No. 735,434. PATENTED AUG. 4, 1903.

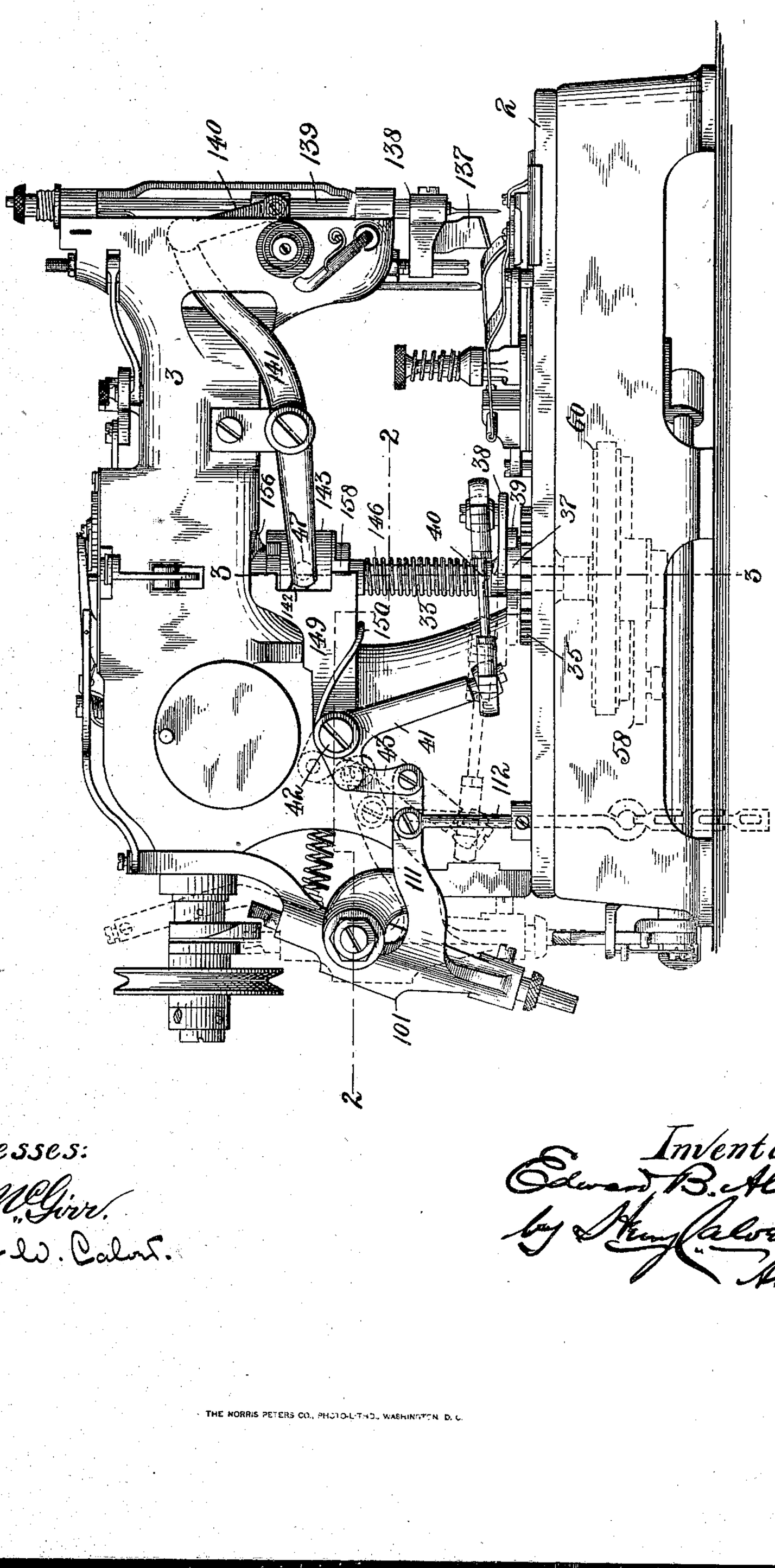
E. B. ALLEN.

BUTTONHOLE STITCHING MACHINE.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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Arthur W. Calvert.

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NO MODEL. 3 SHEETS—SHEET 2.

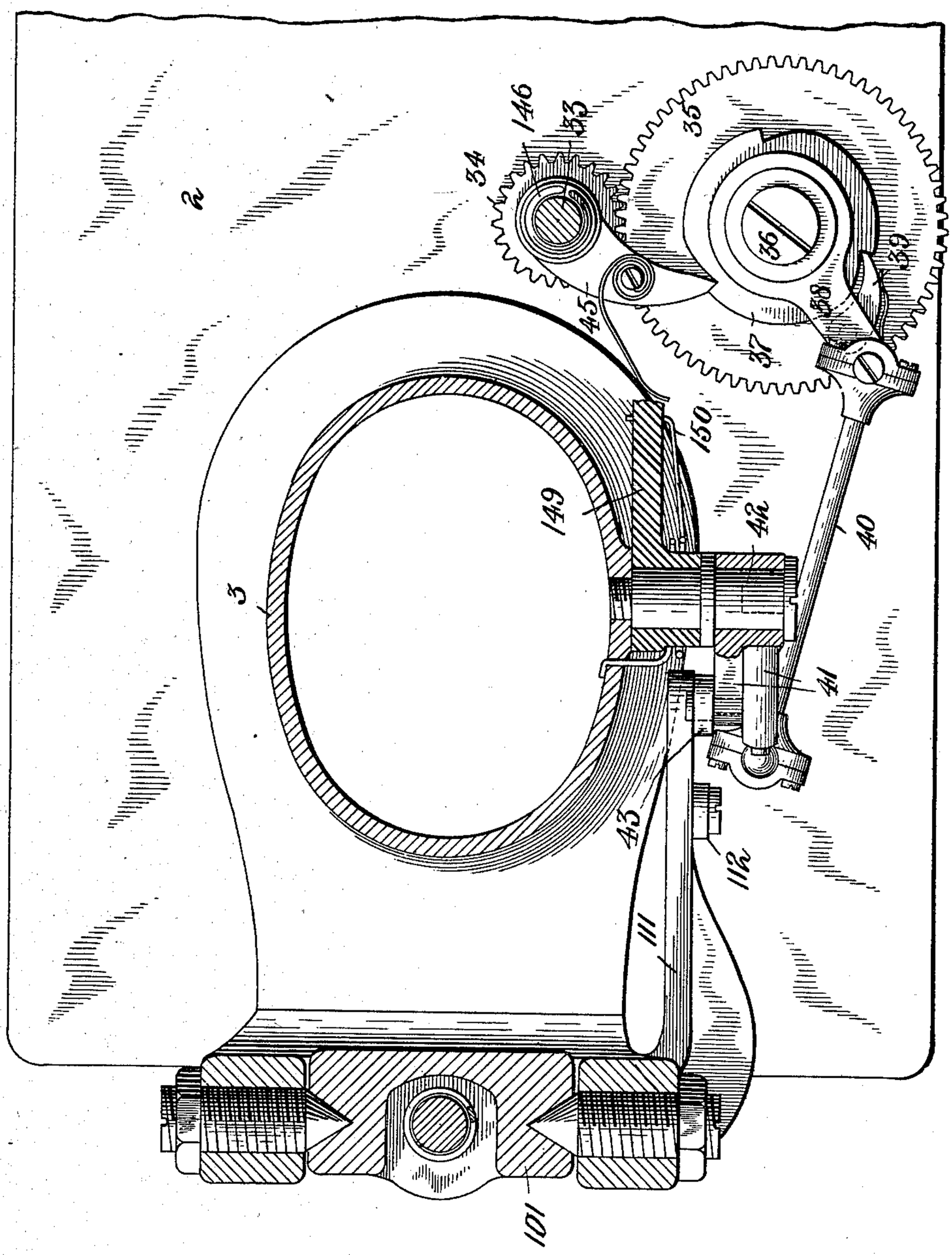

Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

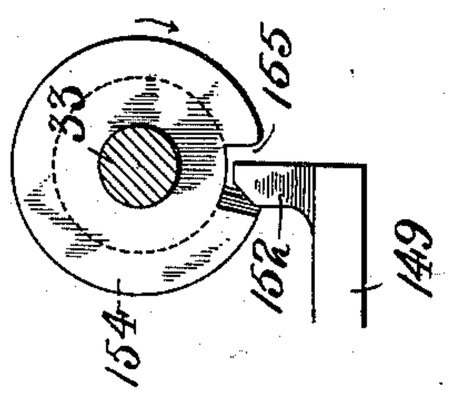


Fig. 7.

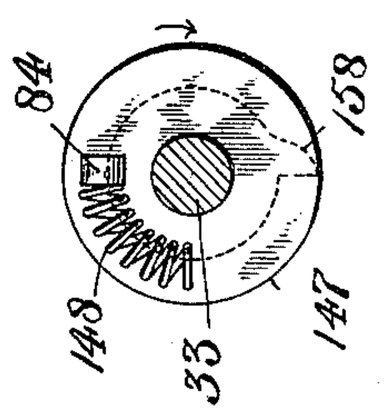


Fig. 4.

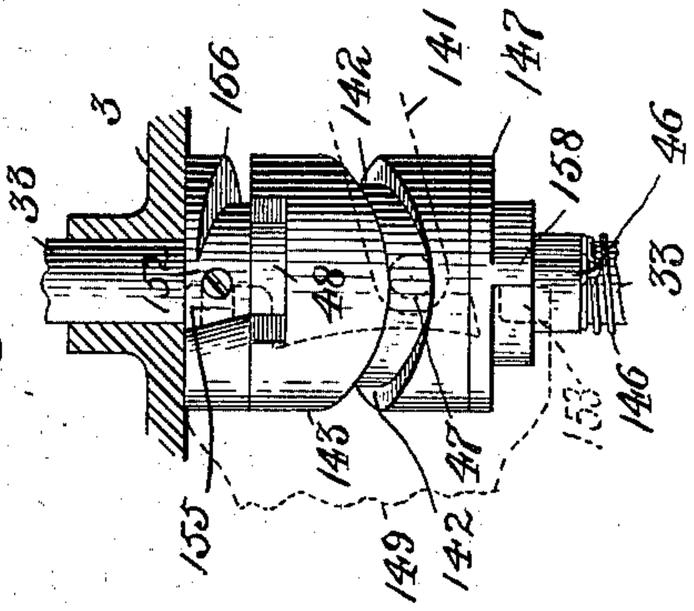


Fig. 5.

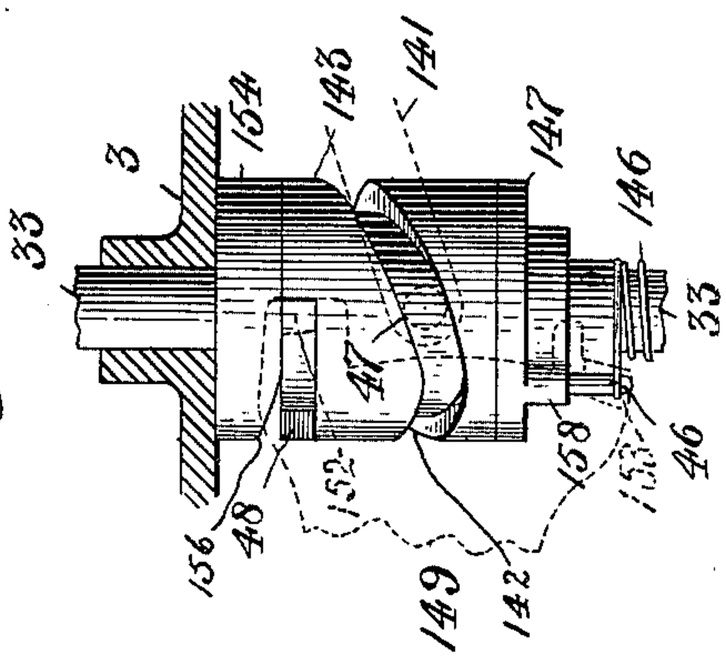
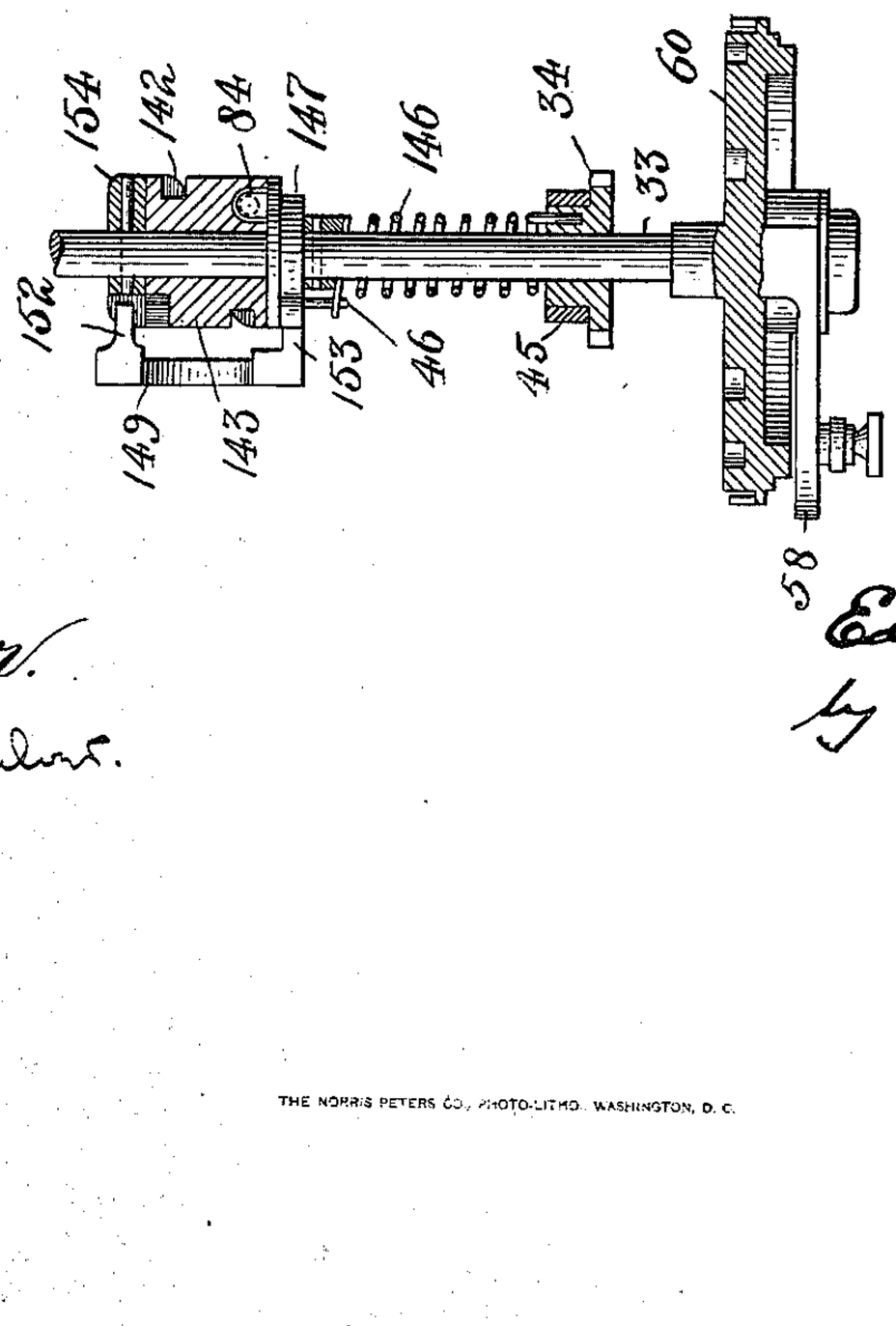


Fig. 3.



Witnesses:

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No. 735,434. Patented August 4, 1903.

UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

BUTTONHOLE-STITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,434, dated August 4, 1903.

Application filed September 22, 1902. Serial No. 124,426. (No model.)

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 Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to means for storing up power from the manual operation of the stop-motion device of a buttonhole-stitching machine by compressing or winding up a spring, and which stored-up power is to be subsequently utilized to perform an operation when a detent or holding device is automatically tripped, such subsequent operation being the cutting of a buttonhole, the shifting of the work-clamp, or the performance of any other function which it may be desirable or necessary to perform. In several applications for patents which I have heretofore filed I have shown and described actuating-springs which were automatically compressed or wound up during buttonhole-stitching operations for the purpose of storing up power to be utilized at the proper times for cutting buttonholes and for performing other functions. In my application, Serial No. 75,667, filed September 20, 1901, I have shown and described a torsional spring which is connected with the feed-wheel, so as to be automatically wound up or compressed during the operation of stitching a buttonhole, and the power thus stored up in said compressed spring is utilized at the proper time for actuating a cutter to cut a buttonhole. In the present instance the cutter-actuating spring is so connected with the clutch-controlling lever of the stop and start motion device that when the attendant depresses a treadle-actuating rod to start the machine the cutter-actuating spring will be compressed or wound up to store up power for the buttonhole-cutting operation when a detent device, which holds the spring, is automatically tripped or released by the machine. In other words, the cutter-actuating spring is wound up or compressed by the attendant or non-automatically instead of being compressed or wound up automatically, as in the mechanisms shown and described in my prior applications, and the compressed spring is automatically released when the stored-up power is to be utilized.

In the accompanying drawings, Figure 1 is a side view of a buttonhole-stitching machine with the present invention applied thereto. Fig. 2 is a partial plan view of the machine with parts in horizontal section on line 2 2, Fig. 1. Fig. 3 is a partial vertical section on line 3 3, Fig. 1. Figs. 4, 5, 6, and 7 are detail views illustrative of the cam and the escapement mechanism.

Referring to the drawings, 2 denotes the work-plate, and 3 the arm, of a buttonhole-stitching machine constructed, as fully set forth in my said application Serial No. 75,667, for working and barring straight buttonholes. The said machine comprises a vertical shaft 33, to the lower end of which, beneath the work-plate of the machine, is fixed the feed-wheel 60, to which an intermittent rotary movement is imparted from a suitably-operated swinging arm 58 and a clutch-dog (not shown, but of well-known construction) actuated by said arm, said feed-wheel being provided with suitable cams, from which the proper feeding and shifting movements are imparted to the buttonhole-clamp. Loosely mounted on the shaft 33 is a pinion 34, with which meshes a gear-wheel 35, rotating loosely on a screw-stud 36 on the work-plate 2 and which gear-wheel is provided with a rigid ratchet-wheel 37, having in the present instance three teeth.

Swinging loosely on the stud 36 is a pawl-carrier 38, provided with a spring-pressed pawl 39, said pawl-carrier being connected by a pitman 40 with the lower arm of a bell-crank lever 41, fulcrumed on the screw-stud 42. The upper or shorter arm of the bell-crank lever 41 is connected by a link 43 with an arm 111 on the clutch-controlling lever 101 of the stop-motion device, and to the said arm 111 is connected the upper end of a treadle-operated rod 112, so that when the said rod is depressed to move the clutch-controlling lever to the position denoted in full lines in Fig. 1 to release the stop-motion device and start the machine the pawl 38 will be

moved to the right, Figs. 1 and 2, to impart a partial rotation to the ratchet-wheel 37 and a full rotation to the pinion 34, with which is connected the lower end of a torsional spring 146, so as to place said spring under tension or to wind up or compress said spring. A detent-pawl 45 prevents backward movement of the ratchet-wheel 37. The stop and start motion device (partly illustrated in the drawings) need not be herein described, as it is the same in principle as that fully shown and described in my United States Patent No. 673,353, granted April 30, 1901, and is the same in detail as the stop and start motion device shown and described in my said application Serial No. 75,667.

The torsional spring 146 is connected at its upper end to a pin 46 on a collar 147, mounted to turn loosely on the shaft 33 and provided on its upper face with a lug 84, entering a recess in the lower face of a cam-cylinder 143, and in which recess is a cushioning spiral spring 148. The buttonhole-cutter 137 is carried by a block 138, secured to the lower end of a vertically-reciprocating cutter-bar 139, connected by a link 140 to the forward end of a lever 141, having at its rear end a pin or roller stud 47, entering a cam-groove 142 in the cylinder 143. Pivoted on the stud 42 is an escapement-lever 149, normally held in a raised position by a spring 150 and provided at its forward end with two teeth 152 and 153.

Attached to the shaft 33 is a collar 154, partly cut away to form a peripheral vertical opening 155, and a cam 156, and the cam-cylinder 143 is provided at its top with a notch 48.

When the machine is stopped, a tappet 158, with which the loose collar 147 is provided, is pressed by the torsional spring 146 against the lower tooth 153 of the escapement-lever, said tooth 153 at this time restraining the cam-cylinder 143 from rotation under the stress of said torsional spring connected with said cam-cylinder through the said collar 147 and the lug 84, with which said collar is provided. At this time the upper tooth 152 of the escapement-lever is in the opening 155 of the collar 156, fixed to the shaft 33. When the feed-wheel is intermittingly rotated during a buttonhole-stitching operation, the cam 156 overrides the tooth 152 and depresses the escapement-lever in opposition to the stress of its lifting-spring 150 until the said tooth 152 is forced down into the notch 48 in the cam-cylinder 143 and the tooth 153 is disengaged from the tappet 158 of the loose collar 147, and the said collar and the cam-cylinder connected therewith then start forward slightly under the stress of the spring 146; but such forward start or partial rotation is immediately checked by contact of the shoulder or wall 157 at one end of the notch 48 against the tooth 152 now in said notch, this partial rotation of the collar 147 and the cam-cylinder 143 from the position shown in Fig. 4 to the position shown in Fig. 5 being for the purpose of disengaging the tappet 158 from the lower detent-tooth 153 of the escapement-lever, and this operation is performed during only a partial rotation of the feed-wheel for a buttonhole-stitching operation. When the shaft 33, actuated by the feed-wheel, has completed its rotation and a buttonhole is completely stitched, or stitched and barred, as the case may be, the opening 155 in the collar 156, rotating with said shaft and feed-wheel, will come into register with the upper tooth 153 of the escapement-lever, so that the spring 150 can lift the said lever to disengage said tooth from the detaining-shoulder 156 on the cam-cylinder and raise said tooth into the said opening. The said cam-cylinder being thus released is now free to be rotated by the stress of its actuating-spring 146 to operate the cutter-actuating lever 141 to cut a buttonhole and then lift the cutter, and when the said cam-cylinder has performed its rotation the tappet 158 comes into contact with the lower tooth 153 on the escapement-lever, which tooth in the raised position of said lever is in the path of rotation of the tappet. This contact of the said tappet with the said tooth 153 arrests the rotation of the cam-cylinder, and the sudden stopping of said cylinder is cushioned by the buffer-spring 148, interposed between a wall of the pocket or recess in said cylinder and the lug 84, which operatively connects the collar with said cylinder.

From the foregoing it will be understood that when the attendant depresses the treadle-actuated rod 112 to move the stop-motion lever 101 from the position denoted by dotted lines in Fig. 1 to the position shown by full lines in said figure the pawl-carrier 38 will, through the pawl 39, ratchet-wheel 37, and the gear-wheel 36, rotate the pinion 34, and thus non-automatically wind up or compress the torsional spring 146 connected therewith, and the power thus stored up in said spring will subsequently be automatically released to perform an automatic operation, which in the present instance is to cut a buttonhole.

The invention is not to be understood as being limited to the detailed mechanism herein shown and described or to the utilization of the invention for the performance of the specific function of cutting buttonholes by the stored-up power of a non-automatically compressed or wound-up spring automatically released by a suitable holding or escapement mechanism when the desired operation is to be effected, as wide variations in the details of the mechanism or in the performance of different functions connected with sewing-machines are possible without departing from the spirit of the invention.

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

1. In a buttonhole-stitching machine, the combination with a rotary cam, and a part or device to be operated from said cam, of a spring, non-automatic means for winding up or compressing said spring, and an automatic escapement or holding and releasing device which, at proper times, releases said compressed spring to permit the stored-up power thereof to be utilized to move or operate the said part or device.

2. In a buttonhole-stitching machine, the combination with a rotary cam, and a part or device to be operated from said cam, of a spring, a treadle-operated device for winding up or compressing said spring, and an automatic escapement or holding and releasing device which, at proper times, releases said compressed spring to permit the stored-up power thereof to be utilized to move or operate the said part or device.

3. In a buttonhole-stitching machine, the combination with a buttonhole-cutter, of a spring, non-automatic means for placing said spring under tension, a cam operatively connected with said spring, connections between said cam and said buttonhole-cutter, and an automatic escapement or holding and releasing device which at a proper time releases said spring to permit the stored-up power thereof to be utilized to cut a buttonhole.

4. In a buttonhole-stitching machine, the combination with a buttonhole-cutter, of a spring, a treadle-operated device for placing said spring under tension, a cam operatively connected with said spring, connections between said cam and said buttonhole-cutter, and an automatic escapement or holding and releasing device which at a proper time releases said spring to permit the stored-up power thereof to be utilized to cut a buttonhole.

5. In a sewing-machine, the combination with a stop and start motion device, of a spring connected with said stop and start motion device so that when an operative part thereof is moved to start the machine the said spring will be placed under tension, a cam operatively connected with said spring, a part or device connected with and operated from said cam, and an escapement or holding and releasing device which, at proper times, automatically releases the said spring to permit the stored-up power thereof to be utilized to operate the said cam.

6. In a sewing-machine, the combination with a stop and start motion device, of a spring connected with said stop and start motion device so that when an operative part thereof is moved to start the machine the said spring will be placed under tension, a cam operatively connected with said spring, a part or device connected with and operated from said cam, an escapement or holding and releasing device which, at proper times, automatically releases the said spring to permit the stored-up power thereof to be utilized to operate the said cam, and treadle connections for moving a part of the said stop-motion device, to wind up or compress said spring non-automatically.

7. In a buttonhole-stitching machine, the combination with a stop and start motion device comprising a lever, of a spring connected with said lever so that when the latter is moved to start the machine said spring will be wound up or placed under tension, a cam operatively connected with said spring, a buttonhole-cutter operatively connected with said cam, and an automatic holding and releasing or escapement device which at proper times enables the stored-up power of said spring to operate the said cam to actuate the said cutter.

8. In a buttonhole-stitching machine, the combination with a stop and start motion device comprising a lever, of a spring connected with said lever so that when the latter is moved to start the machine said spring will be wound up or placed under tension, a cam operatively connected with said spring, a buttonhole-cutter operatively connected with said cam, an automatic holding and releasing device which at proper times enables the stored-up power of said spring to operate the said cam to actuate the said cutter, and treadle connections for moving the stop and start motion lever, to wind up or compress the said spring non-automatically.

9. In a buttonhole-stitching machine, the combination with a stop and start motion device comprising a lever, treadle connections with said lever to move the same to start the machine, a spring, a pawl-and-ratchet device and gearing connecting said lever with said spring to place the latter under tension when said lever is non-automatically moved to start the machine, a cam operatively connected with said spring, a buttonhole-cutter operatively connected with said cam, and an automatic escapement or holding and releasing mechanism which, at proper times, enables the stored-up power of said spring to be utilized to rotate the said cam to actuate the said cutter.

10. In a sewing-machine, the combination with a part or device to be moved or operated, of a torsional spring, a rotary cam connected with said spring so as to be rotated thereby, a pawl-and-ratchet device and gearing connected with said spring to wind up or compress the same, non-automatic means for operating said pawl-and-ratchet device and gearing for winding up said spring, and an escapement or holding and releasing device which, at proper times, is operated to release said compressed spring to permit the stored-up power thereof to be utilized to move or operate the said part or device.

11. In a sewing-machine, the combination with a buttonhole-cutter, of a torsional spring, a rotary cam connected with said spring so as

to be rotated thereby, a pawl-and-ratchet device and gearing connected with said spring to wind up or compress the same, non-automatic means for operating said pawl-and-ratchet device and gearing for winding up said spring, and an escapement or holding and releasing device which, at proper times, is operated to release said compressed spring to permit the stored-up power thereof to be utilized to operate said cutter.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD B. ALLEN.

Witnesses:
HENRY J. MILLER,
HENRY A. KORNEMANN.