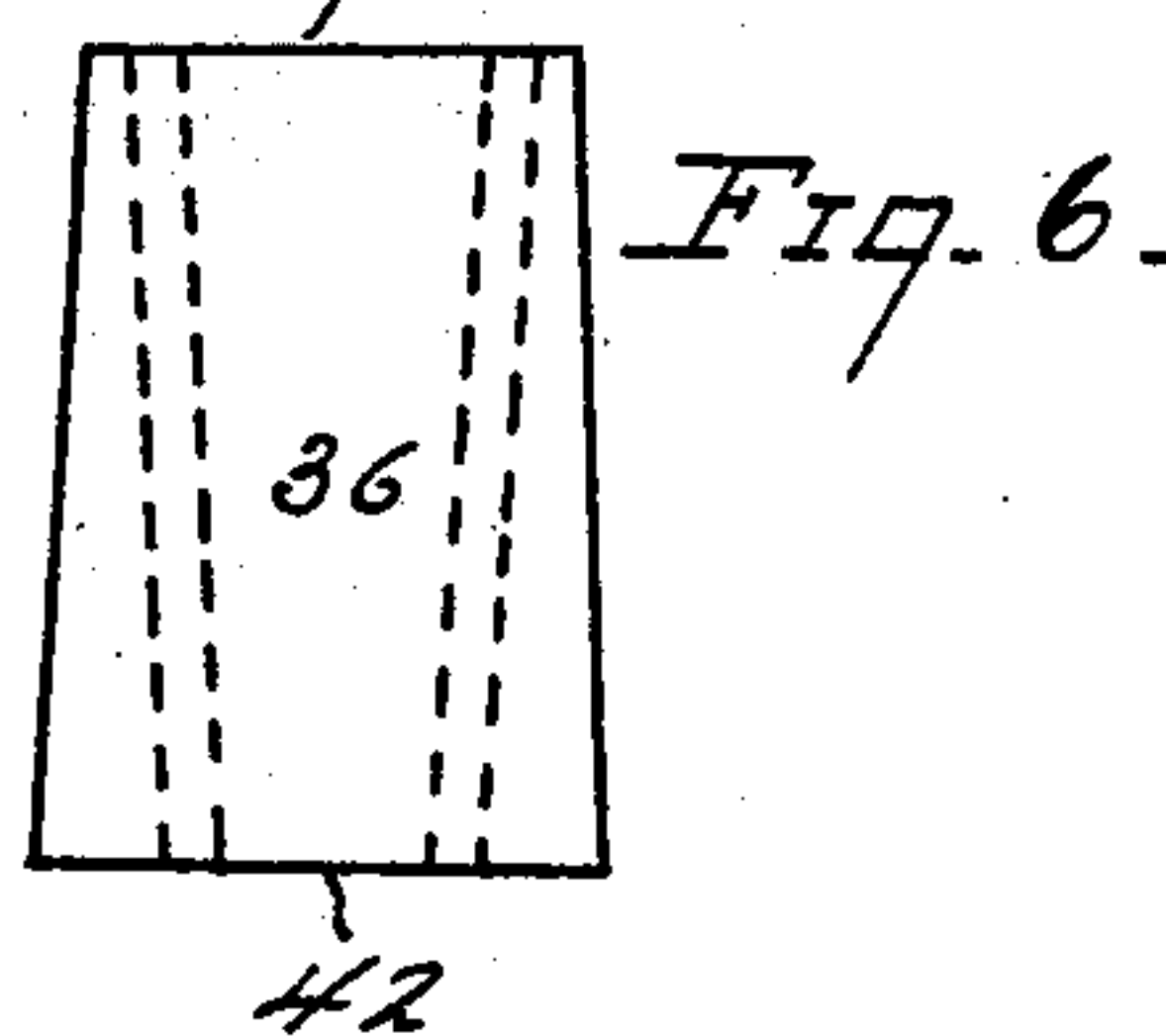
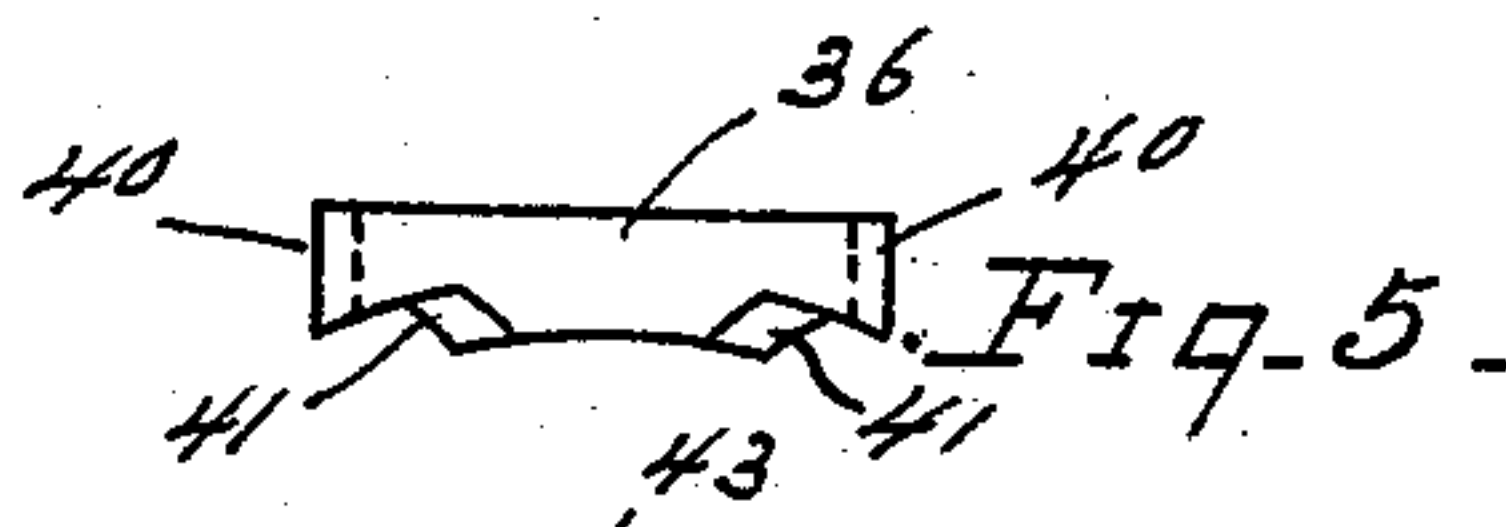
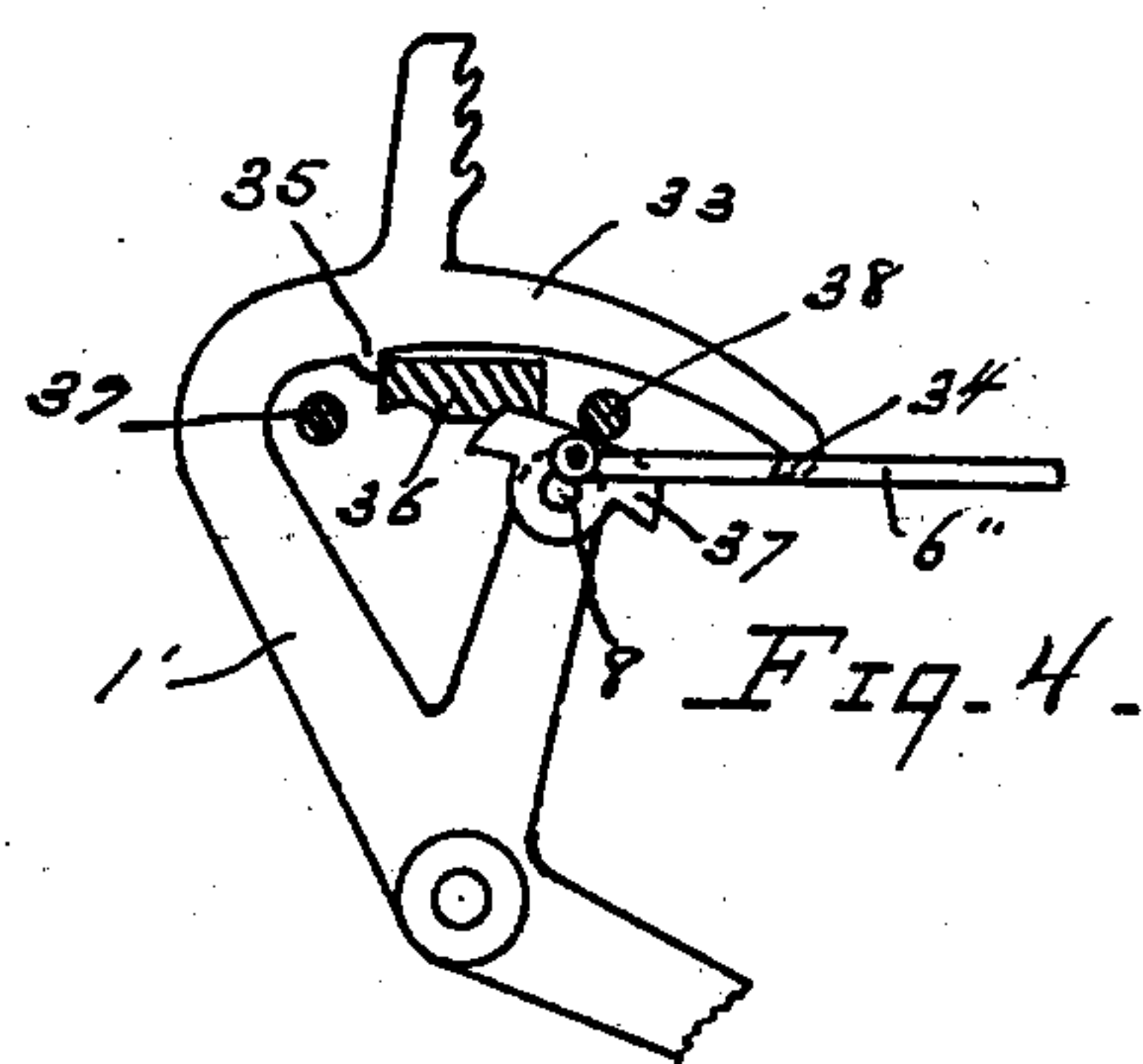
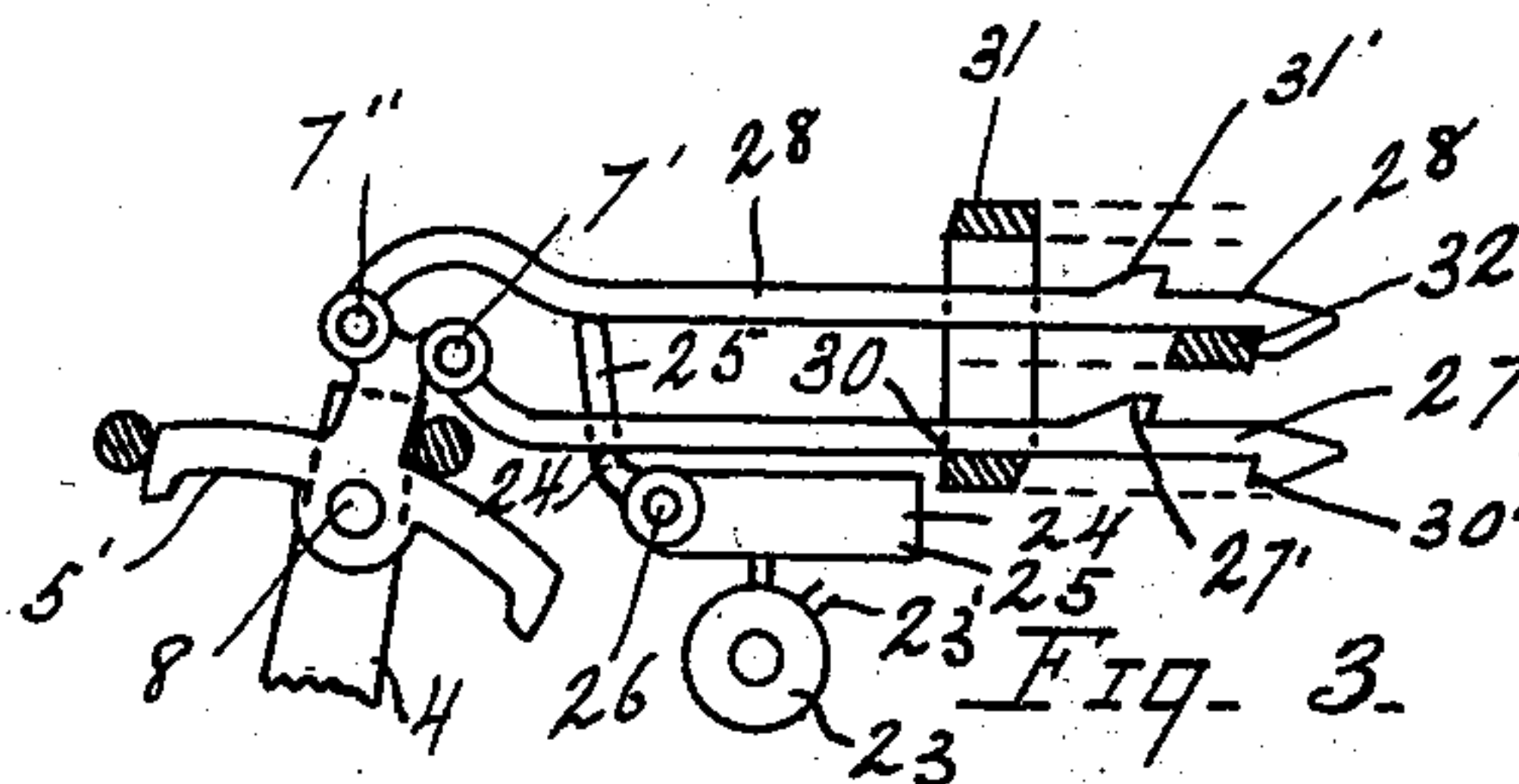
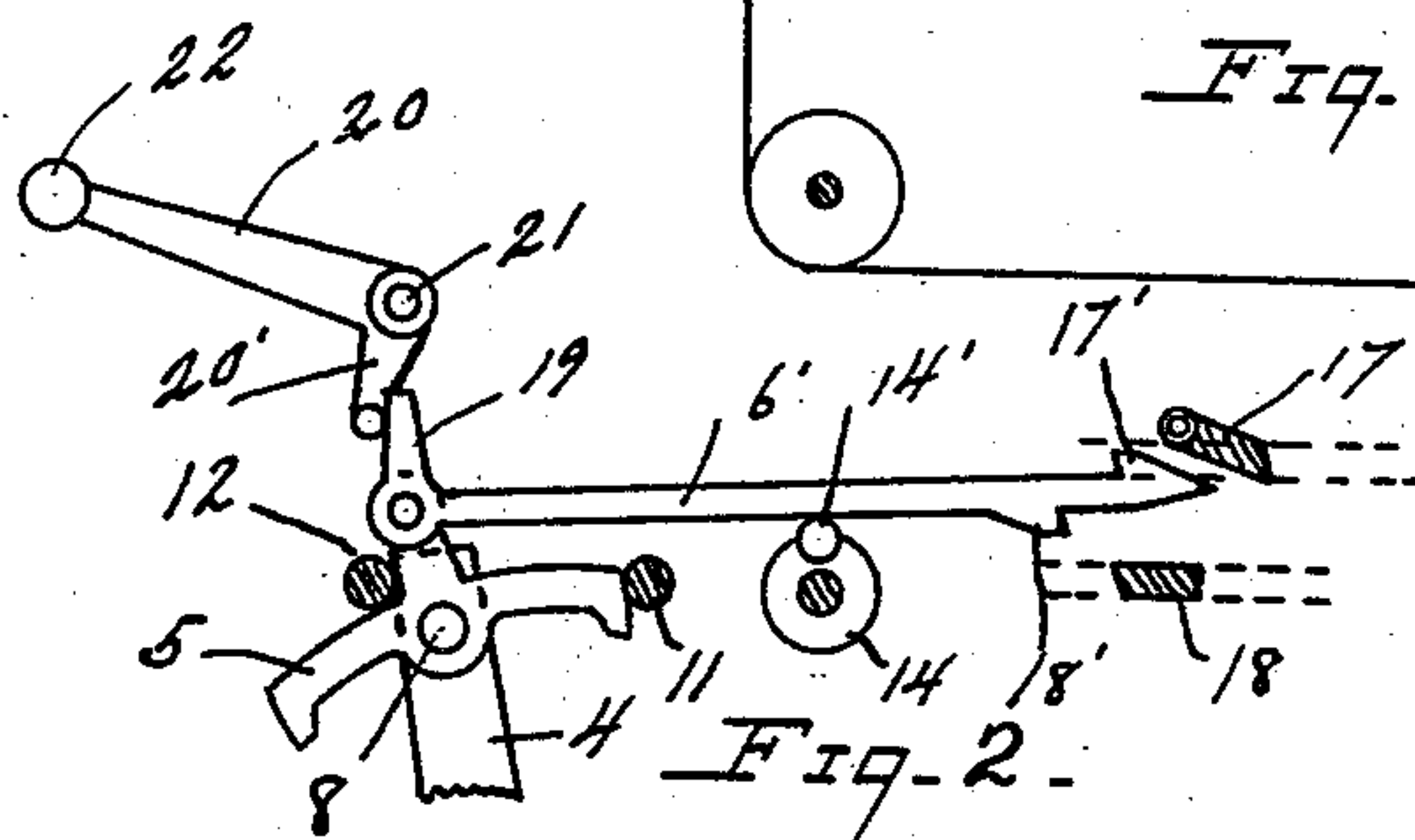
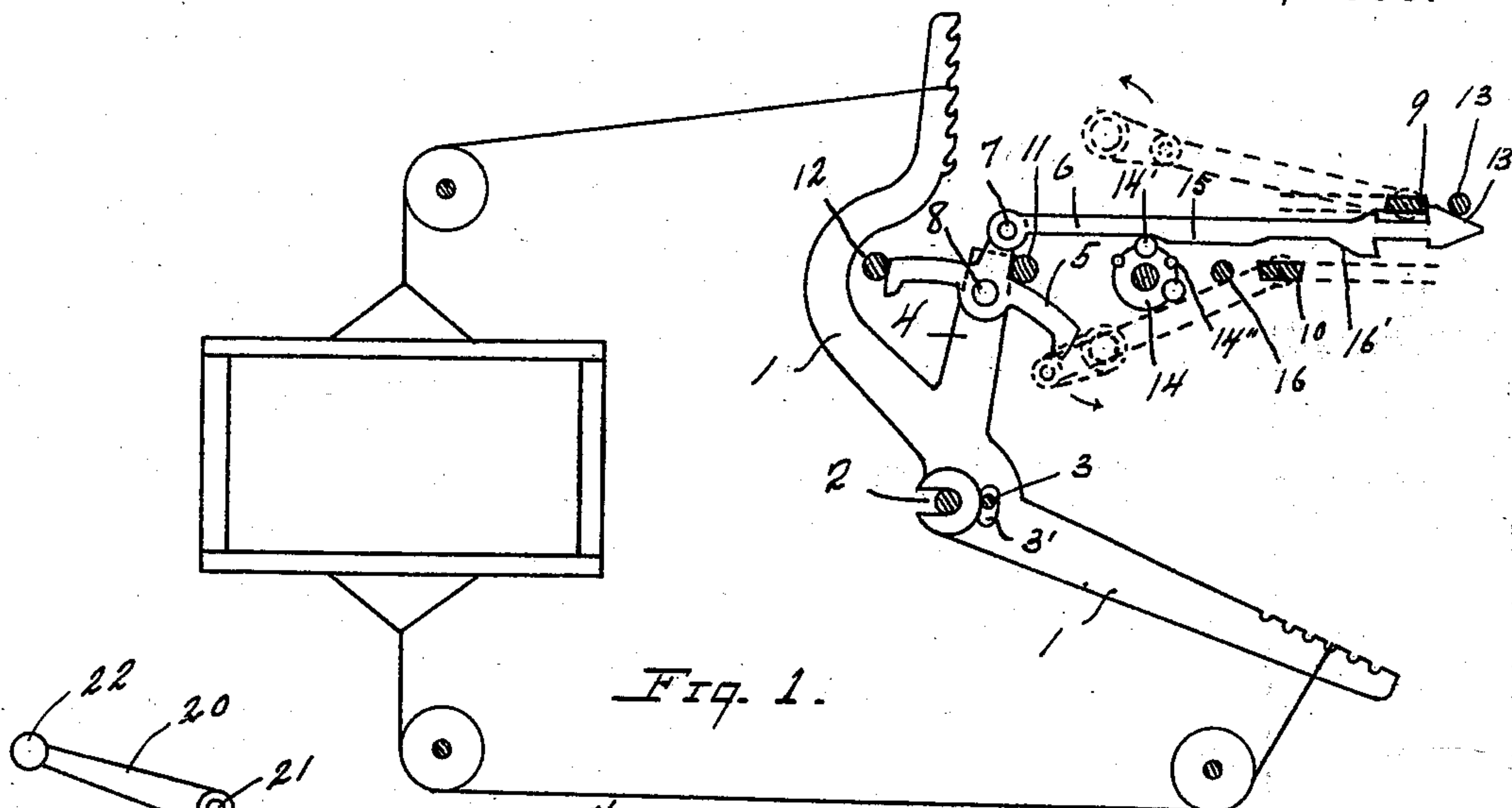


(No Model.)

C. ALVORD.  
SHEDDING MECHANISM FOR LOOMS.

No. 552,089.

Patented Dec. 31, 1895.



WITNESSES:

C. J. Newton  
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# UNITED STATES PATENT OFFICE.

CLINTON ALVORD, OF PHILADELPHIA, PENNSYLVANIA.

## SHEDDING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 552,089, dated December 31, 1895.

Application filed February 28, 1894. Serial No. 501,817. (No model.)

*To all whom it may concern:*

Be it known that I, CLINTON ALVORD, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Shedding Mechanism for Looms; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to the harness-motion of looms; and it consists in the means for actuating the harness-lever and locking device, as will be hereinafter fully described and the nature thereof indicated in the claims.

The object of my invention is to obtain a simple, accurate and economical mechanism for actuating the harness or other parts of a loom, and I have striven to avoid the multiplicity of pieces and joints so objectionable in other well-known harness-motions.

Referring to the drawings, Figure 1 is a sectional elevation showing the main features of my invention. Fig. 2 is a modification of the operating mechanism, and also shows the locking arrangement. Fig. 3 shows a modification in the mechanism for moving the lock-lever, substantially all of one pick. Fig. 4 shows a modification of the lock-lever and butting-surfaces, and Figs. 5 and 6 show said inclined butting-surfaces drawn on a larger scale.

In that embodiment of my invention illustrated by Fig. 1 of the drawings the harness-lever 1 is hung on shaft 2, is retained in place by pin 3 passed through curved slot 3' in said lever 1, and has the usual harness-frame connected to its ends by cording, as in ordinary loom construction.

On the arm 4 of lever 1 is pivotally mounted at 8 a lock-lever 5, the segmental arms of which are struck on a curve from the center of shaft 2. Hook 6 is connected to a third radial arm of lock-lever 5 at a point 7 outside of pivot 8, on which lock-lever 5 is mounted. The free end of hook 6 is provided at top and bottom with two projections between which there is a small space, forming at the upper side a notch to be engaged by the recipro-

cating knife 9, and at the lower side a notch to be engaged by the reciprocating knife 10, whereby the hook may be moved longitudinally.

The knife 9 I denominate the "elevator," it acting to raise the harness-frame connected to lever 1, and the knife 10 the "depressor," it acting to lower the said harness-frame. The hook is vibrated by a pattern-surface 14 to cause its notches to engage the reciprocating knives, a riser 14' on the pattern-surface acting to raise the hook and place its upper notch in engagement with the elevator 9, and a "sinker" 14'' permitting the hook to fall by reason of its own weight, thus engaging the lower notch of the hook with the depressor 10. As the reciprocation of the knives 9 and 10 is constant, it is necessary that the hook be freed from engagement with said knives at the extreme of its movement; otherwise when once engaged by one of the knives there would be a like reciprocation of the hook and an open shed could not be formed. To effect this disengagement I have placed at a point near the position reached by the elevator 9 in its outward movement a clearing-bar 13, which coacts with the beveled portion 13' on the upper side of hook 6, and have placed a clearing-bar 16 at a point near the position reached by the depressor 10 in its inward movement, which clearing-bar 16 coacts with the beveled portion 16' upon the under side of the hook. Upon the under side of the hook 6 is formed also the run 15 against which the risers of the pattern-surface operate, and that end of the riser nearest the pivotal point of the hook is cut away to permit the hook to be depressed by the action of the clearing-bar 13.

In order that the harness-lever may be retained in either extreme position and an open shed be formed, there are provided stationary butting-bars 11 and 12, which coact with the lock-lever 5 to lock the harness-lever in either extreme position. These butting-bars are arranged in an arc struck from the center of shaft 2, and placed one on each side of the arm 4 of the harness-lever and of the radial arm of lock-lever 5 and bear upon the segmental arms of said lever 5. When in this position the arm 4 and lever 5 are locked together and the pull upon the hook 6 draws



the arm 4 and moves the harness-lever, the lock-lever 5 having no independent movement at this time. This movement will continue until the arm 4 of lever 1 is brought against one of the butting-bars, and at that instant the end of one segmental arm clears the opposite butting-bar and is, by a slight turn of lever 5 upon its pivot, placed against the butting-bar. The tension on the warps carried by the harness-frame cannot disturb the position of the parts and the harness-frame will be unmoved until the hook is moved in the return direction, at which time the lock-lever 5 is turned slightly on its pivot and the end of the segmental arm freed from engagement with the butting-bar. The harness-frame is then free to be moved into its other position by the continued movement of the hook, the parts being locked at the end of the movement in the same way as just described.

In Fig. 2 the lock-lever 5 is hung on arm 4 of harness-lever 1 in the ordinary manner. The hook 6 rests on the pattern-surface 14 and extends outward between the reciprocating knives 17 and 18. On the upper side of hook 6' is a projection 17' to work with the elevating-knife 17 and on the under side is a similar projection 18' to work with the depressing-knife 18. Knife 17 is hinged at its upper edge, and its free or outer working edge drops by its own weight into the working line assumed by projection 17' when hook 6' is resting on a riser 14'. When there is a single projection on the hook to operate with a knife, there is no need of the clearing-bars 13 and 16, so they are omitted. The hook 6' has cast integral therewith the finger 19. Lever 20 is pivoted on pin 21, and when handle 22 is pulled downward arm 20' of lever 20 acts on finger 19 and forces hook 6' outward to its extreme position, causing lock-lever 5 to bring harness-lever 1 up and lock it there. The hinge on knife 17 will allow the knife to swing up and then down again with the passage of projection 17' of hook 6'.

In Fig. 3 the pattern-surface 23 is of the well-known lag style with two pegs 23' for each harness on each lag. The weighted indicating-levers 24 and 25 are pivoted on pin 26, and operated by pattern-surface 23 in the ordinary manner. Weighted levers 24 and 25 act upon hooks 27 and 28, throwing them in and out of operative connection with the reciprocating knives. When a peg 23' comes under a weighted lever 24, the weight end is elevated and the hook 27 allowed to drop. When there is no peg under lever 24 the weight keeps hook 27 up. Hook 28 is controlled in the same way by weighted lever 25. Hooks 27 and 28 are pivoted at 7' and 7'' to lock-lever 5', which is hung on arm 4 of the harness-lever. Reciprocating knives 30 and 31 move in unison and are intended to act on projections 30' and 31' of hooks 27 and 28. Knife 32 always moves in the opposite direction from knives 30 and 31 and acts upon pro-

jections 27' and 28' of hooks 27 and 28. The knives make one complete cycle of motion, or one outward and one inward stroke, in two picks of the loom, and the pattern-surface 23 turns once to every cycle of motion of the knives, or once in two picks. When a hook is engaged with a knife the lock-lever and harness-lever are moved as previously described for Fig. 1.

Fig. 4 shows a modified form of lock-lever and harness-lever. The butting-surfaces are on one bar instead of two, as shown in Figs. 1, 2, and 3, and the harness-lever 1' has cast integral therewith the arm 33, having the two projections 34 and 35, which strike on either side of butting-bar 36, and thus limit the motion of the harness-lever 1'. Lock-lever 37 is actuated by hook 6'', as previously described for Fig. 1. The harness-lever 1' is shown locked up in Fig. 4, and if any force should tend to keep it up when the hook 6 is being moved inward by the depressor-knife the lock-lever would turn on its axis 8 to unlock itself from bar 36 and then continue to turn at 8 instead of moving the harness-lever. To prevent such undue rotation, the bars 38 and 39 are placed to act as guides or stops for lock-lever 37, and after lever 37 has been unlocked the continued movement of the hook 6'' will cause it to pass under butting-bar 36 and lock on the other side.

Bar 36 in Fig. 4 is a section of butting-bar 36 shown in Figs. 5 and 6. The sides or butting-surfaces 40 and 41 of bar 36 are shown to be inclined toward each other in Figs. 5 and 6, and the purpose of this inclination is as follows: In Fig. 1 the tapering shed of the loom is formed by attaching each successive harness farther from the center of pin 2, which is done in the usual manner by use of the notches at the ends of the arms of harness-lever 1. In ordinary practice the front harness-frame would have the least shed or movement, and the last or back harness-frame would be attached farthest from the pin 2, and thus have the greatest movement. This is ordinary loom practice.

In Fig. 4 I have shown a limited number of notches at the extremities of the harness-lever 1', and a proper tapering shed could not be obtained by the use of so few notches. To form a correct tapering shed I employ the tapering or inclined butting-bar 36. The end 42 is placed toward the front or breast-beam of the loom, and the end 43 toward the rear of the loom. It is evident that when lock-lever 36 and harness-lever 1' are working at end 42 of bar 36 a smaller shed will be formed than when they are working with the end 43. The butting-surfaces 40 of bar 36 are made tapering to the same extent as surfaces 41, but in the opposite direction, and thus projections 34 and 35 of lever 1 allow each successive harness-lever to move farther than the one in front of it. Thus an angular or tapering shed is formed of the successive harness-frames by virtue of the increased angular movement of



the harness-lever, and is supplemented by a few notches at the extremities of the harness-levers.

5 The operation of my invention is as follows: The pattern-surface 14 is timed to move when the knives are at the opposite extremity of their motion to that shown in Fig. 1. When so timed, a hook 6 which has a sinker under it will drop onto depressor-knife, and  
10 a hook with a riser under it will be forced up and connect with the elevating-knife 9. The forward movement of the knives will unlock the harness-levers and they will be moved into their opposite positions and locked in  
15 place. An open shed will be formed and the harness-frames will have been pulled positively into position. The harnesses will remain in their respective places so long as sinkers and risers follow on the pattern-surface, but when a riser follows a sinker, or  
20 vice versa, the levers, and consequently the harnesses, will move into the opposite position. The hooks are freed from the knives by the action of clearing-bars 13 and 16, as  
25 previously described. With the elevating-knife of the form shown in Fig. 2 the leveling arrangement may be used. When a warp end breaks in the loom, it is convenient to have all the harness-frames in one position  
30 for convenience in finding the empty heddle. Those harnesses that are up will stay up, but those that are down may be forced up by pulling on the handle 22 of lever 20, thus forcing up all the depressed harnesses by the action of  
35 arm 20' against finger 19 of hook 6. When the loom is started, the motion of the knives will bring the harness-levers into place again according to the selection of the pattern-surface.

40 The action on the harness-levers of the two-hook arrangement shown in Fig. 3 is exactly the same as the single hook except that the actuating-knives are intended to operate in either direction. The harness-lever is locked  
45 in position by the lock-lever and butting-surfaces, but the knives make one outward and one inward movement in two picks of the loom instead of one pick, as shown in Fig. 1. In this way a slow and easy movement is im-  
50 parted to the harnesses, for the harness moves substantially all of one pick in passing from one extreme of the shed to the other.

In locking the harness-lever in place against stationary butting-surfaces I use a lock-lever,  
55 but I might employ any mechanical equivalent of the lever, such as a slide, without altering the main feature of the invention. Therefore in the claims I refer to the harness-lever as the "prime" member and the lock-lever as the "secondary" member of the mechanism. Neither do I confine myself to the exact style of actuating mechanism shown, for

the harness-lever and lock-lever could be moved in some way other than by the hook-and-knife mechanism herein illustrated with-  
65 out departing from the general idea of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

70 1. In a loom mechanism, the combination with a harness frame, a prime member, and suitable connections from said harness frame to said prime member, of a secondary member operatively connected with said prime  
75 member, butting surfaces, a pair of hooks connected with said secondary member, reciprocating knives engaging said hooks by which said prime member is moved against one of  
80 said butting surfaces and said secondary member is brought, by its continued motion, against the other one of said butting surfaces, whereby said prime member is locked  
85 in position and is moved twice in each cycle of motion of its actuating mechanism, substantially as described.

2. In a loom, the combination with a prime member, a secondary member operatively connected with said prime member, butting  
90 surfaces and means for actuating said secondary member, by which said prime member is moved against one of said butting surfaces, and said secondary member is brought, by its continued motion, against the other  
95 one of said butting surfaces, whereby said prime member is locked in position, of independent means for actuating said secondary member, whereby said prime member is un-  
locked at will, substantially as described.

3. In a loom mechanism, a prime member  
100 provided with an arm 4, stationary butting bars 11 and 12 placed at each end of movement of said arm 4, a secondary member consisting of a lock lever 5 pivoted on said arm 4 and provided with a radial arm, means con-  
105 nected with said radial arm to move said secondary member, said lock lever being arranged to bear against one of said butting bars and be held from rocking, whereby its motion is communicated to said arm 4 and  
110 to be released at the end of the movement of said arm 4, whereby said lock lever is allowed to rock on said arm 4, thereby bringing its end into contact with said butting bar to lock  
115 said prime member in position, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLINTON ALVORD.

Witnesses:

M. S. ALVORD,  
C. S. NEWTON.