

E. B. ALLEN & J. O. RINGE.
 BUTTONHOLE SEWING MACHINE.
 APPLICATION FILED AUG. 7, 1908.

946,651.

Patented Jan. 13, 1910

2 SHEETS-SHEET 1

Fig. 1.

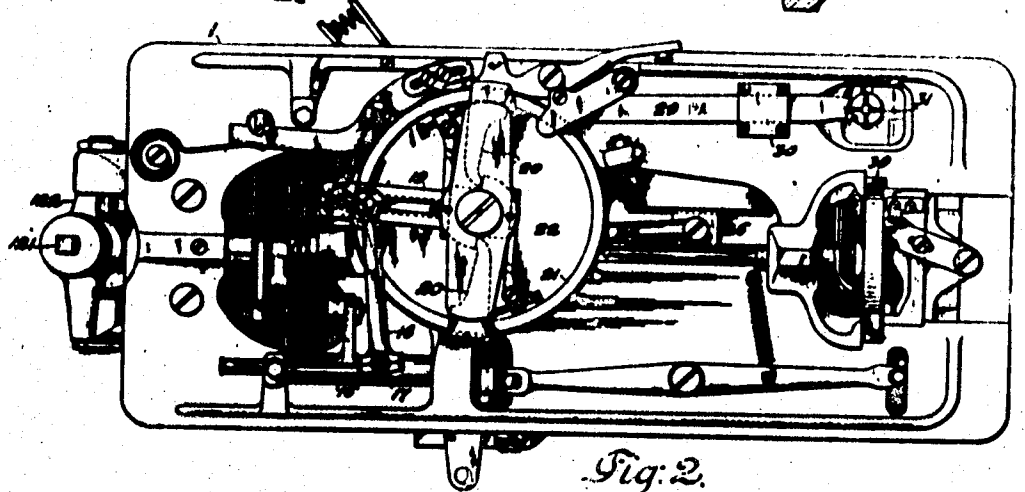
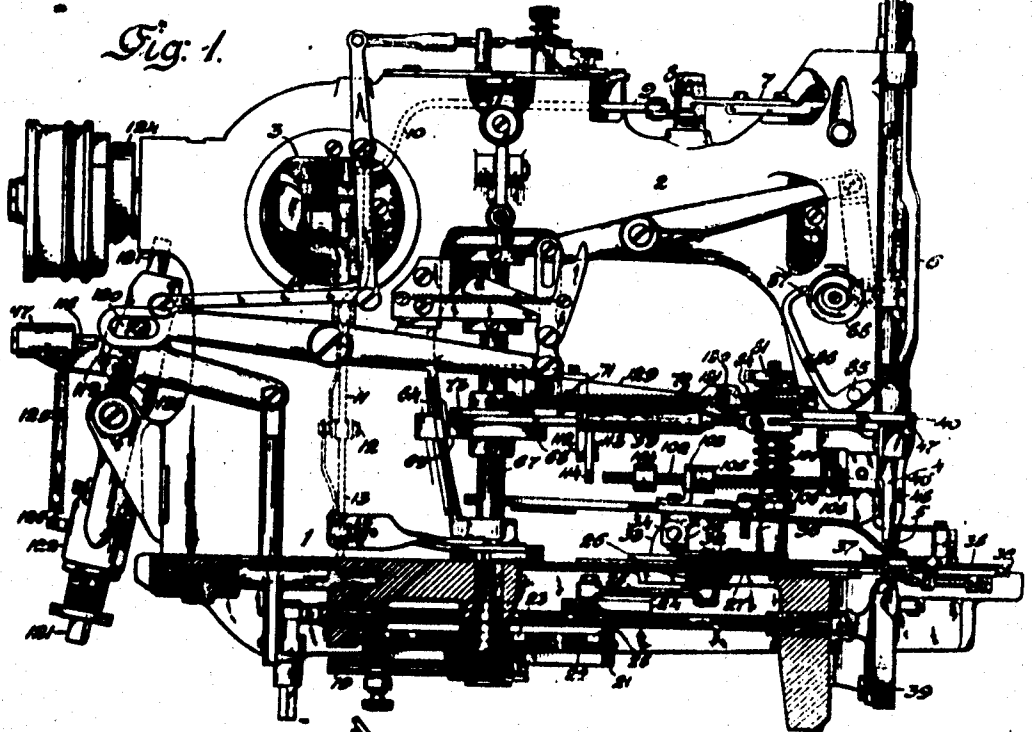


Fig. 2.

WITNESSES
Prof. J. H. ...
S. A. Konemann

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 BY
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 ATTORNEY

E. B. ALLEN & J. O. RINGE.
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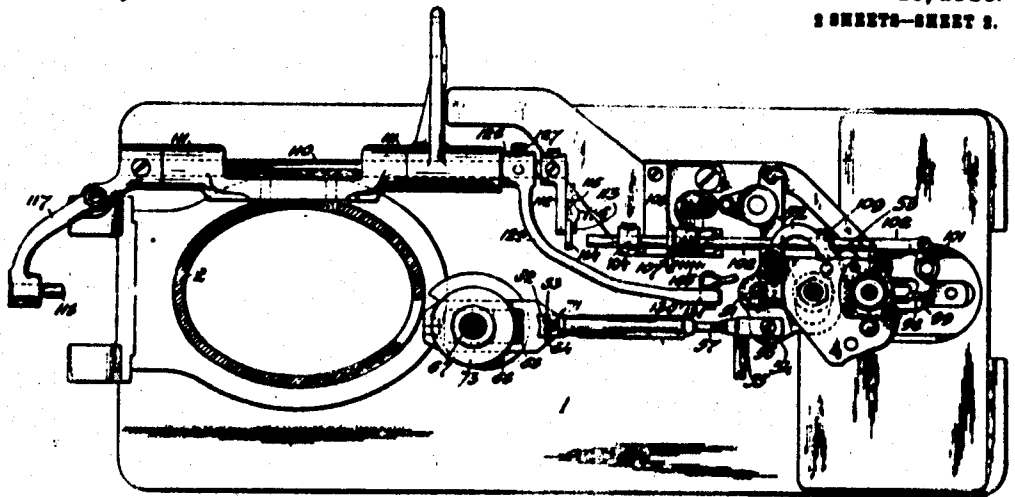


Fig. 3.

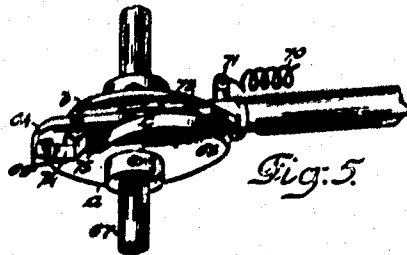


Fig. 5.

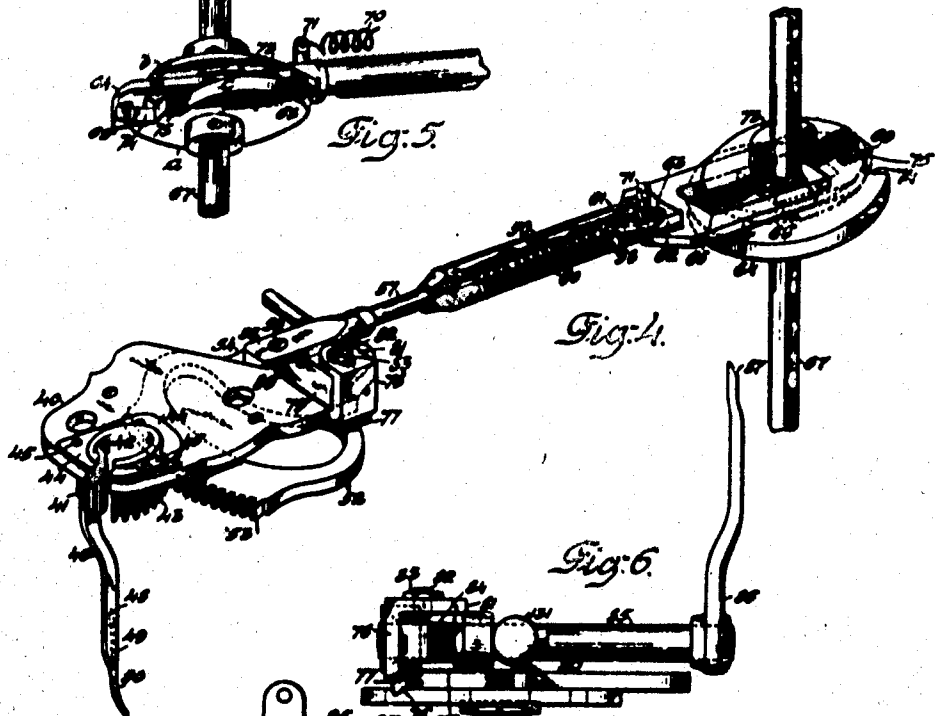


Fig. 4.



Fig. 6.

WITNESSES
John F. ...
W. H. ...

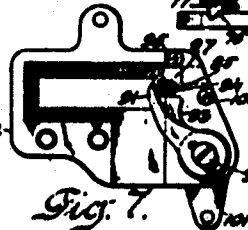


Fig. 7.

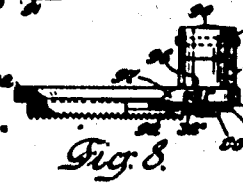


Fig. 8.

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UNITED STATES PATENT OFFICE.

EDWARD BEECHER ALLEN AND JOHN C. RINGE, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

BUTTONHOLE-SEWING MACHINE.

940,651.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed August 7, 1908. Serial No. 447,331.

To all whom it may concern:

Be it known that we, EDWARD BEECHER ALLEN and JOHN C. RINGE, citizens of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Buttonhole-Sewing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to provide a purl-thread guide which shall accommodate itself to overseaming stitch-forming mechanism for changes in the direction of feed, as in buttonhole stitching machines and embroidering machines wherein the stitching mechanism is mounted independently of the feeding mechanism and does not follow changes of direction of the latter.

The present invention is designed especially for embodiment in straight buttonhole stitching machines of the class exemplified in that forming the subject of the United States patent of Edward B. Allen No. 800,231, dated December 3, 1905, although adapted for use in other types of machines. In the buttonhole machine referred to, the vertically reciprocating thread-carrying needle receives lateral or overseaming movements throughout the cycle of operation of the machine, the work being held in a traveling clamp to which are imparted alternate advance and retrograde step-by-step feeding movements to space the stitches, intermediate dwells for the production of barring stitches at opposite ends of the buttonhole, and lateral shifting movements for properly positioning the edge-covering and barring stitches in a manner well-known.

According to the present improvement, in its preferred form, a purl-thread or cord-guide is mounted upon an oscillating carrier journaled substantially concentrically with the needle-bar and is so controlled that its delivery eye is maintained in advance of the stitching mechanism during the stitching of the first side of the buttonhole, and is then thrown to the side of the stitching mechanism for the first barring operation, after which it is shifted to a position diametrically opposite its initial position in relation to the stitch-forming mechanism which it maintains during the stitching of the second side of the buttonhole and the barring of the second end, after which both the nec-

dle-thread and the purl-thread are severed by a common cutting implement in the present instance carried by the clamping foot of the work-holder. By maintaining the purl-thread guide in advance of the stitch-forming mechanism throughout both the advance and retrograde feeding movements, the purl-thread is adapted to be laid upon the work where it is stitched in place and embraced by the side overseam stitches, while the lateral deflection of the purl-thread at the end of the first side stitching operation permits the laying of a succession of bar stitches and the secure anchorage of the last side-overseam-stitch in line with the center of the buttonhole slit so that in the subsequent reversal of the position of the thread-guide the last overseam stitch of the first side affords a firm turning point for the purl-thread or cord so that the lead of the latter will be within the field of operation of the stitch-forming mechanism in beginning the overseaming of the second side of the buttonhole. A similar deflection of the purl-thread is not required at the initial end of the buttonhole, for the reason that means are provided for severing such thread at the completion of the stitching operation.

The present invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a rear side elevation, partly in section, of a buttonhole stitching machine of the well-known Singer No. 71 class, embodying the present improvements, and Fig. 2 is a bottom plan view of the same. Fig. 3 is a sectional plan of the machine with the bracket-arm removed to expose the mechanism beneath. Fig. 4 is a perspective view of the purling mechanism, and Fig. 5 is a similar view of a portion thereof taken from a different position. Fig. 6 is a rear view of the forward portion of the operating mechanism of the purl-thread guide. Fig. 7 is a bottom plan of the clamping foot of the work-holder with the removable section omitted to expose the cutting and nipping devices, and Fig. 8 a sectional elevation of the same.

The machine is constructed with the usual bed-plate 1 and overhanging bracket-arm 2 in which is journaled the main-shaft 3 operatively connected at its forward end with the needle-bar 4 having the thread-carrying needle 5. As in the said Patent No. 800,231,

the swinging needle-frame 6 derives its lateral movements, which are communicated to the needle-bar and needle, through a pitman connection 7, rocker 8 and link-bar 9 to which latter are communicated endwise reciprocating movements for imparting to the needle its side-stitch and bar-stitch jogging movements, and sidewise movements to effect the coupling of said bar alternately to different points of its swinging actuator. The depending rearwardly extending tail 10 of this link-bar is adapted in its lateral movements to engage the upper end of a laterally toothed coupling lever 11 fulcrumed at 12 to the lower section 13 of an eccentric-rod whose upper section 14 is slidably fitted to the lower section 13 and normally coupled thereto by means of the coupling lever 11. When the link-bar 9 is in side-stitching position the tail 10 is disengaged from the coupling lever 11, but when the link-bar is in barring position the tail 10 serves to shift the coupling lever 11 to uncouple the sections 13 and 14 of the eccentric-rod to enable the latter to reciprocate idly.

The lower end of the eccentric-rod section 13 is pivotally connected with a lateral arm 15 of a rocker 16 having a depending arm 17 embraced by one end of a pitman-rod 18 whose opposite end is connected with a clutch-lever 19 actuating the clutch-dogs 20 embracing the annular flange 21 of the feed-wheel 22 by which the latter derives a step-by-step rotary motion. The feed-wheel 22 is provided in its upper face with the usual cam-groove 23 entered by a stud upon one arm of a bellcrank lever whose other arm 24 is connected by means of a pitman 25 through the slide-block 26 with the clamp base-plate 27 from which the advance and retrograde step-by-step feeding movements are imparted to the work-clamp; and the cam-wheel 22 has a second cam-groove 28 entered by a stud carried by the rock-lever 29 fulcrumed at 30 and having its opposite end connected by means of a screw 31 with the slide-plate 32 of the work-holder, whereby the lateral shifting movements are communicated to the work-holder. The upper slide-plate of the work-holder is provided with bearing lugs 33 to which are pivotally connected by means of the pin 34 the depending lugs 35 of the upper clamp-lever 36 carrying the clamping foot 37 with lower serrated bearing portion entering and normally seated upon the bottom of the recess 38 formed in the top of the slide-plate 32. As herein represented, an oscillating shuttle within the shuttle race 39 cooperates with the needle in the production of overseam stitches.

Secured to the lower end of the head of the bracket-arm 2 is a bearing plate 40 parallel with the bed-plate and formed with an opening 41 surrounding the needle-bar to which

is fitted the hub 42 of a segmental pinion 43 having an annular notch near its upper end entered by the inner edge of the sectional thrust-plate 44 secured upon the bearing plate 40 by means of screws 45.

The purl-thread guide is formed with a laterally offset shank 46 secured at its upper end by means of fastening screws 47 to the pinion 43 and has near its lower end a thread aperture 48 forming the mouth of a thread channel 49 extending downwardly through the contracted lower portion 50 of the thread-guide and terminating in a delivery opening at the lower end of the same. As will be observed, the oscillation of the pinion 43 by means about to be described causes the purl-thread guide to assume positions at different sides of the stitch-forming mechanism and the path of movement of the needle 5.

Fulcrumed upon the bottom of the bearing plate 40 by means of the screw-stud 51 is a rocking plate 52 having a segmental series of gear teeth 53 meshing with the teeth of the pinion 43, and adapted to oscillate the same. At one side of the fulcrum-screw 51 the rocking plate 52 is provided with a perforated ear 54 embraced by the forked head 55 of a sectional connecting rod pivotally attached thereto by means of a screw-pin 56. The rod 57 to which the head 55 is connected, is formed at its rearward end with a fixed collar 58 fitted within the tubular section 59 and having interposed between the same and the forward end of the cavity in the section 59 the spring 60, whereby the sectional rod is normally maintained in contracted condition, with the collar 58 firmly seated upon the threaded bushing 61 entering the rearward end of the section 59 and having a rearwardly extending lug 62 secured by means of screws 63 to the face of a slotted slide-plate 64 whose rectangular central opening 65 embraces a guide-block 66 fitted upon the upright shaft 67 of the feed-wheel 22. The slide-plate 64 rests upon and is supported by the pattern-cam 68 fixed upon the feed cam-shaft 67, and has a depending lug 69 normally resting upon the plural-stepped operative edge of the cam 68 and constituting a follower therefor, being maintained in yielding contact therewith by means of a spring 70 interposed between a stud 71 upon the lug 62 and a stud 72 upon the lower end of the head of the bracket-arm. The slide-plate 64 is confined upon the upper face of the cam 68 by means of a disk 73 whose hub is fixed upon the feed cam-shaft 67. As indicated more particularly in Figs. 3 and 5, the cam 68 is of general snail-shape with three steps at one side formed by two adjacent notches 74 and 75, which afford an inner, an outer and an intermediate step which the lug 69 is caused to successively engage under the action of the spring 70 in the rotation of the cam 68.

The positions of the parts represented in Figs. 1 to 4 inclusive, are those assumed immediately after the first barring operation and while the second side of the buttonhole is being stitched, whereby the delivery end of the purl-thread guide is shifted into a position in front of the needle by the action of the spring 70 upon the slide-plate 64, the lug 69 having rested upon the outer periphery 10 or portion *a* of larger curvature of the cam 68 as represented in Fig. 5 during the stitching of the first side of the buttonhole and entered the notch 74 so as to rest upon the intermediate step *b* for the first barring operation and entered the second notch 75 so as to rest upon the step *c* at the completion of the barring operation for the stitching of the second side of the buttonhole. As the purl thread-guide 46 has an oscillatory 20 movement around the needle-path, it will be seen that when the lug 69 of the slide-plate 64 rests upon the step *b* of the pattern-cam 68, the thread-guide delivery opening 50 assumes a position at one side of the stitching mechanism and intermediate its extreme positions upon opposite sides of the needle which it occupies in the respective side stitching operations of the machine; and this intermediate position is assumed 30 while the longitudinal feeding mechanism is inactive and the barring is being done intermediate the lateral movements of the work for spacing the lines of side stitches upon opposite margins of the buttonhole slit. As the section 59 of the extensible connecting rod immediately begins its retractile movement under the action of the eccentric portion *c* of the pattern-cam during the stitching of the second side of the buttonhole, it is necessary to forcibly detain the purl-thread guide in its third or extreme position to prevent its premature return to initial position. To this end, the rocking plate 52 is formed in its upper side with a notch 45 76 entered by the ratchet shaped tooth 77 of a detent block 78 fixed upon the free end of the flat spring 79 which is secured at its opposite end by means of fastening screws 80 upon the top of the bearing plate 40. As the plate 52 carrying the toothed sector 53 is rocked to bring the thread-guide into extreme position, the tooth 77 of the detent snaps into the notch 76 of said plate and detains the same while the section 59 of the connecting rod is gradually retracted and the spring 80 is correspondingly compressed by the distension of the component members of the connecting rod between which it is interposed. The detent block 78 is provided 60 with an overhanging lug 81 carrying an adjustable stud-screw 82 with lock-nut 83, the lower end of the stud-screw being engaged at the completion of each stitching operation by the operating crank-arm 84 fixed 65 upon one end of the tension release rock-

shaft 85 having at its opposite end an arm 86 with wedge-shaped outer end 87 adapted to enter the space between and separate the tension-disks 88 in a manner well-known. The means for actuating the tension releasing device will be later described in connection with the thread severing device. 70

As in the United States patent to Edward B. Allen No. 885,310, the clamping foot, constituting the upper member of the work-holder, is formed at one side of its forward end with a slot parallel with its upper face, the lower side of which is closed by means of a detachable section 32', and journaled in an upright bearing boss 89 upon the body of the clamping foot is a cutter rock-shaft 90 having fixed upon its lower end by means of a screw 90' the thread-cutting blade 91 adapted to cooperate with a cutting edge 92 formed upon the clamping foot section 32' in cutting the threads, and a superposed nipping blade 93 cooperating with relatively stationary jaws carried by the body of the foot in nipping the threads. The operative edge of the nipping blade is provided in its outer portion with two thread-receiving notches 94 and 95 with an intermediate spur or thread-dividing finger 96 for separating the needle-thread and purl-thread at the completion of a stitching operation. The bottom of the foot-portion 22 is formed immediately above the path of movement of the thread-notch 94 with a rigid flat seat operating in conjunction with the adjacent upper face of the thread-nipping blade to nip the needle-thread, and adjacent said seat the foot-portion 32 is recessed to receive a yielding seat or jaw 97 in the form of a block whose thin 100 98 is set into the top of the foot 32 and secured therein by means of a fastening screw 99, the shank 98 being sufficiently thin and elastic to permit the block 97 to yield upwardly slightly to accommodate the nipping device to the larger purl-thread preferably employed in the working of buttonholes. As represented in Fig. 3, the operative corner of the block 97 is notched or recessed to insure the proper location of the purl-thread under the action of the nipping blade 93. As will be observed, the cutting blade is separate from the nipping blade for convenience in sharpening or for renewal, and its operative edge is disposed slightly back of that of the nipping blade to insure the nipping of the threads prior to their being severed. A stop-screw 100 is provided in the path of movement of the nipping blade to limit its forward or operative movement. 125

The cutter rock-shaft has secured to its upper end the crank-arm 101 to which is pivotally connected the forward end of a slide-rod 102 whose rearward end is supported within a bearing 103 mounted upon 130

the upper work-clamp lever 36 and provided upon opposite sides thereof with the spaced fixed collars 104 and 105. A spring 106 intermediate a perforated lug 107 of the bearing 103 and a lateral pin 108 upon the collar 109 fixed upon the forward portion of the rod 102 serves to yieldingly maintain the rod in retracted position with its fixed collar 105 resting against the forward face of the bearing 103, and the nipping and cutting blades in advance or operative position. A rock-shaft 110 mounted in a bearing bracket 111, fixed to the bracket-arm, carries at its forward end a rigid lateral arm 112 upon which is pivotally mounted by means of the screw 113 the thrust-plate 114 yieldingly maintained in normal alignment with said arm by means of a spring 115 and a stop-screw 116. The position of the arm 112 upon its rock-shaft is such that, in the initial position of the work-holder, the edge of the thrust-plate 114 rests upon the side of the rod 102, but as the clamp moves forward in the stitching of the first side of the buttonhole, the end of the rod 102 passes the thrust-plate 114 which snaps in behind it, so that upon the return of the clamp with the rod 102, the latter is detained while its carrying clamp member 36 continues its return, thereby slowly turning the cutter rock-shaft 90 and opening the nipping device to release the threads nipped at the end of the previous stitching operation to enable them to be stitched into the goods in the final barring operation.

The rock-shaft is provided upon its rearward end with a lateral arm 117 having an axially yielding stud 118 adapted to engage the top of the lug 119 carried by the collar 120 of the plunger-rod 121 mounted in the stop-lever 122 and normally forced upwardly by means of the spring 123 in contact with the stopping cam 124 when the stop-lever 122 is thrown into operative relation with said stopping cam at the completion of a stitching operation. When the stop-lever 122 is thrown backwardly into operative position, the lug 119 first forces the stud 118 backwardly, but the depression of the plunger-rod 121 by the cam 124 carries the collar 120 downwardly sufficiently to permit the stud 118 to snap over the top of the lug 119 when the rise of the plunger-rod 120 as its upper end enters the usual notch in the stopping cam 124 causes the engagement of the lug 119 with the stud 118, thereby lifting the arm 117 and correspondingly shifting the arm 112 with its thrust-plate 114, which permits the retraction of the rod 102 under the action of its spring 106, thus throwing the cutting and nipping knives 91 and 93 forwardly to successively nip and sever the needle and purling threads. When the stopping lever 122 is again thrown forwardly in starting the machine, the lug

119 is disengaged from the stud 118, and the arm 117 is caused to descend under the action of the spring 125 connecting its outer end with a pin 126 upon the stopping lever, thus depressing the arm 112 and causing the edge of the thrust-plate 114 to rest upon the rod 102 of the thread-cutting device, as before described. As before indicated, the cut ends of the threads are held within the nipping device until the stitching of the second side of the succeeding buttonhole has been commenced, when the cutting and nipping blades are gradually retracted to the side of the stitching aperture in the clamping foot until the buttonhole is finished, when the cutting and nipping operation is repeated as before described.

The rock-shaft 110 has fixed to its forward end portion by means of the stud-screw 127 the hub 128 of a bent arm 129 having a forked forward end 130 adapted to embrace the spherical crank-pin 131 carried by the operating crank-arm 84 of the tension-releasing device. It will thus be seen that the rocking of the shaft 110 as described not only causes the actuation of the thread-cutting and nipping devices, but separates the tension-disks 88 and disengages the detent member 78 from the sector-plate 52 to permit the purl-thread guiding finger to return to initial position preparatory to the stitching of the first side of a succeeding buttonhole. In practice, the parts are so timed that the thread-cutter is actuated slightly in advance of the return of the purl-thread guide to initial position, which insures the seizure of the purl-thread adjacent the yielding jaw 97 of the nipping device. The blades 91 and 93 are in practice made sufficiently thin to have a slight spring, so as not to crush either the needle-thread or the purl-thread against their respective fixed nipping jaws in the nipping operation.

From the foregoing description it will be seen that not only is the actuating mechanism adapted to impart to the controlling thread-guide plural-stage movements from one to the other extreme position, but means are provided for returning the same to initial position. It is obvious that the character of the work will determine the number of intermediate stages of the purl-thread guide in a complete excursion from initial position, and it is equally evident that the direction of return from extreme position to initial position is not material, although in the present instance the spring 60 serves to retract the guide in the opposite direction from that in which it is moved from initial position in stitching the first side of the buttonhole.

The machine represented in the accompanying drawings is provided with the lower thread-cutting and pull-off device shown in the said United States Patent

No. 885,810, but the same is not herein described, and forms no part of the present invention.

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

1. In a sewing machine, the combination with overseaming stitch-forming mechanism and feeding mechanism for producing relative feeding movements in different directions between the stitch-forming mechanism and the work, of a purl-thread guide, and automatically acting means for shifting the same into and out of an initial position relative to the stitch-forming mechanism.

2. In a sewing machine, the combination with overseaming stitch-forming mechanism and feeding mechanism for producing relative feeding movements in different directions between the stitch-forming mechanism and the work, of a circularly moving purl-thread guide, and automatically acting means for moving the same to-and-fro in relation to an initial position in respect of the stitch-forming mechanism.

3. In a sewing machine, the combination with overseaming stitch-forming mechanism including a needle, and feeding mechanism for producing relative feeding movements in different directions between the stitch-forming mechanism and the work, of a purl-thread guide, means for imparting to said guide step-by-step movements from an initial position at one side to the other side of said needle, and means for returning said guide to initial position.

4. In a sewing machine, the combination with overseaming stitch-forming mechanism and work-feeding mechanism for producing between the stitch-forming mechanism and the work alternate advance and retrograde step-by-step feeding movements, and an intermediate dwell, of a movable purl-thread guide, and shifting means whereby the same is caused to assume and remain in a position in advance of the stitch-forming mechanism in each direction of feed, and at the side thereof intermediate extreme positions relative to the direction of feed during the dwell in the feeding movement.

5. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a normally stationary purl-thread guide, and means including a plural-stepped cam connected with the feeding mechanism for causing the same to assume and maintain positions in advance of the stitch-forming mechanism relative to the direction of feed.

6. In a sewing machine, the combination with overseaming stitch-forming mechanism, feeding mechanism for moving the

work in different directions relatively thereto, and a stop-motion device for controlling the operation of the stitch-forming mechanism, of a purl-thread guide, means connected with the feeding mechanism for causing the same to assume and maintain positions in advance of the stitch-forming mechanism relative to the direction of feed, and means connected with and controlled by the stop-motion device for effecting the return of said purl-thread guide to initial position at the completion of a stitching operation.

7. In a sewing machine, the combination with overseaming stitch-forming mechanism, feeding mechanism including a cam for moving the work in different directions relatively thereto, and a stop-motion device controlled by a connection with said cam in arresting the operation of the stitch-forming mechanism, of a purl-thread guide, means connected with the cam of said feeding mechanism for causing said purl-thread guide to assume and maintain positions in advance of the stitch-forming mechanism relative to the direction of feed, and means connected with and controlled by the stop-motion device for effecting the return of said purl-thread guide to initial position at the completion of a stitching operation.

8. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism including a cam for moving the work in different directions relatively thereto, of a purl-thread guide, yieldingly acting means controlled by a pattern cam moving in unison with the cam of said feeding mechanism for causing said purl-thread guide to assume and maintain positions in advance of the stitch-forming mechanism relative to the direction of feed, and yieldingly acting means for returning the purl-thread guide to initial position.

9. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a purl-thread guide, means including a plural-stepped pattern cam for causing said purl-thread guide to assume and maintain positions in advance of the stitch-forming mechanism relative to the direction of feed, and yieldingly acting means for returning the purl-thread guide to initial position.

10. In a sewing machine, the combination with overseaming stitch-forming mechanism and work feeding mechanism constructed to produce between the stitch-forming mechanism and the work alternate advance and retrograde step-by-step feeding movements, and an intermediate dwell, of a movable thread-guide, means including a three-stepped pattern cam for causing said purl-thread guide to assume and maintain a po-

sition in advance of the stitch-forming mechanism relative to and during the feeding movements and at the side of the stitch-forming mechanism during the dwell therein.

11. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a purl-thread guide, a plural-stepped pattern cam, a follower therefor, a connection intermediate said follower and the purl-thread guide including an extensible connecting rod comprising spring-pressed sections, a detent whereby one of the sections of said connecting rod is detained while the other section is moved to initial position by said pattern cam, and means for disengaging said detent to permit the thread-guide to return to initial position.

12. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a purl-thread guide, a plural-stepped pattern cam, a follower therefor, a connection intermediate said follower and the purl-thread guide including an extensible connecting rod comprising spring-pressed sections, a detent whereby one of the sections of said connecting rod is detained while the other section is moved to initial position by said pattern cam, and automatically acting means for disengaging said detent to permit the thread-guide to return to initial position.

13. In a sewing machine, the combination with overseaming stitch-forming mechanism, feeding mechanism for moving the work in different directions relatively thereto, and a stop-motion device for controlling the operation of the stitch-forming mechanism, of a purl-thread guide, a plural-stepped pattern cam, a follower therefor, a connection intermediate said follower and the purl-thread guide including an extensible connecting rod comprising spring-pressed sections, a detent whereby one of the sections of said connecting rod is detained against the action of its spring while the other section is moved to initial position by said pattern cam, and means actuated by said stop-motion device for disengaging said detent to permit the thread-guide to return to initial position.

14. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a purl-thread guide, a plural-stepped pattern cam, a follower therefor, an oscillating carrier for said thread-guide, a connection intermediate the cam-follower and said thread-guide carrier including an extensible connecting rod comprising spring-pressed sections, a detent whereby one of

the sections of said connecting rod is detained while the other section is moved to initial position by said pattern cam, and means for disengaging said detent to permit the thread-guide to return to initial position.

15. In a sewing machine, the combination with overseaming stitch-forming mechanism, and feeding mechanism for moving the work in different directions relatively thereto, of a purl-thread guide, a plural-stepped pattern cam, a follower therefor, a carrier for said thread-guide provided with a toothed pinion, an oscillatory toothed segment meshing with said pinion, a connection intermediate said follower and the oscillatory toothed segment including an extensible connecting rod comprising spring-pressed sections, a detent applied to said segment for maintaining it in one of its extreme positions, and means for disengaging said detent to permit the segment to return to initial position under the action of the spring of said connecting rod.

16. In a buttonhole sewing machine, the combination with stitch-forming mechanism and mechanism for producing between the stitch-forming mechanism and the work alternate advance and retrograde step-by-step feeding movements and intermediate lateral shifting movements for spacing the side stitching, of a purl-thread guide, and means including a pattern-cam for maintaining the same positioned in advance of the stitch-forming mechanism during the advance and retrograde feeding movements and positioned laterally of and intermediate its extreme positions in relation to the stitch-forming mechanism intermediate the lateral shifting movements and during the change from advance to retrograde feeding movements.

17. In a sewing machine, the combination with stitch-forming mechanism including a thread-carrying needle, mechanism for producing relative feeding movements between the stitch-forming mechanism and the work in different directions, and means for producing relative jogging movements between the needle and the work, of a purl-thread guide, positively acting means for imparting thereto plural-stage movements around the needle, and means including a spring for returning the thread-guide to initial position.

18. In a sewing machine, the combination with stitch-forming mechanism including a thread-carrying needle, mechanism for producing relative feeding movements between the stitch-forming mechanism and the work in different directions, and means for producing relative jogging movements between the needle and the work, of a purl-thread guide, positively acting means for imparting thereto plural-stage movements around

the needle, means including a spring for returning the thread-guide to initial position, detaining means for preventing the movement of the thread-guide under the action of said spring, and means for disengaging said detaining means.

In testimony whereof, we have signed our

names to this specification, in the presence of two subscribing witnesses.

EDWARD BEECHER ALLEN.
JOHN C. RINGE.

Witnesses:

E. L. TOLLES,
H. J. MILLER