Sept. 26, 1939. E. P. SPAINE 2,174,294

BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

Filed July 16, 1938 6 Sheets-Sheet 1

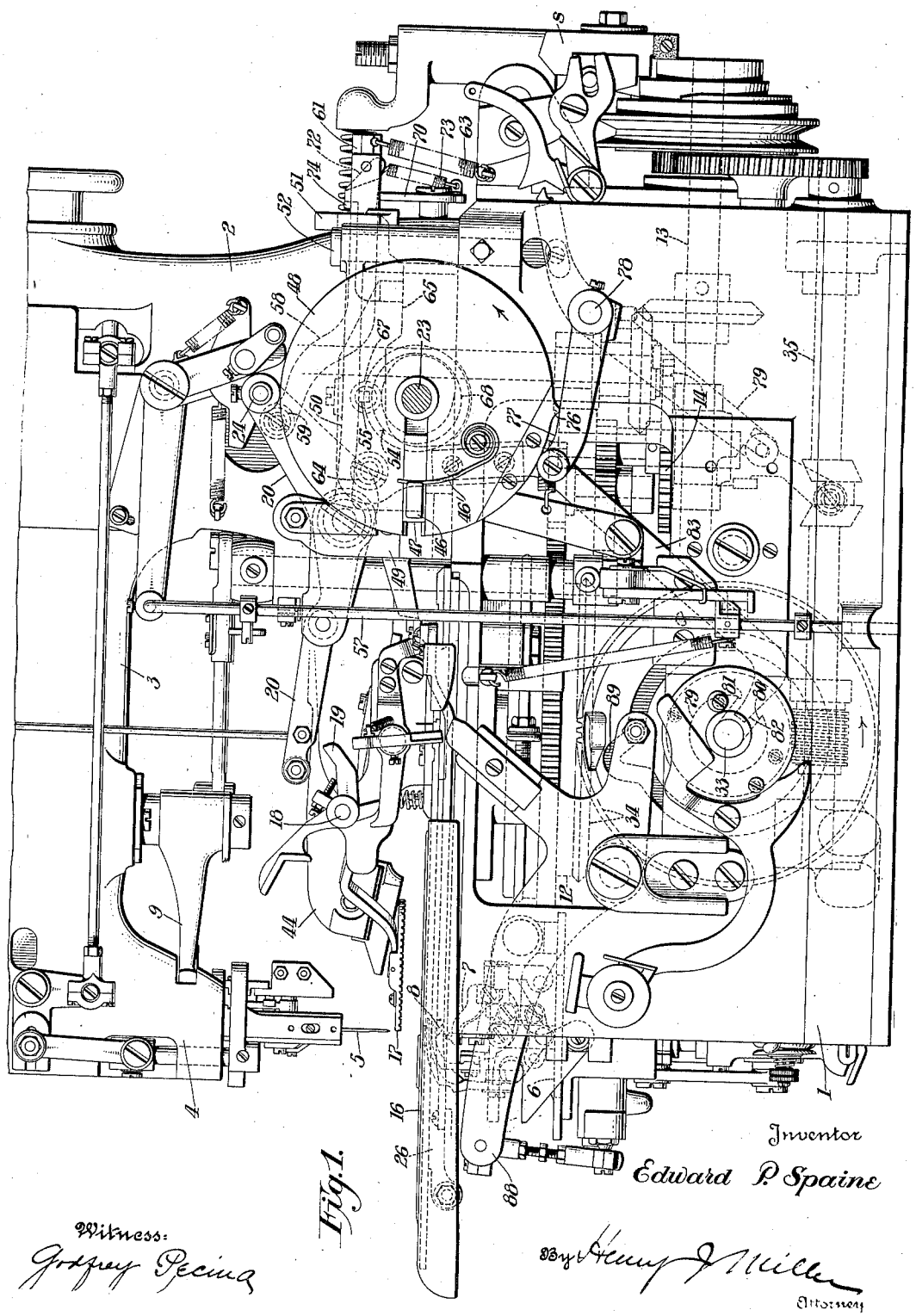


Fig. 1.

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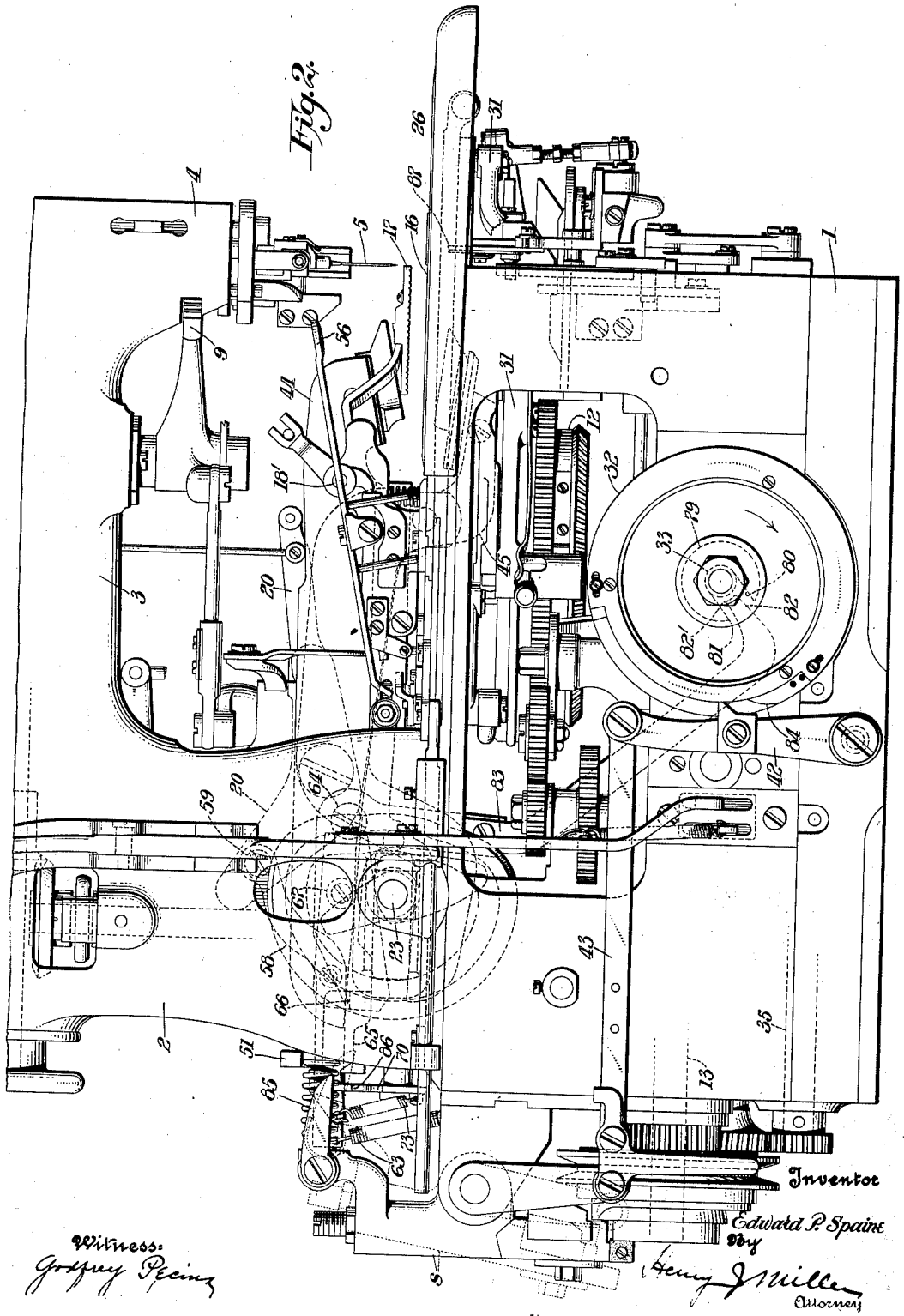
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BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

Filed July 16, 1938 6 Sheets-Sheet 2

Fig. 2.



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BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

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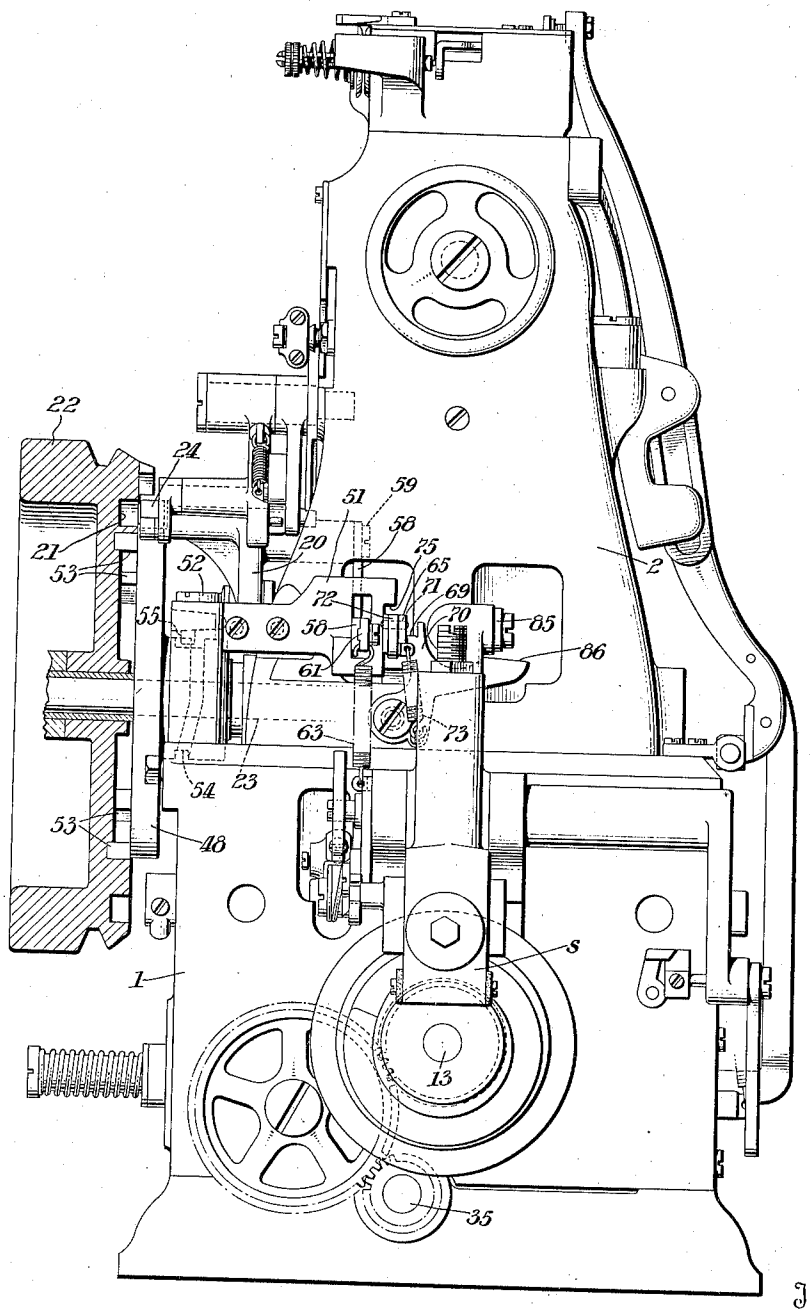


Fig. 3.

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BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

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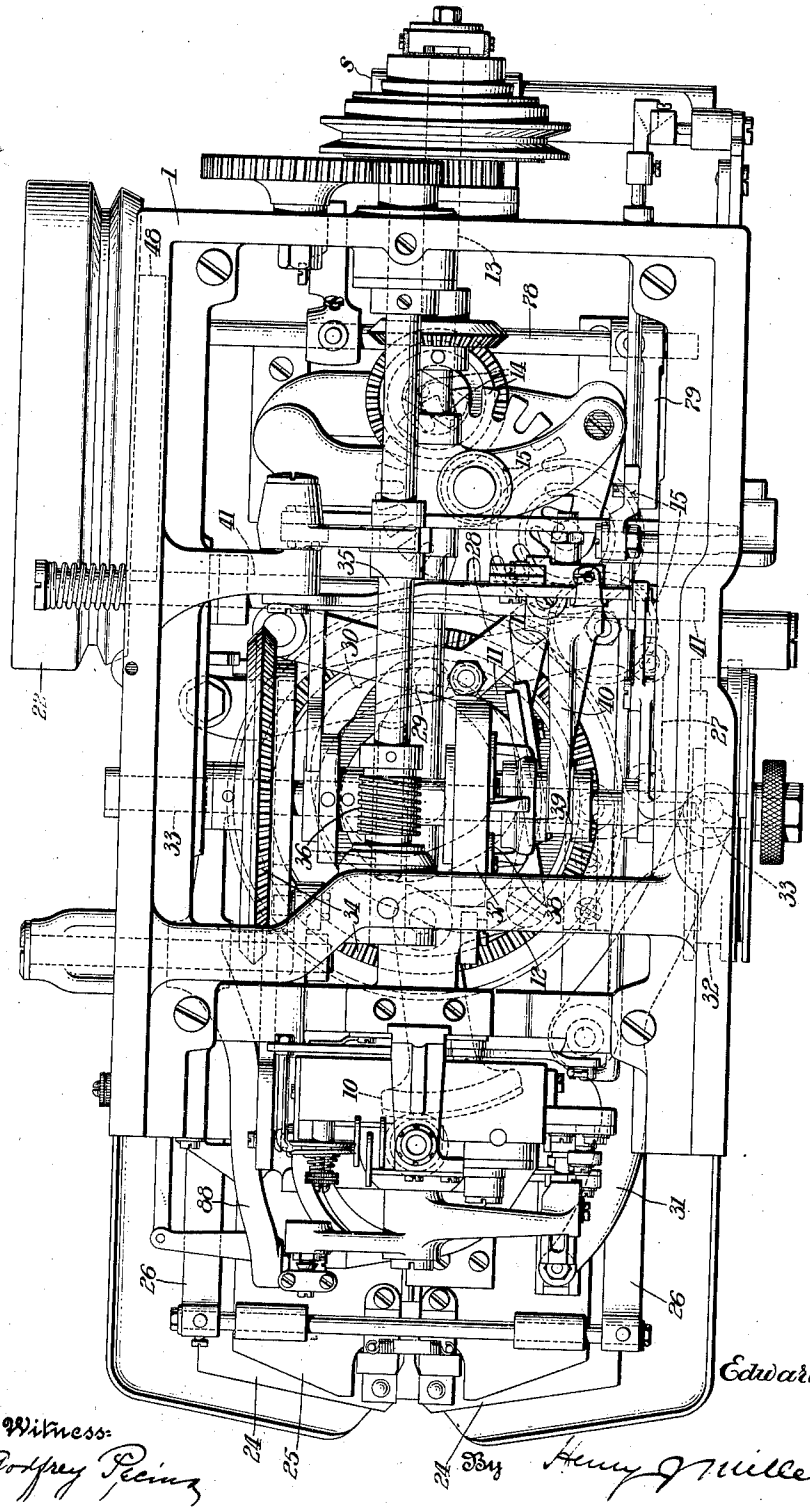


Fig. 4.

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BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

Filed July 16, 1938 6 Sheets-Sheet 5

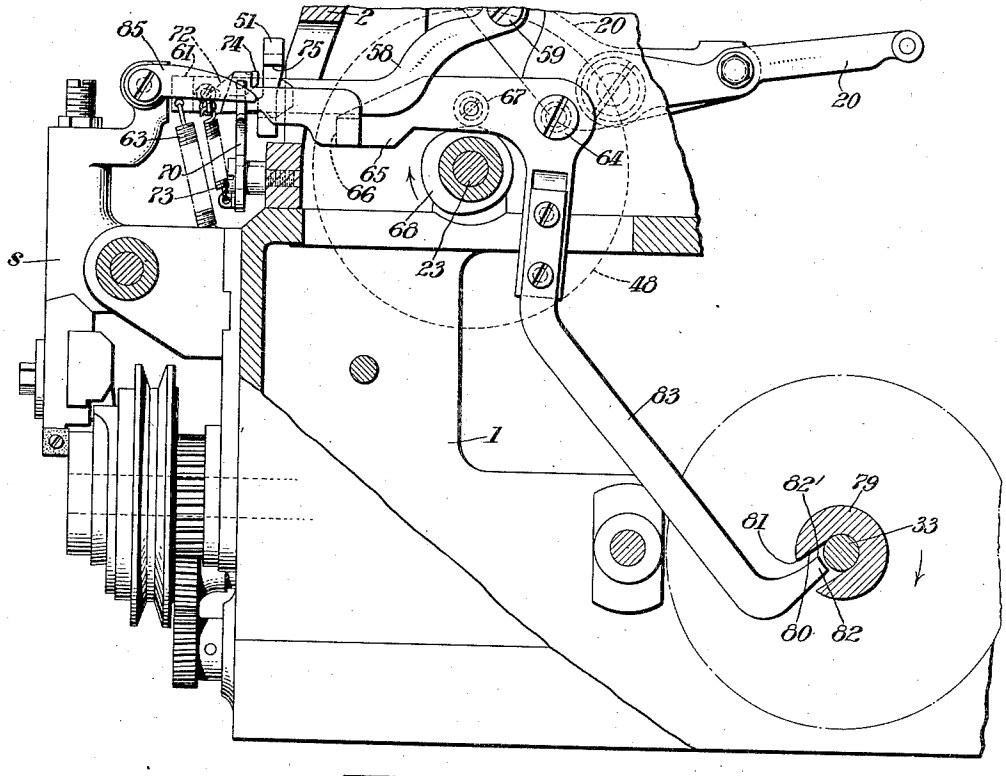


Fig. 5.

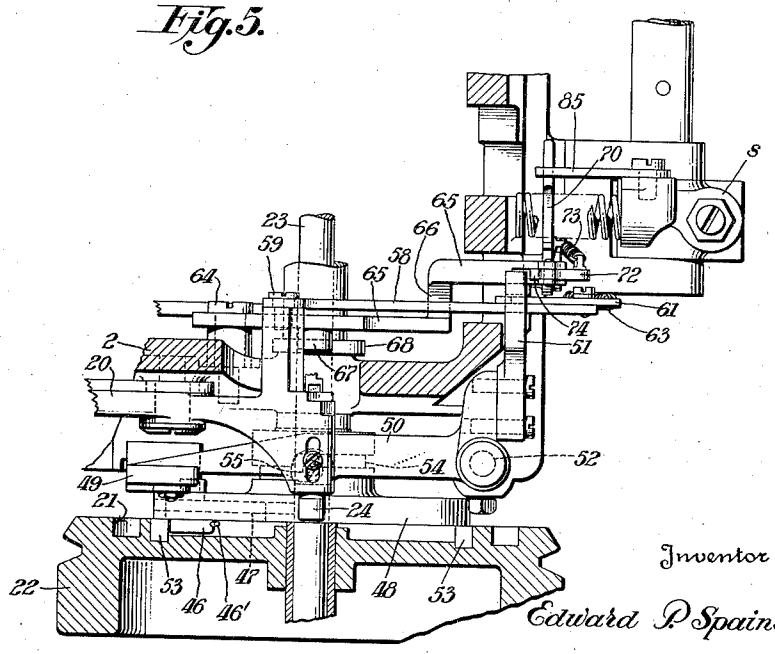


Fig. 6.

Witness:
Godfrey Peck

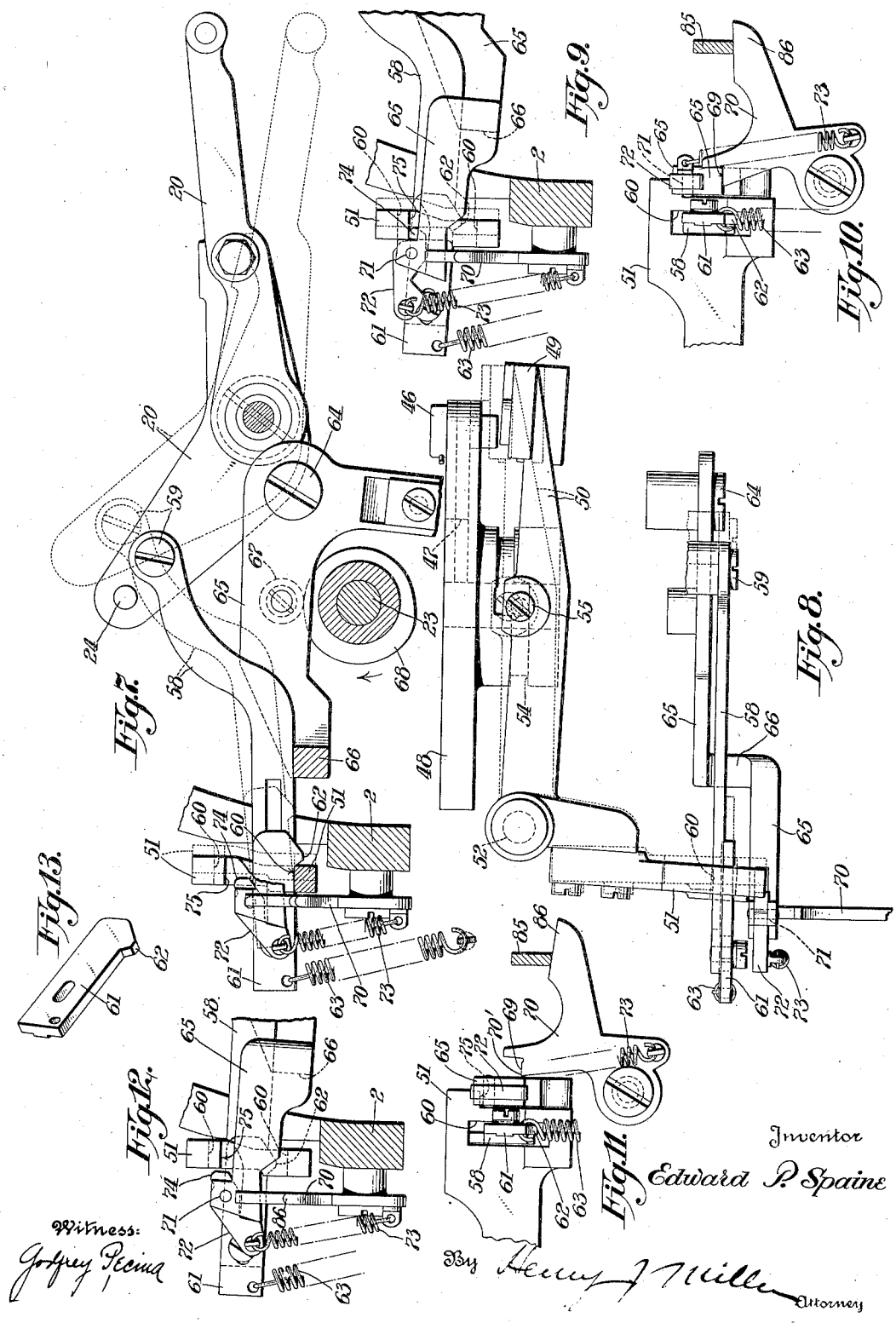
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BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

Filed July 16, 1938 6 Sheets-Sheet 6



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Patented Sept. 26, 1939 2,174,294

UNITED STATES PATENT OFFICE

2,174,294

BUTTONHOLE-CUTTER SAFETY DEVICE FOR AUTOMATIC BUTTONHOLE SEWING MACHINES

Edward P. Spaine, Bridgeport, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application July 16, 1938, Serial No. 219,489

7 Claims. (Cl. 112—68)

This invention relates to sewing machines of the automatic eyelet-end type having buttonhole-cutting mechanism and buttonhole-working mechanism which are separately power driven and whose sequence of operations is controlled automatically. These machines are of two distinct types known as "cut-first" machines and "cut-after" machines. In a "cut-first" machine the buttonhole-cutting mechanism operates prior to the operation of the buttonhole-working mechanism whereas, in a "cut-after" machine the buttonhole-working mechanism operates prior to the operation of the buttonhole-cutting mechanism. To prevent clashing of parts it is important that safety means be provided to prevent the possible operation of the buttonhole-cutting mechanism at times during a buttonhole-producing cycle other than the time when it should properly operate.

An object of the present invention is to provide a safety device of the character described which will positively guard against the operation of the buttonhole-cutting mechanism over substantially the entire period of operation of the other mechanisms of the machine, so that the buttonhole-cutting mechanism cannot possibly operate or be operated while any working part of the machine is in a position to clash therewith or be damaged thereby.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings, Fig. 1 is a right side elevation of a buttonhole sewing machine embodying the invention. Fig. 2 is a left side elevation of the machine. Fig. 3 is a rear end elevation of the machine. Fig. 4 is a bottom plan view of the machine. Fig. 5 is a vertical sectional view taken transversely of the buttonhole-cutter shaft. Fig. 6 is a horizontal sectional view through the bracket-arm standard of the machine showing, in plan, the parts of the present safety mechanism associated with the buttonhole-cutter shaft. Fig. 7 is a view similar to Fig. 5 with the parts drawn to a larger scale and showing the clamp-closing lever at the two extremes of its motion. Fig. 8 is a view similar to Fig. 6 with the cutter-starter or so-called "gate" shown, in full lines, in running position and, in dotted lines, in stopping position. Fig. 9 is a fragmentary view similar to Fig. 7 but showing the cutter-starter shifter lifted to its ineffective position. Fig. 10 is a view showing the lifter for the cutter-starter shifter latched in ineffective position. Fig. 11 is a similar view showing the slight drop of the lifter lever for the cutter-starter shifter when the latch is unlatched by the operation of the stop-motion lever in starting the stitch-forming mechanism; this slight drop preventing re-engagement of the latch when the stop-motion lever moves to stopping positon, Fig. 5. Fig. 12 is a view, similar to Figs. 7 and 10, showing recovery of the cutter-shifter blocking latch which is carried by the lever which lifts the cutter-starter shifted to ineffective position; the recovery occurring when the cutter-starter returns from full line (running) position, Fig. 9, to the dotted line (stopping) position, same figure. Fig. 13 is a perspective view of the toothplate mounted on the cutter-starter shifter.

In the preferred embodiment of the invention illustrated, the machine frame comprises a hollow box-like bed 1 from one end of which rises the standard 2 of the overhanging bracket-arm 3 terminating in the head 4.

The stitch-forming mechanism is of the well known type embodying an upper endwise reciprocatory and laterally vibratory needle 5 and underthread mechanism constructed substantially in accordance with the disclosure of United States Patent No. 1,372,473, dated March 22, 1921, and comprising a turret 6, Fig. 1, which is turnable about a vertical axis and carries threaded and non-threaded loopers, the former of which is shown at 7, and a pair of loop-detainers one of which is shown at 8. The needle-actuating mechanism is also mounted to turn about a vertical axis coincident with the axis of the turret and the usual turning movements are imparted to the upper needle and under looper mechanisms by the connected upper and lower sector gears 9 and 10, respectively, which are actuated in unison by the usual connections with the cam-groove 11, Fig. 4, in the feed-wheel 12. This well known mechanism is more completely shown, for example, in United States Patent No. 1,162,207, November 30, 1915; Reissue Patent No. 15,324, April 4, 1922; and Patent No. 1,534,017, April 21, 1925. The mechanism operates to rotate the stitch-forming devices in one direction about a vertical axis during the sewing around the eyelet-end of a buttonhole and to reversely rotate the stitch-forming devices between sewing periods to restore them to initial position. The stitch-forming de-

vices receive their stitch-forming movements from the main sewing shaft 13 which also drives the feed-cam 12 in step-by-step fashion, during the sewing, through the well known pin-and-star-wheel drive 14, Fig. 4, and the usual train of gears 15, such as more completely shown in said United States Reissue Patent No. 15,324.

The work-clamp is of the travelling type. It is first rapidly moved over the bed to carry the work forwardly from initial or buttonhole-cutting position to sewing position then more slowly moved in step-by-step fashion to place the stitches about the buttonhole, and then rapidly returned to initial position. It is constructed substantially in accordance with said United States Reissue Patent No. 15,324, and comprises the lower clamp-plates 16 and upper clamping feet 17 which are depressed into clamping engagement with the work by a rocking movement of two connected coaxial rock-shaft sections 18, 18' to the former of which is connected an arm 19, Fig. 1, adapted to be depressed by the usual clamp-closing lever 20 actuated at the beginning of a buttonhole-making cycle by a cam-groove 21, Fig. 3, in a continuously running pulley 22 loose on the buttonhole-cutter shaft 23. A slide-pin 24, carried by the rearwardly extending arm of the clamp-closing lever, is permitted to enter the cam-groove 21 for one revolution of the pulley 22, whereupon it is ejected and latched in ejected position, as explained in United States Patent No. 1,832,665, November 17, 1931; the present clamp-closing mechanism being constructed substantially in accordance with the disclosure in said United States Patent No. 1,832,665.

The clamp-plates 16 are carried by the cross-slide plate 25, Fig. 4, which, in turn, is carried by the longitudinal slide-frame 26 to which travelling movements are imparted by the link-connection 27, Fig. 4, with the longitudinal feed-lever 28 having a follower 29 working in the longitudinal feed cam-groove 30 in the feed-wheel 12. The cross-slide plate 25 is shifted by the lever 31, Fig. 4, which has the usual connections with the feed-wheel 12 and removable pattern-cam 32 on the cross-shaft 33 which is geared at 34, Fig. 1, to the feed-cam 12, so as to run with the latter. The present feed mechanism is constructed substantially in accordance with the disclosure of said United States Reissue Patent No. 15,324.

The rapid feed of the work-clamp from buttonhole-cutting position to sewing position and return is effected by the usual constantly running rapid feed drive-shaft 35, which through a worm-and-gear reduction 36, Fig. 4, drives the live element 37 of a clutch, the driven element 38 of which is fast on the cross-shaft 33. It will be understood by referring to said United States Reissue Patent No. 15,324, that the withdrawal of the cone 39 from the driven clutch-element 38 effects engagement of the driving and driven clutch-elements 37, 38, while projection of the cone 39 toward the driven clutch-element 38 effects the de-clutching of the parts 37, 38. The cone 39 is actuated by the usual arm 40 rigidly mounted on the endwise slidable rod 41 which is operated and controlled by the usual mechanism described in the Allen et al. United States Patent No. 1,711,483, of May 7, 1929.

The pattern-wheel 32, Fig. 2, which is removably carried by the cross-shaft 33, operates the usual tilting stop-motion lever *s* through the lever 42 and link 43 to control the period of action of the stitch-forming mechanism.

The buttonhole-cutting mechanism is constructed substantially in accordance with the disclosure of said United States Patent No. 1,548,815, and embodies the travelling buttonhole-cutter levers 44, 45, Fig. 2, which are given their customary travelling and closing-and-opening movements by suitable cams on the cutter-shaft 23 to which a single rotation is imparted prior to sewing by the continuously rotating pulley 22 acting through the usual one-revolution clutch. This well known clutch comprises a spring-pressed clutch-tooth 46 which is carried by a slide-block 47 sliding radially of the disk 48 fast on the cutter-shaft 23. This slide-block 47 is held in retracted position, Figs. 1 and 6, by the head 49 of a cutter-clutch control or cutter-starter lever 50 having an angular extension 51 at its rear end which is fulcrumed on the vertical stud-pin 52. When the cutter-starter lever 50, 51 is shifted from dotted line to full line position, Fig. 8, the head 49 thereof releases the clutch-tooth slide 47 which is projected radially of the disk 48 by the spring 46', Fig. 1 to carry the clutch-tooth 46 into the path of movement of the internal teeth 53 on the pulley 22. The construction and mode of operation of the cutter-starter 50, 51 and cutter-clutch 46, 47, 53 are more fully disclosed in said United States Patent No. 1,548,815. It will be understood that when the cutter-starter is shifted to running position, full lines in Fig. 8, the cutter-shaft 23 is coupled to the power pulley 22 for one revolution only and is thereupon disconnected from the pulley 22 and brought to rest by the automatic return of the cutter-starter 50, 51 to stopping position (dotted lines, Fig. 8); this return being effected by the cam-groove 54 in the hub of the disk 48 on the cutter-shaft acting upon the follower-pin 55 which is carried by the lever 50 and enters the cam-groove 54.

The machine in which the invention is presently embodied is a "cut-first" machine, that is, the buttonhole-cutting mechanism is operated before the buttonhole-working mechanism is started. When the operator presses down upon the starting lever 56, Fig. 2, the starting rod 57, Fig. 1, is, through suitable connections, pulled downwardly to initiate the action of the clamp-closing mechanism. The down-pull on the starting rod 57 effects the release of the slide-pin 24 which enters the clamp-closing cam-groove 21 in the pulley 22 and causes the clamp-closing lever 20 to be given clamp-closing and return impulses. In the clamp-closing impulse the lever 20 is moved from full line position, Fig. 7, to dotted line position and effects the closure of the work-clamp by striking and depressing the lever 19, Fig. 1, on the work-clamp. During the return impulse of the clamp-closing lever 20, the cutter-starter 50, 51 is shifted to running position, shown in full lines in Figs. 7 and 8. This is accomplished by the cutter-starter shifter 58 which is in the form of a push-rod pivoted at 59 on the clamp-closing lever 20 and, at its other end, projecting through a rectangular opening 60, Figs. 10 and 11, in the cutter-starter lever-arm 51. The portion of the push-rod 58 which projects through the opening 60 in the lever-arm 51 has longitudinally adjustably mounted upon it a slide-plate 61 formed with a depending tooth 62 which, when the push-rod 58 rides upon the lower edge of the opening 60 in the cutter-starter lever-arm 51 under the influence of the spring 63, engages

the lever-arm 51 and shifts the latter to full line or running position, Fig. 7, in the return impulse of the clamp-closing lever 20. This starts the cutter-shaft 23.

Means are provided to lift the push-rod or cutter-starter shifter 58 to an ineffective position where it does not ride upon the lower edge of the opening 60 in the cutter-starter lever-arm 51, and may reciprocate idly, if inadvertently operated, without tripping the buttonhole-cutting mechanism into operation. To this end there is fulcrumed on the stud-screw 64 a safety-lever 65 which extends rearwardly over the cutter-shaft 23, Fig. 7, thence laterally at 66 under the cutter-starter shifter 58, and thence rearwardly alongside the rearward end of the cutter-starter shifter 58. This safety lever 65 carries a follower roll 67 in position to be engaged and lifted by a cam 68 on the cutter-shaft 23. During the single rotation of the cutter-shaft 23, the cam 68 lifts the safety-lever 65 to the position shown in Figs. 9 and 10 where it is retained by engagement thereunder of the shoulder 69 of the spring-biased latch-lever 70. In this elevated position of the safety-lever 65, the transversely extending portion 66 thereof, Fig. 12, holds the cutter-starter shifter 58 in a safely elevated position with the tooth 62 well above the bottom edge of the opening 60, where the bar 58 may reciprocate idly, should the clamp-closing lever be inadvertently operated.

Pivoted at 71 on the rear end of the safety-lever 65 is a cutter-starter blocking latch 72 the tail of which is connected to one end of the biasing spring 73 for the latch 70. When the cutter-starter 51 is shifted to running or full-line position, Fig. 7, the shoulder 75 thereon moves to a position over the nose 74 of the latch 72, so that when the safety-lever 65 is lifted to the position shown in Fig. 9, the nose 74 is depressed by the shoulder 75. At the close of the single revolution of the cutter-shaft 23, the cutter-starter 51 is returned to its initial or stopping position, Fig. 12, and releases the nose 74 of the latch-lever 72 which springs upwardly behind the cutter-starter 51 and blocks the latter against rearward movement. This cutter-starter blocking latch-nose 74 locks the cutter-starter against accidental or inadvertent hand-initiated repeat operations at abnormal times during a buttonhole-producing cycle.

As the button hole cutter-shaft 23 nears the completion of its single rotation, Fig. 1, and with the parts of the safety mechanism held elevated by the latch 70, Figs. 10 and 12, in safety position, the cam-nose 76 on the disk 48 depresses the arm 77 fast to the rock-shaft 78 the operation of which initiates the throwing in of the rapid-feed clutch 37, 38 to start the rapid feed of the work-clamp from buttonhole-cutting to buttonhole-sewing position, as disclosed in said United States Patent No. 1,711,483.

The cross-shaft 33 which drives the feed-wheel 12 during this rapid-feed of the work-clamp, has mounted thereon, in the present instance, a safety cam-cylinder 79, Fig. 5, having a notch 80 therein affording at one side of the notch an angular drop-off shoulder 81. When the machine is at rest, the cam 79 is in position for the notch 80 to receive the terminal extension 82 of an arm 83 fixed to the safety-lever 65. When the buttonhole cutter-shaft is operated to cut the buttonhole, the safety-lever 65 is lifted by the cam 68 to safety position and latched there by the latch 70. In this position of the safety-lever 65, the extension 82 thereof is withdrawn from the notch 80 and is clear of the cam-cylinder 79 as the latter turns during the rapid-feed of the work-clamp from buttonhole-cutting to buttonhole-sewing position.

When the work-clamp arrives in buttonhole-sewing position, the rapid-feed is thrown out and the cam 84 on the pattern-wheel 32 acts upon the lever 42 and link 43 to tilt the stop-motion lever *s* to its dotted line position to start the stitch-forming mechanism.

The stop-motion lever *s* has fixed to its upper end a forwardly extending horizontal arm 85, which, in the tilting motion of the lever *s* to dotted line position, Fig. 2, strikes the tail 86 of the latch 70 and disengages the shoulder 69 from the safety-lever 65 which drops sufficiently, Fig. 11, to prevent re-engagement of the shoulder 69 thereunder when the stop-motion lever returns to its upright or full-line position, Fig. 2, to stop the sewing operation. The amount of drop of the safety-lever 65 at this time is determined by the engagement of the safety-lever extension 82 with the cylindrical surface of the safety-cam 79 on the cross-shaft 33 which at the beginning of the rapid-feed movement of the shaft 33 is in position to take over from the latch 70 the duty of holding the cutter-starter shifter 58 elevated in ineffective position.

When the stop-motion lever *s* returns to its vertical (full line) position, Fig. 2, to stop the stitch-forming mechanism at the completion of the sewing of the buttonhole, the latch 70 is released and its nose 70', Fig. 11, engages the side of the safety-lever 65 which is free to drop when released by the cylinder-cam 79.

At the completion of the sewing operation, the rapid-feed is again thrown in to drive the shaft 33 and feed-wheel to carry the work-clamp rapidly back to its initial or starting position wherein the buttonhole was cut. During the return rapid-feed of the work-clamp the stitch-forming mechanism is reversely rotated to restore the needle and turret to their starting positions. In some machines which are provided with thread- and cord-trimming mechanism such as disclosed in U. S. Patent No. 1,711,483, of May 7, 1929; the actuation of the thread-cutter 87 is dependent upon the actuation of the lever 88, by the cam 89 in the gear 34 on the cross-shaft 33. It is desirable that the safety-lever be held in safety-position by the barrel-cam 79 until the work-clamp has been returned to initial position, the stitch-forming mechanism reversely rotated to initial position, and until the thread-cutter scissors 87 have been advanced to cut the thread and retracted, so that the buttonhole-cutting mechanism cannot possibly be operated while any part of the machine is in position to clash therewith. To this end, the follower-extension 82 of the safety-lever arm 83 is formed at its trailing end-portion with an angular shoulder 82', Fig. 5, which, when released by the drop-off shoulder 81 of the cam 79, allows the safety-arm 85 to suddenly drop to the position shown in Fig. 7, ready to begin another cycle of operations. The shoulder 81 is timed to pass the shoulder 82' after the cross-shaft 33 and all parts actuated thereby have been restored substantially to starting position, clear of the field of action of the buttonhole-cutter levers 44, 45.

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

1. In a buttonhole sewing machine, buttonhole-cutting mechanism including a cutter-shaft, but-

tonhole-working mechanism, power means to drive said mechanisms, said buttonhole-working mechanism including stitch-forming mechanism, a work-clamp, a feed-wheel making one complete rotation per buttonhole-producing cycle of the machine, said feed-wheel being connected to relatively move the stitch-forming mechanism and work-clamp to sew about a buttonhole and to relatively shift the stitch-forming mechanism and work-clamp into and out of sewing relation prior and subsequent to the sewing period, a clutch device including a cutter-starter movable to a running position to start the operation of the buttonhole-cutting mechanism, spring-biased cutter-starter blocking means, a cam connected with the feed-wheel and having a long circular portion with connections to hold said blocking means in cutter-starter blocking position, said cam having an abrupt drop-off shoulder to release said blocking means instantly and permit the latter to move under the influence of its spring out of the path of said cutter-starter at the end of a buttonhole-producing cycle of operations of the machine.

2. In a buttonhole sewing machine, buttonhole-cutting mechanism including a cutter-shaft, buttonhole-working mechanism, power means to drive said mechanisms, said buttonhole-working mechanism including stitch-forming mechanism, a work-clamp, a feed-wheel making one complete rotation per buttonhole-producing cycle of the machine, said feed-wheel being connected to relatively move the stitch-forming mechanism and work-clamp to sew about a buttonhole and to relatively shift the stitch-forming mechanism and work-clamp into and out of sewing relation prior and subsequent to the sewing period, a clutch device including a cutter-starter movable to a running position to start the operation of the buttonhole-cutting mechanism, spring-biased cutter-starter blocking means, a cam connected with the feed-wheel and having a long circular portion with connections to hold said blocking means in cutter-starter blocking position, said cam having a sudden drop-off to release said blocking means and permit the latter to move out of the path of said cutter-starter at the end of a buttonhole-producing cycle of operations of the machine, means actuated by the button-hole cutter shaft to initially move said cutter-starter blocking means to blocking position, and means actuated by the buttonhole-cutter shaft to start the buttonhole working mechanism.

3. A buttonhole sewing machine having, in combination, buttonhole-cutting mechanism including a cutter-shaft, buttonhole-working mechanism, the latter mechanism including stitch-forming mechanism, a work-clamp and a feed-wheel with connections for relatively moving the stitch-forming mechanism and work-camp into and out of sewing relation and to sew about a buttonhole, power means to drive the buttonhole-cutting and buttonhole-working mechanisms, clamp-closing mechanism, clutch means including a cutter-starter movable to a running position to connect the buttonhole-cutter shaft to its power means, a cutter-starter shifter actuated by the clamp-closing mechanism, a cam on the buttonhole-cutter shaft and connections to move the cutter-starter shifter to an ineffective position, a latch to temporarily hold said shifter in said ineffective position, means actuated by the buttonhole working mechanism to trip said latch, a cam connected with the feed-wheel and having a circular portion, a follower arranged to bear upon said circular portion and take over the duty of holding said cutter-starter shifter in ineffective position when released by said latch, said cam having a sudden drop-off to permit said cutter-starter shifter to move to effective position at the end of a buttonhole producing cycle of operations of the machine.

4. A buttonhole sewing machine having, in combination, buttonhole-cutting mechanism including a cutter-shaft, buttonhole-working mechanism, the latter mechanism including stitch-forming mechanism, a work-clamp, a feed-wheel with connections for relatively moving the stitch-forming mechanism and work-clamp into and out of sewing relation and to sew about a buttonhole, and a cross-shaft parallel to said cutter-shaft and geared one-to-one to said feed-wheel, clutch means including a cutter-starter movable to a running position to connect the cutter-shaft to its source of power, clamp-closing mechanism, a cutter-starter shifter actuated by the clamp-closing mechanism, a safety-lever arranged to move the cutter-starter shifter to an ineffective position, a cam on the cutter-shaft to so move said lever, said lever having an extension reaching to said cross-shaft, and a cam on said cross-shaft operatively related to said lever-extension and having a drop-off arranged to release said lever-extension at the close of a buttonhole producing cycle.

5. A buttonhole sewing machine having, in combination, buttonhole-cutting mechanism, including a cutter-shaft, buttonhole-working mechanism, the latter including stitch-forming mechanism, a stop-motion device therefor including a tilting stop-motion lever, a work-clamp, a feed-wheel with connections for relatively moving the stitch-forming mechanism and work-clamp into and out of sewing relation and to sew about a buttonhole, power means to drive the buttonhole-cutting and buttonhole-working mechanisms, clamp-closing mechanism, clutch means including a cutter-starter movable to a running position to connect the cutter-shaft to its power means, a cutter-starter shifter actuated by the clamp-closing mechanism, a cam on the cutter-shaft and connections to move the cutter-starter shifter to an ineffective position, a latch to temporarily detain said shifter in said ineffective position, latch-tripping means actuated by the tilting motion of the stop-motion lever to stitch-forming mechanism starting position, a cam connected with the feed-wheel and having a circular portion, a follower arranged to bear upon said circular portion and take over the duty of holding said cutter-starter shifter in ineffective position when released by said latch, said cam having a sudden drop-off to permit said cutter-starter shifter to move to effective position at the end of a buttonhole producing cycle of operations of the machine.

6. A buttonhole sewing machine having, in combination, buttonhole-cutting mechanism including a cutter-shaft, buttonhole-working mechanism, the latter mechanism including stitch-forming mechanism, a work-clamp and a feed-wheel with connections for relatively moving the stitch-forming mechanism and work-clamp into and out of sewing relation and to sew about a buttonhole, power means to drive the buttonhole-cutting and buttonhole-working mechanisms, clamp-closing mechanism, clutch-means including a cutter-starter movable to a running position to connect the cutter-shaft to its power means, a cutter-starter shifter actuated by the

clamp-closing mechanism, a safety-lever fulcrumed on an axis parallel to said cutter-shaft and arranged to move said cutter-starter shifter to an ineffective position where it may idly perform the motion imparted to it by an untimely operation of the clamp-closing mechanism, a cam on the cutter-shaft arranged to move said safety-lever to safety position, means to detain said safety-lever in safety position after said cutter-shaft has operated, means on said safety-lever to block movement of said cutter-starter to cutter-starting position when said safety-lever is in safety position, and means to release said safety-lever at the close of a buttonhole-producing cycle of operations of the machine.

7. A buttonhole sewing machine having, in combination, buttonhole-cutting mechanism including a cutter-shaft, buttonhole-working mechanism, the latter mechanism including stitch-forming mechanism, a work-clamp and a feed-wheel with connections for relatively moving the stitch-forming mechanism and work-clamp into and out of sewing relation and to sew about a buttonhole, power means to drive the buttonhole-cutting and buttonhole-working mechanisms, clamp-closing mechanism, clutch-means including a cutter-starter movable to a running position to connect the cutter-shaft to its power means, a cutter-starter shifter actuated by the clamp-closing mechanism, safety means to hold said cutter-starter shifter in an ineffective position where it may idly perform the motion imparted to it by an untimely operation of the clamp-closing lever, said safety means including a pivoted element which, in safety position, blocks movement of said cutter-starter to running position, the pivotal axis of said element being transverse to the direction of the thrust imparted to said element when blocking movement of the cutter-starter.

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