(No Model.)

3 Sheets—Sheet 1.

F. W. OSTROM.

BUTTONHOLE SEWING AND CUTTING MACHINE.

No. 581,031. Patented Apr. 20, 1897.

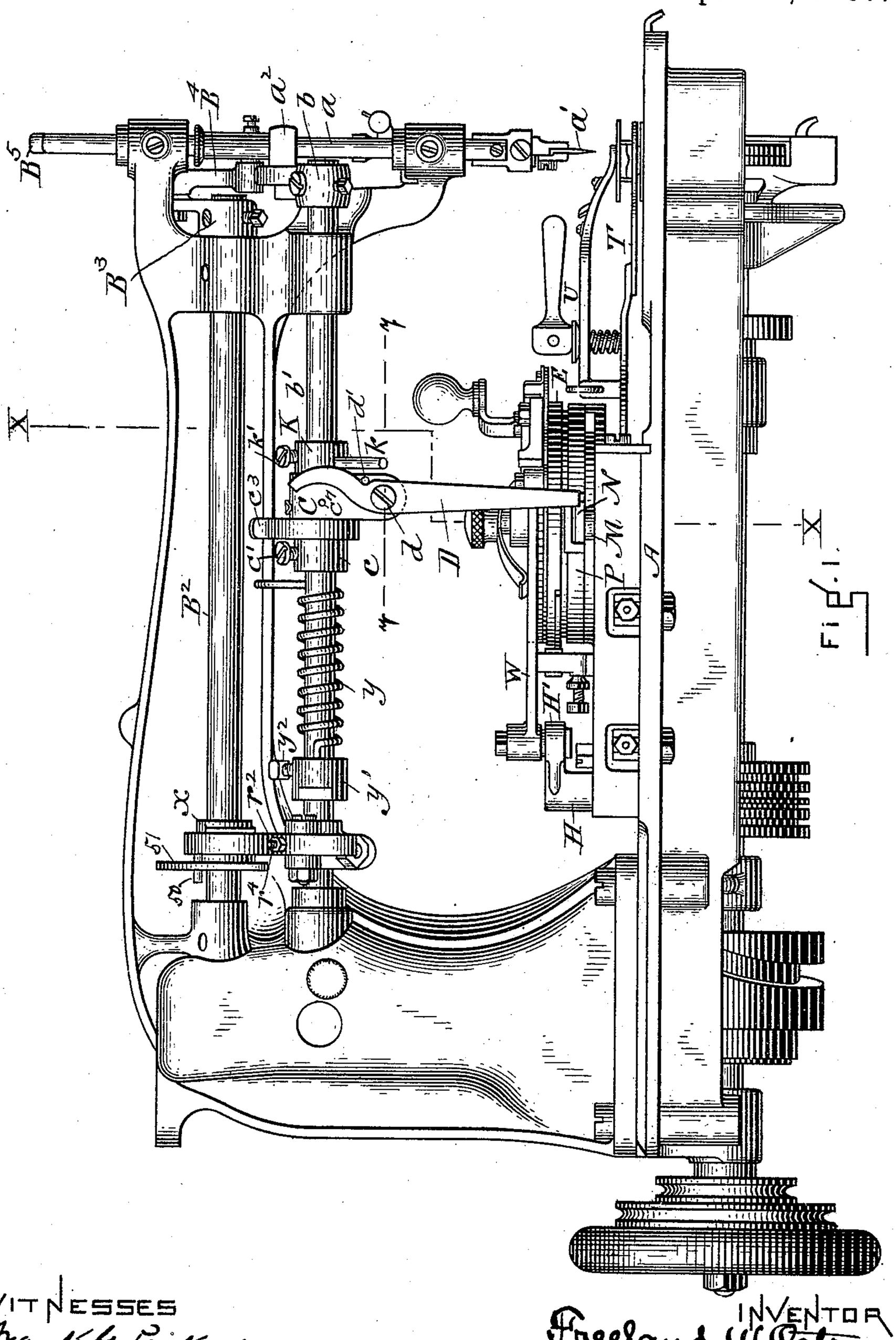

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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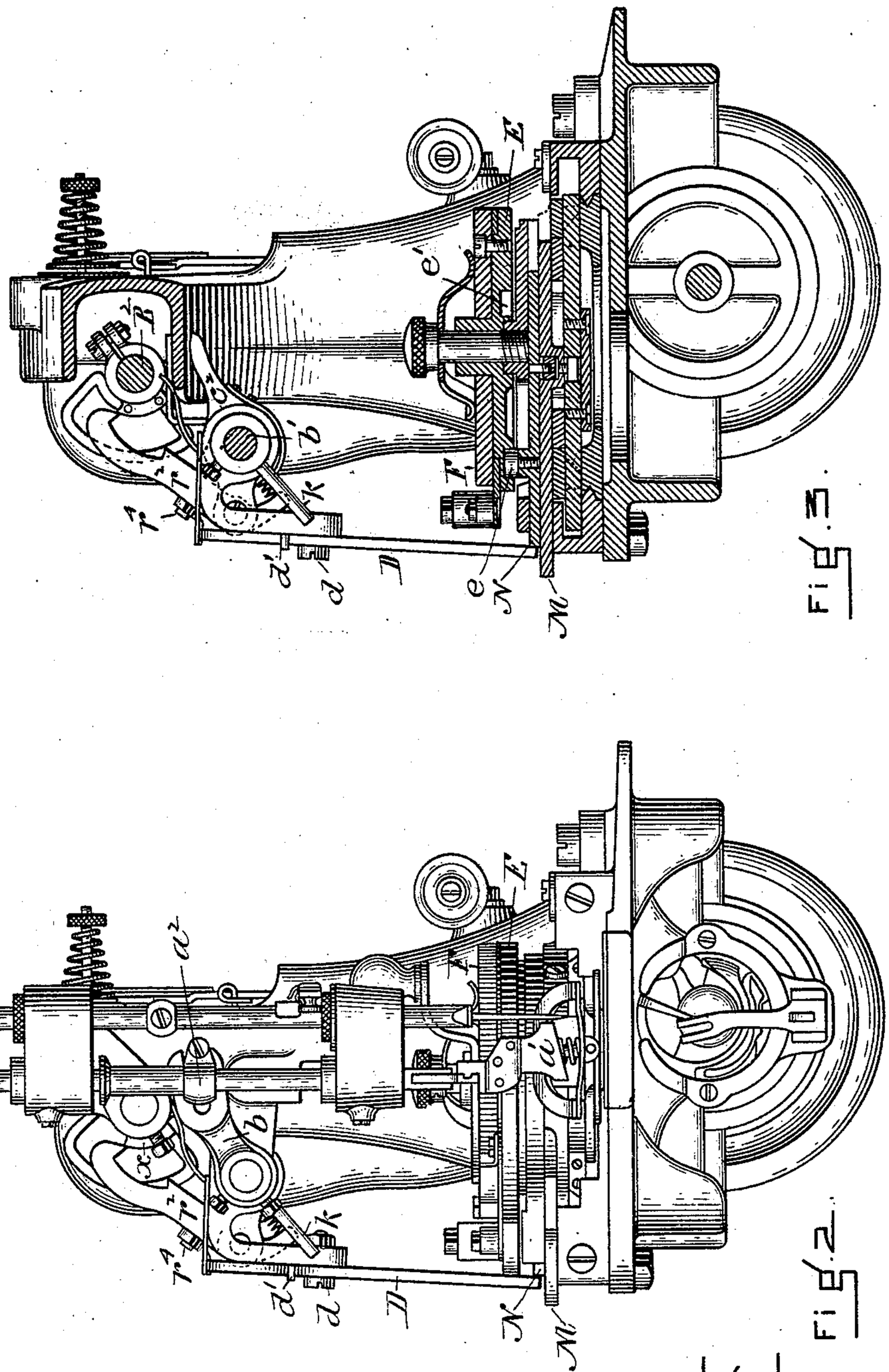

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(No Model.) 3 Sheets—Sheet 3.

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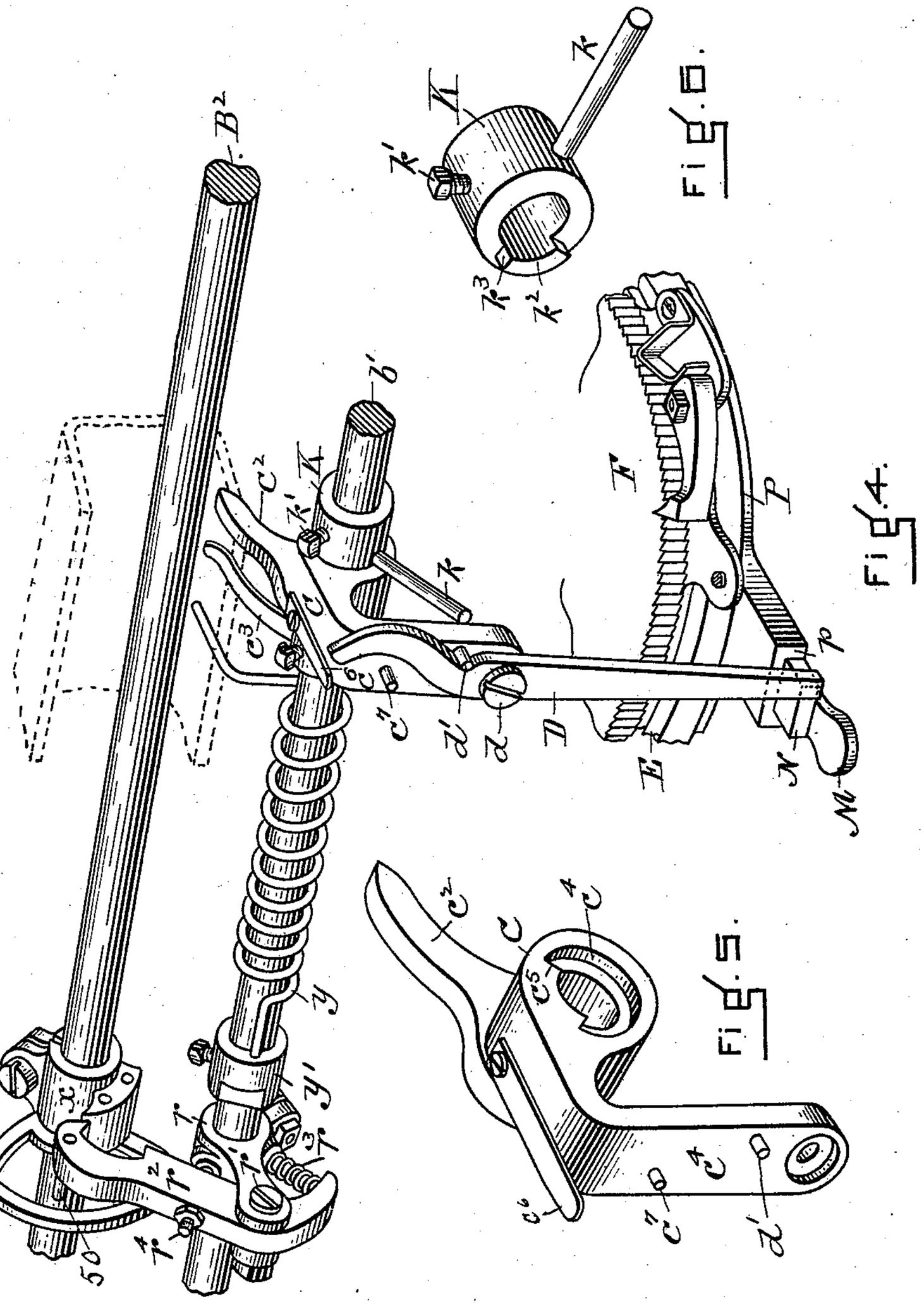

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 7.

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UNITED STATES PATENT OFFICE.

FREELAND W. OSTROM, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

BUTTONHOLE SEWING AND CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 581,031, dated April 20, 1897.

Application filed August 2, 1895. Serial No. 558,010. (No model.)

To all whom it may concern:

Be it known that I, FREELAND W. OSTROM, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented an Improvement in Buttonhole Sewing and Cutting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention is an improvement in the well-known Wheeler & Wilson buttonhole sewing and cutting machine, wherein the required buttonhole-slit is cut by a single thrust of a broad-bladed cutter; and more particularly it is an improvement upon the cutting mechanism set forth in United States Letters Patent No. 439,680, granted to me November 4, 1890. In that invention a trip mounted upon the rotary feed-wheel of the work-feed mechanism is employed, which in the rotation of the feed-wheel acts upon a train of connections to bring about an engagement between a cutter-bar rock-shaft and a depressor mounted on the needle-bar rock-shaft to thereby cause a depression of the cutter to cut the buttonhole-slit coincident with a downthrust of the needle-bar, and, secondly, a cam or disengager mounted on the cutter-bar rock-shaft is employed to act upon the train of connections and break the engagement of the train with the trip on the feed-wheel during the rocking movement of the cutter-bar rock-shaft and thus permit the disengagement of the train from the depressor and prevent a second downthrust of the cutter-bar and cutter during the making of a single buttonhole. As is well known, the rotary feed-wheel upon which the trip is mounted has different rates of speed according to the length of buttonhole to be stitched and the fineness of stitch to be made.

In this my invention I dispense entirely with the trip mounted on the variably-movable feed-wheel and rely upon a reciprocating part of the ordinary work-feed mechanism itself to temporarily engage the prime member of the train of connections at a predetermined time in the movement of such reciprocating part to start the cutter mechanism into action, whereby I am enabled to simplify the construction of parts, to lessen the cost of the machine, and to obtain needed room between the head and base of the machine.

My invention is set forth in the following description, and is particularly pointed out in the claims.

Figure 1 is a rear side elevation of a buttonhole-machine embodying my invention; Fig. 2, a front end elevation thereof; Fig. 3, a transverse vertical section on line *x x*, Fig. 1. Fig. 4 is a detail in perspective of parts of the cutter mechanism broken away from the machine to more clearly show their construction and arrangement. Fig. 5 is a detail in perspective of the sleeved bell-crank, which is loosely mounted on the cutter-bar rock-shaft and to which is pivoted the prime member of the connecting-train that contacts with a reciprocating part of the work-feed mechanism. Fig. 6 shows in perspective what I herein term the "disengager" and which in Fig. 4 is made fast to the cutter-bar rock-shaft by means of a set-screw. Fig. 7 is a cross-sectional detail of the lever D and lower arm c^4 of the collar C on the line of the longitudinal axis of the pivot-screw d to show the cavity in the lower part of said arm c^4 and illustrating the coiled spring d^2, encircling said pivot-screw and having one end fast in the arm c^4 and the other end in the lever D.

The bed-plate A, the work-feed mechanism, including the cloth-clamp T U, the heart-cam disk E, the ratchet feed-wheel F, the cam-slide M, the slide N, the lever H H′, the link W, actuated by the lever H H′ to rotate the feed-wheel F are all substantially as in United States Patent No. 303,557, granted August 12, 1884, to Andrew C. Campbell, assignor to the Wheeler & Wilson Manufacturing Company, of Bridgeport, Connecticut, and the same parts, together with the needle-bar rock-shaft B^2, its crank B^3, the link B^4, and needle-bar B^5, the cutter-bar rock-shaft b', its crank-arm b, collar a^2, the cutter-bar a, and attached cutter a' are common to the machine shown in Patent No. 439,680, granted to me as above referred to. So, too, as in the patent last referred to, the needle-bar rock-shaft B^2 has fast on it a hooked collar or depressor x, described in the patent as the "collar 26, having a pin or projection 25," and the cutter-bar rock-shaft has fast on it a collar r,

on which at r' is pivoted a latch r^2, (shown as acted upon by a spring r^3, (which in this instance acts on the lower free end of the latch r^2 to normally keep the said latch pressed inwardly to predetermined position adjacent the depressor x, which position can be regulated by means of the screw-threaded stop-pin r^4, which passes through the latch r^2 and bears upon the collar r, as shown in Fig. 4.

The purpose of the pin 50, the free end of which extends toward the back of the machine, so as to come within the confining influence of the loop 51, is to prevent the possibility of the latch r^2 being thrown completely out of operative position with relation to the depressor x. It will be perceived that the spring r^3 holds the latch r^2 toward the depressor x, while the pin r^4 permits by its adjustment the latch to be adjusted and held in adjusted position by said spring r^3 to the depressor x in one direction so that upon operation of the other actuating parts the latch will be thrown into engagement with the depressor x, while, on the other hand, when the latch is thrown out of engagement with the depressor the pin 50 and the loop 51 prevent the possibility of the latch being thrown out of operative position.

The spring y, one end of which is held in the collar y', made fast on the cutter-bar rock-shaft b by the screw y^2 and the other end of which bears on the overhanging arm of the machine, as shown in Figs. 1 and 4, serves to keep the cutter-bar a normally elevated and also holds the latch r^2 toward the depressor x.

Against the collar c, (see Fig. 1,) made fast on the cutter-bar rock-shaft b' by means of the set-screw c', abuts a collar C, which is loose on said shaft and has a stop-finger c^2, which bears against the under side of the overhanging arm of the machine, as more clearly shown in Fig. 3, to limit the movement of said collar on said shaft in one direction, while movement thereof in the opposite direction is against the stress of the spring c^3, attached to said collar and also pressing against the overhanging arm, as more clearly shown in Figs. 3 and 4.

To the depending arm c^4 of the collar C is pivoted the lever D by means of the pivot-screw d. Movement of this lever on its pivot in one direction is restrained by the stop-pin d', fast in the depending arm c^4, and to move the lever in the opposite direction the stress of the coiled spring d^2 (see Fig. 7) must be overcome. The stop-pin c^7 limits the possible movement of the lever against the stress of the spring d^2, while the flat spring c^6, fast on the collar C, may be utilized to hold the lever D against the stop-pin c^7 when it is desired to hold the lower end of said lever out of contact with the slide N.

As shown more clearly in Fig. 4, the lower end of the pivoted lever D extends downward to the work-moving mechanism of the machine and is arranged in the path of the reciprocating slide N to be acted upon by the latter at one end of its reciprocating movement. The upper end of the lever D is curved outwardly, as shown in Fig. 4, to project beyond that side of the collar C nearest the cutter-bar, so as to be struck at a predetermined time by the pin or what I term the "disengager" k, projecting from the collar K, which may be made fast on the cutter-bar rock-shaft in adjusted position by means of the set-screw k'. By reference to Fig. 6 it will appear that the face of the collar K adjacent the collar C has a projection k^2, which enters the recess c^1 (see Fig. 5) in the collar C, so that the shoulder k^3 of the projection k^2 will be engaged by the shoulder c^5 at one end of the recess c^1. The recess c^1 is concentric with the axis of rotation of the collar C on the cutter-bar rock-shaft and is considerably larger circumferentially than the projection k^2 of the collar K. By this construction it will be observed that when the parts are fitted together and arranged as shown in Fig. 4, with the collar K made fast on the cutter-bar rock-shaft by the set-screw k' and the collar C loose on said shaft, outward movement of the slide N (see Fig. 4) will push the lower end of the lever D outwardly, and in turn the collar C will be partially rotated on the cutter-bar rock-shaft. In this partial rotation of the collar C the shoulder c^5 of the recess c^1 in said collar will push against the shoulder k^3 of the projection k^2 and force the collar K, and with it the cutter-bar rock-shaft b', to which it is made fast, to partake of the rotary movement of the collar C, whereby the latch r^2 will, partaking of the movement of said shaft, be moved into the path of movement of the depressor x, which oscillates with the needle-bar rock-shaft B^2, and be caught by it. At this juncture the needle-bar rock-shaft is partaking of that movement by which it depresses the needle-bar. In the continuation of such movement the hooked end of the depressor is carried upwardly and takes with it the latch r^2, which in turn further rotates the cutter-bar rock-shaft b' to depress the cutter-bar and cutter. In this further rotation of the cutter-bar rock-shaft b' the collar K is carried with it, the excess of recess c^1 in the collar C over the size of the projection k^2 of the collar K permitting the shoulder k^3 to move away from the shoulder c^5, whereby the collar C is not moved by the collar K. Further, it will be noted that in this partial rotation of the collar K with the cutter-bar rock-shaft b' the disengager or pin k moves upwardly and, contacting with the curved end of the lever D, which projects into its path of movement, turns said lever partially on its pivot-screw d in the direction to move its lower end toward the cutter-bar to take it out of contact with the slide N and thus disengage those parts or break the connection between said slide and the train of connections between it and the depressor x. When thus disengaged from the slide N, the lower end of the lever D, which I term the

"prime" member of the train, is thrown back into position against the projecting end p of the cover-plate P by means of the stress of the spring c^3 turning the collar C on the cutter-bar rock-shaft b' to bring the stop c^2 up against the overhanging arm of the machine. Thus it will be observed that this disengagement of the prime member of the train, the lever D, and slide N occurs during the downward thrust of the cutter-bar and cutter coincident with a downthrust of the needle-carrier to cut the buttonhole-slit through the operation of the depressor x on the latch r^2 in engagement therewith. Now upon a reverse movement of the needle-bar rock-shaft B to elevate the needle-carrier the hooked portion of the depressor x moves downward and permits the coiled spring y, acting on the cutter-bar rock-shaft b', to correspondingly elevate the cutter-carrier and to take the latch r^2 out of the path of movement of the hooked portion of the depressor x, the disengagement of the prime member D from the slide N permitting the coiled spring y to thus act on the latch r^2. Thus it will be observed that upon the next elevation of the hooked end of the depressor x, due to oscillation of the needle-bar rock-shaft B to repeat the downthrust of the needle-carrier B^5, the depressor cannot take hold of the latch r^2, whereby a second actuation of the cutter-carrier and cutter is prevented in the making of a single buttonhole.

The slide N, in connection with the other parts of the work-moving mechanism, is fully set forth in United States Patent No. 303,557, above referred to. As there described, it will be found that the slide N has a predetermined or fixed endwise reciprocation in the cover-plate P (marked D in Patent No. 303,557) in a plane crosswise of the bed-plate A. This motion is given thereto by means of the heart-cam groove e' of the heart-cam plate E, engaging the roller e of the slide-bar N. The heart-cam plate E is fast with the ratchet-wheel F and rotates with it when the latter is acted upon by the pawl W. The heart-cam plate E and ratchet-wheel F make a single revolution in the operation of the machine to stitch a single buttonhole, and when the slide N is finishing its stroke toward the back of the machine, substantially as shown in Figs. 3 and 4, and the work-moving mechanism is actuated accordingly the stitching is then being done at the last portion of the last side of the buttonhole. In the present instance the parts are so arranged and adjusted that it is during the stitching of the last portion of the last side of the buttonhole that the slide N in the latter part of its lengthwise movement toward the back of the machine acts upon the prime member D of the train of connections to throw the latch r^2 into the path of movement of the hooked portion of the depressor x to effect a connection of the parts and bring about an actuation of the cutter-bar and cutter by said depressor. So, too, the collar K, carrying the pin k, can be adjusted on the cutter-bar rock-shaft b' and held in adjusted position by the set-screw k', so as to require more or less throw on the part of the slide N before acting on the prime member D sufficiently to throw the latch r^2 into the path of movement of the hooked portion of the depressor x, so as to be engaged thereby.

When the lower end of the prime member D has been thrown out of operative contact with the slide N, as described, the prime member will, by the action of the spring d^2, (see Fig. 7,) be caused to bear against the side of the slide N until in the further operation of the machine the projecting portion of the slide (see Fig. 4) has been moved into the part p of the cover-plate P, as when the machine is stitching along the first side of the buttonhole, whereupon said spring d^2 will move the lower end of the prime member D into the path of movement of the slide N, so that upon its return stroke the slide will again engage the prime member to bring about the actuation of the parts, as above described.

What I claim is—

1. In a buttonhole-sewing machine, the combination with a stitch-forming mechanism; a work-clamp; a work-clamp feed mechanism including a reciprocating feed slide-bar which has a constant undeviating endwise reciprocation, whatever may be the variations in the feed of the work-feed mechanism and the consequent feed movement of the work-clamp; a work-cutter and its carrier arranged in the head of the machine and normally elevated; a depressor which ordinarily does not depress the cutter-carrier and cutter; and connections between said slide-bar, cutter-carrier and depressor, the prime members of said connections projecting into the path of movement of one end of said slide-bar so as to be struck by said end only and at only one end of the endwise movement of said slide-bar, to thereby set said connections in motion, whereby the depressor is temporarily caused to depress the cutter-carrier and cutter, substantially as described.

2. A sewing-machine containing the following instrumentalities, in combination, viz: stitch-forming mechanism; work-feed mechanism including a reciprocating feed slide-bar which has a predetermined or endwise reciprocation whatever may be the feed of said work-feed mechanism; a cutter; a cutter-carrier; a depressor; connections between said slide-bar, cutter-carrier and depressor, the prime member of said connections normally projecting into the path of movement of said slide-bar so as to be struck thereby at one end of its endwise reciprocation to set said connections in motion, whereby the depressor is temporarily caused to depress the cutter-carrier and cutter to cut the required buttonhole-slit; and a disengager to operate upon the said connections and temporarily break the connection between said

reciprocating slide-bar, cutter and depressor, and insure a single actuation only of the cutter in the making of a single buttonhole, substantially as described.

3. In a buttonhole-sewing machine, the combination with a stitch-forming mechanism; a work-clamp; a mechanism including a reciprocating feed slide-bar which has a predetermined or fixed endwise reciprocation for operating the work-clamp; of a depressor operated by the actuating mechanism of the sewing-machine; a work-cutter; its carrier; means to elevate the cutter-carrier and means to support it when elevated and disconnected from said depressor; and connections between said reciprocating slide-bar, cutter-carrier, cutter and depressor, the prime member of said connections normally projecting into the path of movement of said slide-bar so as to be struck thereby at one end of its endwise reciprocation to set said connections in motion, substantially as and for the purposes set forth.

4. In a buttonhole-sewing machine, in combination with a stitch-forming mechanism; a work-clamp; and mechanism including a reciprocating feed slide-bar which has a predetermined or fixed endwise reciprocation whatever may be the feed of said mechanism for operating the work-clamp; of a cutter-carrier normally elevated; a cutter carried thereby; a depressor operated by the needle-bar-actuating mechanism; and connections between said slide-bar, cutter-carrier and depressor, the prime member of which projects into the path of movement of one end of said slide-bar, so as to be struck by said end only and at only one end of the endwise movement of said slide-bar, whereby the cutter is thrown into action, substantially as described.

5. In a buttonhole-sewing machine the combination with a stitch-forming mechanism including a reciprocating needle-carrier; a work-clamp; and mechanism including a reciprocating feed slide-bar which has a predetermined or fixed endwise reciprocation for operating the work-clamp; a cutter-carrier normally elevated; a cutter of suitable length to cut an entire buttonhole at a single stroke; a slotted throat-plate through which the said cutter can descend; a depressor operated by the needle-bar-actuating mechanism to cause a descent of the cutter-bar and cutter as a buttonhole is being completed; and connections between the said reciprocating feed slide-bar, cutter-carrier and depressor, the prime member of said connections normally projecting into the path of movement of said slide-bar, so as to be struck thereby at one end of its endwise reciprocation to set said connections in motion, whereby the cutter is thrown into action; and a disengager carried by said connections and operated thereby to break said connections between two descents of the needle-carrier, whereby a single actuation only of the cutter is insured, substantially as described.

In testimony whereof I hereunto set my hand, in the presence of two subscribing witnesses, this 30th day of July, 1895.

FREELAND W. OSTROM.

Witnesses:
JAMES H. LANGE,
ELEANOR F. GROLL.