

Nov. 30, 1943.

H. GUNTHER

2,335,827

ARTICLE ATTACHING MACHINE

Filed Jan. 7, 1942

3 Sheets-Sheet 1

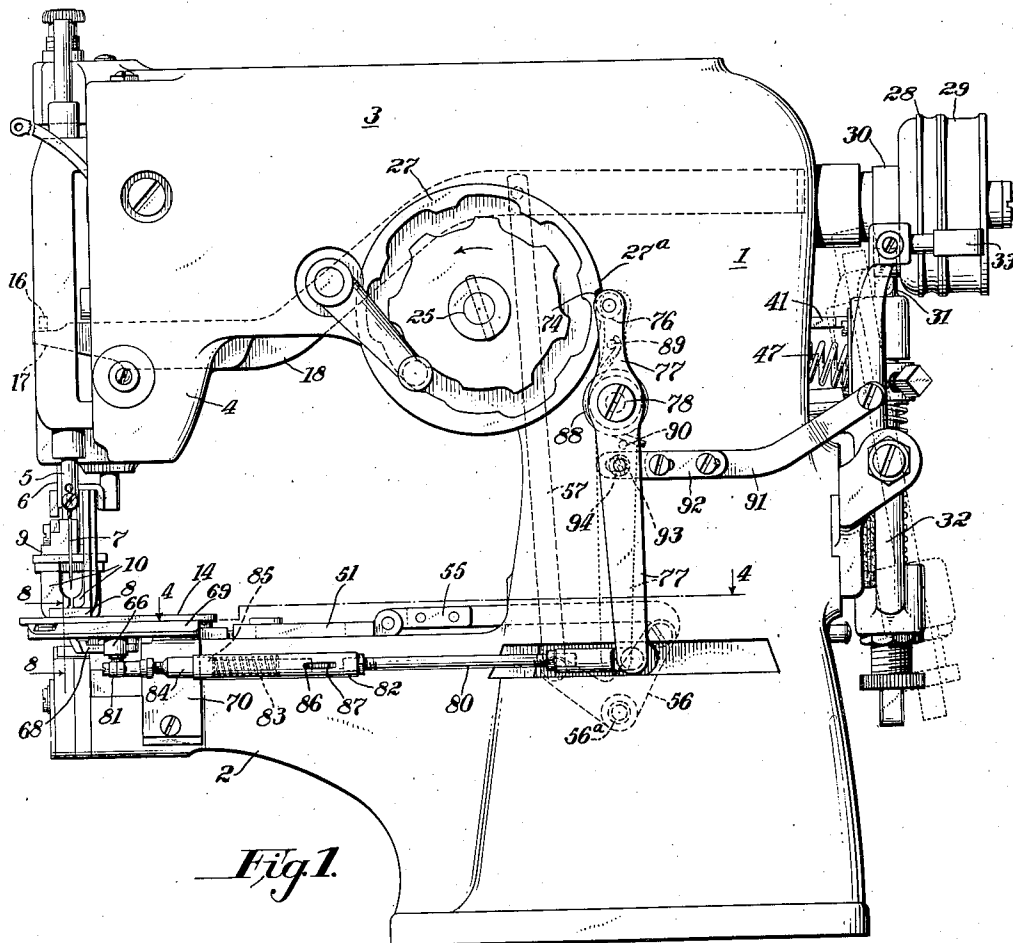


Fig. 1.

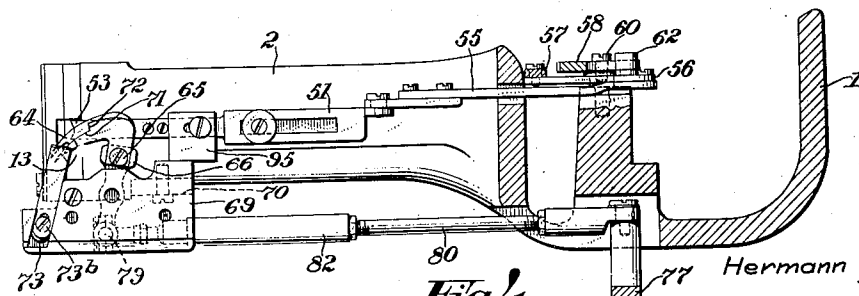


Fig. 4.

Inventor
Hermann Gunther

Witness:

John H. Cave

By John F. Heine

Attorney

Nov. 30, 1943.

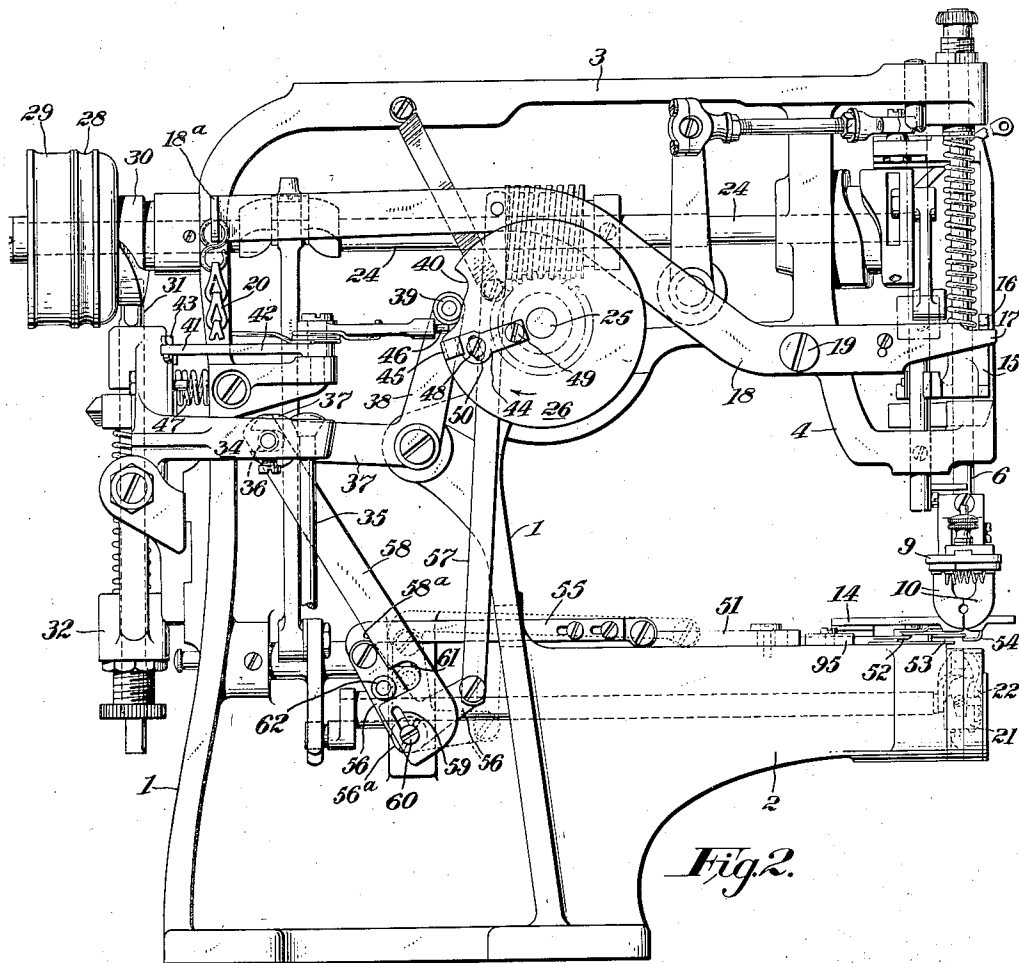
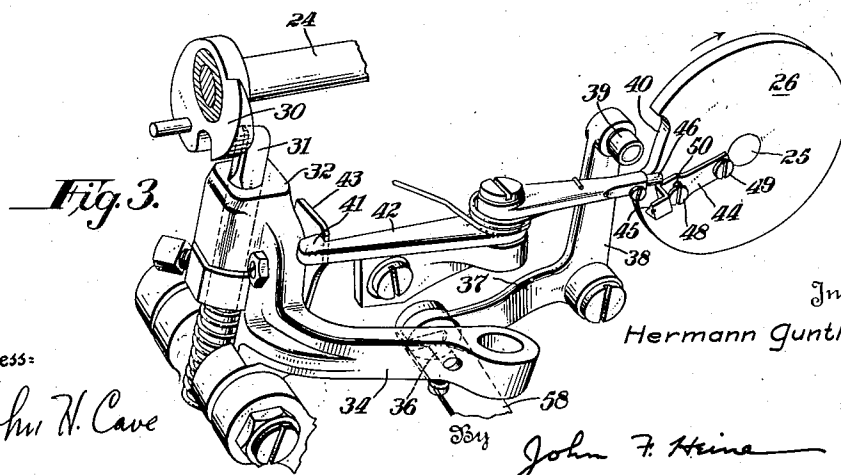
H. GUNTHER

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3 Sheets-Sheet 2



Inventor

Hermann Gunther

Witness:

John H. Cave

John F. Heine

Attorney

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H. GUNTHER

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3 Sheets-Sheet 3

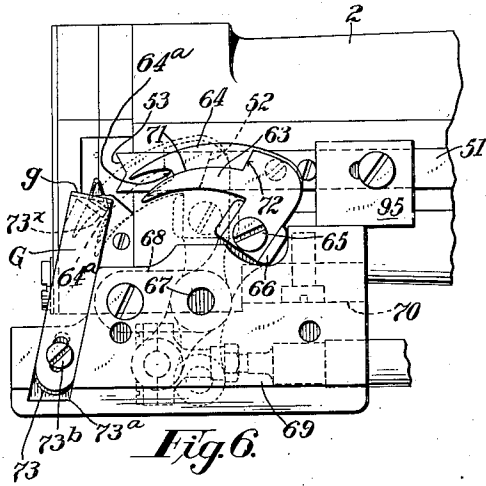


Fig. 6.

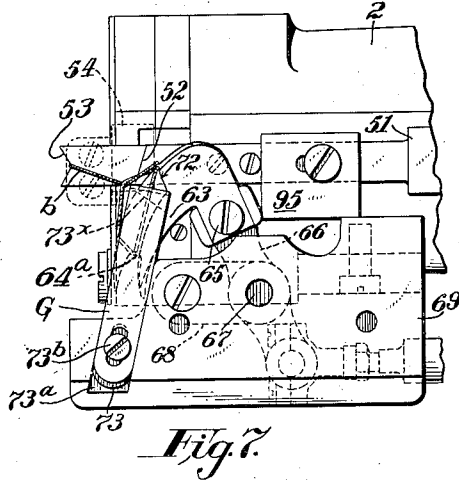


Fig. 7.

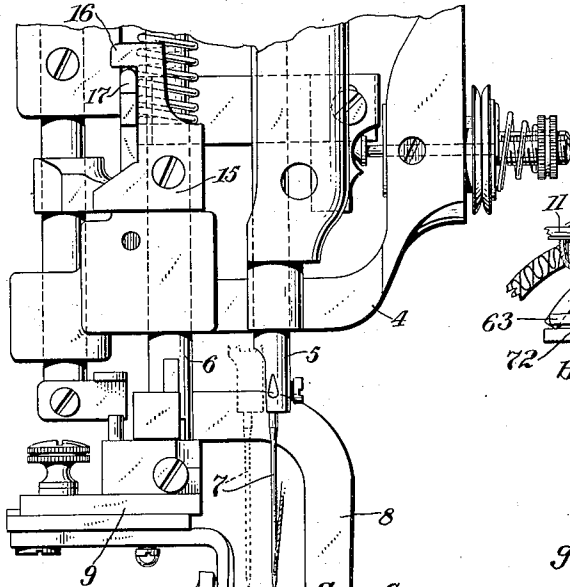


Fig. 5.

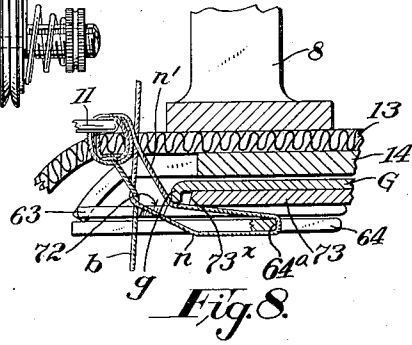


Fig. 8.

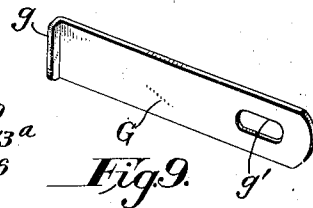


Fig. 9.

Witness:

John N. Cave

By John F. Heine

Attorney

Inventor
Hermann Gunther

UNITED STATES PATENT OFFICE

2,335,827

ARTICLE ATTACHING MACHINE

Hermann Gunther, Elizabeth, N. J., assignor to
The Singer Manufacturing Company, Elizabeth,
N. J., a corporation of New Jersey

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11 Claims. (Cl. 112—252)

This invention relates to article attaching machines of the two-thread lock-stitch variety and it has as an object to provide improved means for severing the article-attaching threads at the completion of a stitching cycle.

Stated more specifically, the invention has as an object to improve the thread-cutting mechanism disclosed in United States Patent to A. F. Fifield, No. 1,378,480, Sept. 20, 1932, by providing improved means for supporting and adjusting certain ones of the thread cutting elements and by providing means to prevent abrading or premature severing of the needle thread.

These and other objects have been attained by securing the stationary cutter element for the needle thread in a readily accessible position on the same bracket which supports the movable cutter-blade for the needle-thread, as distinguished from securing it on the under side of the throat-plate as in the Fifield patent; and in providing a guard which prevents the needle-thread from being carried into contact with the thread-cutting edge of one of the thread-severing elements until after the completion of the last stitch and until severing of the needle-thread is desired.

Mounting of the stationary needle-thread cutter-blade on the bracket which also carries the movable cutter-blade facilitates accurate adjustment of those elements relative to each other, which adjustment is exceedingly difficult to make in the Fifield construction in which the stationary blade is carried by the underside of the throat-plate which, when in place, overlies and obscures the movable blade.

With the above and other objects in view as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter described in connection with the accompanying drawings which illustrate a preferred embodiment of the invention.

Fig. 1 is a right side elevation of a button sewing machine embodying the present invention.

Fig. 2 is a left side elevation of the machine.

Fig. 3 is a detail perspective view of the stop-motion control mechanism of the machine.

Fig. 4 is a fragmentary horizontal sectional view taken substantially on the line 4—4 of Fig. 1 and with the throat-plate of the machine removed.

Fig. 5 is a fragmentary front end elevation of the machine with the throat-plate and work-holding presser-foot in section.

Fig. 6 is a detail plan view of the forward end of the work-supporting arm of the machine, with

the throat-plate removed, showing in full lines, the positions occupied by the bobbin-thread pull-off and cutter and the needle-thread pull-off and the movable needle-thread cutter blade, during running of the machine, and, in dotted lines, the position to which the needle thread pull-off and movable cutter blade are moved as the machine comes to rest.

Fig. 7 is a view similar to Fig. 6 but showing the parts approaching thread-cutting positions to which they are moved by the manual lifting of the presser-foot, at the completion of a stitching cycle.

Fig. 8 is an enlarged transverse sectional view substantially on the line 8—8 of Fig. 1 illustrating the action of the thread-cutter guard hereinafter mentioned.

Fig. 9 is a perspective view of the thread-cutter guard detached from the machine.

Referring more specifically to the drawings, the invention is illustrated as embodied in a button sewing machine comprising a frame including a standard 1, a cylindrical work-supporting bed 2 and an overhanging bracket-arm 3 terminating in a head 4 in which is mounted an endwise reciprocating and laterally vibrating needle-bar 5 and a spring-pressed presser-bar 6 carrying respectively, a needle 7 and a work-holding presser-foot 8. The presser-bar also carries a conventional button-clamp 9 having separable jaws 10 which grip the shank 11 of a button 12 and hold it in stitch-receiving position upon a work-piece 13 held by the presser-foot 8 upon a throat-plate 14, which parts 8 and 14 constitute a work-holder. The presser-bar has fixed thereto the usual lifter-block 15, under the shoulder 16 of which extends the end 17 of a manually operated presser-bar lifting lever 18 fulcrumed at 19 and constituting manually operated mechanism for opening the work-holder for insertion and removal of the work. To the off-set rear end 18^a of lever 18 is attached an actuating chain 20 connected to a suitable treadle or knee-shift, not shown.

The needle 7 cooperates with the usual oscillatory shuttle 21, including a thread-case 22 carrying a bobbin 23 to form stitches; the needle and shuttle being actuated by the usual connections with the main-shaft 24. The main-shaft also drives a cross-shaft 25, journaled in the arm 3, to which is fixed a stop-motion controlling cam 26 and a needle-bar vibrating cam 27. The shaft 25 is driven at a slow speed and ordinarily makes one revolution for each button-sewing cycle. In the present instance, however, controlling means are provided whereby the shaft 25 may, at the

will of the operator, be caused to make two revolutions before the machine is automatically brought to rest, thus doubling the number of button-attaching stitches.

The main-shaft 24 carries at its rearward end the tight and loose belt-pulleys 28 and 29, respectively, and a stop-cam 30 with which co-operates the usual upwardly spring-pressed plunger 31 carried by the tilting stop-motion lever 32. The stop-motion lever 32 carries the usual belt-shipper 33 and includes the forwardly extending arm 34 which is connected by the pull-rod 35 to a suitable starting treadle or knee-shift (not shown). The arm 34 of the stop-motion lever 32 carries a roller-stud 36 which is embraced by the forked arm 37 of a bell-crank lever the other arm 38 of which carries a roller-stud 39 resting in the notch 40 in the cam 26 when the machine is at rest.

When the stop-motion lever 32 is tilted to running position, by a down-pull on the starting rod 35, it is retained in such position by engagement of the hooked end 41 of the spring-pressed latch-arm 42 with the arm 43 which is rigidly mounted upon and constitutes a part of the stop-motion lever 32. By this movement of the stop-motion lever 32, the roller 39 is moved outwardly from the notch 40 in the stop-motion controlling disk or cam 26. There is mounted on the cam 26 a tripping-plate 44 having an inclined nose 45 adapted to strike the tail-pin 46 of the latch-lever 42 and deflect such tail-pin inwardly, thereby withdrawing the hooked end 41 of the latch-lever from the arm 43 and releasing the stop-motion lever 32 for movement to stopping position under the influence of its spring 47, Fig. 2. The tripping-plate 44 is so timed upon the cam 26 that when its nose 45 engages the tail-pin 46 to release the stop-motion lever 32, the trailing end of the notch 40 has just passed the roller 39. Thus, although the stop-motion lever 32 has been released from the hold of the latch-lever 42, it cannot move to stopping position but is retained in running position by the roller 39 riding upon the circular portion of the periphery of the cam 26. If, therefore, the operator pulls down on the rod 35 to start the machine and holds the rod down until the tripping-nose 45 passes the tail-pin 46, the latch-lever 42, in its recovery, will reengage the stop-motion lever 32 and hold it in running position for one revolution of the cam 26. At the end of the first revolution of the cam 26, the latch-arm 42 will be tripped by the tripping nose 45 and the roller 39 will be permitted to ride upon the circular portion of the periphery of the cam 26 to retain the stop-motion lever 32 in running position during the second revolution of the cam 26 at the end of which the roller 39 will drop into the notch 40 and permit the stop-motion lever 32 to return to stopping position. The tripping-plate 44 is secured to the cam disk 26 by means of two screws 48, 49. The screw 48 passes through a slot 50 in the tripping-plate 44 to permit adjustment of the tripping-plate 44 about the screw 49 as a center. Inasmuch as the screw 49 is located close to the axis of the shaft 25, the adjustment provides for the accurate timing of the tripping-nose 45 upon the cam 26.

The bobbin-thread pull-off and severing device, per se, is constructed substantially in accordance with the disclosure of the Fifield patent referred to. It comprises a reciprocatory bar 51 mounted on top of the work-supporting arm 2 and carrying at its forward end the vertically

spaced cutter and pull-off blades 52 and 53, respectively. A stationary blade 54 (Fig. 2) is mounted on the under side of the throat-plate 14 in the path of the space between the blades 52 and 53. When the bar 51 carrying the blades 52 and 53 is projected from its inoperative position, Fig. 6, to its operative position, Fig. 7, the pull-off blade 53 engages the bobbin-thread *b* and passes under the stationary blade 54, thereby forming a bight in the bobbin-thread and pulling a length thereof from the hobbin 23. The cutter-blade 52 passes over the stationary blade 54 and, being considerably shorter than the pull-off blade 53 does not engage and sever the bobbin-thread until after the pull-off movement is practically completed. The bar 51 is connected by a link 55 to a bell-crank lever 56 fulcrumed on a stud 56^a (Fig. 1), which lever is connected by the link 57 to the presser-bar lifting lever 18 lying behind the stop-motion controlling cam 26. The bobbin-thread pull-off and severing device is thus connected to the work-clamp opening mechanism and is manually operated by the same means which opens the work-clamp.

An interlocking device is provided to prevent the opening of the work-clamp while the stop-motion lever 32 is in running position and to prevent the shifting of the stop-motion lever to running position while the work-clamp is open.

This device comprises a slide-bar 58 connected at one end to the stud 36 carried by the arm 34 of the stop-motion lever. Adjacent its opposite end the bar is slidably supported adjacent the bell-crank lever 56 by means of a slot 59 formed in the bar and a screw 60 passing through said slot and threaded into the fulcrum stud 56^a of the lever 56. Thus the bar is shifted endwise in opposite directions as the stop-motion lever is shifted into "running" and "stop" positions. Formed in the bar 58 adjacent its lower end is a notch 61 which, in the "stop" position of the stop-motion lever, is aligned with a roller-stud 62 carried by the bell-crank lever 56. Therefore, when the machine is at rest, the rear end of the presser-bar lifting lever 18 may be drawn downwardly by the chain 20, shifting the link 57 downwardly and turning the bell-crank lever 56 about its fulcrum 56^a, thus shifting the link 55 (and the cutter-bar 51 attached thereto) forwardly as indicated in dotted lines in Fig. 2. When the stop-motion is shifted to "running" position the bar 58 is moved downwardly to a position in which the edge 58^a thereof lies adjacent to and in the path of movement of the roller-stud 62, thus obstructing movement of the lever 56 and preventing lifting of the presser-foot and cutting of the threads during the operation of the machine. Likewise, when the presser-foot is lifted and the link 55 is advanced, the presence of the roller stud 62 in the notch 61 prevents downward movement of the bar 58, thereby precluding starting of the machine.

The needle-loop detaining and severing device comprises a pair of superposed pointed blades 63, 64 secured by a screw 65 to a lever 66 which is fulcrumed on a stud 67 of a bracket-piece 68 screwed to the under side of a table-plate 69 on which the throat-plate 14 is mounted. The blade 64 is formed with a notch or throat 64^a which engages the needle thread loop thereby preventing the thread loop from slipping along the blade, as it does in the above mentioned Fifield construction, thus insuring that a predetermined amount of thread will be drawn from the supply, as later will be described. The table-plate 69 has a de-

pending shank 70, Figs. 1 and 5 by which it is secured to the work-supporting arm 2 of the sewing machine frame. The underlapping-blade 64 is the loop-detaining blade and its function is to enter the last needle-loop being drawn out by the shuttle 21, after which such loop is drawn up by the take-up to a position snugly embracing the loop-detaining blade 64 and the bobbin-thread *b*. Further movement of the blade 64 distends the loop of thread thereabout and draws a predetermined amount of thread through the eye of the needle to form the first stitch in the next succeeding stitching cycle. The overlapping-blade 63 is provided with a curved thread-deflecting edge 71 leading to a cutting edge 72. The function of the blade 63 is to deflect or guide the work-limb of the needle-loop to the cutting edge 72 which, in the final movement of the blades 63 and 64, severs the work-limb of such loop in cooperation with the sharpened extremity 73^x of the ledger-blade 73. The ledger-blade is fitted within a groove 73^a formed in the upper face of the table-plate 69 and is held therein by a clamp screw 73^b passing through a slot therein and threaded into the table-plate. Inasmuch as both the fixed cutter-blade 73 and the movable cutter-blade 63 are carried by the table-plate 69 and are readily accessible when the throat-plate is removed, those cutter-blades may be very readily adjusted relative to each other and to the limb of the thread which they are designed to sever.

The lever 66, with its blades 63 and 64, is designed to operate with a two-stage movement, the first stage of which is automatically imparted to the lever 66 and the second stage of which is derived from a manual operation after the machines come to rest. The first or automatic stage of movement of the lever 66 is derived when a roller-stud 76 on the upper end of the lever 77, fulcrumed at 78 to the sewing machine frame, is shifted into a notch 74 formed in the periphery of the cam 27. The lever 77 is pivotally connected at its lower end to one end of a yieldingly compressible link 80 the other end of which is connected, by the ball-and-socket joint 81, to the lever 66. The link 80 includes the tubular member 82 which houses the compression spring 83 and is entered by the plunger 84 having a shoulder 85 which bears against the spring 83. The plunger 84 carries a cross-pin 86 working in guide-slots 87 in the tubular member 83. A spring 88 coiled about the fulcrum-screw 78 bears at one end against a screw-pin 89 on the lever 77 and yieldingly urges such lever in a direction to carry the roller-stud 76 toward the cam-disk 27. The other end of the spring 88 is anchored to a stud-pin 90 fixed to the sewing machine frame. The stop-motion lever 32 is connected to the lever 77 by means of a link 91 which is adjustable in length, as indicated at 92 and which is formed at one end with a slot 93 entered by a screw 94 threaded into the lever 77.

The operation is as follows: When the stop-motion lever 32 is tilted to dotted line or running position, Fig. 1, the link 91 pushes the lever 77 to dotted line position and thereby moves the needle-loop detaining and severing blades 63, 64 from dotted to full line positions, Fig. 6. This movement of the lever 77 shifts the roller 76 out of the notch 74 in the cam disk 27.

When the stop-motion lever 32 is finally released by the movement of the roller 39 into the notch 49 in the cam 26, the periphery of the cam disk 27 is under the roller 76, and prevents the lever 77 from moving out of its dotted line

position, Fig. 1, under the influence of the spring 88. Hence the needle-loop detaining and severing blades 63, 64 remain in their full line positions, Fig. 6, when the stop-motion lever 32 is released and moves to its vertical or stopping position, Fig. 1. During the last revolution of the main-shaft 24 and while the stop-cam 30 is depressing the plunger-bar 31 preparatory to the final ascent of the plunger-bar 31 into the stop-notch in the cam 30, the trailing portion 27^a of the cam disk 27 passes beyond the roller 76 and allows the lever 77 to be moved by the spring 88 from dotted line position, Fig. 1, to full line position, whereby the needle-loop detaining and severing blades 63, 64 are moved from their retracted or full line positions, Fig. 6, to their dotted line positions in the same figure; such movement being the automatically effected first stage movement of the needle-loop detaining and severing blades. During such movement, the needle-loop detaining blade 64 enters the last needle-loop being drawn out by the shuttle, as shown in Figs. 5 and 6, and detains such loop when the machine comes to rest.

When the operator exerts a down-pull on the lever-arm 18 to raise the bar 6 and presser-foot 8 or, in other words, manually opens the work-holder for removal of the work, the bobbin-thread cutter-bar 51 is manually projected toward the free end of the work-supporting arm 2, as previously explained. During this movement of the bar 51, a block 95, secured upon the slide-bar 51, strikes the lever 66 and moves the latter from the dotted line position shown in Fig. 6, to and beyond the position shown in Fig. 7, thereby causing the work-limb of the detained needle-loop to be deflected by the curved edge 71 of the blade 63 to the cutting edge 72 which cooperates with the ledger-blade 73 to sever such work-limb substantially simultaneously with the severing of the bobbin-thread by the cutting edge 52. This last described movement of the blades 63, 64 which is caused by the impact of the block 95 upon the lever 66, is the manually effected second stage movement of the needle-loop detained and severing device. This movement is permitted by the compression of the spring 83 within the tube 82 of the compressible link 80. When the operator releases the arm 18 to lower the presser-member 8, the blades 63 and 64 are immediately restored to their dotted line positions, Fig. 6, by the recovery of the spring 83 within the tube 82.

In the operation of thread-cutters of the type hereinbefore described, the blade 64, in drawing off thread from the supply to form the initial stitch of a succeeding stitching cycle, carries the work-limb of the thread-loop thereabout into contact with the cutting edge 73^x of the stationary cutter blade 73. When this blade is extremely sharp, as it is when new and after a re-sharpening operation, pressure of the thread on the cutting edge, together with such endwise movement of the thread as is effected by the "give" of the work and the stretch in the thread, causes the thread to be abraded and in some instances completely severed prematurely.

To obviate this difficulty, this invention provides a guard G of simple form which effectively prevents the needle-thread from being damaged or severed until the cutting edge 72 of the blade 63 is brought into shearing relation with the sharpened forward end 73^x of the blade 73. This guard, which is shown detached in Fig. 9, comprises a thin strip of sheet metal having at one

end a rounded down-turned portion *g* and at its opposite end a screw slot *g*¹. The guard is designed to overlie the stationary cutter blade 73 and to be held clamped thereupon by the same screw 73^b which secures the blade in the slot 73^a in the table-plate 69. Both the cutter blade 73 and the guard *G* are slotted for passage of the screw 73^b and therefore may be adjusted lengthwise relative to the table-plate 69 and relative to each other.

The body of the guard *G* and its downturned end *g* substantially enclose the thread cutting end 73^x of the stationary cutter blade 73 and therefore prevent the thread from being prematurely drawn into cutting contact with said thread-cutting end. The action of this guard will best be understood by reference to Figs. 5 and 8. In Fig. 5 the needle-thread loop is shown as just entered by the end of the thread pull-off and detaining blade 64. Fig. 8 shows the blade 64 in an advanced position in which it has expanded the thread loop and drawn off a substantial amount of thread to start the next stitching cycle. In approaching the position shown in Fig. 8, the blade 64 carries the work-limb *n*¹ of the needle-thread loop *n* into contact with the rounded down-turned end *g* of the guard which holds the thread out of cutting contact with the cutting edge 73^x. While the needle thread may touch the under side of the cutter blade 73, as illustrated in Fig. 8, it is not drawn over the sharp cutting edge thereof and therefore the thread will not be abraded thereby.

Immediately after the movable thread-cutter blade 63 has passed through the position shown in Figs. 7 and 8 the cutting edge 72 thereof is brought into shearing relation with the cutting edge 73^x of the stationary cutter-blade 73 and the work *n*¹ of the needle-thread loop is severed thereby.

From the foregoing it will be apparent that this invention has improved the thread-cutting mechanism disclosed in the above mentioned Fifield patent and has provided an effective guard to prevent damage to, and premature severing of, the needle-thread.

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

1. A thread-severing mechanism for a sewing machine having a throat-plate comprising a stationary blade supported below and in spaced relation to said throat-plate and having a thread-cutting edge, a cooperating movable blade having a thread-cutting edge, and guard means between said throat-plate and said stationary blade to hold the thread out of contact with the cutting edge of said stationary blade until said cutting edges are brought into thread-cutting relation.

2. A thread-severing mechanism for a sewing machine having a throat-plate comprising a stationary blade supported below and in spaced relation to said throat-plate and having a thread-cutting edge, a cooperating movable blade having a thread-cutting edge, and a guard member between said throat-plate and said stationary blade and having a portion substantially enclosing the cutting edge of the stationary blade to hold the thread out of contact therewith until said cutting edges are brought into thread cutting relation.

3. A thread-severing mechanism for sewing machines comprising a stationary blade having a thread-cutting edge, a movable blade arranged at one side of said stationary blade and having a thread-cutting edge cooperating with the sta-

tionary cutting edge to sever the thread and a guard member located at that side of said stationary blade remote from the movable blade and having an offset portion lying in the path of the needle-thread to hold the thread out of contact with the cutting edge of said stationary blade until said cutting edges are brought into thread cutting relation.

4. A thread-severing mechanism for sewing machines comprising a stationary blade having a thread-cutting edge, an oscillatory blade movable below and in contact with said stationary blade and having a thread-cutting edge cooperating with the first named cutting edge to sever a thread, and guard means to hold the thread out of contact with the cutting edge of said stationary blade until said cutting edges are brought into thread cutting relation, said guard means comprising a sheet metal element overlying said stationary cutter-blade and having a downturned end substantially enclosing the cutting edge of said stationary blade and around which the thread is bent prior to the severing action of the blades.

5. In a sewing machine having stitch-forming mechanism, needle-thread severing mechanism including a fixed blade and a movable blade, said blades having complementary thread-cutting edges, and a stop-motion mechanism to control the action of said stitch-forming mechanism; manually actuated means, actuable after the stop-motion mechanism has been shifted to a position to arrest the action of said stitch-forming mechanism, to actuate said thread-severing mechanism, and a guard member associated with said fixed blade and having a portion located in the horizontal plane thereof forwardly of its cutting edge and in the path of the needle thread to hold the thread out of contact with the cutting edge of said fixed blade until said cutting edges are brought into thread-cutting relation by said manually actuated means.

6. A thread pull-off and severing mechanism for sewing machines comprising a movable thread pull-off blade, a movable thread-cutter blade having a thread-cutting edge, a complementary stationary thread-cutting blade having a thread-cutting edge, means to actuate said pull-off blade and movable thread-cutter blade, and guard means to prevent the thread from being drawn into contact with the cutting edge of the stationary blade by the movement of said pull-off blade.

7. A thread pull-off and severing mechanism for sewing machines comprising an oscillatory thread pull-off blade, an oscillatory thread-cutter blade movable with said pull-off blade and having a thread-cutting edge, a complementary stationary thread-cutting blade having a thread-cutting edge adapted to cooperate with the first mentioned thread-cutting edge to sever the thread, means to oscillate said pull-off blade and movable thread-cutter blade, and a guard element located in advance of said stationary cutting edge to prevent the thread from being drawn into contact with the cutting edge of the stationary blade by the advancing movement of said pull-off blade.

8. A sewing machine comprising a frame including a work-supporting bed, stitch-forming mechanism supported by said frame, and thread-severing mechanism supported by said bed, said thread-severing mechanism including a stationary thread-cutting blade and a cooperating mov-

able thread-cutting blade, a common support for both of said blades comprising a member secured to said bed, one of said thread-cutting blades being pivotally attached to said member and the other being fixedly secured thereto, means for adjusting one of said blades relative to the other, and means for actuating said movable cutter-blade.

9. A sewing machine comprising a frame including a work-supporting bed, stitch-forming mechanism supported by said frame, and thread-severing mechanism supported by said bed, said thread-severing mechanism including a stationary thread-cutting blade having a thread-cutting edge and a cooperating movable thread-cutting blade having a thread-cutting edge, a common support for both of said blades comprising a supporting member secured to said bed, one of said thread-cutting blades being pivotally attached to said member and the other being fixedly secured thereto, a guard member shielding the cutting edge of said stationary blade to prevent accidental contact of the thread therewith, means for adjusting one of said blades relative to the other, means for actuating said movable cutter-blade, and common means for securing said stationary cutter-blade and said guard member to said supporting member.

10. A sewing machine comprising a frame including a work-supporting bed, stitch-forming mechanism supported by said frame, and thread-severing mechanism supported by said bed, said thread-severing mechanism including a stationary thread-cutting blade and a cooperating movable thread-cutting blade, a common support for

both of said blades comprising a plate secured to said bed, one of said thread-cutting blades being pivotally attached to the underside of said plate and the other being fixedly secured within a groove formed in the upper face of said plate, a guard member secured in said groove above said stationary cutter-blade and having a down-turned portion substantially enclosing the cutting edge of said stationary cutter-blade to prevent accidental contact of the thread therewith, means for effecting relative adjustment between said thread cutting blades and between said stationary blade and said guard, and means for actuating said movable cutter-blade.

11. A sewing machine having, in combination, stitch-forming mechanism; a needle-thread pull-off device including a thread pull-off blade having therein a thread-engaging notch and movable to pull off a loop of thread of predetermined length from the supply; needle-thread severing mechanism located above said pull-off device including a stationary blade having a thread-cutting edge and a movable blade having a thread-cutting edge located behind said thread-engaging notch and adapted to cooperate with the cutting edge of said stationary blade to sever a thread-loop pulled out by said pull-off blade; and a sheet metal guard member engaging the upper face of the stationary cutter blade and having a portion substantially enclosing the cutting edge thereof to prevent accidental contact of the thread therewith as the thread is pulled from the supply by said pull-off blade.

HERMANN GUNTHER.