

July 6, 1943.

E. P. SPAINE

2,323,494

GIMP-CORD GUARD FOR BUTTONHOLE SEWING MACHINES

Filed Oct. 10, 1941

2 Sheets-Sheet 1

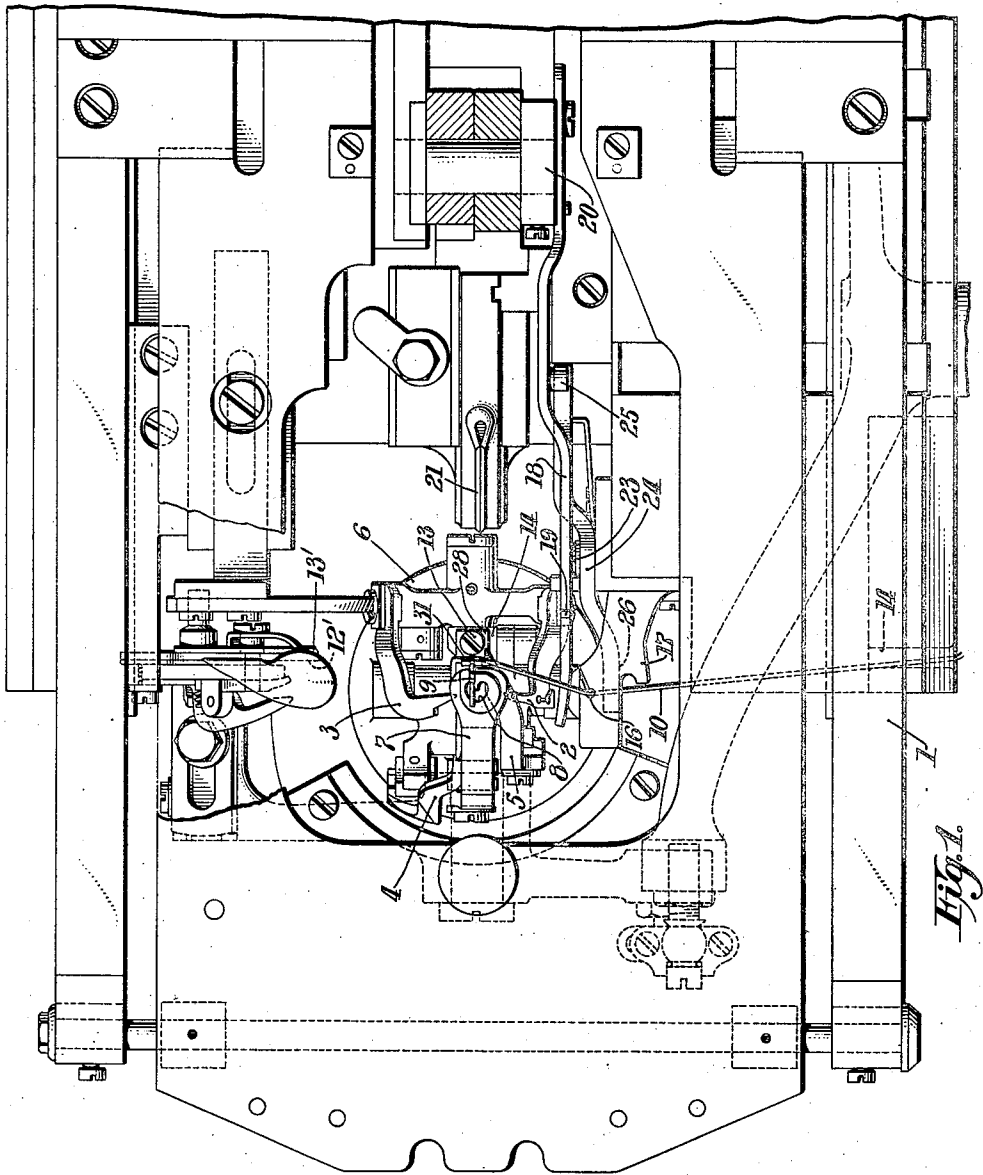


Fig. 1.

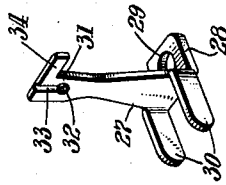


Fig. 2.

Inventor
Edward P. Spaine

Witness:
Godfrey Peina

By John F. Heine
Attorney

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2 Sheets-Sheet 2

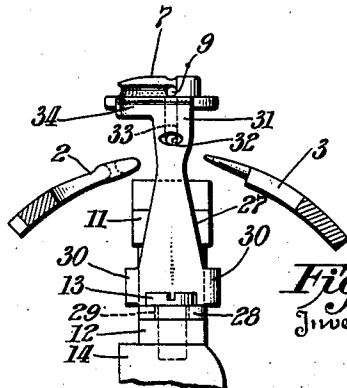
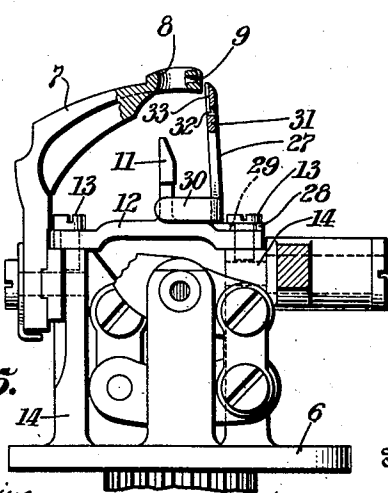
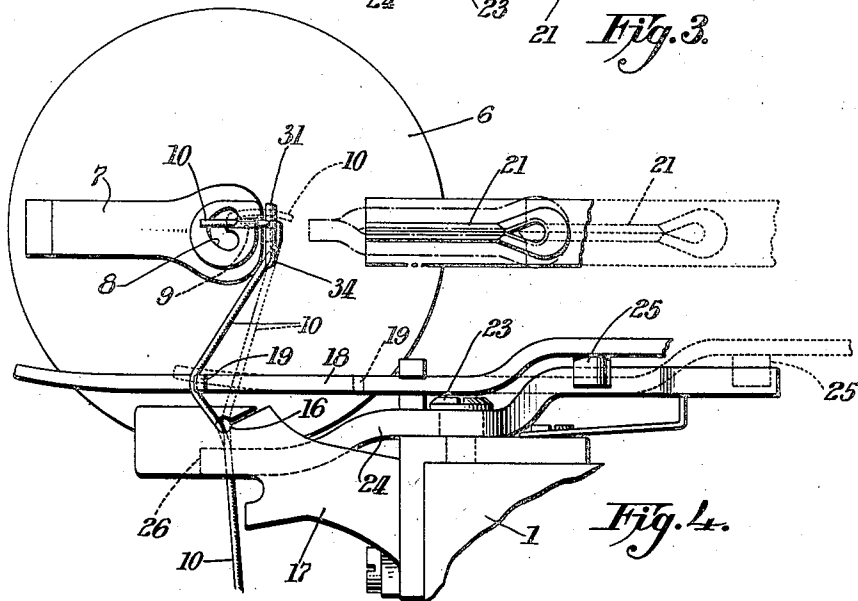
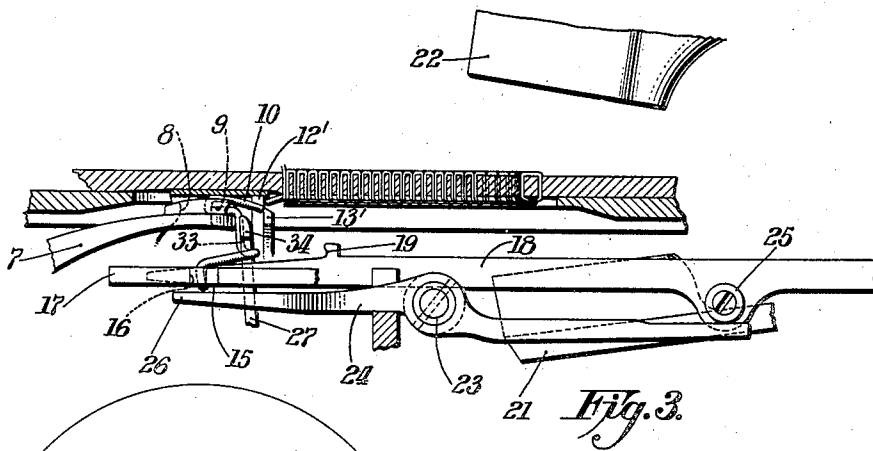


Fig. 5.

Witness:
George Reina

Fig. 6.

Inventor

Edward P. Spaine

John F. Heine

Attorney

UNITED STATES PATENT OFFICE

2,323,494

GIMP-CORD GUARD FOR BUTTONHOLE SEWING MACHINES

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

Application October 10, 1941, Serial No. 414,442

10 Claims. (Cl. 112—161)

This invention relates to sewing machines of the buttonhole type adapted to sew a group of stitches and then come to rest. Machines of this type commonly embody stitch-forming mechanism and a work-holder with means for relatively moving them to sew about a buttonhole. A cord-guide is customarily provided adjacent the sewing point to deliver a stay- or gimp-cord within the range of action of the stitch-forming mechanism so that such cord will be embraced within the stitching; the guide for the stay-cord being commonly formed as a small hole in the usual needle-throat member. Means are also commonly provided for cutting the stay-cord, as well as the sewing threads, after the sewing operation has been completed.

To avoid retrimming operations it is desirable, with machines of the class described, that the stay-cord and the sewing threads be cut close to the last stitch in the work and a free end of cord is thus left protruding from the needle-throat member. Means are commonly provided for pulling the stay-cord back through the guide in the needle-throat member so that the protruding end of the cord will be no longer than required to be safely bound by the initial stitches of the buttonhole.

As a result of the free end of the stay-cord being short and protruding from its guide-hole in the needle-throat member in a direction toward the operator, the end of the stay-cord is frequently engaged by the material while the same is being introduced into the work-clamp and thus pushed back through the guide-hole or displaced to the point where the cord-end is out of the range of the action of the needle. When this accidental displacement of the stay-cord in the needle-throat member occurs the stay-cord is not directed within the range of action of the stitch-forming mechanism and the buttonhole is formed without the stay-cord.

Further, in buttonhole machines of the cut after type, i. e., machines in which the buttonhole cutting devices are operated to cut the buttonhole after the stitching operation is completed, which are set to sew buttonholes considerably shorter than the maximum size buttonhole of which the machine is capable of sewing, the usual stay-cord pull-back device must of necessity pull a considerable length of cord back through the cord-guiding duct in the needle-throat member to align the cord-end properly for the succeeding buttonhole. The excess stay-cord usually lays loosely forwardly of the receiving end of the cord-guiding duct in the needle-

throat member. At times, especially when a small diameter cord of a wiry nature is used, this excess stay-cord curls up over the front edge of the needle-throat member, in which position the stay-cord can be readily engaged and pulled out of the cord-guiding duct in the needle-throat member by the material during the introduction of the same into the work-clamp.

It is the primary object of the present invention to provide simple and durable means for preventing the accidental displacement of the stay-cord in the needle-throat member.

It is another object of the present invention to preclude the excess length of stay-cord which has been pulled back through the cord-guiding duct in the needle-throat member from curling up over the front edge of the needle-throat member into a position where it is likely to be engaged and displaced in the cord-guiding duct by the material as the same is introduced into the work-clamp.

A further object of the present invention is the provision of a guard adapted to preclude the snagging of the material on the needle-throat member during the stitching of the buttonhole.

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.

The invention will be better understood by reference to the following detailed description of certain specific embodiments of the invention shown in the accompanying drawings, in which Fig. 1 is a top plan view of a portion of the bed of a buttonhole sewing machine embodying the invention; the usual two-piece work-supporting plate and work-clamp having been removed to better show the arrangement of the parts.

Fig. 2 is a perspective view of the guard element.

Fig. 3 represents a vertical sectional view taken longitudinally of the machine-bed at the stitching point, showing the parts beneath the work-support in elevation and the stay-cord cutting device in cord-severing position.

Fig. 4 represents a top plan view of the parts shown in Fig. 3 at a later stage in the cycle, illustrating, in dotted lines, the stay-cord immediately after it has been cut and, in full lines, the stay-cord after it has been acted upon by the

cord pull-back mechanism and is in proper position for the succeeding stitching operation.

Fig. 5 is a right side elevational view, partly in section, of the usual rotary turret carrying the lower stitch-forming devices, showing the position of the guard element with respect to the needle-throat member.

Fig. 6 is a front elevational view of the guard element shown in Fig. 5.

For the purposes of the present disclosure the invention is described as embodied in an automatic eyelet-end buttonhole sewing machine, the frame of which includes a hollow rectangular bed 1 housing the lower stitch-forming mechanism. The lower stitch-forming mechanism is constructed substantially in accordance with the disclosure of the U. S. patent to Allen et al., No. 1,372,473, of March 22, 1921, and comprises a threaded looper 2, a non-threaded looper 3 and a pair of loop-detainers 4 and 5, all operatively mounted on a turret 6 which is rotatable about a vertical axis. The turret 6 also carries the usual buttonlike needle-throat member 7 having a needle-clearance aperture 8 and cord-guiding duct 9 for the stay-cord 10 which is thus led within the range of action of the stitch-forming mechanism so as to be covered by the buttonhole stitches. Disposed beneath the needle-clearance aperture 8 in the needle-throat member 7 is a needle-guide 11 of which the shank 12 is secured at its opposite ends by screws 13 to the upstanding lugs 14 integral with the turret 6.

In a buttonhole sewing machine of the type illustrated, the usual work-holder, which is disclosed in the U. S. patent to Allen, Re. 15,324, dated April 4, 1922, occupies a position removed from sewing position when the machine is at rest. When the machine is started the work-holder is first shifted rapidly by the rapid feed-drive to sewing position, then is given a slower step-by-step motion as the sewing proceeds around the button hole and finally is given a rapid shift back to initial position, in which position the buttonhole and cord, as well as the two sewing threads, are cut.

The thread- and cord-cutter is constructed substantially in accordance with the disclosure of my Patent No. 2,070,029, dated February 9, 1937. It comprises a scissors-device including an upper blade 12' (Fig. 3) and a lower blade 13' which at the proper time in the stitching cycle are projected in open relation transversely across the lead of the threads and cord between the last stitch and the needle-throat 7. During the final advancing movement of the scissors-device the lower blade 13' thereof is actuated to cut the threads and cord 10 close to the work, as shown in Fig. 3. After the stay-cord is cut by the scissors-device a rather long cord-end is left projecting from the cord-guiding duct 9 in the needle-throat member. In order to reduce the length of this cord-end and avoid a manual retrimming operation, means are provided for pulling the stay-cord back through the cord-guiding duct 9 in the needle-throat member so that the protruding end of the cord will be no longer than required to be safely bound by the initial stitches of the buttonhole. The means employed for pulling back the stay-cord are constructed substantially in accordance with the disclosure of the U. S. patent to Allen, No. 1,646,946, issued October 25, 1927. As shown in Figs. 1 and 4 of the accompanying drawings, the stay-cord 10 is led to the needle-throat member through an aperture 14 in the machine-bed; thence across the under

flat nipping face 15 (Fig. 3) and up through the "self-threading" cord-eye 16 in the cord-nipper jaw member 17, thence across to the cord guiding duct 9 in the needle-throat member 7. Periodically reciprocating horizontally between the cord-nipper jaw member 17 and the needle-throat member 7 is a cord pull-back bar 18 having a cord-engaging shoulder 19. The cord pull-back bar is connected at its inner end to the travelling fulcrum-block 20 which carries the buttonhole cutting levers 21 and 22. Pivoted upon a fulcrum-stud 23 which is threaded into the machine-bed 1 is a nipper member 24 adapted to be turned about its fulcrum-stud by a roller 25 carried by the cord pull-back bar 18 during the advance of the cutter-levers 21 and 22 preparatory to the cutting of the buttonhole. Such movement of the nipper member 24 causes the jaw 26 thereof to pinch the cord 10 against the under face 15 of the member 17 and thus to arrest the feed of the cord. After the stay-cord 10 is nipped the cord-engaging shoulder 19 engages the cord between the cord-eye 16 and the needle-throat member 7 and pulls a measured length of cord back through the cord-guiding duct 9 in the needle-throat member 7, see Fig. 4.

In practice trouble has been experienced in maintaining the shortened cord-end in the cord-guiding duct 9 during the introduction of the work into the work-holder. It is necessary that care be taken to insure that the work when it is introduced does not engage the cord-end and push the same back and/or out of the duct 9. The object of the present invention is to provide guard means which eliminates this accidental displacement of the stay-cord in the needle-throat member.

To this end there is provided a guard-element 27 having a shank 28 apertured at 29 (see Fig. 2) to receive the needle-guide securing screw 13. The aperture 29 preferably is slightly larger than the shank of the screw 13 to provide for limited adjustment of the guard-element. To aid in maintaining the guard-element in proper operative position the shank thereof is formed with two horizontally disposed ears 30 adapted to straddle and engage the opposite sides of the needle-guide 11. The upper end of the guard-element terminates into a head 31 the upper edges of which is sufficiently high to extend above the lower edge of the needle-throat member 7, Fig. 5. Formed in the head 31 preferably vertically beneath the receiving end of the cord-guiding duct 9 is a horizontal cord-guiding aperture 32 in register at its inner end with a vertical cord-guiding channel 33 of which the upper end registers with the cord-guiding duct 9 in the needle-throat member 7. The stay-cord 10 in its passage from the cord-eye 16 in the jaw member 17 to the needle-throat member 7 passes horizontally through the cord-guiding aperture 32; thence vertically in the channel 33; thence horizontally through the duct 9 in the needle-throat member.

It will be understood from the foregoing that the head 31 of the guard-element is positioned so that the face thereof containing the channel 33 is in a plane which extends across the receiving end of the cord-guiding duct 9 and the concave wall of the channel 33 provides, in effect, an abutment wall which serves to back up the end-portion of the stay-cord 10 located in the cord-guiding duct 9 of the needle-throat member. When the stay-cord is thus controlled it becomes practically impossible to accidentally

displace the cord in the needle-throat member. While the path travelled by the cord 10 is a sinuous one it is not of such a nature as to impede the pulling back of the measured length of stay-cord after the scissors-device has cut the cord at the end of the stitching operation.

In addition to serving as a means to prevent accidental displacement of the cord in the needle-throat member 7, the guard-element 27 functions, particularly in a "cut-first" buttonhole sewing machine, to prevent the snagging of the work on the free end of the needle-throat member in its travel around the buttonhole. In cut-first machines, i. e., machines in which the buttonhole cutting devices are operated to cut the buttonhole before the stitching operation begins, the work adjacent the buttonhole curls downwardly into the usual needle-clearance opening in the work-support. This frequently happens when the work being sewn is thick and of a spongy nature. When the work curls downwardly into the needle-clearance opening it very often becomes snagged on the free end of the needle-throat member 7 as the same travels about the eye of the buttonhole, resulting in a malformed buttonhole in which the lower ply of work is deflected beyond the range of action of the vibrating needle and therefore not included within the overedge stitching. Also, in "cut after" buttonhole sewing machines the guard-element serves to prevent snagging of the work on the free end of the needle-throat member, particularly in cases wherein the material being buttonholed is heavy and of a soft, loose nature, such as various knit materials, etc. In these cases, the usual work-clamping members must be separated laterally a considerable distance to stretch the material, and in doing so greatly increase the clearance between the needle-throat member and the work-clamping members. The soft, loose material frequently drops through the increased clearance space to a position below the free end of the needle-throat member where the possibility of the snagging of the material by the needle-throat member exists. The snagging of the work on the needle-throat member 7 is eliminated by the guard-element 27 due to the fact that the upper edge of the head 31 of the guard-element extends above the lower edge of the free end of the needle-throat member, as clearly shown in Figs. 3 and 5. Regardless of whether the sewing machine is a cut-first or a cut-after type, any work extending into the needle clearance opening and at a level below that of the lower edge of the end of the needle-throat member is engaged by the head 31 of the guard-element and deflected over the top of the needle-throat member. To better guard the end of the needle-throat member for the full extent of its width the head of the guard-element is extended horizontally as at 34, Figs. 2 and 6.

It will be understood from the above description taken in connection with the accompanying drawings that I have provided a guard-element which functions to preclude the accidental displacement of the cord in the needle-throat member during the introduction of work into the work-holder, which guard-element does not impede the purposeful feed of the stay-cord forwardly or backwardly. Also, I have provided a guard-element which functions to eliminate snagging of the work on the free end of the needle-throat member. Another important advantage obtained by the use of the improved

guard-element is that a needle-throat member having a large size cord-guiding duct suitable for accommodating the largest size stay-cord can be universally employed, since with the improved guard-element the needle-throat member can successfully accommodate and control stay-cords of the smallest size. Thus the guard-element eliminates the necessity of having several needle-throat members with cord-guiding ducts varying in size to suit the particular stay-cord used.

In the preferred embodiment of the invention the guard-element is in the form of an attachment designed to be readily applied to existing machines without the necessity of machining operations or the provision of additional securing screws or the like.

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

1. In a sewing machine, a buttonlike needle-throat member having a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, and a member disposed in advance of the receiving end of said cord-guiding duct and providing an abutment wall located in a plane extending across the receiving end of said duct and serving to back up the cord delivered to said duct and preclude accidental displacement of the cord in the needle-throat member.

2. In a sewing machine, a buttonlike needle-throat member having a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, and a member disposed in advance of the receiving end of said cord-guiding duct and having formed therein a cord-guiding aperture offset from said cord-guiding duct to provide an abutment wall serving to back up the cord delivered to said duct and preclude accidental displacement of the cord in the needle-throat member.

3. In a sewing machine, a needle-throat member having a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, and a member disposed in advance of the receiving end of said cord-guiding duct for preventing accidental displacement of the cord in the needle-throat member, said member having formed therein a cord-guiding aperture offset from said cord-guiding duct and a cord-guiding channel connecting the cord-guiding aperture with said cord-guiding duct.

4. In a sewing machine, a buttonlike needle-throat member having a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, and a member disposed in advance of the receiving end of said cord-guiding duct and having formed therein a cord-guiding aperture spaced from said duct to provide an abutment wall located in a plane extending across the longitudinal axis of said duct to back up the cord delivered to said duct and preclude accidental displacement of the cord in the needle-throat member.

5. In a sewing machine, a circularly moving turret, a needle-throat member mounted on said turret and having a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, and a member secured to said turret and formed with a head-portion having a wall disposed in advance of and located in a plane extending across

the receiving end of said cord-guiding duct, said head-portion having formed therein a cord-guiding aperture spaced from said cord-guiding duct and opening into said wall and a cord-guiding channel connecting said cord-guiding aperture with said duct.

6. In a sewing machine, a buttonlike needle-throat member having an overhanging free end formed with a needle-clearance aperture and a stay-cord guiding duct terminating at its delivery end in said needle-clearance aperture, and a member disposed in advance of the receiving end of said cord-guiding duct for preventing accidental displacement of the cord in the needle-throat member, said member comprising a shank terminating in a head-portion providing a substantially vertical wall disposed adjacent to the free end of said needle-throat member, said head-portion having formed therein a cord-guiding aperture spaced vertically beneath the receiving end of said cord-guiding duct and opening into said substantially vertical wall, the cord-guiding aperture and the cord-guiding duct providing a sinuous cord-delivery passageway adapted to exercise control on the stay-cord without impeding the travel of the same either forward or backward through the cord-delivery passageway.

7. In a buttonhole sewing machine, a circularly moving turret, a buttonlike needle-throat member mounted on said turret and having a free end-portion formed with a needle-clearance aperture, and a guard-element secured on said turret and having a head-portion disposed in advance of the free end-portion of said needle-throat member for preventing the work from becoming snagged upon the needle-throat member during the movement of the turret.

8. In a buttonhole sewing machine, a circularly moving turret, a buttonlike needle-throat member mounted on said turret and having a free end-portion formed with a needle-clearance aperture, and a guard-element secured on

said turret and having a head-portion of which the upper edge thereof extends across and is located above the lower edge of the free end-portion of said needle-throat member whereby the work is prevented from becoming snagged upon said needle-throat member during the movement of the turret.

9. A unitary guard-element adapted for attachment upon a sewing machine having a needle-throat member formed with a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, comprising, a shank, and a head-portion integral with said shank, said head-portion having formed therein a cord-guiding aperture spaced from the cord-guiding duct in said needle-throat member to provide an abutment wall located in a plane extending across the receiving end of the cord-guiding duct to back up the cord delivered to the duct and preclude the accidental displacement of the cord in the needle-throat member.

10. A unitary guard-element adapted for attachment upon a sewing machine having a needle-throat member formed with a needle-clearance aperture and a cord-guiding duct terminating at its delivery end in said needle-clearance aperture, comprising, a shank apertured to receive a securing screw, a pair of spaced ears projecting from said shank and adapted to straddle and engage a fixed member on the machine to prevent the guard-element from turning about the securing screw, and a head-portion integral with said shank, said head-portion having formed therein a cord-guiding aperture spaced from the cord-guiding duct in said needle-throat member to provide an abutment wall serving to back up the cord delivered to the cord-guiding duct and preclude the accidental displacement of the cord in the needle-throat member.

EDWARD PAUL SPAINE.