

No. 815,501.

PATENTED MAR. 20, 1906.

E. B. ALLEN.

BUTTONHOLE CUTTING DEVICE FOR SEWING MACHINES.

APPLICATION FILED MAY 13, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

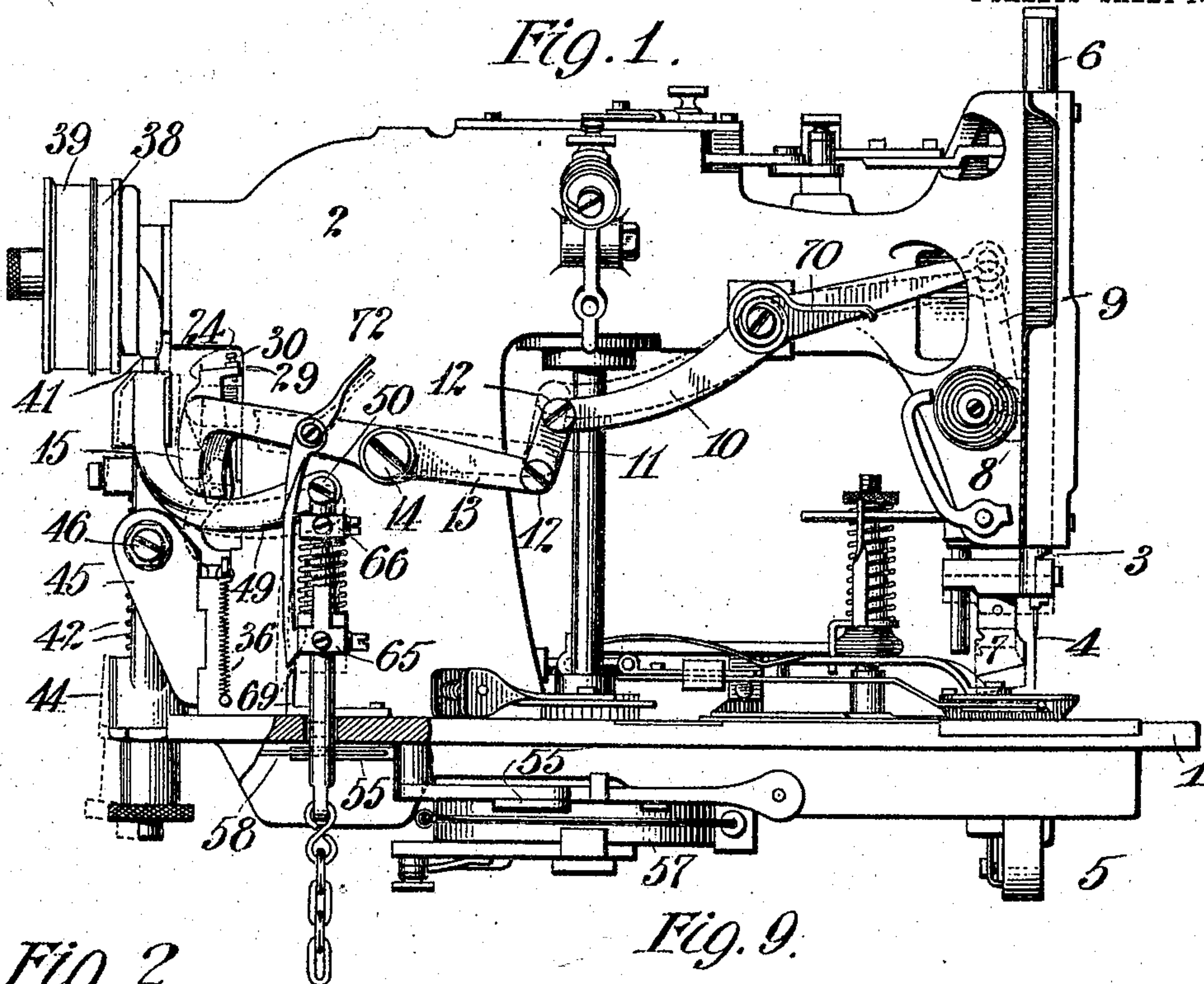


Fig. 2.

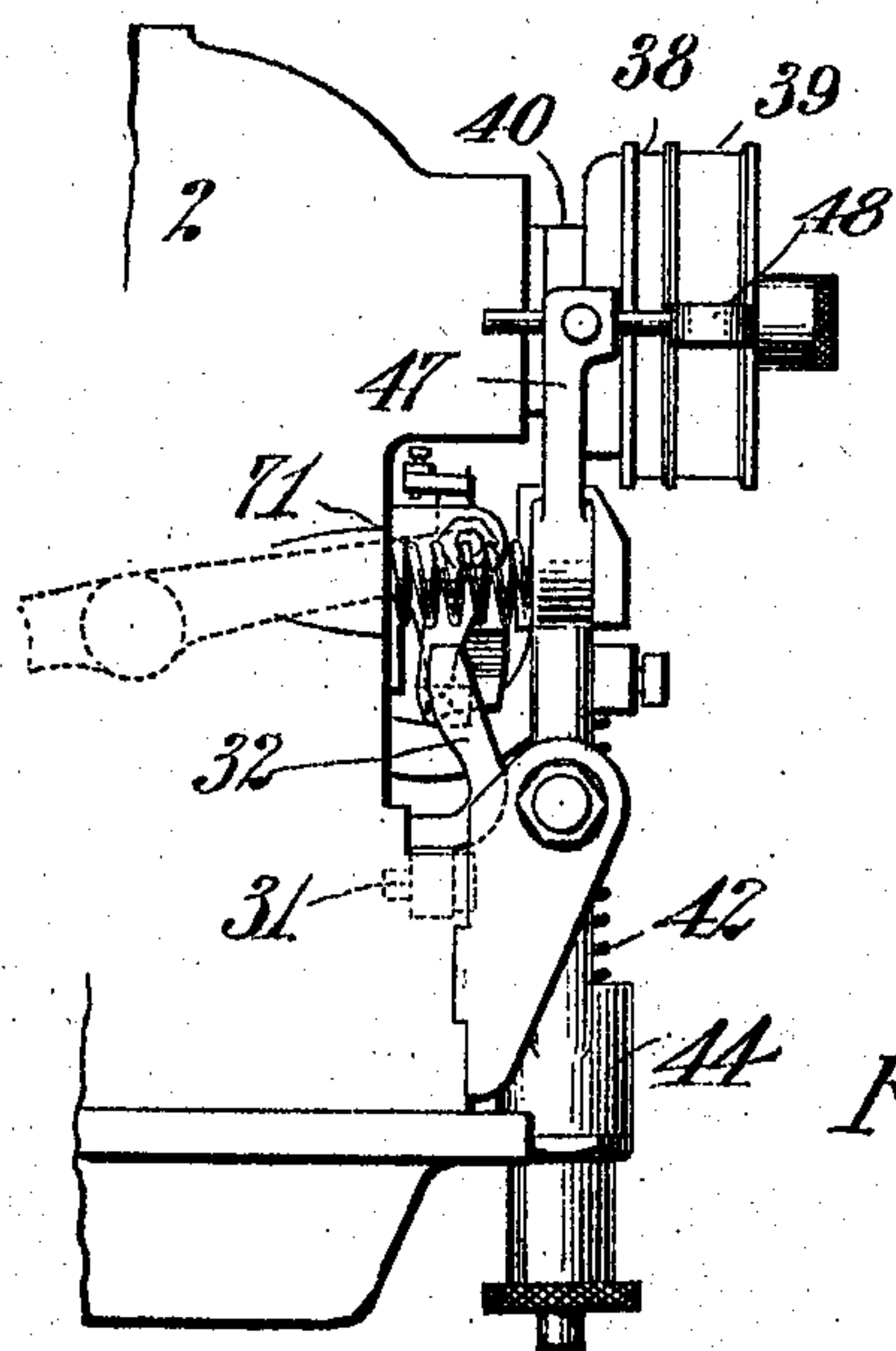


Fig. 9.

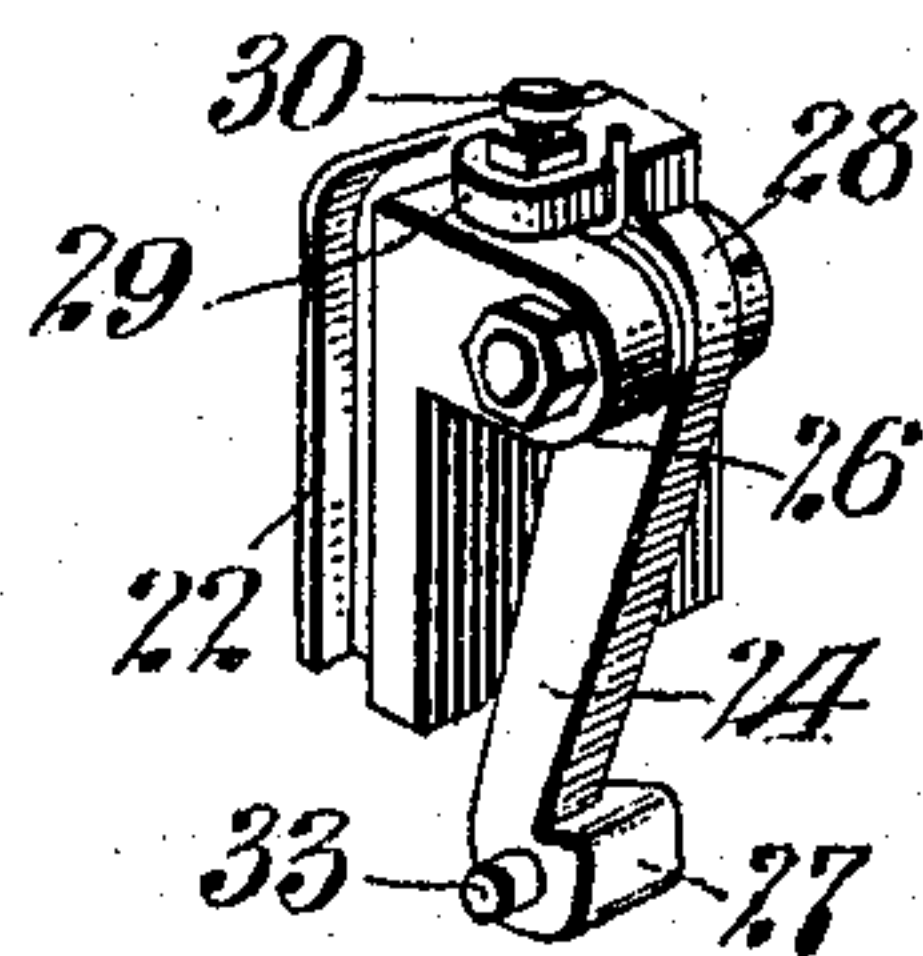


Fig. 10.

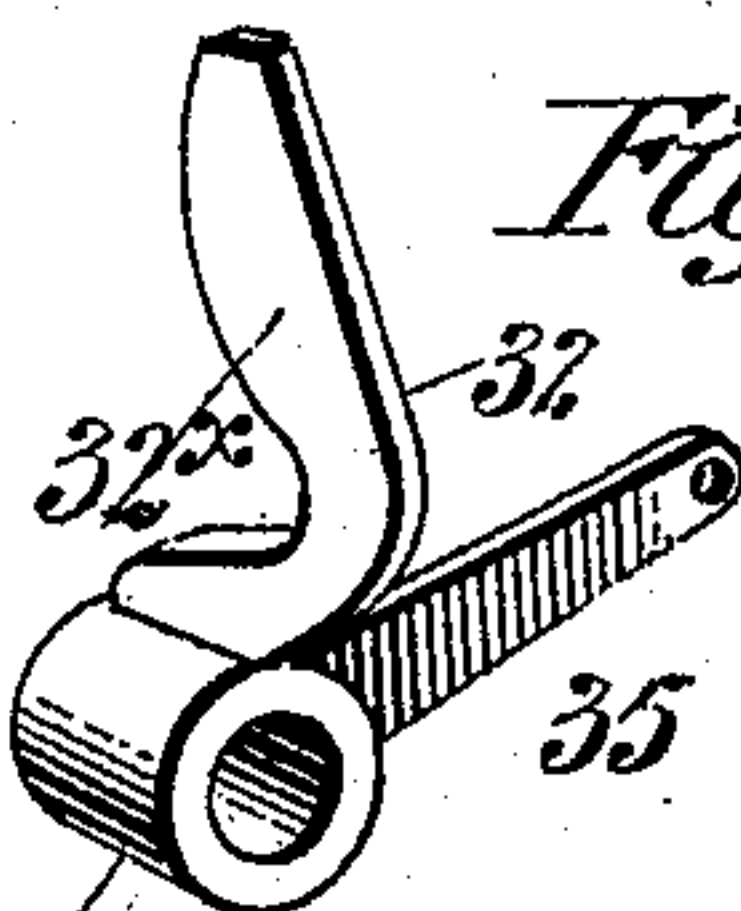


Fig. 11.

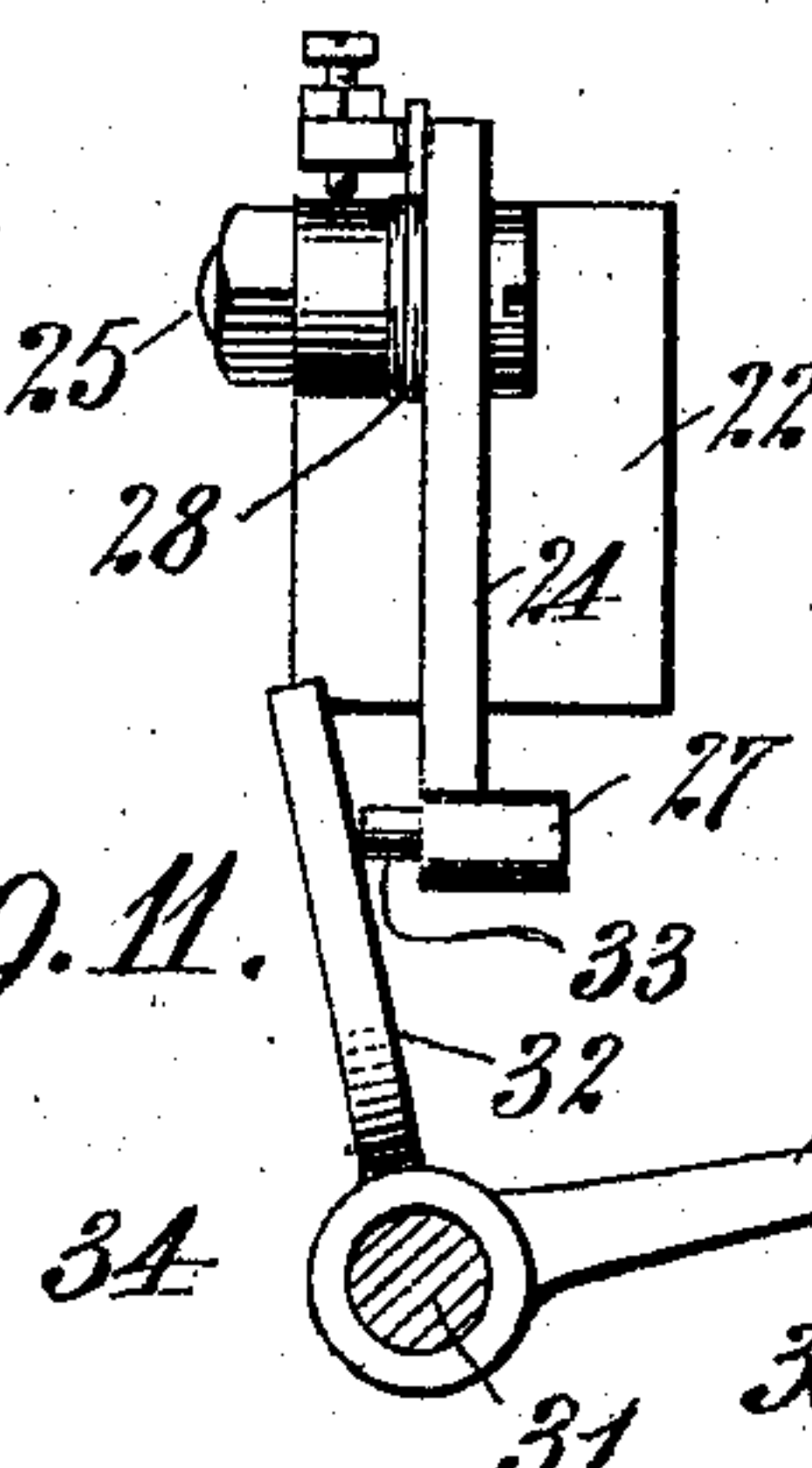
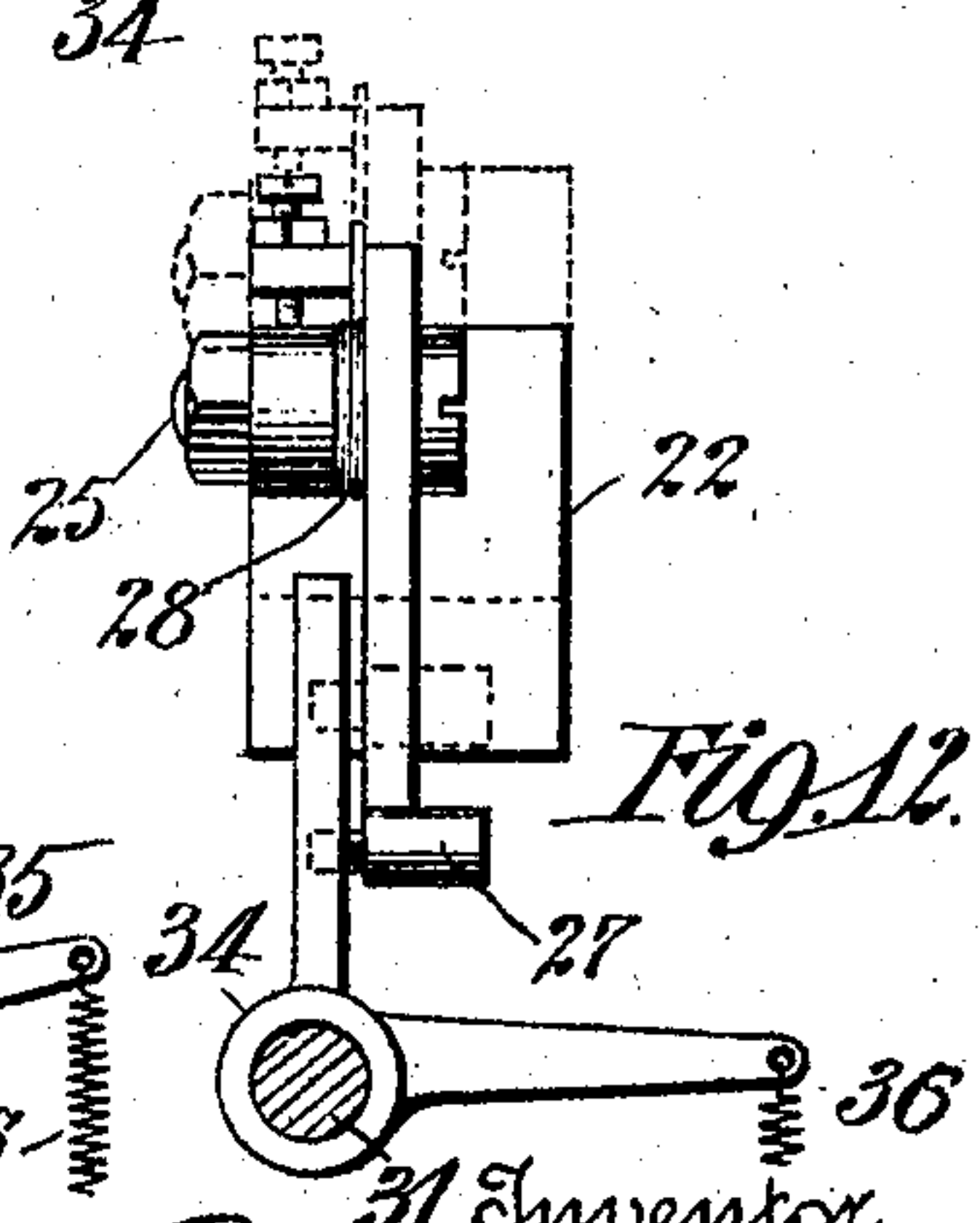


Fig. 12.



2 Witnesses  
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By his Attorney  
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Henry J. Miller.



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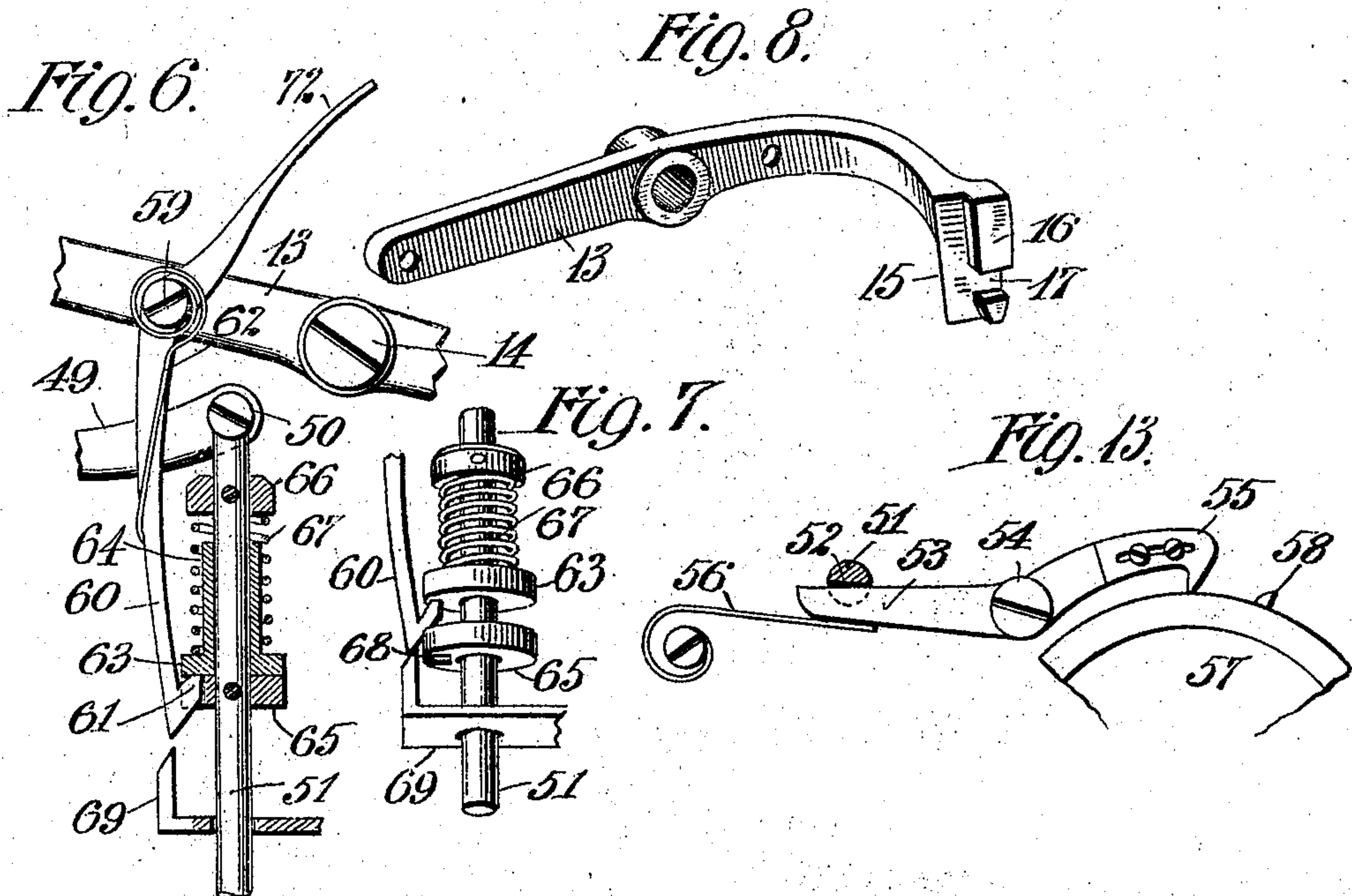
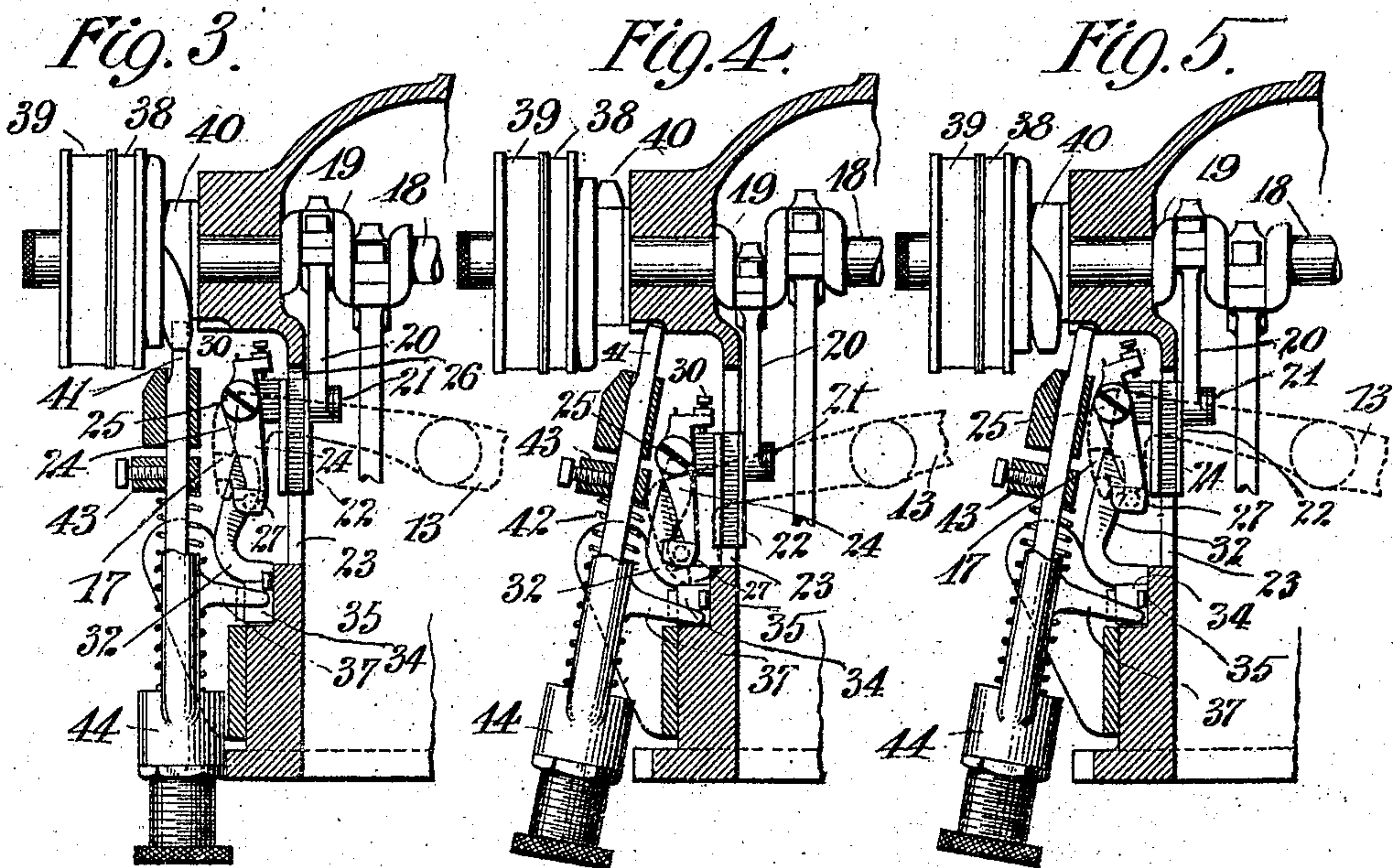
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2 SHEETS—SHEET 2.



Witnesses  
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Inventor  
Edward B. Allen  
By His Attorneys  
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# UNITED STATES PATENT OFFICE.

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## BUTTONHOLE-CUTTING DEVICE FOR SEWING-MACHINES.

No. 815,501.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed May 13, 1905. Serial No. 260,221.

*To all whom it may concern:*

Be it known that I, EDWARD B. ALLEN, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Buttonhole-Cutting Devices for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in cutting devices for buttonhole-stitching machines, particularly of that class represented in my United States Patent No. 767,539, dated August 16, 1904, in which the cutting of the buttonhole-slit precedes the stitching operation; and it has for its primary object the shortening of the stroke of the cutter-actuator to produce a corresponding increase in its power, so as to render it more effective in performing its work.

In its preferred form the invention is embodied in a buttonhole cutting and stitching machine of the class represented in my said patent, in which the knife-bar is given a two-stage movement, having the first portion communicated by the treadle mechanism connected with the stop-motion device for setting the machine in motion, while the second and operative portion of such two-stage movement is effected automatically by means of an actuator deriving continuously-reciprocating movements from the rotation of the main shaft through a coupling device whose parts are thrown into engagement by the initial treadle action. The knife is positively withdrawn from the material by the initial return stroke of the actuator, from which it is uncoupled at the end of the same and raised, by means of a suitable spring, to initial operative position, where it remains until the machine is again started for a succeeding buttonhole cutting and stitching operation.

In the drawings annexed, Figure 1 is a side elevation of a buttonhole-sewing machine of the Singer type embodying the present improvement. Fig. 2 is a similar elevation of the opposite side of the rear portion of the machine. Figs. 3, 4, and 5 are elevations, partly in section, of the rear portion of the machine looking at the same side as represented in Fig. 1, but representing the cutter-

actuating mechanism in different operative relations. Fig. 6 is an enlarged elevational view, partly in section, of the treadle connection with the cutter mechanism, and Fig. 7 is a perspective view of the interengaging parts of such treadle connection in another relation. Fig. 8 is a perspective view of the coupling-lever of the cutter mechanism. Figs. 9 and 10 are perspective views, respectively, of the cutter-actuator and the throw-out lever for its coupling member; and Figs. 11 and 12 are rear end views of the same parts in different operative relations. Fig. 13 is a plan view of the latch-lever for the treadle-rod and means for tripping the same for permitting the stop-motion to operate in stopping the machine.

The machine is constructed with the usual bed-plate 1 and bracket-arm 2, in the forward end of which is mounted the needle-bar 3, whose needle 4 operates in conjunction with a shuttle confined in the race-block 5 and the knife-bar 6, carrying the knife 7 and provided with a lug 8, connected by the link 9 with the forward end of a rock-lever 10, whose rear end is connected, by means of the link 11 and pivotal pins 12, with the forward end of the tilting lever 13, mounted upon the stud 14, carried by the bracket-arm, whose inturned rear end is provided with a depending head 15, having along the rear edge a rib 16, with notch 17 near the lower end of the same. The rear end portion of the main shaft 18 is provided, in addition to the usual connections for actuating the shuttle-shaft and the feeding mechanism, with a crank 19, connected, by means of the pitman 20 and pin 21, with a laterally-grooved block 22, fitted to a guideway 23, provided therefor in the rear wall of the bracket-arm, such block constituting the cutter-actuator, which receives vertical reciprocatory motions from the main shaft throughout the cycle of the machine.

A coupling device is provided for temporarily connecting the rear end of the tilting lever 13 with the continuously-reciprocating actuator 22, comprising a latch-lever 24, pivoted at 25 to a lug 26 upon the actuator 22, which is provided at the rear of its lower end with a tooth 27, adapted at certain times to enter the notch 17 of the lever 13. The lever



24 is pressed normally backward by means of a coil-spring 28, encircling the pivotal screw-pin 25 and having its ends engaging, respectively, the actuator and a lug 29 upon the adjacent upper end of the latch-lever, which is provided with an adjustable stop-screw 30, passing through the same and resting upon the lug 26 to determine the normal position of the latch-lever, the spring 28 permitting the latch-lever to yield when its tooth 27 is engaged by the adjacent edge of the rib 16 upon the tilting lever 13 and to cause the tooth 27 to snap into the notch 17 when such parts come into register.

Upon the bracket-arm 2 beneath the latch-lever 24 is mounted, by means of a fixed screw-stud 31, a throw-out lever 32, of which the outer operative end portion is adapted to engage a lateral stud 33 upon one side of the latch-lever 24 and is formed with a flat face adjacent to said latch-lever and with an inner inclined cam-shaped edge 32<sup>x</sup>. The hub 34 of this lever is provided with a lateral arm 35, which is normally drawn downward by means of a spring 36 for pressing the throw-out lever 32 toward the latch-lever 24, but which lateral arm 35 is adapted for engagement with a lateral finger 27 upon the adjacent side of the vibrating stop-lever 44 of the stop-motion device, whereby the tilting of the lever 44 into operative position for stopping the machine causes the finger 37 to engage the under side of the arm 35 and to thereby shift the throw-out lever 32 wholly out of engagement with the latch-lever 24 and lateral stud 33, carried thereby, while the reverse movement of such stop-lever in the starting of the machine permits the latch-lever 24 to swing backwardly into normal position, with the end of the stud 33 opposed to the flat side of the throw-out lever, as represented in Figs. 2 and 11.

When the cutter is in raised initial position, the head of the tilting lever 13 is sufficiently elevated to bring its notch 17 materially above the coupling-tooth 27 of the lever 24, carried by the actuator, and such parts are thus incapable of operative engagement for the actuation of the cutting mechanism. The lever 13 may be brought into operative relation with the coupling-lever 24 by the means now to be described in connection with the stop-motion device.

The main shaft 18 is provided with the usual fast and loose pulleys 38 and 39, the former having the yieldingly-connected stop-motion cam 40, whose peripheral notch is entered by the upper end of the plunger-rod 41, normally pressed upwardly into the same by means of the spring 42, interposed between a collar 43 thereon and the lower end of the central vertical opening in the vibrating stop-motion lever 44, pivoted upon the bracket 45 upon the column of the bracket-arm 2 by

means of center screws 46 and provided with the upwardly-projecting belt-shipper arm 47, having the belt-guide 48 and with laterally and rearwardly extending arm 49, to the end of which is pivoted, by means of a screw 50, the upper end of the treadle-rod 51, provided with the usual lateral notch 52, entered by the tail of a bent lever 53, pivoted by a screw-stud 54 on the under side of the bed-plate and having upon its other end a nose-piece 55, pressed, by means of the spring 56, into normal contact with the periphery of the feed-wheel 57 and adapted to be engaged periodically by the tripping-lug 58, carried by the latter.

Upon the rear portion of the tilting lever 13 is mounted, by means of the screw-stud 59, a depending latch-arm 60, pressed normally toward the treadle-rod 51 by means of a spring 62 and having at its lower end a hooked shoulder 61, adapted to engage the under side of a flange 63 upon the lower end of a sleeve 64, mounted upon the treadle-rod intermediate the fixed collars 65 and 66, between which flange and the collar 66 is interposed a spring 67 for maintaining the flange 63 normally in contact with the collar 65. The operative lower end of the latch-arm 60 normally enters a notch 68 in the collar 65 for engagement with the flange 63.

When the treadle-rod 51 is drawn downward by actuation of the treadle by the operator, the descent of the sleeve 64 and flange 63 therewith causes the depression of the rear portion of the tilting lever 13 through the latch-arm 60 until the inclined lower end of the latch-arm lies in contact with the similarly-inclined upper end of a lug 69, secured upon the bed-plate, during which movement of the latch-arm the head 15 of the lever 13 descends in contact with the yielding lower end of the latch-lever 24, whose tooth is caused at the end of such movement to enter the notch 17 in the lever for coupling the cutter mechanism with the actuator 22, which still remains at rest, for the reason that the belt has not yet been shifted entirely from the loose pulley to the fast pulley and the plunger-rod 41 has been shifted laterally only partially out of the notch in the stop-motion cam 40, all as indicated in dotted lines in Fig. 1. The tilting of the lever 13, forming a member of the train of cutter mechanism, has evidently caused only the partial depression of the cutter-knife 7 to a position in which its point is but slightly above the material to be cut. The further depression of the treadle-rod now causes the final throw of the stop-motion lever 44 to throw the belt upon the fast pulley 38 and withdraw the plunger-rod 41 from its notch in the cam 40 for the actuation of the main shaft 18. The initial descent of the actuator 22 now causes the depression of the head 15 of the lever 13, as in-



indicated in Fig. 4, and consequent final depression of the cutter-knife 7 to form the slit in the material, the continued downward movement of the rear portion of the lever 13 causing the descent of the latch-arm 60 with its inclined lower end in contact with the cam-stud 69, which latter causes it to swing outwardly out of engagement with the flange 63, whose spring 67 now forces it downward into contact with the collar 65 to prevent reengagement with the shoulder 61 when the latch-arm 60 rises after the cutting operation. As the coupling-lever 24 descends with the actuator its lateral pin 33 rides over the curved edge of the throw-out lever 32, whose spring shifts it into contact with the face of the coupling-lever 24. Upon the upward stroke of the actuator 22 the pin 33 follows the curvature of the edge of the lever 32 and gradually tilts the lever 24 until at the end of its upstroke, as represented in Fig. 5, the tooth 27 is withdrawn from its notch 17 in the lever 13, the release of which permits the return of the cutter mechanism to initial position under the action of the spring 70, acting upon the rock-lever 10, whereby the head 15 of the lever 13 is thrown upwardly out of operative relation with the coupling-lever 24, which continues its vertical movements with the actuator 22, with the lateral pin 33 resting continuously in contact with the curved edge 32<sup>x</sup> of the throw-out lever 32.

The stitching operation having proceeded under the continued rotation of the main shaft 18, initiated as before described, the tripping-lug 58 upon the feed-wheel 57 engages the nose-piece 55 of the latch-lever 53 and withdraws the tail of the same in opposition to its spring 56 from the lateral notch 52 in the treadle-rod 51, when the stop-motion lever 44 is permitted to reassume under the action of its return-spring 71 its initial position, thereby shifting the belt upon the loose pulley and presenting the end of the plunger-rod 41 to the notched stop-motion cam 40 in a manner well known, such action of the lever 44 causing the lifting of the treadle-rod 51 into initial position for engagement of the hooked shoulder 61 of the latch-arm 60 with the flange 63 of the sleeve 64, as before described, for a succeeding cutting and stitching operation.

The latch-arm 60 is provided with a tail portion 72, which may be manipulated by the operator to throw the shoulder 61 of the latch-arm 60 out of the path of movement of the yielding flange 63, carried by the treadle-rod 51, in case it should be desired to operate the machine without the usual slit-cutting operation, as in mending a previously-cut and partially-stitched buttonhole.

Having thus set forth the nature of my invention, what I claim herein is—

1. The combination with a buttonhole-

stitching machine comprising suitable stitching forming mechanism, of a buttonhole-cutting device adapted to receive a two-stage cutting movement in one and the same direction, manually-actuated means for imparting to said cutting device the first stage of the cutting movement, and automatically-acting means independent of the stitch-forming mechanism for communicating the final stage of the cutting movement.

2. The combination with a buttonhole-stitching machine, of a two-stage buttonhole-cutting mechanism comprising a cutter-bar, an automatically-acting actuator therefor, means including a coupling device for connecting said cutter-bar with said actuator, and manually-actuated means for first imparting to said cutter-bar the first stage of its cutting movement and then bringing into operative relation the interengaging parts of the coupling device to effect the automatic production of the final stage of the cutting movement.

3. The combination with a buttonhole-stitching machine, of a stop-motion, cutting mechanism, an actuator therefor, a coupling device for temporarily connecting said cutting mechanism with its actuator, and common manually-controlled operating means having independent connections with said cutting mechanism and stop-motion adapted to successively effect the coupling of said cutting mechanism with its actuator and the starting of the machine.

4. In a buttonhole-sewing machine, the combination with stitching mechanism, cutter mechanism including a tilting lever, an actuator operative continuously while the stitching mechanism is in operation, a coupling device intermediate the cutting mechanism and its actuator of which the initial coupling position of one member is controlled by said tilting lever, manually-operative means for tilting said lever to bring the component members of the coupling device into operative relation, and means for automatically disengaging said members after a cutting operation.

5. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion, cutter mechanism operative independently of said stop-motion, an actuator therefor, a coupling device intermediate said cutter mechanism and its actuator, common manually-operative means for bringing the component members of said coupling device into operative relation and subsequently actuating the stop-motion to set the machine in operation, and means for automatically disengaging said members of the coupling device.

6. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion including a vibrating stop-lever,



cutter mechanism operative independently of said stop-motion and including a tilting lever, an actuator therefor continuously operative while the stitching mechanism is in action, a coupling device intermediate said cutter mechanism and its actuator and having one of its component members movable into its initial coupling position by said tilting lever, and common manually-operative means connected independently with said tilting lever and said stop-lever for first tilting the former to bring the coupling members into operative relation and then actuate said stop-motion.

7. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion, cutter mechanism operative independently of said stop-motion, an actuator therefor, a coupling device intermediate said cutter mechanism and its actuator and having one of its component members movable into its initial coupling position by a member of said cutter mechanism, and common manually-operative means yieldingly connected with said cutter mechanism and positively connected with said stop-motion for first bringing the component members of said coupling device into operative relation and then actuating the stop-motion to set the machine in operation.

8. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion, cutter mechanism operative independently of said stop-motion, an actuator therefor, a coupling device intermediate said cutter mechanism and its actuator and having one of its component members movable into its initial coupling position by a member of said cutter mechanism, common manually-operative means having a detachable yielding connection with said cutter mechanism and a positive connection with said stop-motion for first bringing the component members of said coupling device into operative relation and then actuating the stop-motion to set the machine in operation, and a device acting automatically to disengage said yielding connection of the manually-operative means from said cutter mechanism.

9. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion including a vibrating stop-lever having a lateral arm, cutter mechanism including a tilting lever, an actuator therefor continuously operative while the stitching mechanism is in action, a coupling device intermediate said cutter mechanism and its actuator and having one of its component members movable into its initial coupling position by said tilting lever, and common operative means comprising a positive connection with said stop-motion and a yielding connection with said tilting lever for actuating the same successively to couple the cut-

ter mechanism and actuator and thereafter set the machine in operation.

10. In a buttonhole-sewing machine, the combination with stitching mechanism, a stop-motion, cutter mechanism operative independently of said stop-motion, an actuator therefor, a coupling device intermediate said cutter mechanism and its actuator and having one of its component members movable into its initial coupling position by a member of said cutter mechanism, common manually-operative means having a detachable yielding connection with said cutter mechanism and a positive connection with said stop-motion for first bringing the component members of said coupling device into operative relation and then actuating the stop-motion to set the machine in operation, and a device acting automatically to disengage said yielding connection of the manually-operative means from said cutter mechanism, means being provided whereby said disengagement may be manually effected.

11. In a buttonhole-sewing machine, the combination with stitching mechanism, a reciprocating actuator continuously operative while the stitching mechanism is in action, a coupling-lever carried by said actuator, cutter mechanism including a tilting lever carrying a coupling member adapted for engagement with said coupling-lever but maintained normally out of operative relation therewith, and means for manually moving said tilting lever to impart to the cutter mechanism an initial stage of a cutting operation and to bring the coacting coupling parts into coupling relation whereby a final stage of the cutting operation may be effected.

12. In a buttonhole-sewing machine, the combination with stitching mechanism, and cutter mechanism including a cutter-bar mounted for endwise operative movement only, and independent means for actuating said cutter mechanism to impart to said cutter-bar two separate stages of its full stroke in the same direction.

13. In a buttonhole-sewing machine, the combination with stitching mechanism, and cutter mechanism including a cutter-bar carrying a suitable knife and mounted for endwise operative movement only, manually-operative means for actuating said cutter mechanism to impart an initial stage of its movement in one direction, and automatically-acting means also actuating said cutter mechanism to impart to said cutter-bar a final stage of movement in the same direction.

14. In a buttonhole-sewing machine, the combination with stitching mechanism, and cutter mechanism including a cutter-bar carrying a suitable knife and mounted for endwise movement only, manually and automatically acting means for successively actu-



ating said cutter mechanism to impart to  
said cutter-bar two stages of movement in  
the same direction, devices being provided  
whereby each of said means is disconnected  
5 from said cutter mechanism while the other  
is acting upon the same.

In testimony whereof I have signed my

name to this specification in the presence of  
two subscribing witnesses.

EDWARD B. ALLEN.

Witnesses:

ALFRED C. DARLING,  
H. A. KORNEMANN.