

(No Model.)

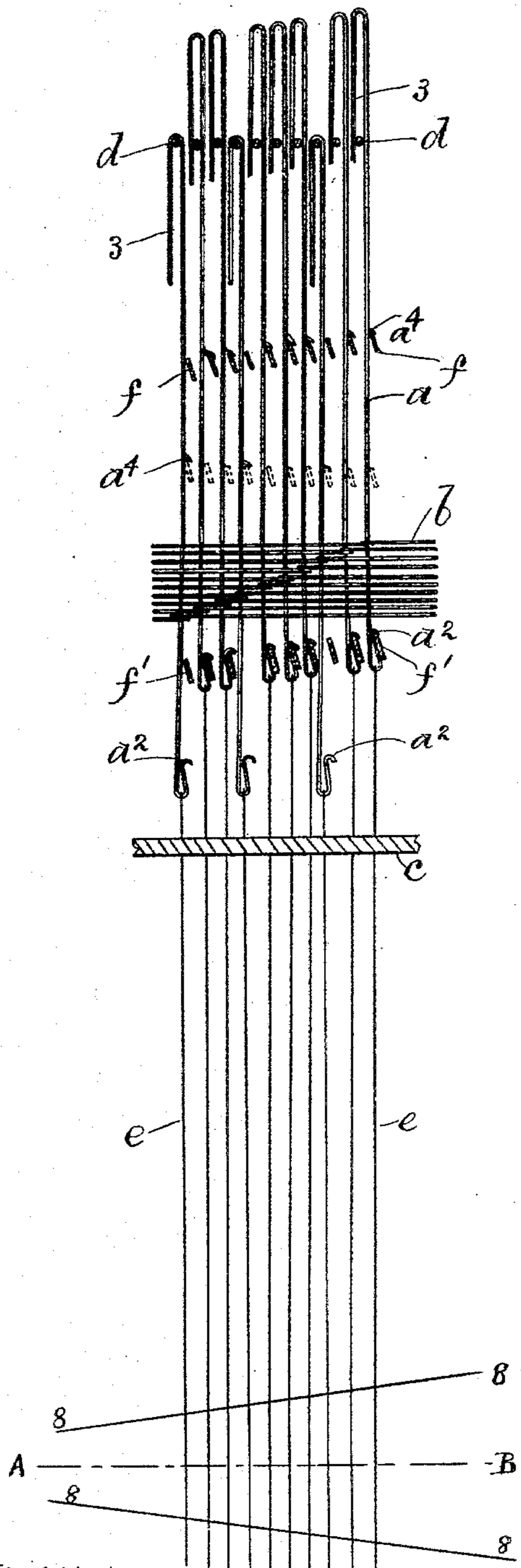
3 Sheets—Sheet 1.

A. LOCKWOOD.  
JACQUARD MACHINE FOR LOOMS.

No. 545,240.

Patented Aug. 27, 1895.

FIG. 3



Witnesses.  
A. D. Hanson.  
Rollin Abell.

FIG. 2

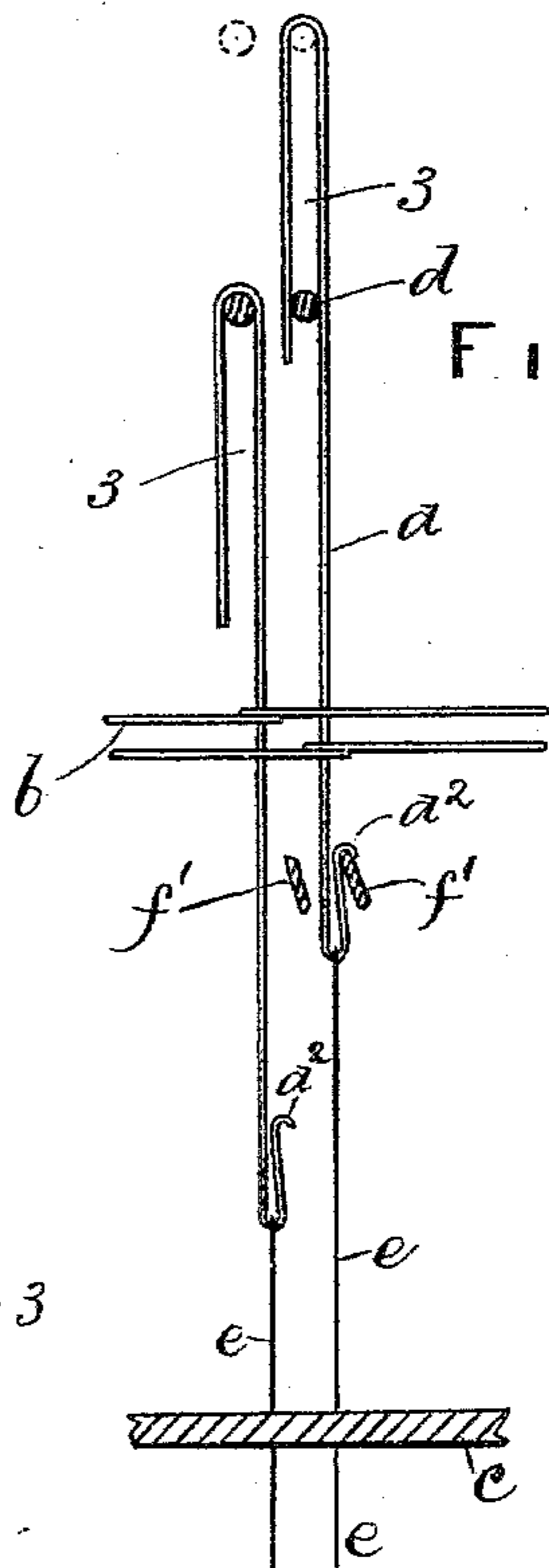
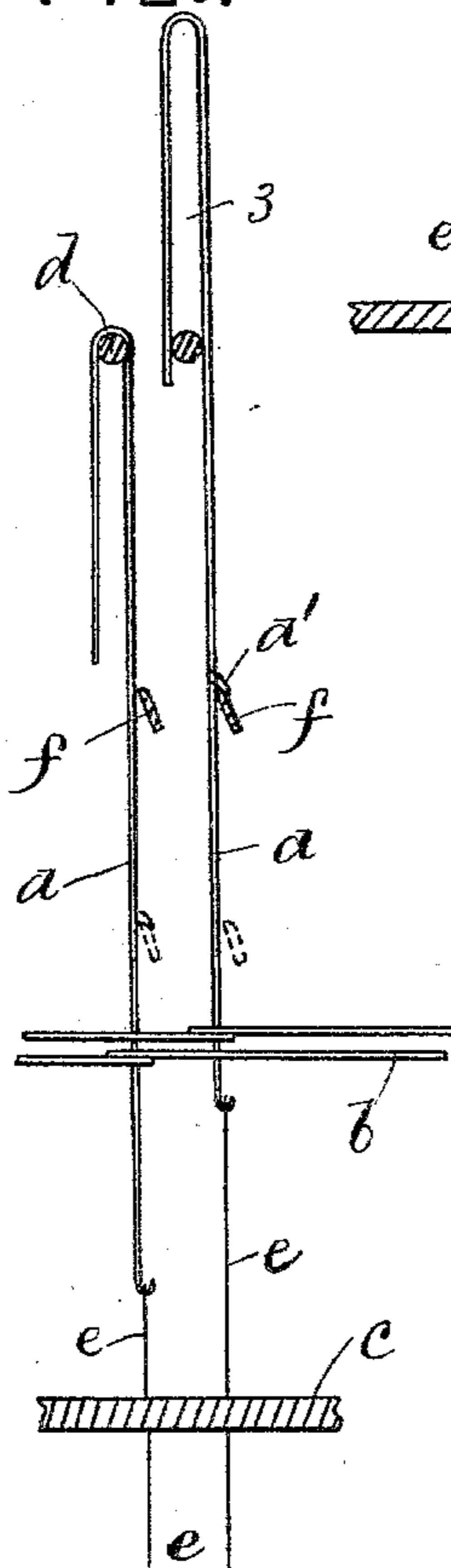


FIG. 1



Inventor.  
Amos Lockwood.  
by Wright & Brown, Attys.

(No Model.)

3 Sheets—Sheet 2.

A. LOCKWOOD.  
JACQUARD MACHINE FOR LOOMS.

No. 545,240.

Patented Aug. 27, 1895.

FIG. 4

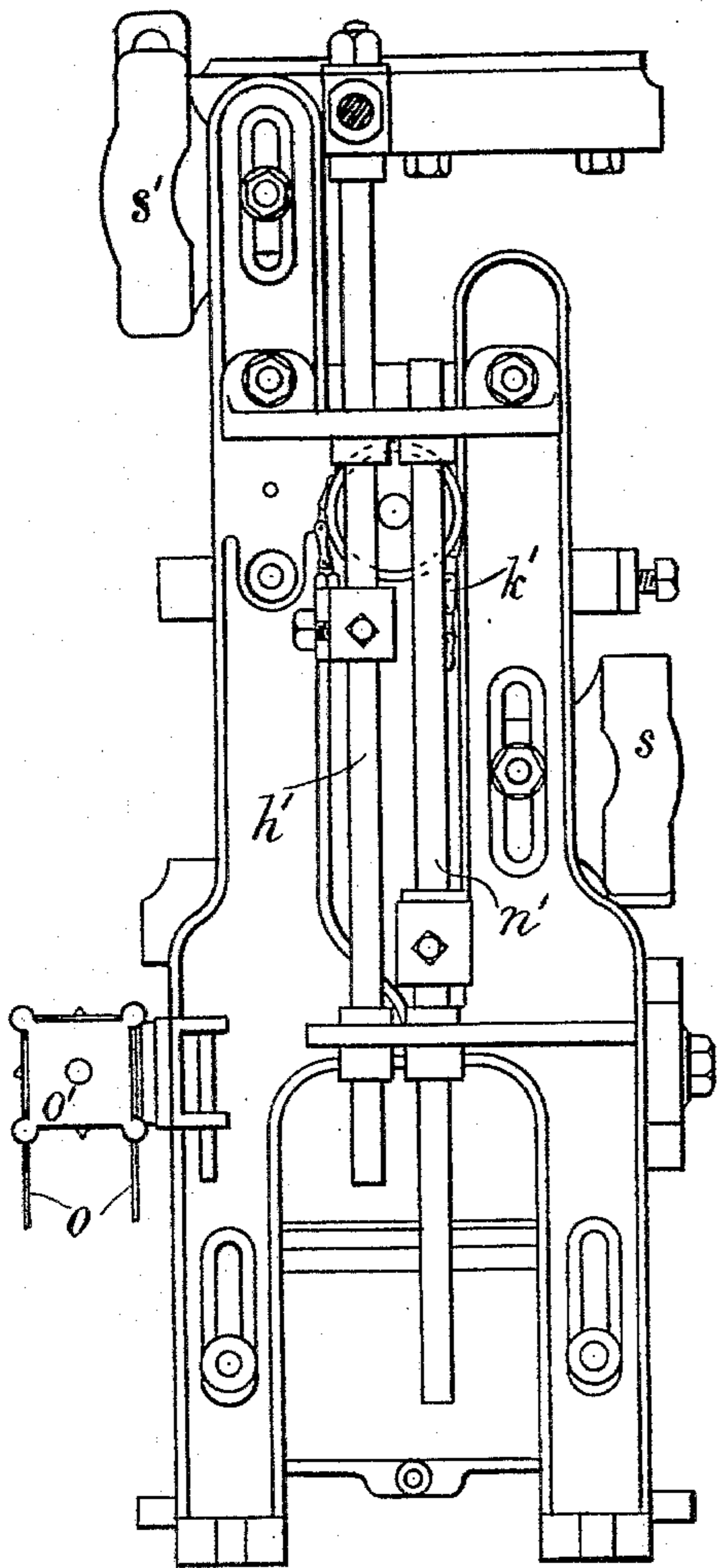
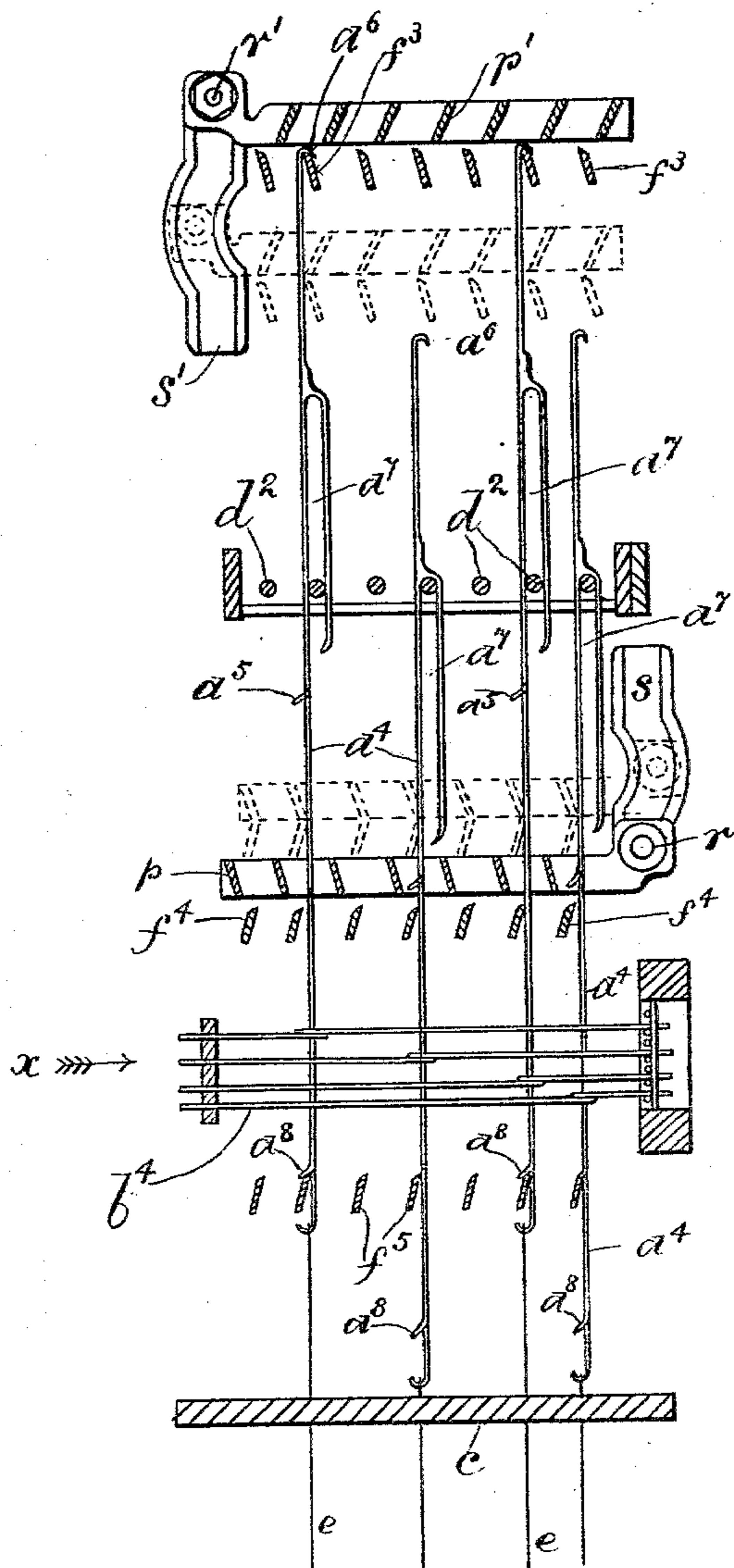


FIG. 6



Witnesses  
A. D. Harrison.  
Rollin Abell.

Inventor  
Amos Lockwood  
by Thos. A. Brown & Quincy  
Attys.

(No Model.)

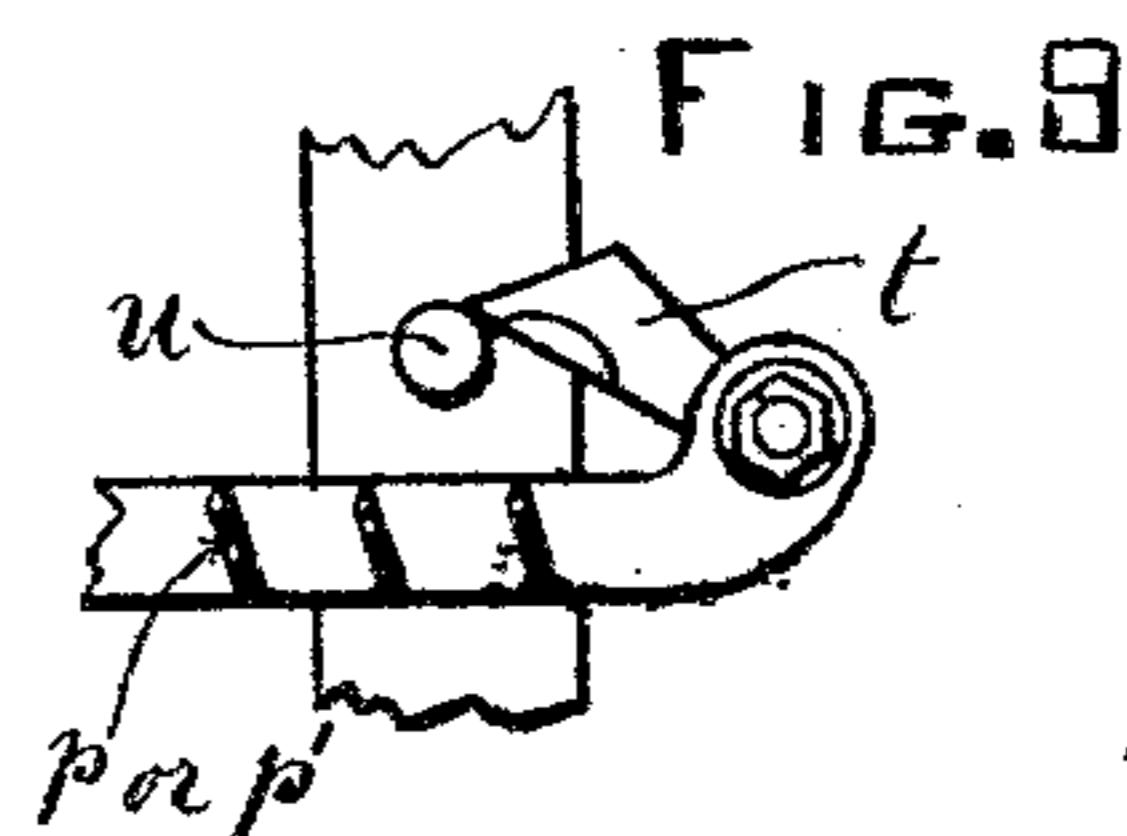
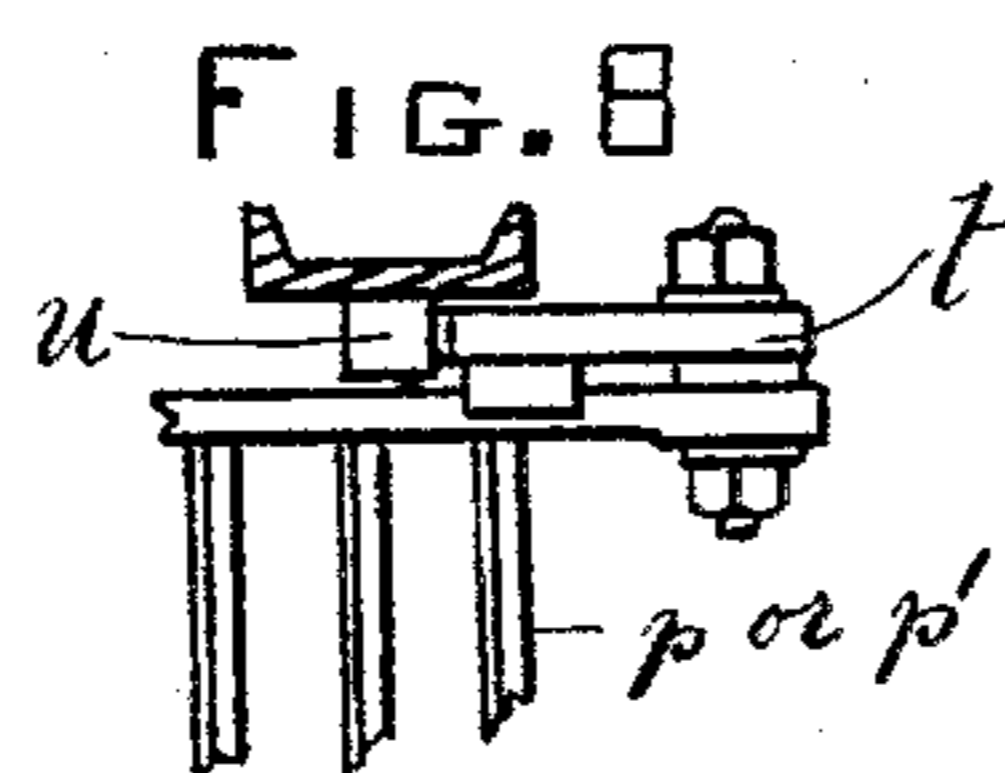
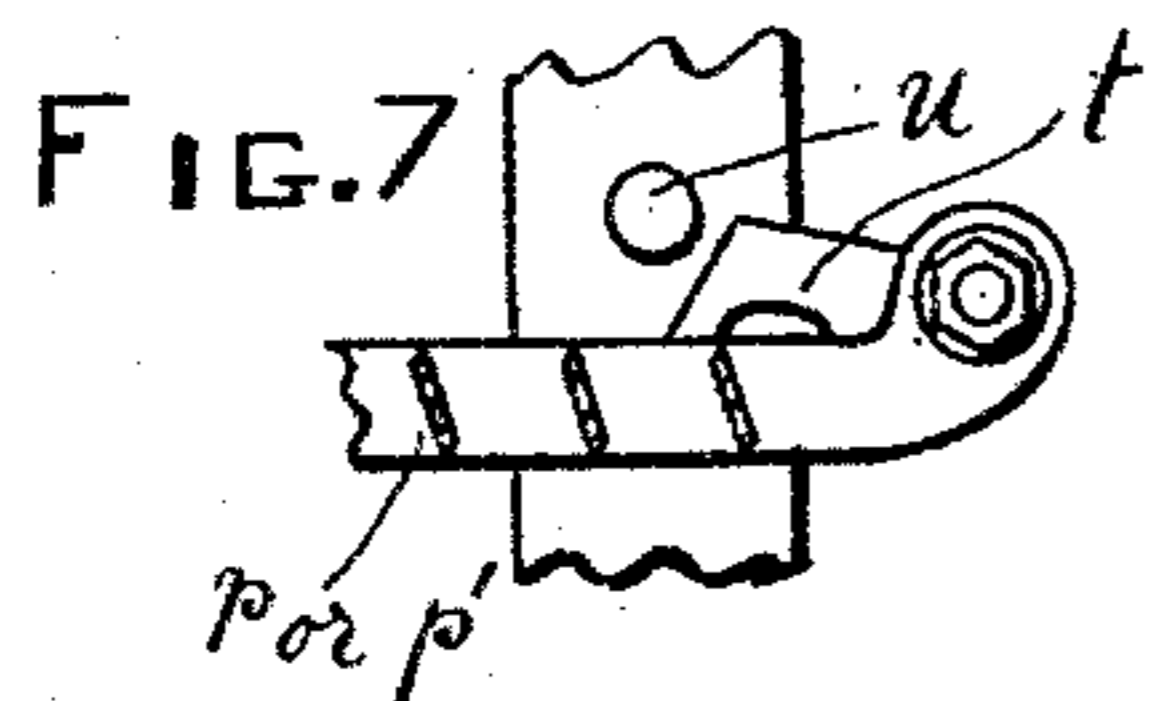
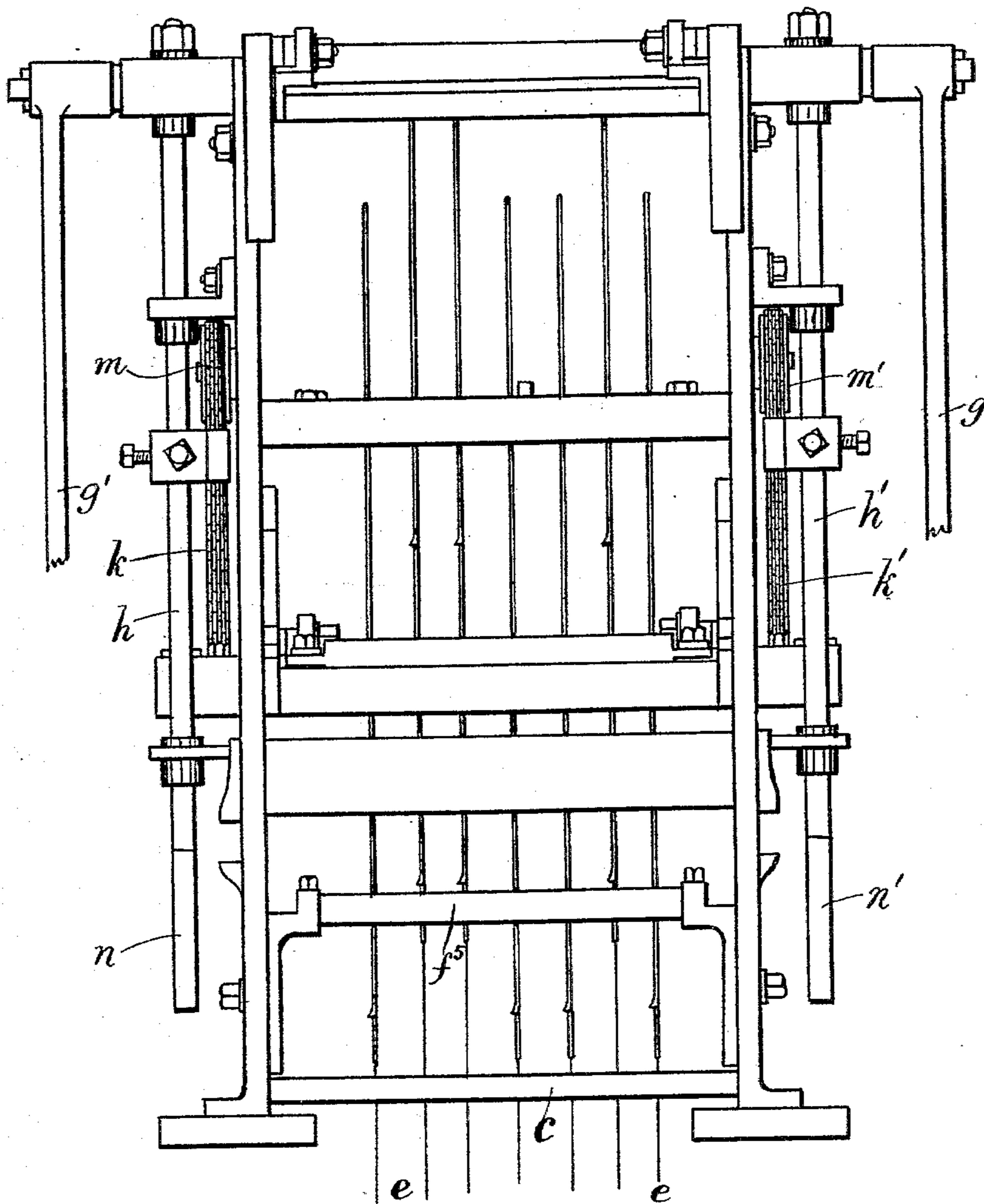
3 Sheets—Sheet 3..

A. LOCKWOOD.  
JACQUARD MACHINE FOR LOOMS.

No. 545,240.

Patented Aug. 27, 1895.

FIG. 5



Witnesses  
A. D. Hanson.  
Rollin Abell.

Inventor  
Amos Lockwood  
by *Thos. Brown & Quincy*  
Attys.

# UNITED STATES PATENT OFFICE.

AMOS LOCKWOOD, OF HALIFAX, ENGLAND.

## JACQUARD MACHINE FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 545,240, dated August 27, 1895.

Application filed December 22, 1894. Serial No. 532,695. (No model.) Patented in England July 1, 1892, No. 12,222, and in Germany May 7, 1894, No. 75,878.

*To all whom it may concern:*

Be it known that I, AMOS LOCKWOOD, a subject of the Queen of Great Britain, residing at King Cross, Halifax, in the county of York, England, have invented certain Improvements in Jacquard Machines for Looms, (for which Letters Patent have been obtained in Great Britain, No. 12,222, bearing date July 1, 1892, and in Germany, No. 75,878, bearing date May 7, 1894,) of which the following is a specification.

My invention relates to the production of Jacquard machines of a construction wherein all springs for operating the needles are dispensed with, the pull or strain on the vertical needles and their neckbands through the weight and force of the depressing-weights and warp-threads suspended therefrom being utilized in place of the springs in the spring-box, or instead of the vertical needles being made resilient; and when such construction is followed in the production of "single-lift" machines the movements of the warp-threads to form a passage or opening for the shuttle may be arranged to be from a central position (certain of the warp-threads being raised above while the others are allowed to descend a similar distance below this normal central position,) or from a bottom position, (which when thus produced the vertical needles of the Jacquard may be made to "dwell" or rest up or down, as desired, notwithstanding the continued movements of the operating-grids,) or from a "top" position as their normal place of rest, by which these machines may be adapted to meet the varied requirements well known by those versed in the art of weaving, while when the said construction is followed in the production of "double-lift" machines these may be arranged so that the threads or warp may dwell or rest in their raised or elevated as well as in their depressed positions. To attain this object I form and arrange the vertical needles which support the neckbands, and consequently the warp-threads and other parts in connection with these vertical needles, in such a manner that these needles are supported by or suspended from a point or position higher than the horizontal needles that are used as intermediaries for operating them by or from the pattern-cards at such

times or whenever said operations of the vertical needles by their horizontal needles have to be effected, by which means the strain or pull thereon, as above described, is allowed to act freely at the desired time of action, and such formation and arrangement of the vertical needles are illustrated by the accompanying sheets of drawings, in which—

Figure 1 is a view showing two vertical needles and their horizontal needles, together with their operating griffs or grids, as also their operating-bars, in cross-section, all illustrative of the arrangement in a single-lift machine that will "shed" or separate the warp-threads from a central or bottom position. Fig. 2 is a similar view to Fig. 1, but shows the arrangement in a single-lift machine that sheds or separates the warp-threads from a top position. Fig. 3 is an elevation-reduced scale showing the series of vertical and horizontal needles and the operating-grids (in section) of a single-lift machine which separates or moves the warp-threads from a central position (and which is arranged so that its vertical needles may dwell or remain in either their raised or lowered positions, as hereinafter explained) and the connections from the vertical needles to the warp. The framework is not shown, as it may be of any of the well-known kinds. Figs. 4 and 5 are end and front elevations of a double-lift Jacquard machine in which my method of construction is followed. Fig. 6 is a vertical section of a portion of the machine illustrated by Figs. 4 and 5, in order to show the formation of these vertical needles, (of which only four are shown to avoid complexity,) as also their method of arrangement. Figs. 7, 8, and 9 are drawings in detail illustrative of parts hereinafter described.

Similar letters and figures of reference indicate similar parts throughout the several views.

In accordance with my said invention, as illustrated in Figs. 1, 2, and 3, I form and arrange the upright or lifting needles *a*, as also the horizontal needles *b*, the bottom board *c*, cross-bars *d*, and operating-grids *f* in such relative positions and in such a manner that the strain on the neckbands or cords *e*, which are attached to the lower ends of the needles

$a$  in the well-known manner, answers all the purposes for which the springs in the spring-box have heretofore been employed.

To allow freedom for the action of said strain on the needles  $a$ , I arrange them so that at their time of being changed, moved, or operated upon by the pattern-cards they are suspended from the bars  $d$ . The bottom board  $c$ , through which the cords or neckbands  $e$  pass, is arranged so that when said needles are at the proper elevation, where said change by the operations of the pattern-cards is effected, the said bottom board  $c$  will hold or guide the said cords  $e$  so that the direction in which the forces caused by the weight of the warp and lingoes (or depressing-weights) act upon them (said cords  $e$ ) will not be straight in line with the needles  $a$ , but will be so far out of line therewith as will cause said weight always to tend to pull or force the lifting-needles into connection with their grids  $f$ .

In Fig. 1 the bars  $d$  are fixed and the grids  $f$  reciprocate, and the vertical needles  $a$  are formed with operating-hooks  $a'$  to be engaged with the grids  $f$ . In this form of arrangement, therefore, the bars  $d$  merely constitute guides for the needles in their vertical reciprocations and supports or fulera, on which the needles center.

In Fig. 2 the round cross-bars  $d$  reciprocate, whereas the grids  $f'$  are fixed and the needles  $a$  are formed at or near their lower ends with suspending hooks  $a^2$  to take over these stationary grids when said needles are raised by the bars  $d$ . Here the round cross-bars not only constitute supports and guides for the needles, but also act in the nature of grids to raise the needles.

In Fig. 3 I show a combination of the arrangements shown in Figs. 1 and 2, for the ordinary reciprocating grids  $f$  are employed to engage operating-hooks  $a^4$  on the needles  $a$  midway their length, and the bars  $d$  also reciprocate, but always move in a direction opposite to the movement of the grids  $f$ . The stationary grids  $f'$  are also used in conjunction with the suspending hooks  $a^2$  at the lower ends of the needles  $a$ .

The arrangement of the movable bars  $d$ , to operate in unison with, yet withal at all times in an opposite direction to the grids  $f$ , above which they are mounted, produces a machine that forms the shed or opening for the shuttle from a central position (shown by broken line A B, Fig. 3) of the warp, one part thereof descending and the other ascending from the said central position, as will be understood. However, by arranging the bars  $d$  to be stationary, as in Fig. 1, the grids  $f$ , being employed for operating the needles  $a$ , the machine thus produced will always raise the threads of warp from their lowest position, as is usual in all Jacquard machines of the ordinary kind.

Yet, again, by arranging the bars  $d$  to be reciprocated, as in Fig. 2, and by forming suspending hooks  $a^2$  on the needles  $a$  at or near

their lowest extremities, dispensing with the ordinary grids  $f$  and mounting stationary grids  $f'$  in proximity with the said hooks  $a^2$ , upon which stationary grids  $f'$  said hooks  $a^2$  are made to lay hold, as and when indicated upon by the pattern-cards so to do, by which means, when said needles are to be inoperative, their said hooks  $a^2$  are brought into contact with their grids  $f'$  and caused to remain in their elevated positions. A machine is produced that will shed or form a passage for the shuttle by causing the warp-threads  $s$  to descend from their highest positions.

When the arrangements shown in Figs. 1 and 2 are combined in the manner shown in Fig. 3, I preferably make the bars  $d$  and the grids  $f$  assume at the upper extremities of their paths of motion positions somewhat parallel with the points of contact that the vertical needles have with the horizontal needles, by which means the lateral force to be exerted by the pattern-cards through the horizontal needles  $b$  to the needles  $a$  is at all times equal, notwithstanding the varied positions in the horizontal planes occupied by these said needles  $b$ , since the points or places of suspension of said needles  $a$  are arranged in planes corresponding with the points of contact of the needles  $b$ . Thus the distance between such place of suspension and said points of contact with the horizontal needles  $b$  is equal throughout the whole series.

As regards the double-lift jacquard, shown in Figs. 4, 5, and 6, I make use of the vertically-moving grids  $f^3$  and  $f^4$ , which are of the old and well-known kind, and which are operated in the usual manner and by the usual means, although I preferably operate these grids  $f^3$  and  $f^4$  by coupling the loom's ordinary operating mechanism by the rods  $g$   $g'$  to the upper grids  $f^3$ , the guide-bars  $h$   $h'$  for maintaining the same in position being coupled by the chains  $k$   $k'$ , which pass over the pulleys  $m$   $m'$  to the guide-rods  $n$   $n'$ , attached to the grids  $f^4$ , so that as the loom's mechanism causes the grids  $f^3$  to rise the grids  $f^4$  will by gravity descend by reason of their chains  $k$   $k'$  allowing them so to do, the reverse movement of said grids  $f^3$  imparting a rising movement to those of  $f^4$ , as will be understood. In addition to this double series of operating-grids  $f^3$  and  $f^4$  I also employ the stationary series of cross-bars  $d^2$  and the stationary grids  $f^5$ , the former supporting the needles  $a^4$  when in their lowest positions, while the latter sustain them in their highest positions, the long-looped or folded part  $a^7$  on these needles  $a^4$  corresponding with the one at 3 on the needles  $a$  in Figs. 1 and 2, the purposes for which are alike—that is, for guiding or keeping the respective needles in position when raised from being supported by their bars  $d$  and  $d^2$ , respectively.

On each needle  $a^4$  and in proper positions relative with each other are formed three hooks  $a^5$ ,  $a^6$ , and  $a^8$ , the two former,  $a^5$  and  $a^6$ ,

being for operating their respective needles when they are placed into contact or made to lay hold of their grids  $f^4$  and  $f^3$ , respectively, while the latter  $a^8$  is for sustaining them in position, as above described, at each time their respective needles are raised to their highest position, if caused so to do by the pattern-cards  $o$  on the cylinder  $o'$  operating their respective needles  $b^4$ , and when they have to descend from this raised position said pattern-cards  $o'$  will move them from laying hold of the grids  $f^5$ , when they are liberated from thus laying hold by reason of being raised by one or other of their operating-grids  $f^3$  or  $f^4$ , as and when said cards  $o'$  are prepared or arranged to effect this purpose.

From the foregoing description it will be seen that the actions of this machine are as follows: Supposing any of the needles  $a^4$  that happen to be in their lowest positions were required to be raised to their highest positions, then by an opening or hole in its pattern-card  $o'$  on the cylinder  $o$  being presented to its respective horizontal needle  $b^4$  no motion would be imparted to this needle  $a^4$ . Consequently its hooks  $a^5$  and  $a^6$  would be in the paths of motion of the grids  $f^4$  and  $f^5$ , respectively, so that the said needle would by one or the other of these grids be raised to its highest position, and provided it was desired that this needle should be retained in this position, by another hole in the next card  $o'$  being presented to its said respective needle  $b^4$ , thus allowing its said needle  $b^4$  to remain stationary, the strain on the needle  $a^4$ , as above described, will cause it to bring its hook  $a^8$  over the grid  $f^5$ , and so the needle  $a^4$  will be prevented from descending. However, supposing any of said needles  $a^4$ , which happened as before to be in their lowest positions, were required to remain so, then by a blank or intact part of one or other of the cards  $o'$  being presented to its respective needle  $b^4$  it will be pressed in the direction of the arrow  $x$ , so that its hook  $a^5$  will be moved in this said direction clear of the grid  $f^4$ , while by said bottom part of the needle  $a^4$  being thus moved in this direction, when such lateral movement is prevented at about its middle part by reason of its being in contact with the bars  $d^2$ , its other or outer end on which is formed the hook  $a^6$  is moved in a direction opposite to that indicated by said arrow  $x$ , the bars  $d^2$  serving as a kind of fulcrum to enable such an action to be performed, such movement of the hook  $a^6$  carrying it clear of the path of motion of its grid  $f^3$ . Consequently neither by the grid  $f^4$  nor the grid  $f^3$  is the needle  $a^4$  at this time moved. Again, supposing that any of the needles  $a^4$  are in their raised positions and are required to descend, provided that they are in contact with or being supported by the grids  $f^5$ , then by one or the other of the grids  $f^4$  or  $f^3$ , as the case may be, whether it is the one or the other that

is approaching its highest position, slightly raising same so that their hooks  $a^8$  may be raised above or out of contact with the grids  $f^5$  by said blank parts of the cards  $o'$  being presented to their respective needles  $b^4$ , these said needles are again pressed in the direction of the arrow  $x$ , so that their hooks  $a^8$  are clear of the grids  $f^5$ , and so may descend with the one or the other of the grids  $f^4$  or  $f^3$  as it returns from having reached its highest position, as above described. Thus the needles required to descend are caused so to do. As will be seen, if no provision was made for preventing those of said needles  $a^4$  which were being lowered, say, by their hooks  $a^6$  being in contact with their grids  $f^3$  from allowing their hooks  $a^5$  to come into contact with their then ascending grid  $f^4$ , or vice versa—that is to say, those of said needles  $a^4$  that are being lowered by their hooks  $a^5$ , being in contact with their grids  $f^4$ , from allowing their hooks  $a^6$  to come into contact with their then ascending grid  $f^3$ —said needles  $a^4$  would never be allowed to descend lower than their central position. However, to obviate this I mount extra grid or guide rails  $p$  and  $p'$  above the grids  $f^4$  and  $f^3$ , respectively. These guide-rails  $p$  and  $p'$  are mounted upon the frames in which the grids  $f^4$  and  $f^3$  are fixed, so that they may move therewith at all times throughout the entire vertical movements of the said grids  $f^4$  and  $f^3$ . In addition to this vertical movement on the part of the guide-rails  $p p'$  a slight lateral horizontally-reciprocatory motion is imparted to them by means of the bowls  $r$  and  $r'$  sliding in the cam-grooves  $s s'$ . As these guide-rails  $p p'$  rise and fall, such slight lateral motion is effected by the adjustment of the cam-surfaces in the fixed cam-slides  $s s'$  to be at the time that one or other of the hooks  $a^5$  or  $a^6$  is passing its respective grid  $f^4$  or  $f^3$  in its descent, as is above described, and at such time or on such lateral movement the guide-rails  $p p'$  are moved so that each one of them is brought to be vertically above its respective grid  $f^4$  or  $f^3$ , as is shown in broken lines, Fig. 5. Thus these hooks  $a^5$  and  $a^6$  are prevented at this part from laying hold of their grids  $f^4$  or  $f^3$ .

Since it is only necessary that the lateral motion of the guide-rails  $p p'$  should be effected during the ascent of their respective grids  $f^4$  and  $f^3$ , other means than the cam-grooves  $s s'$  might be employed—such, for example, as illustrated by Figs. 7, 8, and 9. Here a cam-piece  $t$  is shown pivoted to the frame carrying the guide-rails  $p p'$ , and said cam-piece has an inclined edge at its free end. A stud  $u$  projects from the rigid frame of the machine in the path of the inclined edge of said cam-piece. In the upward movement of the frame supporting the guide-rails  $p p'$  the inclined edge of the cam acts against the stud  $u$ , and said frame is thereby shifted laterally. In the downward movement of said frame the

cam simply rides over the stud, turning on its pivot, as shown in Fig. 9. A suitable spring or other means will be employed to restore the frame after it has been shifted by the cam.

5 Such being the nature and object of my invention, what I claim is—

1. In a Jacquard machine, the combination of upright needles having grid-hooks and elongated downturned guiding and pivoting-  
10 hooks, cross-bars straddled by said elongated hooks and constituting fulcra therefor, a bottom-board, neck-cords attached to the lower ends of the upright needles and passing through the bottom-board, and card-operated  
15 horizontal needles engaged with the upright needles.

2. In a Jacquard machine, the combination of upright needles having grid-hooks and elongated downturned guiding and pivoting  
20 hooks, vertically reciprocating cross-bars straddled by said elongated hooks and constituting fulcra for the needles, a bottom-board, neck-cords attached to the lower ends of the upright needles and extending through  
25 the bottom-board, and card-operated horizontal needles engaged with the upright needles.

3. In a Jacquard machine, the combination of upright needles having grid-hooks and elongated downturned guiding and pivoting  
30 hooks, vertically reciprocating cross-bars straddled by said elongated hooks and constituting fulcra for the needles, a bottom-board, neck-cords attached to the lower ends of the upright needles and extending through  
35 the bottom-board, card-operated horizontal needles engaged with the upright needles, reciprocating grids for engagement with certain of the grid-hooks of the upright needles, and  
40 stationary grids for engagement with others of the grid-hooks of the upright needles.

4. In a Jacquard machine, the combination of upright needles having grid-hooks and elongated downturned guiding and pivoting hooks, cross-bars straddled by said elongated  
45 hooks and constituting fulcra therefor, a bottom-board, neck-cords attached to the lower ends of the upright needles and passing through the bottom-board, card-operated horizontal needles engaged with the upright  
50 needles, reciprocating grids for engagement with the grid-hooks of the upright needles, laterally movable guide-bars arranged adjacent to said grids and vertically movable therewith, and means for intermittently shifting  
55 said guide-bars, substantially as and for the purpose described.

5. In a Jacquard machine, the combination of upright needles having grid-hooks and elongated downturned guiding and pivoting  
60 hooks, cross-bars straddled by said elongated hooks and constituting fulcra therefor, a bottom-board, neck-cords attached to the lower ends of the upright needles and passing through the bottom-board, card-operated horizontal  
65 needles engaged with the upright needles, reciprocating grids for engagement with certain of the grid-hooks of the upright needles, stationary grids for engagement with others of said grid-hooks, guide-bars arranged  
70 adjacent to the reciprocating grids and carried up and down therewith, said guide-bars being also laterally movable, and means for intermittently shifting said guide-bars, substantially as and for the purpose set forth.

AMOS LOCKWOOD.

Witnesses:

SAMUEL HEY,  
GEORGE MILLER.