No. 622,632. Patented Apr. 4, 1899.

F. W. OSTROM.

STOP MOTION FOR SEWING MACHINES.

(Application filed Dec. 18, 1897.)

(No Model.) 3 Sheets—Sheet 1.

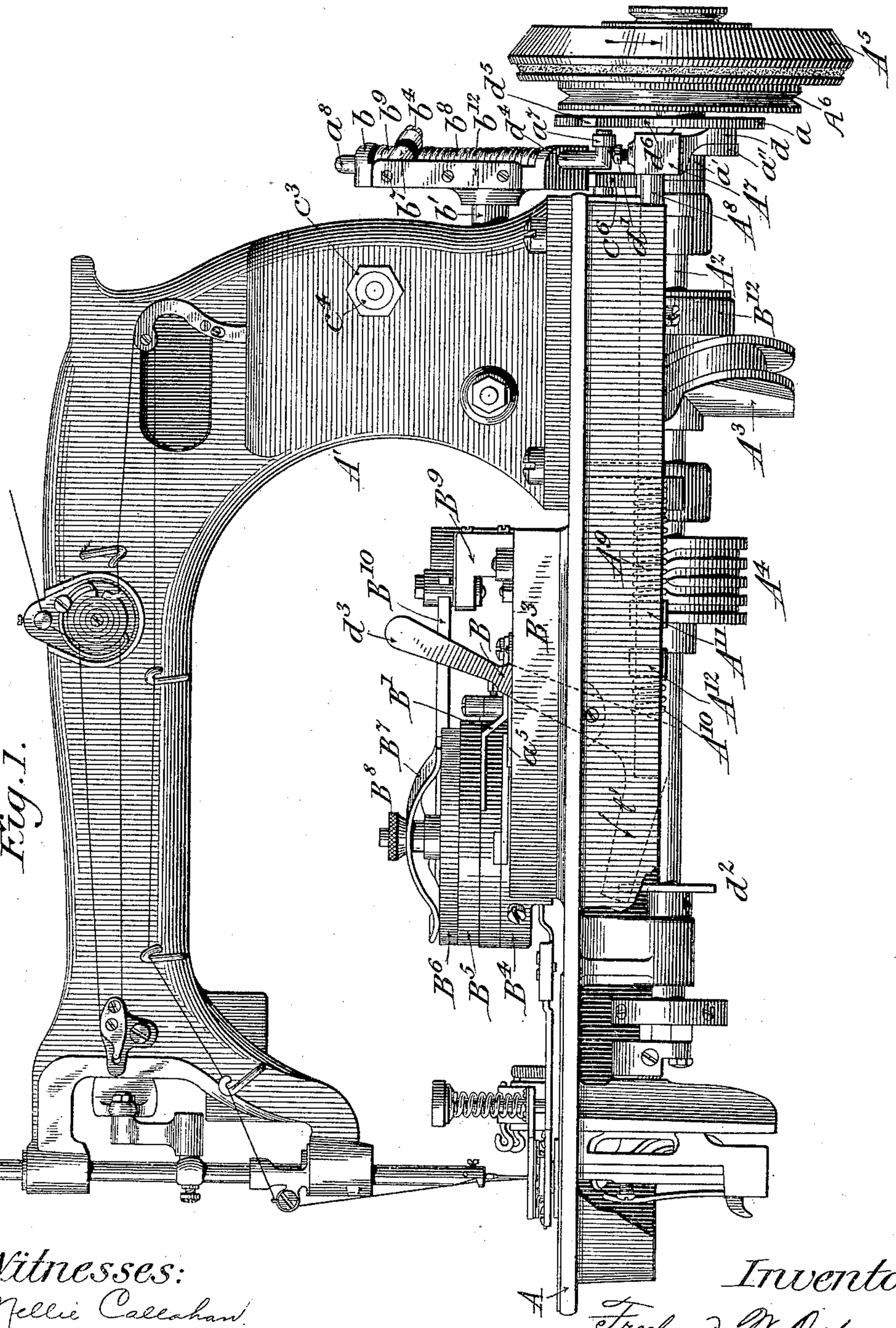

Fig. 1.

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Fig. 2

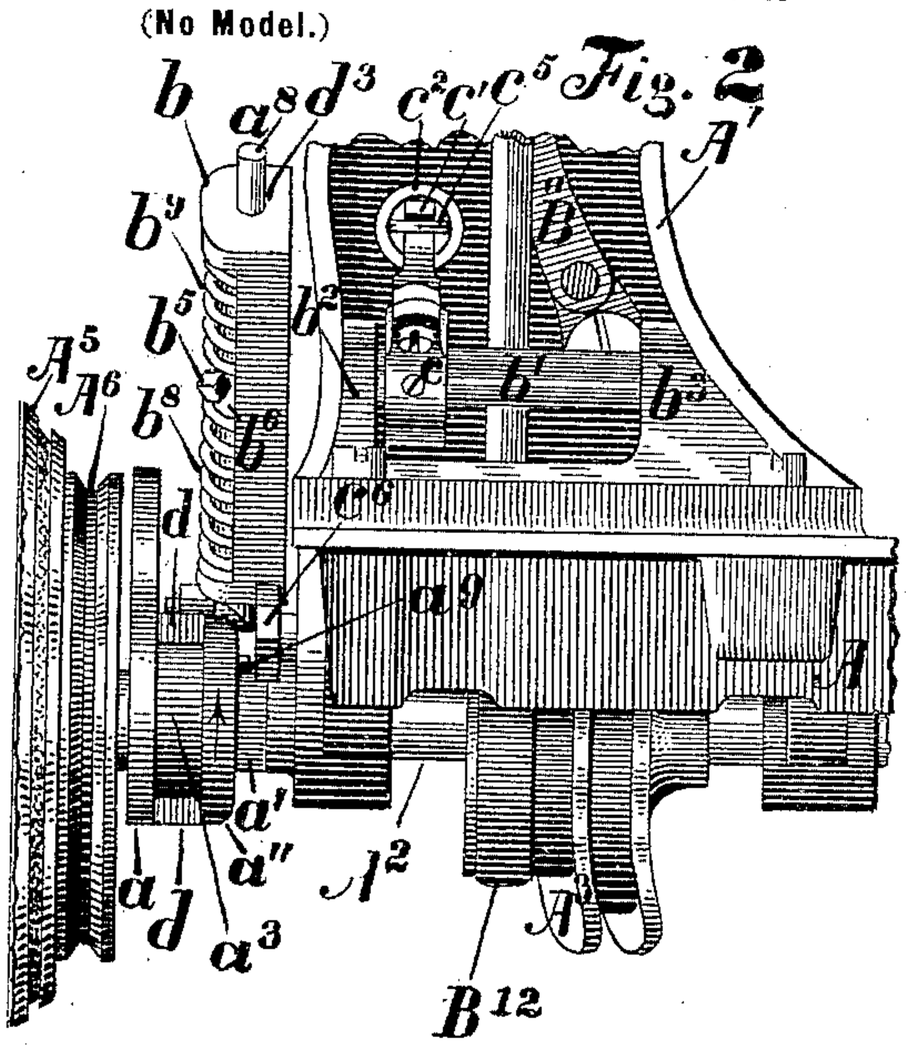


Fig. 3

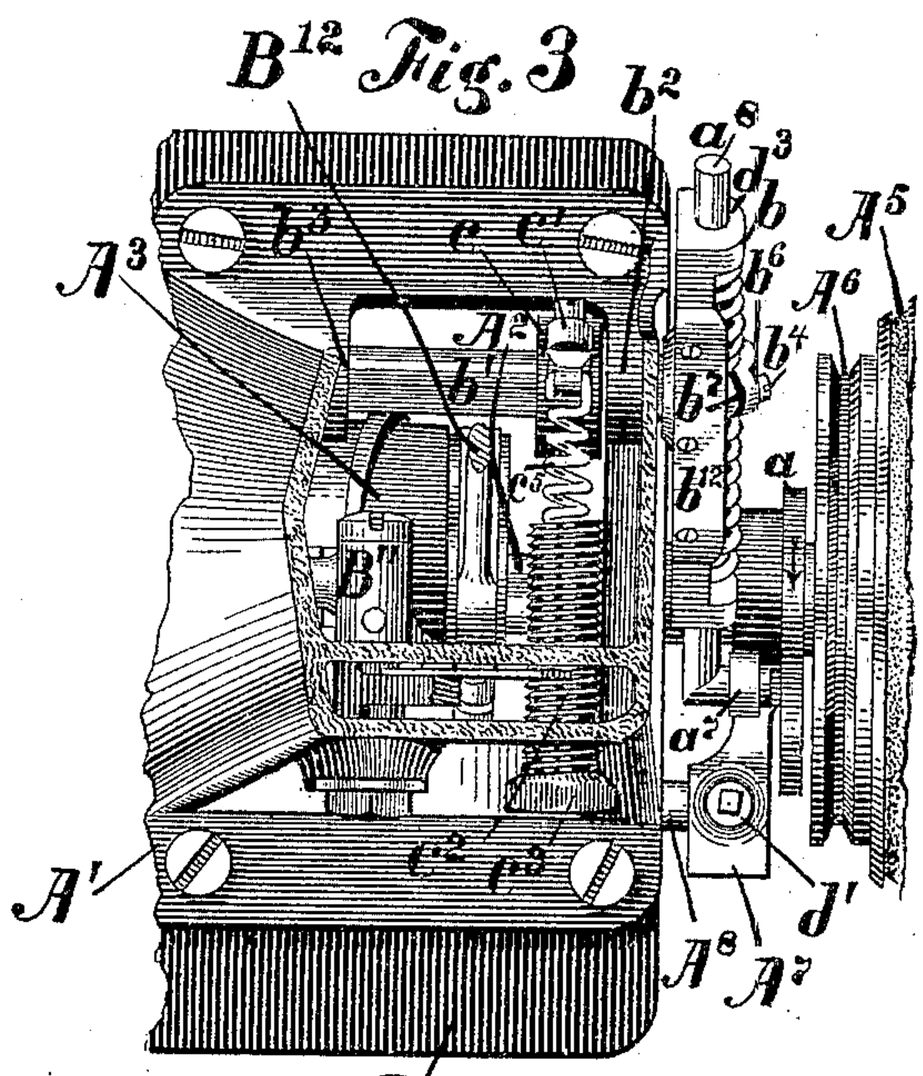
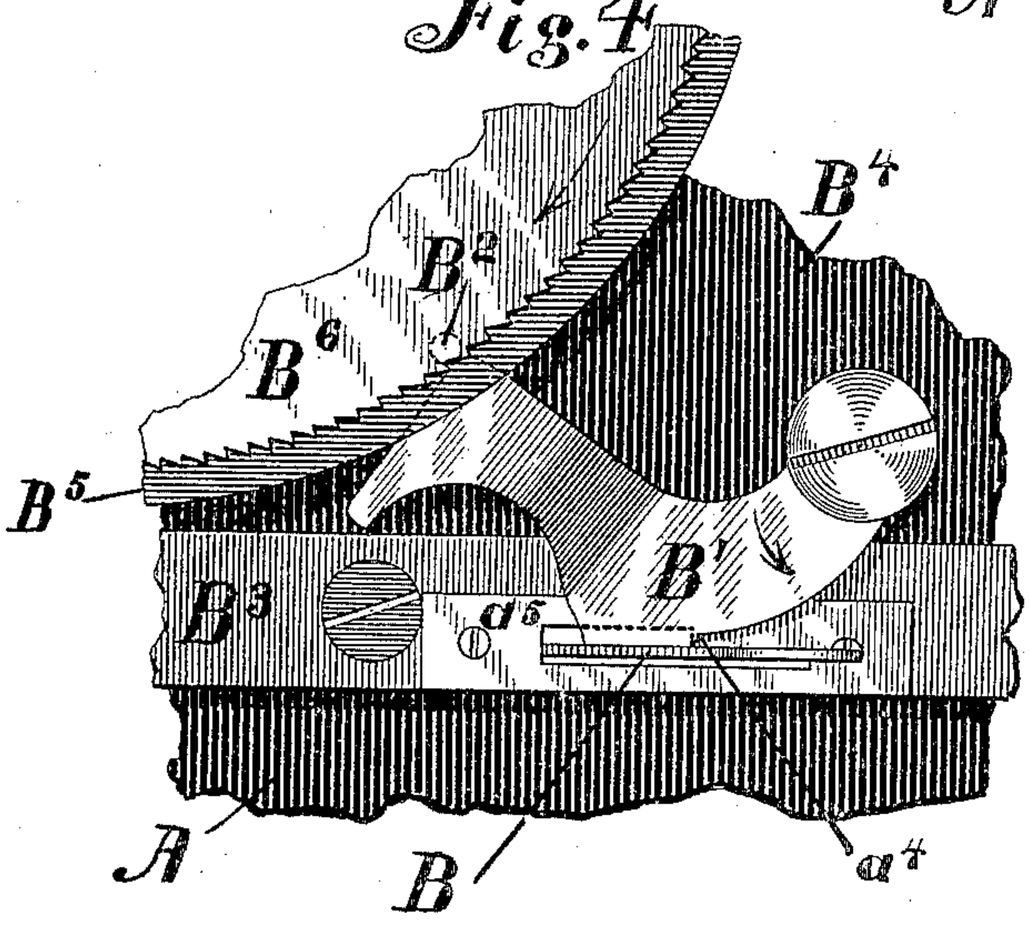


Fig. 4



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(No Model.) 3 Sheets—Sheet 3.

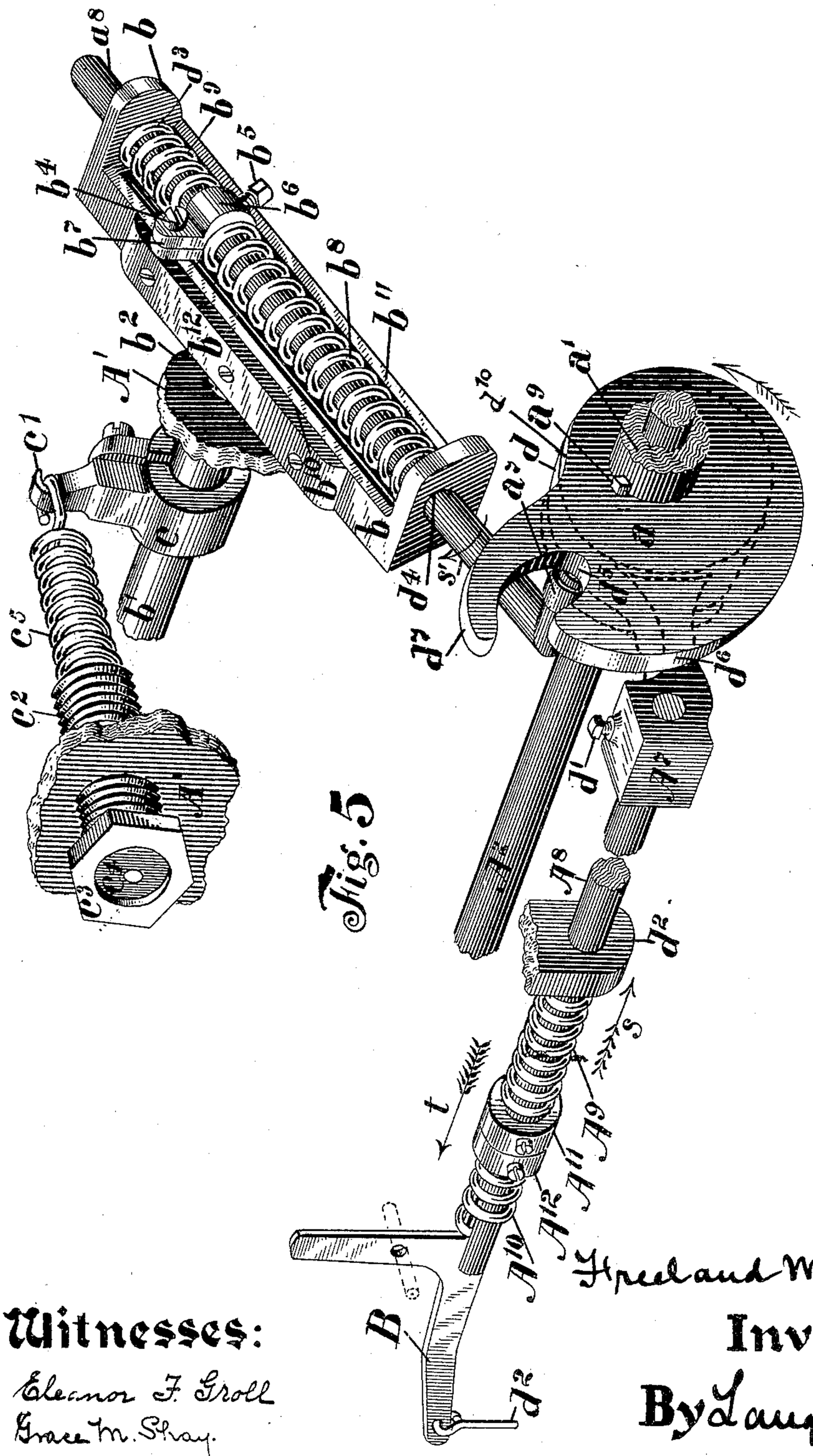

Fig. 5

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UNITED STATES PATENT OFFICE.

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

STOP-MOTION FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 622,632, dated April 4, 1899.

Application filed December 18, 1897. Serial No. 662,438. (No model.)

To all whom it may concern:

Be it known that I, FREELAND W. OSTROM, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Stop-Motions for Sewing-Machines, of which the following is a specification.

This invention has for its object to improve that class of devices designed to automatically predetermine a cycle of feed movement for the automatic overseaming of a given figure—such as, for instance, the device illustrated and described in United States Patent No. 303,453, issued to me (as assignor to the Wheeler & Wilson Manufacturing Company, of Bridgeport, Connecticut) August 12, 1884, and more particularly illustrated in Figures 1, 2, and 3.

Another object of my invention is to increase the utility of buttonhole-sewing machines, and to indicate the construction and operation of my invention I have chosen to illustrate and describe it in connection with so much of the buttonhole-sewing machine set forth in the patent above referred to as is necessary to show an operative combination.

Prior to this invention many devices have been devised to control the automatic operation of sewing-machines provided with special devices for the stitching or overseaming of particular classes or kinds of work—such, for instance, as buttonhole-sewing machines, button-sewing machines, eyelet-hole-overseaming machines, and embroidery-machines—and the degree of success attending the operation of such devices has depended largely upon their ability to resist the strain occasioned by the sudden stopping of the sewing and feeding mechanisms as well as their ability to prevent excessive strain, displacement, or breaking of parts of the stitch forming and feeding mechanism.

The particular objects of my invention are, first, to automatically arrest the action of the machine without undue strain or injury to the elements comprising the stop-motion, and, second, to prevent undue strain or injury to the parts of the machine proper.

Sewing-machines employing stop-motions greatly vary in their construction of parts and speed of operation. Some designs of sewing-machines for special work—such, for instance, as button-sewing machines—have comparatively few parts and are of light construction, while others—such, for instance, as buttonhole-sewing machines, which employ a cloth feeding and vibrating mechanism—have many parts and are of comparatively heavy construction, and while the speed of operation demanded of the former is from six to nine hundred revolutions per minute that demanded of the latter is from ten to thirteen hundred revolutions per minute. Owing to such differences in construction and operation, two distinct types of stop-motion devices have been employed, neither having a general application—that is, stop-motions which have been employed with the lighter forms of construction and of slower operation have been constructed to positively stop the machine at some particular point in the needle operation, usually with the needle sufficiently elevated to permit the manual manipulation of the material without interference—and such devices are commercially termed "positive" stop-motions. Stop-motions employed with the heavier and more rapid machines are frictionally controlled and control the stopping of the machine within a practical limit, but not in a predetermined position, as is the case with what are termed "positive" stop-motions.

Patent No. 303,453, previously referred to, comprises a frictionally-controlled stop-motion for use in connection with a buttonhole-sewing machine employing a cloth feeding and vibrating clamp, and such stop-motion practically predetermines the overseaming of the buttonhole, but does not predetermine the exact stitch or the relative position of the needle, and where the finishing end of the buttonhole is overlapped for from three to six stitches, as is the custom with the machine shown and described in Patent No. 303,453, the stopping of the machine on a particular stitch is of no great importance; but the greater objection to the practical operation of stop-motions frictionally controlled is that they are liable to stop the machine with the needle in the material, thereby necessitating the manual operation of the machine to properly position the needle above the material

before the material can be repositioned for the overseaming of the succeeding buttonhole. To lessen this latter difficulty, I later on made the improved construction illustrated and described in my United States Patent No. 352,775, dated November 16, 1886, and and while this later improvement substantially lessened the difficulty of the stopping of the machine with the needle in the material it could not be relied upon to predetermine the stitch because of its mere frictional control.

My present invention is intended for general application and to positively predetermine the relative position of material and elements of construction when the machine is brought to a position of rest by the control of the stop-motion. It embraces a new combination of elements effecting a control which insures the practical operation of both the machine and the stop-motion and without any undue strain or injury to the combined construction.

The particular features of my invention are hereinafter more fully described, and particularly pointed out in the claims.

Fig. 1 is a front elevation, with a portion of the frame broken out, of the well-known Wheeler & Wilson automatic buttonhole-sewing machine with my improvement added. Fig. 2 is a rear side view of a portion of the Wheeler & Wilson automatic buttonhole-sewing machine embodying my improvement. Fig. 3 is a plan view of a portion of Fig. 1. Fig. 4 is a detail view illustrating how the tripping-pin carried by the feed-cam predetermines the automatic action of the stop-motion mechanism. Fig. 5 is a perspective view in detail to better illustrate the construction, operation, and relative positions of the parts embodying my improvement.

Referring to the drawings, the frame A, the overhanging arm A′, the main shaft A^2, the take-up cam and eccentric A^3, the switch-cam A^4, the tight pulley A^5, the loose pulley A^6, the shipper-lever A^7, the shipper-rod A^8, the springs A^9 A^{10} and their collars A^{11} A^{12}, the catch-lever B, the trip-lever B′, (see Fig. 4,) the tripping-pin B^2, carried by the rotating feed-cam B^5, the guideway B^3, the slide-frame B^4, (see Fig. 1,) the feed-cam B^5, the feed-wheel B^6, the spring B^7, and spring-nut B^8, the vibrating lever B^9 and its connection B^{10}, the take-up lever B^{11}, (see Fig. 3,) and the eccentric connection B^{12}, (see Figs. 2 and 3,) together with the stitch-forming mechanism shown in Fig. 1, are in construction and operation common to the well-known Wheeler & Wilson automatic buttonhole-sewing machine.

By a comparison of the figures illustrating my present invention with Figs. 1 and 2 of Patent No. 352,775, above referred to, it will be observed that the brake-shoe and arm, designated in the latter figures referred to as d^4 d^5, respectively, are here dispensed with; but other mechanism is provided which positively controls the action of the tight pulley A^5 when the stop-motion operates to arrest the action of the stitch-forming and cloth-feeding mechanisms.

My present invention does not relate to the automatic action of the stop-motion as controlled by the action of the cloth-clamp-actuating mechanism; but, on the contrary, it has for its object to stop the operation of the stitch-forming and cloth-feeding mechanism at a predetermined stage in the cycle of stitch-forming and cloth-feeding movements.

Referring to Fig. 5, the cam-disk a is splined upon the hub a' of the tight pulley A^5. (See Fig. 1.) The cam-disk a at its inner side is formed with a hub a'', the hub being provided with a groove a^3, (see Fig. 2,) which coacts with the forked end d of the shipper-lever A^7, (see Fig. 1,) secured to the shipper-rod A^8 by the set-screw d'. Whenever the shipper-rod A^8 is moved endwise by the action of the catch-lever B in the direction indicated by the arrow s, (see Fig. 5,) it carries with it the shipper-lever A^7 and the cam-disk a. Whenever the shipper-rod A^8 is moved in the direction indicated by the arrow t by the action of the spring A^9, the shipper-lever A^7 and cam-disk a are moved in that direction also. The movement of the shipper-rod A^8 in the direction indicated by the arrow t is automatically brought about by the action of the tripping-pin B^2, carried by the feed-cam B^5. (See Fig. 4.) The pin B^2 in its rotation moves the trip-lever B′, which in turn moves the catch-lever B, out from engagement with the notch a^4 in the catch-plate a^5, secured to the guideway B^3, permitting the spring A^9, located between the collar A^{11}, fast on the shipper-rod A^8, and the downwardly-extending portion d^2 of the frame A, (see Fig. 5,) to move the shipper-rod A^8 and parts carried by it in the direction indicated by the arrow t, which movement of the shipper-rod carries the cam-disk a into position to coact with the roller a^7, forming a part of the stop-rod a^8, to automatically stop the cloth-feeding and stitch-forming mechanism in a predetermined position. The coaction of the cam-disk a and roller a^7 will later be more fully explained.

The movement of the shipper-lever A^8 in the direction indicated by the arrow s effects the frictional engagement of the loose and tight pulleys and connects the stitch-forming and cloth-forming mechanisms with their source of power. This movement is manually performed by moving the catch-lever B in the direction indicated by the arrow t'. (See Fig. 1.)

The shipper-rod spring A^{10} is heavier and stiffer than the spring A^9, but it is of such length with relation to the movement of the catch-lever B that the latter has no effect upon the spring A^{10}, except when said spring is acted upon by the catch-lever B to move the shipper-rod A^8 in the direction indicated by the arrow s to force the loose pulley against the tight pulley. Whenever the catch-lever

is so operated, it gradually compresses the spring A^{10} until the power exerted by it is sufficient to overcome the opposing pressure of the spring A^9, thus releasing the machine from control by the stop-motion, and the further compression of the spring A^{10} by the catch-lever B forces the loose pulley against the tight pulley. The frictional control of the loose and tight pulleys is governed by a power determined by the strength of the spring A^{10}. The spring A^9 gives movement to the shipper-rod A^8 and parts carried by it in the direction indicated by the arrow *t* to effect the stopping of the cloth-clamp-actuating and stitch-forming mechanism. The relative strength of the springs A^9 A^{10} is governed by the adjustment of the collars A^{11} A^{12}.

Referring to Figs. 1 and 2, the tight pulley A^5, suitably secured to the main shaft, is constructed with an inwardly-extending hub a', (shown in section in Fig. 5,) which acts as the shaft for the loose pulley A^6 and cam-disk *a*. The loose pulley A^6 is free to rotate independent of the rotation of either the tight pulley A^5 or cam-disk *a* and is capable of movement longitudinally on said hub a'. The cam-disk *a*, like the loose pulley A^6, is also capable of longitudinal movement on the hub a', but incapable of rotation excepting synchronously with that of the tight pulley. Suitably secured in the hub a' is a spline a^9, (see Figs. 2 and 5,) which prevents the cam-disk from independent rotation, but permits of its longitudinal movement. The manual movement (by hand operation of the handle d^3 or through a suitable foot-treadle connected with the rod d^2) of the shipper-rod A^8 in the direction indicated by the arrow *s* releases the cam-disk *a* from the roller a^7 of the stop-rod a^8 and causes the cam-disk *a* to force the loose pulley against the tight pulley and operatively connect the cloth-clamp-actuating and stitch-forming mechanisms with their source of power.

The foregoing explains the movements and relative coaction of the parts necessary to the bringing into action of the buttonhole-sewing machine, and broadly considered such mechanism contains no new mode of operation. It is substantially the mode of operation illustrated and described in my United States Patent No. 352,775 for performing the like function.

My improvement has to do primarily with the mechanism which effects the stopping of the buttonhole-sewing machine with the needle in a predetermined position relative to the material.

I will now proceed to point out the elements of construction and their mode of operation which give to my improved construction its superior utility.

b is a frame constructed with a shaft b' and capable of oscillation in the bearings b^2 b^3 (see Fig. 2) in the overhanging arm A'. Mounted in suitable bearings in the oscillating frame *b* is a stop-rod a^8, elbowed at its lower end to accommodate the coaction of the roller a^7 with the cam-disk *a*. Rigidly secured to the stop-rod a^8 by the pinch-screw b^4 and set-screw b^5 is a pinch-collar b^6. The set-screw b^5 and the lug b^7 of the pinch-collar b^6 are located with relation to the surfaces b^{10} b^{11} of the oscillating frame *b* to hold the stop-rod a^8 against any rotative movement in its bearings d^3 d^4, but permitting of its lengthwise movement in opposition to the spring b^8, mounted on the stop-rod a^8. The lug b^7 of the pinch-collar b^6 coacts with the surface b^{10} of the oscillating frame *b* to hold the stop-rod against rotative movement when the roller a^7 is in operative relation to the cam portion d^6 or notch d^5 of the cam *a*. The set-screw b^5 coacts with the surface b^{11} to prevent the stop-rod a^8 from rotation in the opposite direction. The operative relation of the parts b^5, b^7, b^{10}, and b^{11} will be more fully described hereinafter.

b^{12} represents an added portion to increase the width of the wearing-surface b^{10}, which construction is special to the machine from which these drawings were made. Regularly constructed the part b^{12} may be a part of the frame *b* and not a part added thereto.

Mounted on the oscillating-frame shaft b' is a pinch-collar *c*, constructed with a hook c'. Threaded into the overhanging arm A' is a hollow adjusting-screw c^2, counterbored at its outer end to receive the washer c^4, which latter is suitably attached to the outer end of the spring c^5, which in turn is connected by the hook c' to the collar *c*. The interposition of the spring c^5 in the chain of connections leading from the cam-disk *a* to the overhanging arm is to yieldingly hold the oscillating frame *b* and its attached parts in their normal position, as shown in Figs. 1, 2, and 3, and to hold the roller a^7 against false movement after it has entered the notch d^5 in the cam *a*, and also to slightly retard the momentum of the main shaft A^2 and the parts driven and carried by it when the roller a^7 rides the cam-shaped periphery d^6 of the cam-disk *a*, as when the roller is in operative relation to the cam-shaped periphery to stop the machine.

Referring to Figs. 1 and 2, c^6 is a seat or stop for the oscillating frame *b* when it is held by the spring c^5 in normal position, as shown in the figures above referred to.

The springs b^8 b^9, encircling the stop-rod a^8, are to relieve the operative elements of construction of undue strain occasioned by the sudden coöperation of the roller a^7 with the notch d^5 of the cam-disk *a*, as when the roller a^7 is actuated by the cam-shaped periphery d^6 of the cam-disk *a* to stop the machine. As the roller a^7 leaves the cam portion d^6 of the cam-disk *a* to enter the notch d^5 it is struck by the projection d^7 of the cam-disk, and the power exerted by the momentum of the operative parts of the machine proper compresses the spring b^8 and stops the machine. The power stored up by the compression of the spring b^8 immediately returns the operative parts of the machine to their predetermined

position of rest. The spring b^9 acts to yieldingly arrest the movements of the parts as they are returned to their predetermined position by the spring b^8. The tubular screw c^2 is adjustably secured in the arm A′ to compensate for variation in length and power of the spring c^5.

Figs. 1, 2, and 3 illustrate the cam-disk a as occupying a position midway between its operative relation to the loose pulley a^6 to operatively connect the loose and tight pulleys and the roller a^7 of the stop-rod a^8 to stop the machine.

Fig. 4 illustrates the catch-lever B as forced out of engagement with the notch a^4 of the catch-plate a^5 by the engagement of the tripping-pin B^2 with the trip-lever B′.

Fig. 5 illustrates the relation of the stop-motion parts when operatively connecting the loose and tight pulleys.

The operation of the stop-motion herein illustrated and described is as follows: Supposing that the loose pulley A^6 is given continuous rotation through suitable driving mechanism connecting it with the power-shaft, with the machine at rest and the roller a^7 in the notch d^5 of the cam-disk a, the operator to start the machine would move the catch-lever B in the direction indicated by the arrow t' until it enters the notch a^4, which insures operative relation of the loose and tight pulleys, and the parts will be so held until the completion of the overseaming of the buttonhole, when they will be released by the automatic action of the tripping-pin B^2. The movement of the lever B, as first above described, forces the shipper-rod A^8, shipper-level A^7, cam-disk a, and loose pulley A^6 in the direction of the arrow s, frictionally contacting the loose and tight pulleys sufficiently to drive the machine, the same movement of the shipper-rod and parts carried by it releasing the cam-disk a from the roller a^7 and permitting the oscillating frame b to take its normal position on its seat or rest c^6, attached to the frame A. When the oscillating frame is thus in its normal position on the seat or rest c^6, the relation of the roller a^7 of the oscillating frame b and the cam-disk a is as shown in Fig. 5—namely, the lowermost surface of the roller a^7 is slightly below the bottom of the notch d^5 in the cam-disk a—so that said roller cannot reënter the notch while the parts are in the position there shown. The parts are maintained in this position by the engagement of the catch-lever B with the notch a^4 in the plate a^5 (see Fig. 4) until in the rotation of the cam-disk a with the shaft A^2 the cam-surface d^{10} (see Fig. 5) of said cam-disk a is brought opposite the roller a^7. The cam-surface d^{10} is nearer the longitudinal axis of the shaft A^2 than is the lowermost surface of the roller a^7, so as to enable the cam-disk a to pass under the roller a^7 when its cam-surface d^{10} is brought around opposite said roller. When this position is reached, the tripping-pin B^2, (see Fig. 4,) acting on the lever B′, will force the catch-lever B from the notch a^4, whereupon the shipper-rod A^8 (see Fig. 5) will be released to the action of the spring A^9, which will release the loose pulley from the tight pulley and also move said rod and the cam-disk a in the direction of the arrow t (see Fig. 5) and bring said disk under the roller a^7, so as to coact therewith. Thereupon continued rotation of the cam-disk a will cause the cam-surface d^6 to pass under and bear against the roller a^7, lifting the latter against the stress of the spring c^5 (see Fig. 5) until said roller enters the notch d^5 of said cam-disk, thereby arresting the action of the machine and stopping the movements of the stitch-forming and work-moving mechanisms at a predetermined stage convenient for the manual manipulation of the material.

What I claim, and desire to secure by Letters Patent, is—

1. In a sewing-machine, stitch-forming mechanism; mechanism for automatically feeding the material to be operated upon through a predetermined extent of stitching; driving mechanism including a belt-pulley and a pulley to rotate with the main shaft of the machine; a notched cam-disk rotating synchronously with the said main shaft, and capable of longitudinal movement thereon, mechanism thrown into action by the automatic operation of the feed mechanism to impart to the cam-disk longitudinal movement in one direction to cause said cam-disk to coact with and be engaged by a stop-rod; and a yieldingly-governed stop-rod to engage the cam at a predetermined stage, whereby the movement of the cam, the main shaft and the parts driven by the latter are automatically and positively arrested at a predetermined time in the stitching operation, in combination, substantially as described.

2. In a sewing-machine, stitch-forming mechanism; feeding mechanism for automatically feeding the material to be operated upon through a predetermined extent of stitching; a drive mechanism employing a loose and a tight pulley; a notched cam-disk mounted on and to rotate with the main shaft of the sewing-machine and capable of longitudinal movement thereon, mechanism thrown into action by the automatic operation of the feed mechanism to impart to the cam-disk longitudinal movement in one direction to cause said cam-disk to coact with and be engaged by a stop-rod and movable in the opposite direction by manual operation; and a stop-rod or catch mounted to yieldingly coact with and to engage the cam to automatically arrest its movement and that of the main shaft and parts driven by it, at a predetermined time, in combination, substantially as described.

3. In a buttonhole-sewing machine, stitch-forming mechanism; cloth-clamp-actuating mechanism; a stop-motion device employing a loose pulley, a tight pulley and a rotating cam-disk; connections between said rotating

cam-disk and cloth-clamp-actuating mechanism, whereby the automatic longitudinal movement of the rotating cam-disk in one direction is controlled by the automatic operation of the cloth-clamp-actuating mechanism; a stop-rod; an oscillating frame therefor, and springs to hold the stop-rod in its normal or inoperative position with relation to the cam-disk, said springs effecting a yielding coaction of stop-rod and rotating cam-disk at such time as the cam-disk is automatically moved into operative relation to the said stop-rod, in combination, substantially as described.

4. In a sewing-machine, stitch-forming mechanism, cloth-clamp-actuating mechanism constructed to automatically stitch a predetermined design; a stop-motion device employing a loose pulley, a tight pulley, a rotating notched cam-disk, and a stop-rod mounted to yieldingly coact with said cam-disk; and connections between said rotating notched cam-disk and cloth-clamp-actuating mechanism, whereby the automatic operation of the cloth-clamp-actuating mechanism moves said disk out of engagement with the loose pulley, and into engagement with the stop-rod, in combination, substantially as described.

5. In a buttonhole-sewing machine, stitch-forming mechanism; cloth-clamp-actuating mechanism including a rotating feed-cam provided with a tripping-pin; driving mechanism including a belt-pulley and a pulley to rotate with the main shaft of the machine; a notched cam-disk rotating synchronously with said main shaft and capable of longitudinal movement thereon, mechanism thrown into action by the automatic operation of the feed mechanism to impart to the cam-disk longitudinal movement in one direction to cause said cam-disk to coact with and be engaged by a stop-rod; and a yieldingly-governed stop-rod to engage the cam at a predetermined stage, whereby the engagement of the cam with the stop-rod is governed by said tripping-pin and the movement of said main shaft and the parts driven by the latter are automatically and positively arrested at a predetermined time in the stitching operation, in combination, substantially as described.

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

FREELAND W. OSTROM.

Witnesses:

GEO. M. EAMES,

C. N. WORTHEN.