

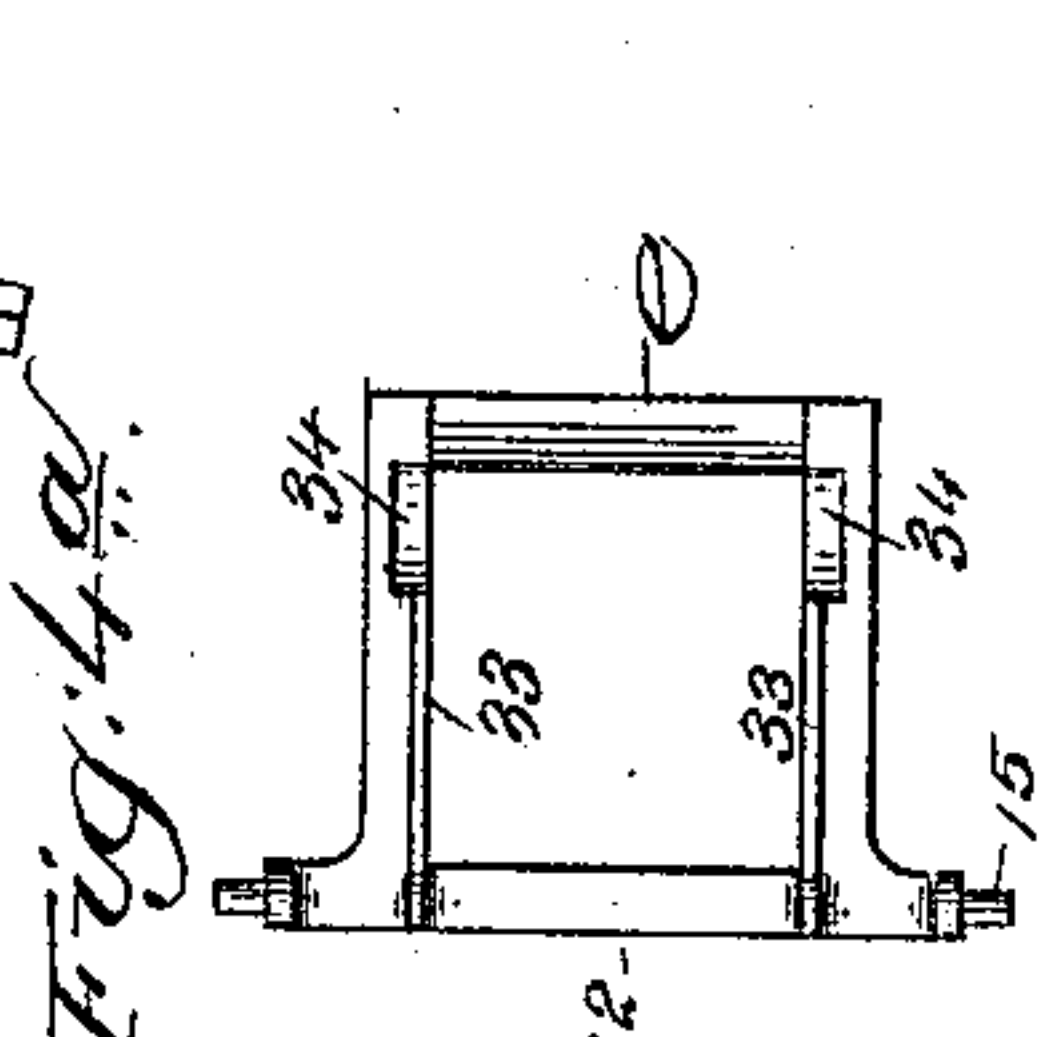
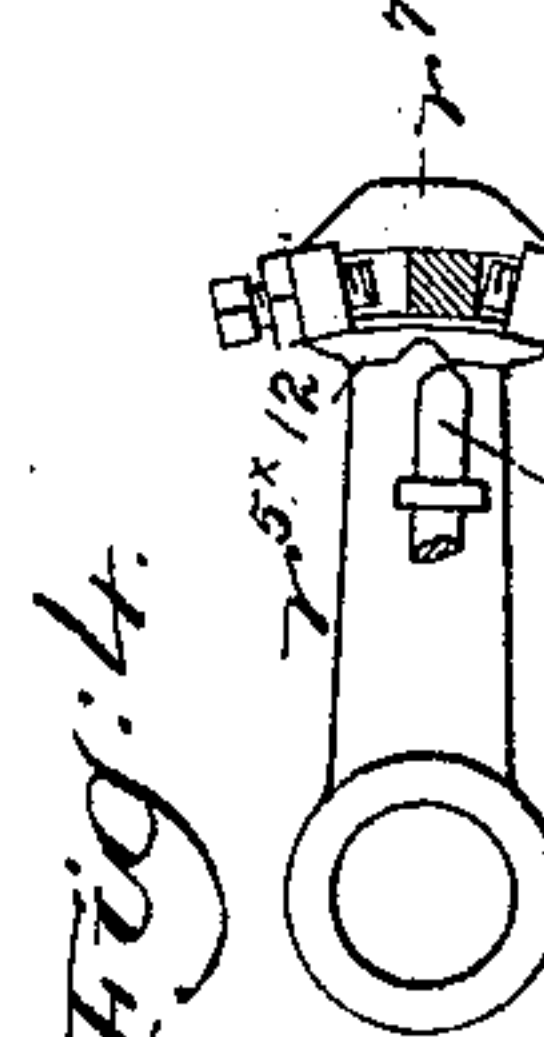
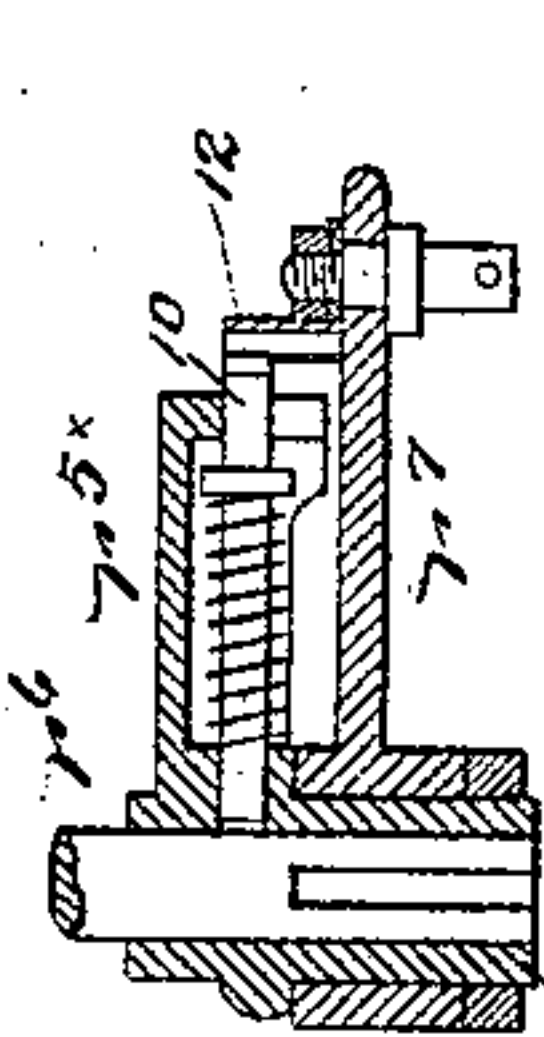
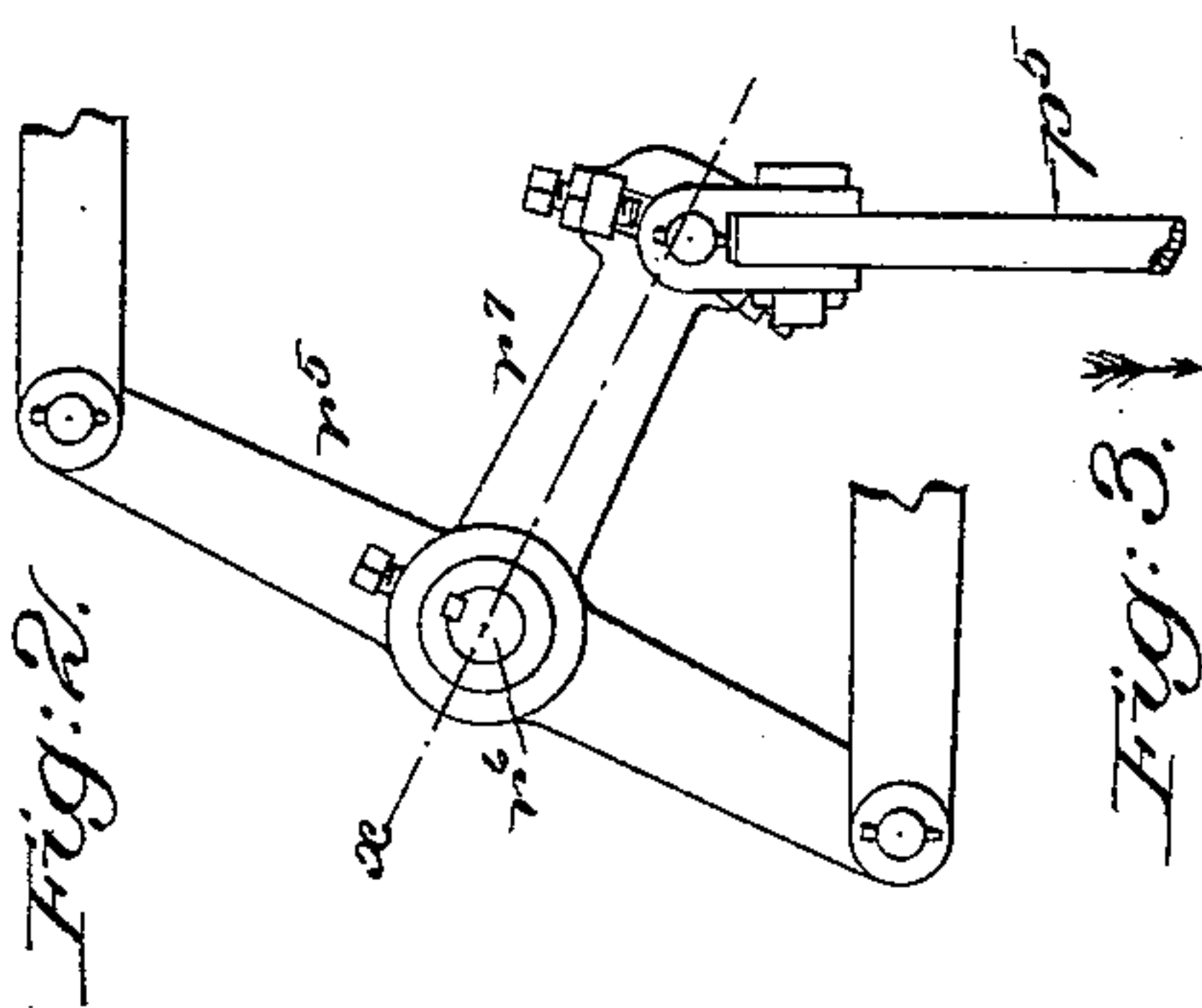
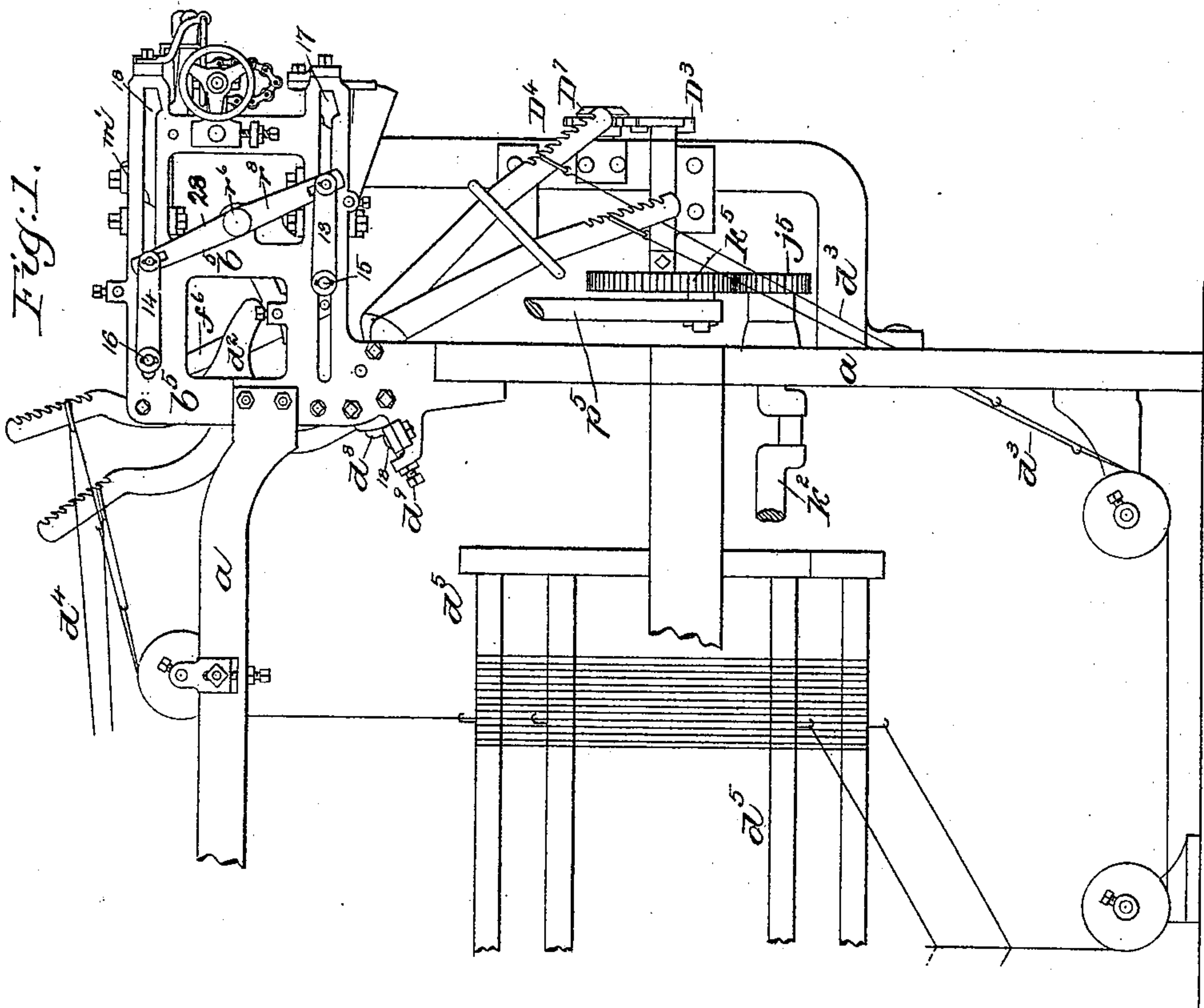
(No Model.)

2 Sheets—Sheet 1.

H. WYMAN.  
SHEDDING MECHANISM FOR LOOMS.

No. 459,474.

Patented Sept. 15, 1891.



Witnesses.  
Fred L. Emery  
John P. C. Printz

Inventor.  
Horace Wyman,  
by Lewis & H. W. W. W.

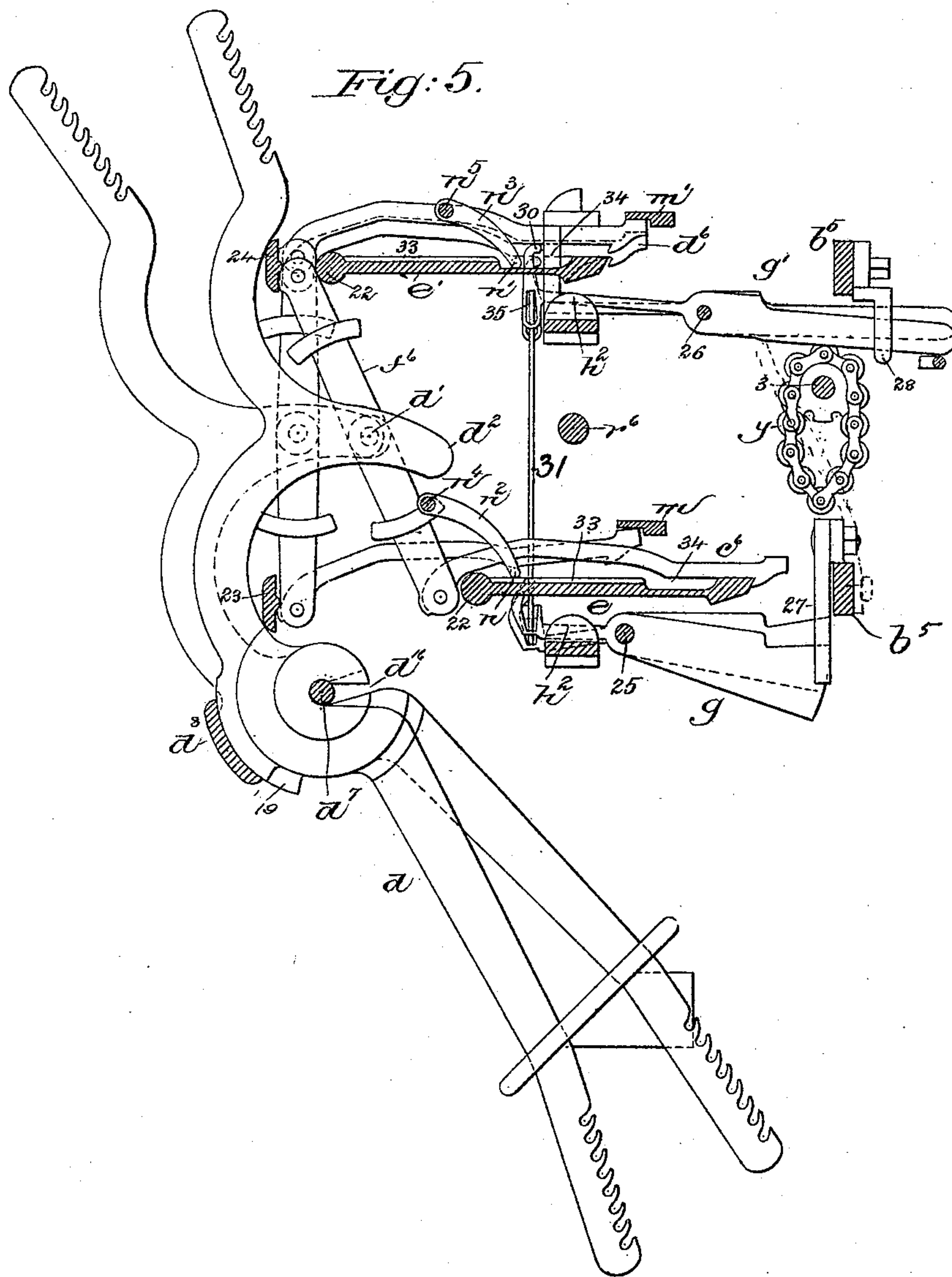
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Horace Wyman.  
by Crosby & Gregory attys



# UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS.

## SHEDDING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 459,474, dated September 15, 1891.

Application filed July 5, 1887. Serial No. 243,399. (No model.)

*To all whom it may concern:*

Be it known that I, HORACE WYMAN, of Worcester, county of Worcester, and State of Massachusetts, have invented an Improvement in Shedding Mechanisms for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the shed-forming mechanism of looms, my invention being shown as applied to an open-shed loom and being an improvement on the class of loom shown in United States Patent No. 217,589. In the patent referred to the descent of the harness-frames is effected by a series of springs that draw the frames to which they are attached into the lower shed; but herein the harness-frames at bottom and top are directly connected by cording to the harness-levers, which latter are moved positively, as will be hereinafter described, in the direction to not only open the shed but also to close it, the harness-frames so moved positively into the lower shed in exactly their proper position being retained there and being prevented from jumping or rising as the reed meets the fell or from rising by reason of excessive tension on the warp, for if some of the said harness-frames yield from the level of the lower shed as the reed reaches the fell their warp-threads will be slackened and will cause the surface of the fabric to appear rough or uneven. The use of springs to close the shed is also very objectionable, for when the shed is being opened the stress of the springs has to be overcome, which requires considerable power, such increase of power being very considerable in broad looms or looms employing any great number of harness-frames, and especially if the loom is run at very high speed. In this my invention the harness-frames are brought positively into the lower shed and are there held positively, while those harness-frames next to pass into the upper shed are moved positively into such position.

Figure 1 is a partial front elevation of a loom provided with my invention; Fig. 2, a detail showing the lifter-actuating lever at the rear side of the loom and the means for connecting it with its actuating-link; Fig. 3, a section of Fig. 2 in the dotted line *x*; Fig.

4, a view of the safety device in the direction of the arrow in Fig. 3; Fig. 4<sup>a</sup>, a top view of one of the lifters, and Fig. 5 is an enlarged sectional detail of some of the parts shown in Fig. 1.

The frame-work *a*, crank-shaft *k*<sup>2</sup>, pinion *j*<sup>5</sup> thereon, toothed gear *k*<sup>5</sup>, connecting-rod *p*<sup>5</sup>, the head *b*<sup>5</sup>, the connections or arms *f*<sup>6</sup>, the hooked jacks *c*<sup>6</sup> *d*<sup>6</sup>, jointed to them, and the fulcrum-bars 23 24 are all substantially as in the said patent, wherein like parts are designated by like letters. The link *p*<sup>5</sup> is connected at its upper end to an arm *r*<sup>7</sup>, loose (see Fig. 3) on the hub of a lever *r*<sup>5</sup>, fast on one end of a rock-shaft *r*<sup>6</sup>, extended to the opposite side of the head, where the said shaft is provided with a lever *r*<sup>8</sup>. The lever *r*<sup>5</sup> has a third arm *r*<sup>5x</sup>, (best shown in Fig. 3,) which has a spring-pressed bolt or stud 10, the beveled or rounded end of which enters a notch in a holding-plate 12, forming part of an ear or flange at the rear side of the arm *r*<sup>7</sup>. The levers *r*<sup>5</sup> and *r*<sup>8</sup>, the latter being also fixed on shaft *r*<sup>6</sup>, are connected each by like links 13 14 to studs 15 16, connected to or forming parts of the carriages *e* *e'*, (shown separately in Fig. 4<sup>a</sup> and in section in Fig. 5,) the said links and levers serving to reciprocate the said carriages alternately in opposite directions in slots 17 and 18 in the sides of the head, as in Fig. 1. The arms or connections *f*<sup>6</sup> have their fulcrum on studs or projections *d'* of the ears *d*<sup>2</sup> of the harness-levers *d*, to the notched lower and upper ends of which are adjustably attached the harness-cording *d*<sup>3</sup> and *d*<sup>4</sup>, extended, respectively, to the top and bottom of the harness-frames *d*<sup>5</sup>, of usual construction. The harness-levers *d* are notched at *d*<sup>6</sup> to enable them to be readily applied to their common fulcrum *d*<sup>7</sup>, in which position they are held by the holding-bar *d*<sup>8</sup>, made adjustable by adjusting-screws *d*<sup>9</sup>, the bar being held in adjusted position by bolts 18. Herein the inner face of the holding-bar *d*<sup>8</sup> is concaved, as shown best in Fig. 5, the levers *d* each having a convexed projection 19 to fit against the said bar. To remove the harness-levers it is necessary to remove the holding-bar *d*<sup>8</sup>. The carriages are beveled at their outer ends to engage such of the notched jacks *c*<sup>6</sup> *d*<sup>6</sup> as are not held up by the action of the fingers *g* and *g'* as the carriages are



moved outwardly or away from the harness-frames, the beveled outer ends of the said carriages acting at such times as "lifters." The carriages referred to (see Figs. 4<sup>a</sup> and 5) have straight rear edges 22, which as the carriages are moved inwardly or arrive at the end of their inward stroke act in succession against the connections  $f^6$  at bottom and then at top, and effect the positive depression or placing into the lower shed of all those harness-frames which are not held elevated by the hooked jacks at the opposite end of the connection  $f^6$  in engagement with the other carriage  $e$  or  $e'$ , the said straight edges 22 at such times acting as eveners to insure the correct position in the lower shed for all those harness-frames which are to remain there during the next pick, the said harness-frames being held in such position by locking-bars, to be described, so that they cannot rise and permit the warp-threads carried by them to become slack as the reed meets the fell of the cloth. The head  $b^5$  has suitable comb-like bars  $h^2$  to guide the fingers  $g$  and  $g'$ , pivoted at 25 and 26 and weighted at their outer ends, other guides, as 27 and 28, guiding the outer ends of the said fingers. The extension-frame also has two locking-bars  $m$  and  $m'$ , having each a shoulder, as shown best in Fig. 5, the said shoulders receiving against them the outer ends of such of the hooked jacks as are lifted by the fingers  $g$  and  $g'$ , the said bars locking or holding the said jacks in position while the carriages  $e$  and  $e'$  are moved outwardly to lift the harness-frames into the upper shed. As each carriage starts outwardly, the fingers below the hooked jacks act to lift into engagement with the locking-bars  $m$  or  $m'$  such of the jacks as are not to be engaged by the carriage to lift the harness-frame with which the jack co-operates, and during the first part of the said onward movement the said fingers act to keep in elevated position the said hooked jacks; but to prevent the accidental descent of the said jacks so placed in line or engagement with and held by the locking-bars as the carriages in engagement with the hooked jacks move them to lift the harness-frames I have provided rest-bars  $n$   $n'$ , which insure that the said jacks shall be held up. These rest-bars  $n$   $n'$  are attached to arms  $n^2$  and  $n^3$ , pivoted at  $n^4$  and  $n^5$  on a rigid part of the head  $b^5$ . The lower ends of each arm  $n^2$  and  $n^3$  rest by gravity upon the upper side of the carriage under it, both the said carriages  $e$  and  $e'$  having a high part 33, which comes under the arms  $n^2$  and  $n^3$ , except at the time when the pattern chain or surface  $y$  is to be moved to change the position of the fingers  $g'$   $g$ , at which time the said arms enter the depressed portions 34 of the carriages. The pattern surface or chain  $y$  is herein shown as elevated to act upon the uppermost series of fingers  $g'$ , and these fingers have up-turned points 30, which pass up through the open central part of the carriage  $e'$  and act directly against the under sides of the jacks

$d^6$ , there being a finger for each jack. The fingers  $g'$  have pockets 35, in which are inserted loosely the upper ends of rods 31, the lower ends of the said rods entering loosely corresponding or suitable pockets in the fingers  $g$ , the said rods transmitting to the fingers  $g$  the movement of the fingers  $g'$  due to the pattern surface or chain. The pattern surface or chain  $y$  and its shaft 3 are and may be as in United States Patent No. 264,864, wherein like letters designate like parts, and in practice the shaft will be rotated intermittently, as described in the said patent, and in a forward or backward direction, as described, the shaft carrying the toothed wheel  $k^5$  being supposed to be provided at its outer end with a pin-wheel  $D^3$ , which engages a star-wheel  $D^4$ , operatively attached to a bevel-gear  $D^7$ , the said parts  $D^2$ ,  $D^4$ , and  $D^7$  being substantially as in said patent. As the carriages complete their outward movement the pattern surface or chain  $y$  is moved to redistribute the fingers  $g'$  and  $g$ , according to the requirements of the next shed to be made. As described, the loose arm  $r^7$  has a notched flange 12, (see Figs. 3 and 4,) which is engaged by the spring-pressed pin 10, carried by the arm  $r^{5x}$  of the three-armed lever  $r^5$ . These two arms and the spring-pressed pin 10 constitute a safety device. If the parts of the loom are all working correctly, the arm  $r^7$ , moved by the link  $p^5$ , will, through the pin 10, move the arm  $r^{5x}$  and turn the rock-shaft  $r^6$  to move the carriages  $e$  and  $e'$ ; but if the jacks should become caught or other accident happen whereby the strain on the moving parts would be such as to break them, then the notched part of the arm  $r^7$  in the movement of the said arm will pass away from the spring-pressed pin or frictional locking device 10 between the said arms  $r^7$  and  $r^{5x}$  and the rock-shaft  $r^6$  will be left at rest. As each carriage  $e$   $e'$  completes its inward throw each of the jacks not held up by a finger below it drops into position to be engaged by the outer end of the carriage as the latter starts out; but if the jack at the upper or lower end of a connection  $f^6$  is disengaged from the carriage nearest to it then the upper or lower end of the connector next the disengaged jack will rest against one of the fulcrum-bars 23 or 24, and when a carriage engages a jack to lift the harness-frame attached to the harness-lever on which the connector to be moved is mounted then the opposite end of the said connector during the outward movement of the jack rests on the fulcrum-bar next to it. If both jacks of any one connector are simultaneously engaged with both of the oppositely-moving carriages, then the harness-lever on which the said connector is pivoted will not be moved, but the harness-frame attached to the said harness-lever will remain in the upper shed. By arranging the pattern-chain, as shown, to act upon the upper rather than upon the lower set of fingers I am enabled to use a longer



pattern-chain without interfering with the other parts of the loom. If the pattern-chain should be made longer than shown, the frame-work will have a suitable guide or shield, as indicated by the dotted lines, Fig. 5, upon which the pattern-chain will drop. This construction also enables the rods used between the fingers  $g'$  and  $g$  to be made as plain rods, the rods, the upper ends of which are acted upon by the inner ends of the fingers  $g'$ , serving to push down the inner ends of the lowermost series of fingers  $g$ .

I am aware that looms have been made embodying shedding mechanism somewhat similar to that herein presented, but differing from the latter in that the connections to which the hooked jacks are pivoted, instead of being mounted directly upon the harness-levers, are mounted upon radius bars or arms, which in turn are connected to the harness-levers, and also in that the cording, instead of being connected to the harness-lever at the top and bottom of the latter, is connected to one end of the said lever, the opposite end of the lever being pivoted to the loom-frame.

I claim—

1. In a loom, the following instrumentalities: a series of harness-frames, harness-levers, cording connected to the top and bottom of the said levers, connections mounted on the said harness-levers, hooked jacks attached to the opposite ends of the said connections, a pattern mechanism to select which of the said jacks shall be next engaged and moved, locking-bars  $m m'$  to engage with the said hooked jacks when at one extreme of their movement and while held by the pattern mechanism out of engagement with the lifters, lifters to engage the said hooked jacks, and means to operate the said lifters, and devices acting positively to carry the ends of the connections back into their normal positions and place the hooked jacks so that they may engage with the said bars  $m m'$ , as described.

2. A series of harness-levers hung or pivoted between their ends and adapted to be connected at top and bottom by cording with the harness-frames of a loom, connections mounted on the said harness-levers, hooked jacks attached to the opposite ends of the said connections, a pattern mechanism to determine which of the said jacks shall be next operated, locking-bars to engage with the said hooked jacks when at one extreme of their movements and while maintained out of engagement with the lifters, lifters to engage the said hooked jacks, means to oper-

ate the said lifters, and devices acting positively to carry the ends of the connections back into their normal positions and place the hooked jacks so that they may engage with the said bars, substantially as set forth.

3. The harness-levers, the connections  $f^6$ , hooked jacks attached to their opposite ends, a pattern-surface and intermediate devices to raise and lower the hooked jacks, and carriages having their outer and inner edges adapted to act the one as a lifter and the other as a depressor and eveners, combined with means to move the carriages, substantially as described.

4. The harness-levers, the connections  $f^6$ , hooked jacks attached to their opposite ends, a pattern-surface and intermediate devices to raise and lower the hooked jacks, and carriages to act not only as lifters but also as eveners, combined with means to move the carriages and with locking-bars to hold those hooked jacks which are not caught by the outer end of the carriage, substantially as described.

5. A set of fingers for the upper set of hooked jacks and a pattern-surface acting upon the outer ends of said upper set of fingers, combined with a set of fingers for the lower set of hooked jacks and a series of connections at their inner ends to enable the upper to actuate the lower set of jacks, substantially as described.

6. The harness-levers, the connections  $f^6$ , hooked jacks attached to their opposite ends, a pattern-surface and intermediate devices to raise and lower the hooked jacks, and carriages to act not only as lifters, but also as eveners, and having depressions 34, combined with means to move the carriages and with locking-bars to hold those hooked jacks which are not caught by the outer end of the carriage, and rest-bars and arms carrying them, the said arms being free to enter the said depressions in the carriages, as set forth.

7. The carriages  $e e'$ , the rock-shaft  $r^6$ , the links, the lever  $r^8$ , the lever  $r^5$ , having an arm  $r^{5x}$ , the arm  $r^7$ , loosely mounted on the said rock-shaft, and means to move the said arm  $r^7$  positively, combined with a safety device, substantially as described, to connect the said arms  $r^7$  and  $r^{5x}$ .

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

HORACE WYMAN.

Witnesses:

S. B. SCHOFIELD,  
JUSTIN A. WARE.