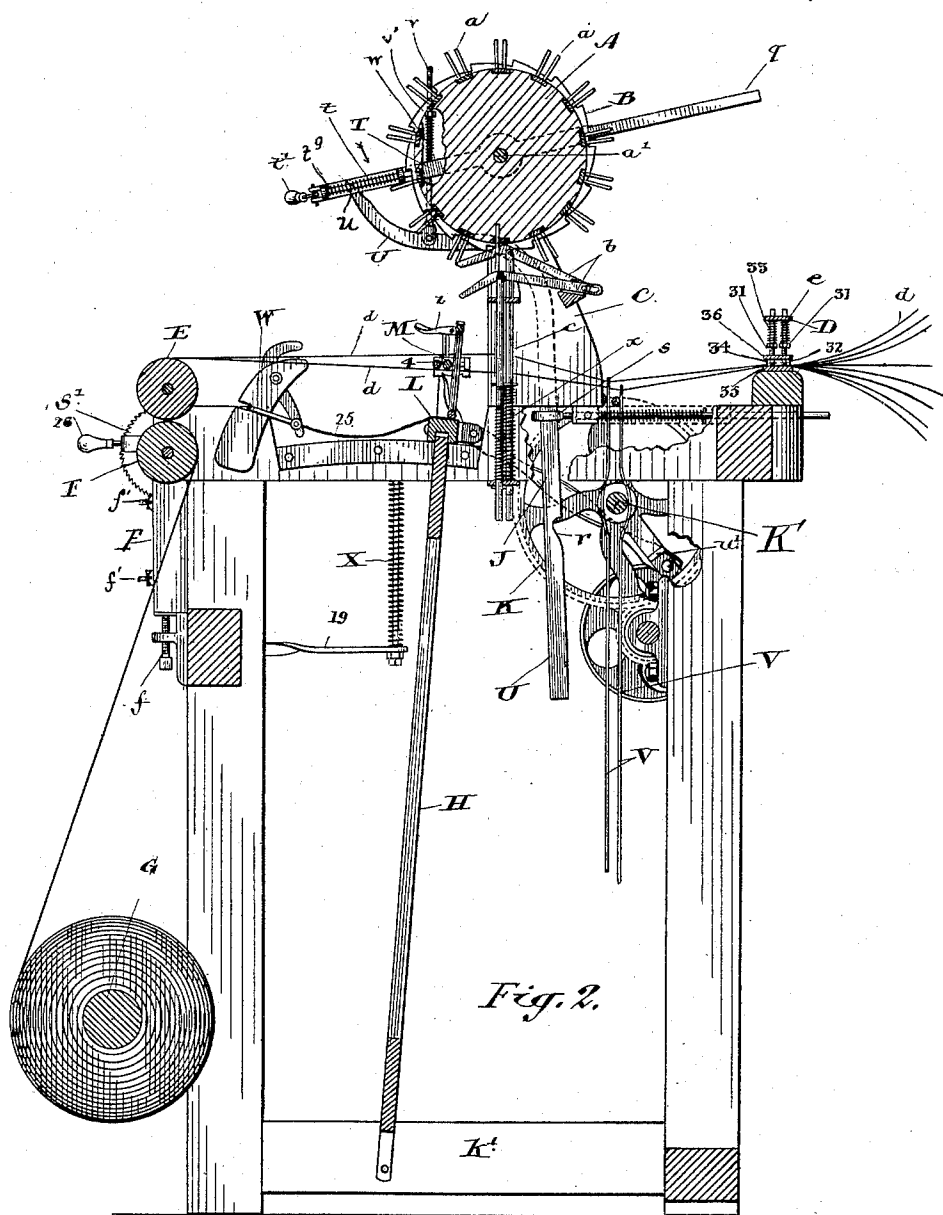
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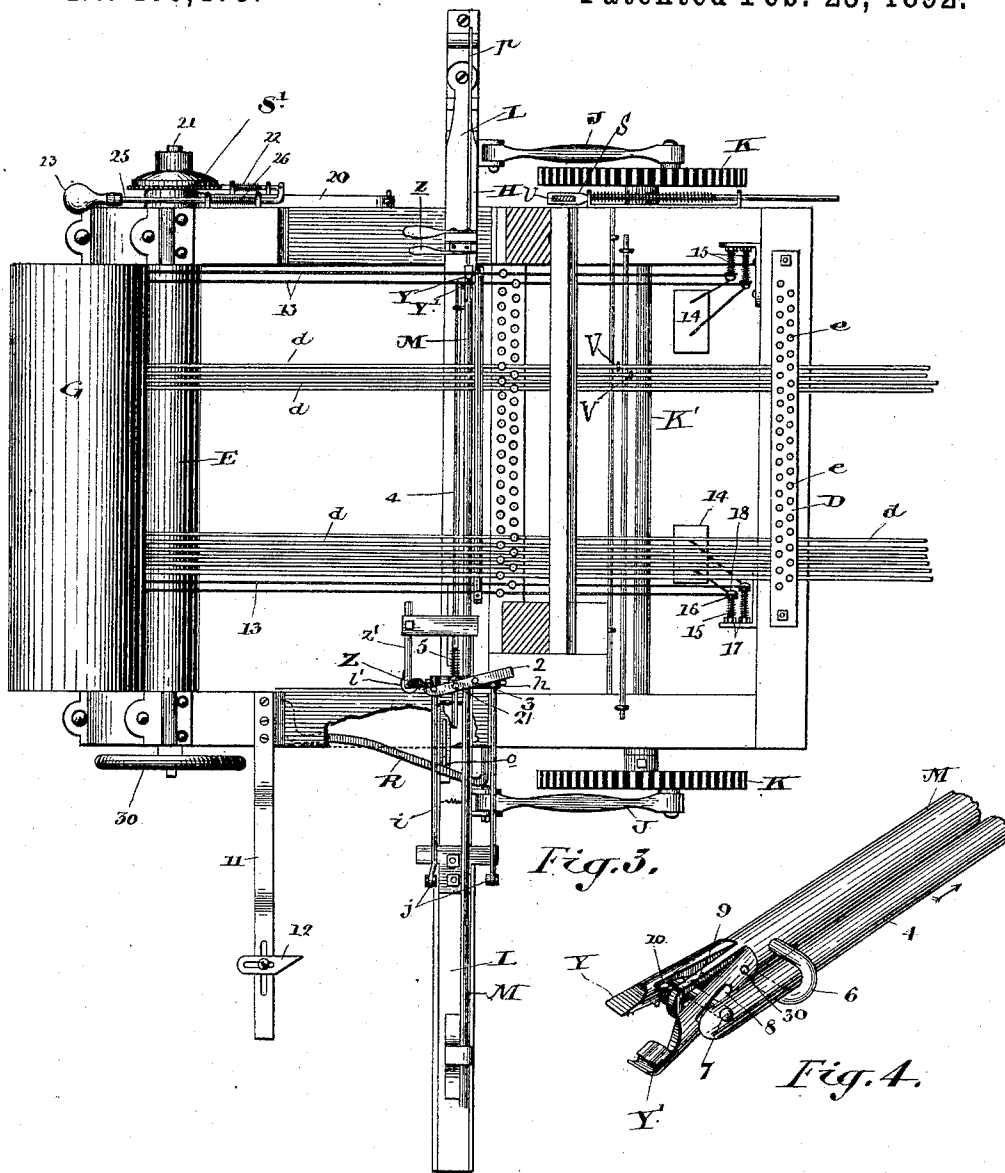
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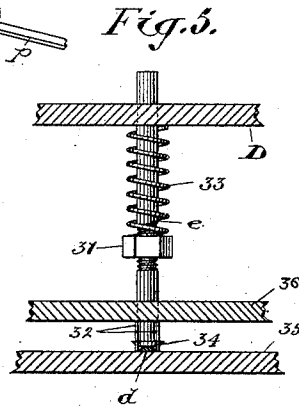
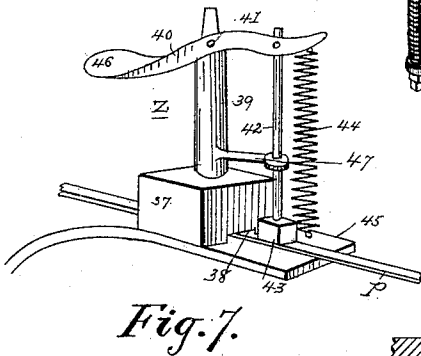
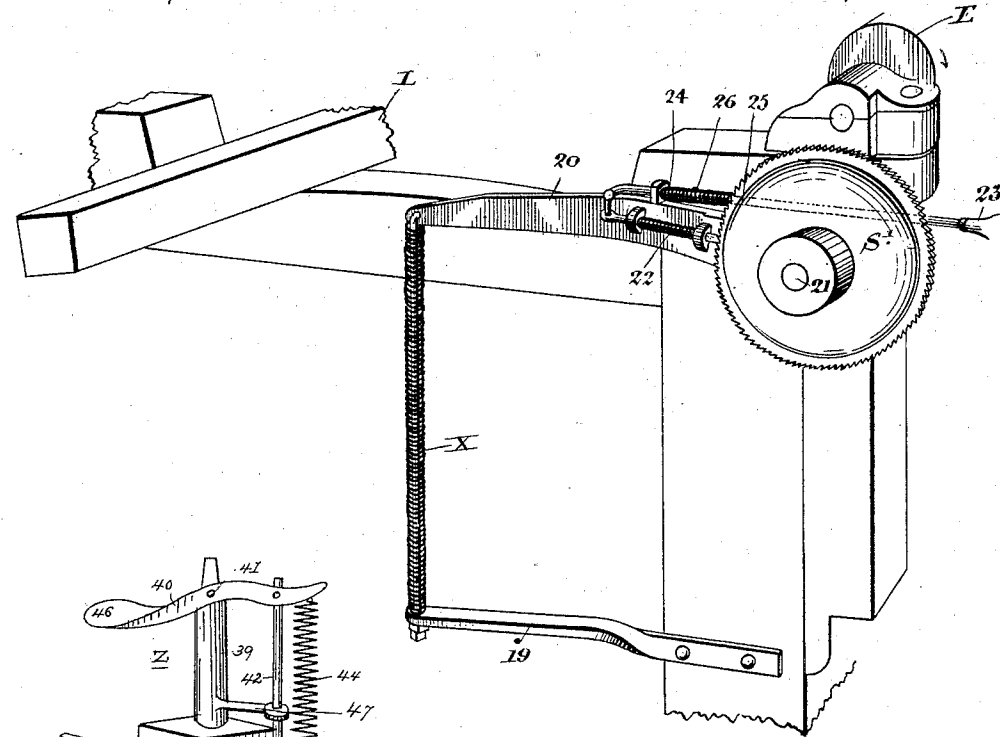
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Fig. 6

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UNITED STATES PATENT OFFICE.

ARCHIBALD HAY, OF WOODSTOCK, CANADA.

LOOM FOR WEAVING CANE, &c.

SPECIFICATION forming part of Letters Patent No. 469,473, dated February 23, 1892.

Application filed December 5, 1889. Renewed December 7, 1891. Serial No. 414,283. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD HAY, manufacturer, of the town of Woodstock, in the county of Oxford, in the Province of Ontario, Canada, have invented a certain new and Improved Loom for Weaving Cane, &c., of which the following is a specification.

The object of the invention is to provide a machine for weaving cane for chair-bottoms or for weaving matting in such a manner that the pattern of the cane or other material worked can be readily changed, and whereby the warp-strands may be fed forward and weft-strands laid in place automatically; and it consists, essentially, of a pattern-drum with rows of removable pins which actuate treadles, to which the spindles for raising or lowering the warp-strands are attached; secondly, of means for effecting the rotation of the pattern-drum; thirdly, of a rod deriving a transverse motion from the swinging of the batten and carrying at one end thereof nippers which automatically clutch the end of the weft-cane and draw it through the shed; fourthly, of a feed-roller so operated as to feed the warp-strands forward automatically a suitable distance, as hereinafter described, and, fifthly, of means for regulating the tension of the warp-strands.

Figure 1 is a perspective view of the machine. Fig. 2 is a longitudinal section through the machine. Fig. 3 is a plan view with pattern-drum and other parts removed. Fig. 4 is a detail of the nippers. Fig. 5 is a detail of the mechanism for operating the feeding-roller. Fig. 6 is a detail view showing one of the spring-actuated spindles. Fig. 7 is a detail view showing the weft-strand holder.

In the drawings like letters and numerals of reference indicate similar parts in the different figures.

In Fig. 1, A is the pattern-drum, and B a ratchet-disk whereby the drum is moved. *a a* are removable pins or cams, a few only of which are shown in position on the periphery of the drum. *b b* are a series of pivoted treadles pivotally attached to each of the upright spindles *c*, which raise or lower the strands of the warp, as the removable pins *a* come in contact with or release the treadles, as the pattern-drum A rotates. (*Vide* also

Fig. 2.) The pattern-drum A is journaled on standards C, forming part of the frame of the machine. Spring-actuated spindles *e* are arranged in alternating rows in the spindle-frame D, so that each strand *d* of the warp while passing between two of the spindles is pressed down on the base 35 of the frame D by the end of one of the spring-actuated spindles *e*. By the arrangement of the spindles in alternate rows, as shown, more room is allowed for each spindle and its attachments. By means of nuts 31, working in threads on the tension-spindle *e*, (*vide* Fig. 6, also Figs. 1, 2, and 3,) the force of expansion-springs 33, and consequent pressure of heads 34 of the extension-spindles *e* on the warp-strands *d*, may be increased or decreased at pleasure. Between the base 35 and stay-frame 36 are guide-wires 32, two in front of each head 34, between which wires the warp-strands *d* pass from under the heads 34 to the upright spindles *c*. Each strand *d* of the warp after passing from the spring-actuated spindles *e* is threaded through an eyelet in the upright spindle *c*, then through a compartment *i* of the reed I, and thence to the feed-rollers E and F, between which it is passed. The ends of the cane or other material which form the warp-strands are joined together, so as to form a long continuous strand. E is the upper feed-roller and F the lower one, which last is mounted in adjustable blocks F', having slots through which pass bolts *f'*, by means of which the said blocks are secured to the frame of the loom. Bearing against the under side of each block is a set-screw *f*, by turning which in one direction the block F' can be raised, or it can be lowered by turning the screw *f* in the other direction if the nuts *f''* on the outer ends of the bolts *f'* are not screwed up too tight, and thus the space between the rollers may be regulated. If preferred, after the adjustment has been made, the nuts *f''* on the bolts *f'* may be screwed up tight and the adjustment thus made fixed. 30 is a hand-wheel on the upper feed-roller E, so that when a cane bottom has been woven by the machine the warp-strands and woven material may be moved forward by hand and a gate may be left where there are no weft-strands at the place where

the cane bottoms are to be severed from each other. G is the beam on which the woven material is wound and is operated by the endless belt *g* on the drums *g' h'*. H is the batten-frame pivoted on the base of the frame at *h'*, as shown in Fig. 2, and carrying the reed I, which packs the weft in place, the batten deriving its swinging motion from the pivoted arms J, pivoted to the rims of wheels K, fixed on the ends of the shaft K' and to the upper part of the batten-frame H. L is the weft-frame attached to the batten-frame H and moving along with it. M is the nipper-rod, which has a cross-head *h* attached to it. This cross-head *h* is attached to the forked rod N by the rods *i*, which are pivotally attached to the prongs *j* on each side of the weft-frame L. The lower end of the forked rod N is pivoted at *k* to the bracket O, which is bolted to the side of the batten H. P is the pivoted arm which gives the transverse throw to the nipper-rod M and is pivoted at *l* to the batten, and its lower end is pivoted at *m* to the link 2, which is attached to the pivoted arm N at *n* and is adjustable as to length to vary the throw by removing the bolts in said link, lengthening the link by putting the bolts into other holes *m'* in said link and screwing up the same. R is a fixed inclined plane (*vide* also Fig. 3) formed on the frame of the machine, against which the head *o* of the rod P is adapted to move as the batten swings to and fro, and S is a strong spring which draws the forked rod N back into the position shown in the drawings, carrying the nipper-rod M across the machine to clutch a strand of the weft *p*. The motion of the batten-frame H to the front draws the head of the rod P in and throws the adjustable link Q, as well as the arm N, outward from the frame, causing the nipper-rod to draw a strand of the weft *p* through the shed formed by the separated strands *d* of the warp. S' is a ratchet-wheel for operating the feed-roller F, more particularly shown in Fig. 5. It will be understood that only a small number of treadles *b* and upright spindles *c* are shown in the drawings; but the series extends across the whole width of the pattern-drum A, the upright spindles *c* being alternately raised and depressed, as hereinafter explained.

In Fig. 2 is seen more particularly the means of raising and lowering the strands *d* of the warp, thus forming the shed through which the weft-strand *p* is drawn, and of causing the batten-frame H to swing, by means of the pivoted arm J, on the wheel K. T is a balance-lever pivoted on the spindle *a'* of the pattern-drum A and counterweighted at *q* to balance the bent arm U, notched at *r'*. This bent arm U passes through the spring-actuated guide *s*, which holds the arm *t* in its normal position. The upper end of the bent notched arm U is pivoted at *u* to the balance-lever T. The spring-actuated dog *t* is shown engaged in a tooth before the bent arm U is raised. The spring-actuated dog *t* passes through the lugs on the balance-lever T and is provided

with a handle *t'*, pivoted at the end to the lever *t* to draw the dog out of the teeth of the ratchet-disk B, and a spring *t* to force it back into its normal position against the tooth of the disk B when the pattern-drum A is wanted to rotate. On the wheel K there is a lug *u'*, which as the wheel revolves engages with the notch *r* on the bent arm U and raises the bent arm up, causing the pattern-drum A to rotate one notch. Through the balance-lever T passes the spindle *v*, which is pivoted at its lower end to the bent arm U and carries near its upper end a collar *v'*, to which one end of a spiral expansion-spring *w* is attached, whose other end is firmly secured to the balance-lever T, and is so arranged and connected to these parts that as the arm U is raised, and carries with it the balance-lever T, the latter as it rises expands the spring *w*, because the rod *v* rises faster than that part of the lever T, through which it passes, and said spring *w*, being expanded, thus tends to force the spindle *v* down through the balance-lever T, and carry downward the bent arm U, so that when the lug *u'* becomes disengaged from the notch *r* in the bent arm U the expansion-spring *w* contracts and said arm U is forced down by said expansion-spring and away from the lever T, so that the spring-actuated dog *t* may be in position to engage with the next notched tooth on the ratchet-disk B prior to the next raising of the bent arm U by the lug *u'*, on the rotating wheel K. The removable pins *a* on the pattern-drum A are arranged according to the pattern desired to be woven. The series of pins come successively in contact with the series of treadles *b*, two of which are shown in Fig. 2, one in its normal position raised up by the expansion-spring *x* on the upright spindle *c*, carrying a strand *d* of the warp, which passes through an eyelet in the said spindle and thence to the feeding-rollers E and F, and the other treadle is depressed by one of the removable pins *a* coming in contact with it and pushing down the upright spindle *c*, through which another strand *d* of the warp is threaded. In this manner the series of strands *d* forming the warp may be raised or depressed, as required, according to the position of the removable pins *a* on the pattern-drum which come in contact with the treadles, and a shed is formed between the strands *d* of the warp, through which the strands *p* of the weft are drawn and packed into place by the reed I. V are hooked tension-rods which hook on each of the strands *d* of the warp, so as to increase the tension of the strands, as may be desired. W are scissors placed on the side of the frame for the purpose of cutting the strands *p* of the weft, when not already cut, to the proper width of the material to be woven, the warp-frame L striking an arm of the scissors and bringing the cutting-edges onto the weft-strand to be cut, when the weft-strand is pushed into place by the reed I on the batten-frame H.

25 is a string attached to the scissors W and weft-frame L to pull the scissors open on the back swing of the batten H. *z* is a strand-holder for holding the end of the weft-strand *p* so as to be gripped by the nippers on the end of the nipper-rod M. This strand-holder comprises a base-piece 37, grooved at 38. 39 is a standard on which a thumb-piece 40 is pivoted at 41. 42 is a pressure-rod pivoted near the end of the thumb-piece 40 and having a head 43 resting on the weft-strand and pressed thereon by means of contracting spring 44, attached to the end of thumb-piece 40 and frame 45. When it is desired to release the strand *p* from the strand-holder *z*, the finger is pressed on the end 46 of the thumb-piece, thus raising the head 43 from the surface of the weft-strand *p*. 47 is a guide for the pressure-rod. In its normal condition the strand *p* is pressed on by the head 43 by virtue of the spring 44. X is the expansion-spring for throwing up the end of the lever-arm 20, which operates the ratchet-wheel S' on the spindle of the lower feed-roller F, as shown in Fig. 5.

Fig. 3 illustrates more particularly the transverse motion of the nipper-rod M and the mode of gripping the end of the weft-strand *p*, which is fed into the machine through the strand-holder *z*. The jaws of the nippers Y Y', formed on the end of the nipper-rod M, are shown in detail in Fig. 4. In the position shown in Fig. 3 the jaws of the nippers have just been opened to grip the end of the weft-strand *p*. The head *o* of the pivoted arm P is shown in the same position against the inclined plane R, as in Fig. 1, the batten H having just been moved back, as indicated, and the nipper-arm M extending transversely across the machine. When the batten-frame H is moved forward by the arms J to the full extent of its throw, the nipper-rod M, carrying the weft-strand *p*, is drawn back by the prongs *j* on the forked rod N, so as to clear the warp-strands *d* and permit the reed I to pack or push the weft-strand *p* into place. Z is a dog pivoted on fixed spindle *z'*, and *l'* is a spring for holding the dog in position to engage with the lever 2, which is pivoted at 3 on the cross-head *h* and at 21 to the rod 4. The spring 5 is attached to the lever 2 and rod 4, so that when the lever 2 is moved inwardly up against the pivoted dog Z the rod 4 is drawn back and the jaws Y Y' are opened, as shown in Fig. 4. When the lever 2 has freed itself from the pivoted dog Z, the spring 5 throws the rod 4 back to its normal position and closes the jaws. When the nipper-rod M is on its reverse movement, the dog Z is allowed by the spring *l'* to yield, and thus allow the lever 2 to slip past it, after which said spring *l'* returns the dog Z to its normal position to engage with and operate said lever 2.

Fig. 4 is the detail of the nipper. 6 is a guide for rod 4, and at the end of said rod is rigidly fixed a pin 7, which passes through a diagonal slot 8 in the lower jaw Y', which is

pivoted on the nipper-rod M, which pin also passes through a slot 9, formed in the reduced end of rod M, and which slot 9 is parallel to the axis of said rod. The pin also passes into another diagonal slot 10, formed in the upper jaw Y, which is also pivoted to the nipper-rod on the same pivot-pin 30 as jaw Y'. In the upper jaw Y the direction of the slot 10 is the reverse of that of slot 8 in the lower jaw Y', as indicated, the pressure of the pin on the sides of the diagonal slots opening and closing the jaws as the rod 4 moves to and fro. When the jaws are to be opened for the purpose of gripping the weft-strand *p*, the rod 4 moves in the direction indicated by the arrow, and the reverse motion of the rod 4 closes the jaw. After the weft-strand *p* has been drawn through the shed, and frame L, by the forward motion of the batten H, has been moved forward to the bracket 11, the cross-head *h*, carrying the lever 2, is in such position that the end of the lever 2 engages with the adjustable dog 12 on the bracket 11, draws back the bar 4, and reopens the jaws Y Y', thus releasing the weft-strand *p*, and the jaws close when the lever 2 is released from the adjustable dog 12, and the spring 5 throws the rod 4 back to its normal position. 13 13 95 are two strings on each side of the warp-strands, so as to form an even edge. They are threaded through the upright spindles *c* and compartments *i'* in the reed I in the same manner as the strands *d* of the warp, the strings passing from boxes 14 through tension-regulating devices 15, where the string is pressed between a washer 16, acted upon by the spring 17, and the head of the spindle 18.

Fig. 5 shows the mechanism for taking up the fabric as it is woven. X is an expansion-spring, one end bearing on the bracket 19, which is attached to the loom-frame, and the other bearing under the end of the lever 20, which is pivoted on the spindle 21 of the ratchet-wheel S'. A spring-actuated dog 22, working through guides formed in the lever 20, engages with the successive teeth in the ratchet-wheel S' as it is caused to rotate. When the batten H, carrying the weft-frame L, swings to the front, the frame L engages with the lever 20, pressing it down and causing the spring-actuated dog 22 to move the ratchet-wheel S'. When the frame L again moves back, so as to free the lever-arm 20, the expansion-spring X throws the lever-arm 20 up again to its normal position, the spring-actuated dog 22 engaging with another tooth on the ratchet-wheel. Each forward motion of the frame L, caused by the swinging of the batten H, depresses the lever-arm 20 and rotates the ratchet-wheel S', which, being on the same spindle 21 as the lower feed-roller F, causes the latter to rotate and pulls the strands of the warp forward, as well as the woven material, between the feed-rollers E and F, the woven material being wound upon the beam G. 23 is a handle attached to a rod

25 for disengaging the spring-actuated dog 22 from the teeth on the ratchet-wheel S' when it is desired to stop the feeding forward of the warp-strands *d*, its end being pivotally attached to the end of the spring-actuated dog 22, and working through a guide 24, formed on the lever 20. This rod 25 is furnished with an expansion-spring 26 to throw it back to the normal position after having been pushed in so as to disengage the spring-actuated dog 22 from the ratchet-teeth. When the width of the fabric to be woven is determined on, the requisite number of warp-strands is drawn through the spindles in the frame D. Each strand is then threaded through the eyelet in its upright spindle *c*, then through the compartments *v* in the reed I, and between the feed-rollers E and F. The hooked tension-rods V may then be hung on the warp-strands *d* and the removable pins *a* arranged on the pattern-drum A, according to the pattern desired in the woven material. When the machine is started and the pattern-drum rotates, the treadles *b* are depressed as they come in contact with the pins *a* on the pattern-drum A and a shed is formed. A weft-strand *p* is inserted into the strand-holder *z* ready to be gripped by the nippers on the nipper-rod M, when it is moved transversely across the machine through the shed formed by the warp-strands *d*, and is drawn through and pushed into place by the reed I; a weft-strand *p* being inserted each time the nippers come forward to meet it, drawn through the shed and pushed into place, as before. The material thus woven is wound automatically on the beam G.

What I claim as my invention is—

1. In a loom, the combination of a pattern-drum with removable pins, a series of treadles pivotally attached to a series of upright spindles with eyelets through which the warp-strands are threaded, and expansion-springs for keeping the upright spindles normally raised, substantially as described and specified.

2. In a loom, the combination of a pattern-drum with removable pins, a ratchet-disk, a counterweighted balance-lever pivoted on the spindle of the pattern-drum, a spring-actuated dog adapted to engage with the teeth of the ratchet-disk, a notched bent arm, a spring-actuated guide, a wheel having a lug adapted to engage with a notch on the bent arm, and a spindle connected with the balance-lever and pivoted to the upper part of the bent arm and provided with an expansion-spring bearing on the upper side of the balance-lever, substantially as described, and for the purpose specified.

3. In a loom, a weft-frame, a nipper-rod mounted thereon and provided with nippers adapted to open and clutch the weft-strand at the end of the transverse throw of the rod and draw the weft-strand through the shed, a forked rod pivotally connected with a cross-head on the nipper-rod, a batten-frame, a

bracket to which the forked rod is pivoted attached to said batten-frame, a contracting spring connected with the bracket and forked rod, an inclined plane on the frame of the machine, an arm pivoted to the batten-frame and having a head adapted to move on said inclined plane, an extensible link pivoted to the pivoted arm as well as to the forked rod, a driving-wheel, and a pivoted arm or pitman attached to said driving-wheel and to the upper part of the batten-frame for operating the same, substantially as described, and in the manner specified.

4. The weft-frame L and the reciprocating nipper-rod M, mounted on said weft-frame and having slotted nipper-jaws Y Y', in combination with rod 4, provided with a pin 7, engaging in the slots in said jaws to open and close the same, substantially as described.

5. The weft-frame L and reciprocating nipper-rod M, mounted on said weft-frame and having slotted nipper-jaws Y Y', in combination with rod 4, provided with a pin 7, engaging in the slots in said jaws to open and close the same, and the spring-actuated dog Z, substantially as described.

6. The weft-frame L and the reciprocating nipper-rod M, mounted on said frame and having slotted nipper-jaws Y Y', in combination with rod 4, provided with pin 7, engaging in the slots in said jaws to open and close the same, the spring-actuated dog Z, pivoted lever 2, spring 5, swinging batten-frame H, bracket 11, and dog 12, substantially as specified.

7. The combination, with the reciprocating nipper-rod M, having a longitudinal slot, and the diagonally-slotted jaws Y Y', pivoted to said nipper-rod, of the rod 4, mounted on said nipper-rod and provided with the pin 7, constructed to reciprocate in the slots in the nipper-rod and jaws, to open and close said jaws, substantially as described.

8. The combination of the pattern-drum A, means for imparting an intermittent motion to said drum, the removable pins *a*, the pivoted treadles *b*, the upright spindles *c*, through which the warp-strands *d* are threaded, and the expansion-springs *e*, substantially as specified.

9. The combination, with the bent arm U, notched at *r*, of the lug *u*', driving-wheel K, the balance-lever T, counterweighted at *q*, spring-actuated dog *t*, ratchet-disk B, expansion-spring *w*, spindle *v*, and pattern-drum A, substantially as specified.

10. The combination of the batten-frame H, adapted to swing on pivot K', the arm P, head *o*, inclined plane R, extensible link Q, spring S, bracket O, forked arm N, and the nipper-rod M, pivoted to the arm N, whereby the nipper-rod is given a transverse throw at each movement of the batten-frame, substantially as specified.

11. The combination, in a loom, of an intermittently-revolving pattern-drum, a swinging batten-frame, a nipper-rod carrying nippers moving on said batten-frame, removable

pins on the pattern-drum, a series of treadles
operated by the said pins, upright spindles
pivoted to the treadles and having eyes for
the warp-strands, springs acting on the spin-
dles, a reed on the batten-frame to press into
5 place the weft-strands, an automatic mechan-
ism for taking up the woven material at each
movement of the pattern-drum, and means
for regulating the tension of the warp-strands
10 and for giving motion to the pattern-drum and
nipper-rod, substantially as described.
12. The combination, with the spindle-frame

D, of the adjustable springs 33, means for ad-
justing said springs, and the tension-spindles
e, arranged in alternating rows and having 15
heads 34 adapted to adjustably press on the
warp-strands on the base of the spindle-frame,
substantially as described.

Woodstock, October 22, 1889.

ARCHIBALD HAY.

In presence of—

ALFRED S. BALL,
H. WESTCOTT.