E. J. RAY.

THREAD SEVERING AND HOLDING MECHANISM.

APPLICATION FILED OCT. 21, 1916.

1,298,786.

Patented Apr. 1, 1919.

4 SHEETS—SHEET 1.

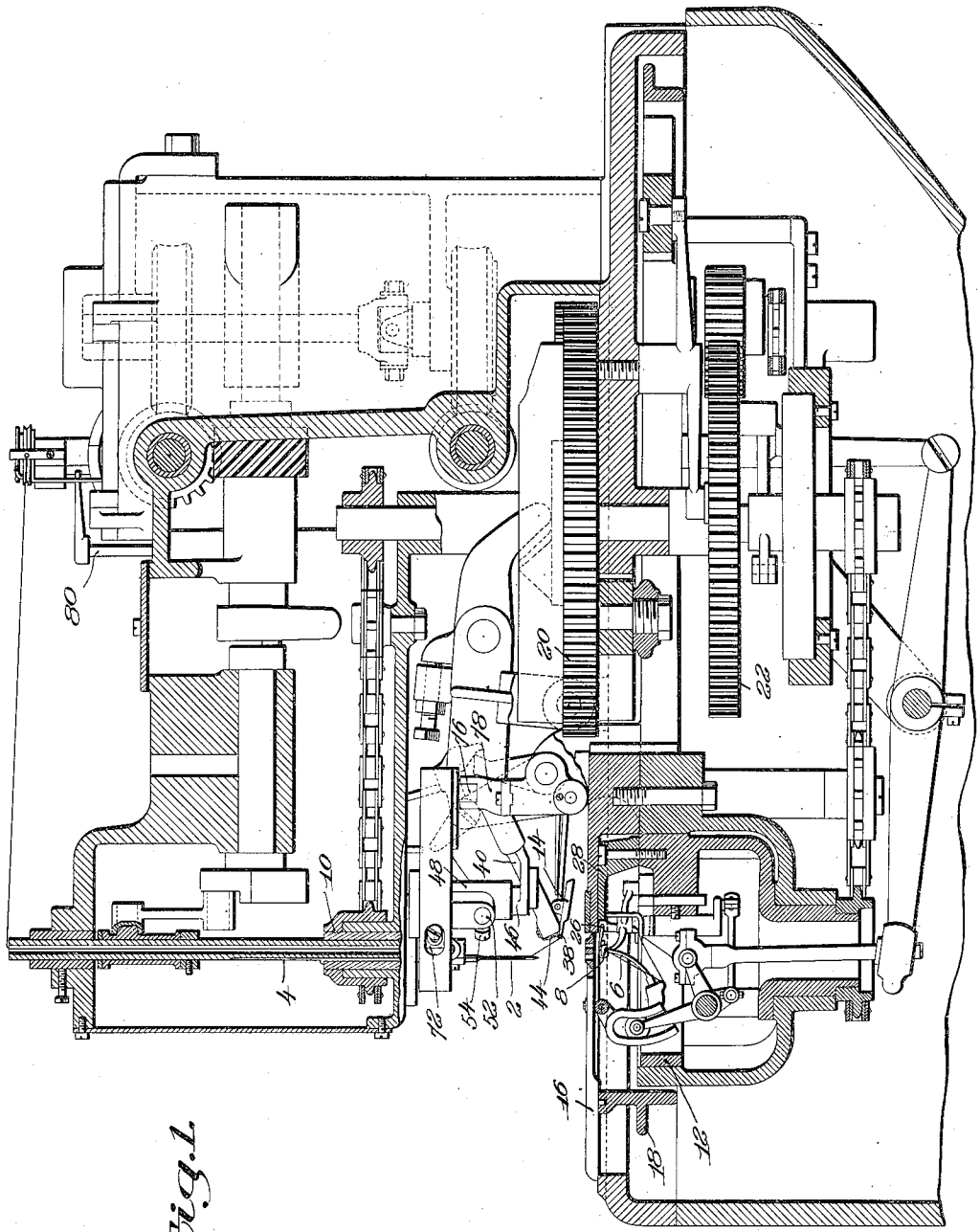


Fig. 1.

Witness

Frederick S. Greenleaf.

Inventor

Eugene J. Ray.

J. Phillips Van Evera & Fisk

Attys

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4 SHEETS—SHEET 2.

Fig. 2.

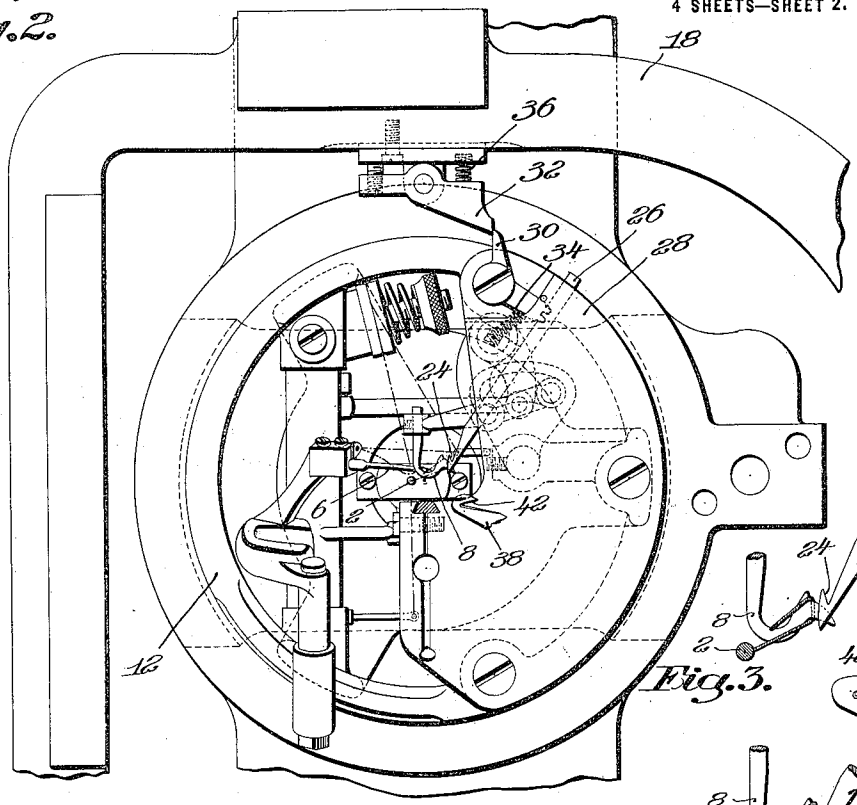


Fig. 3.

Fig. 4.

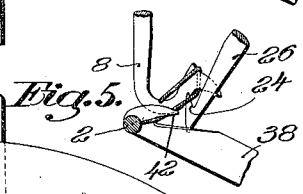
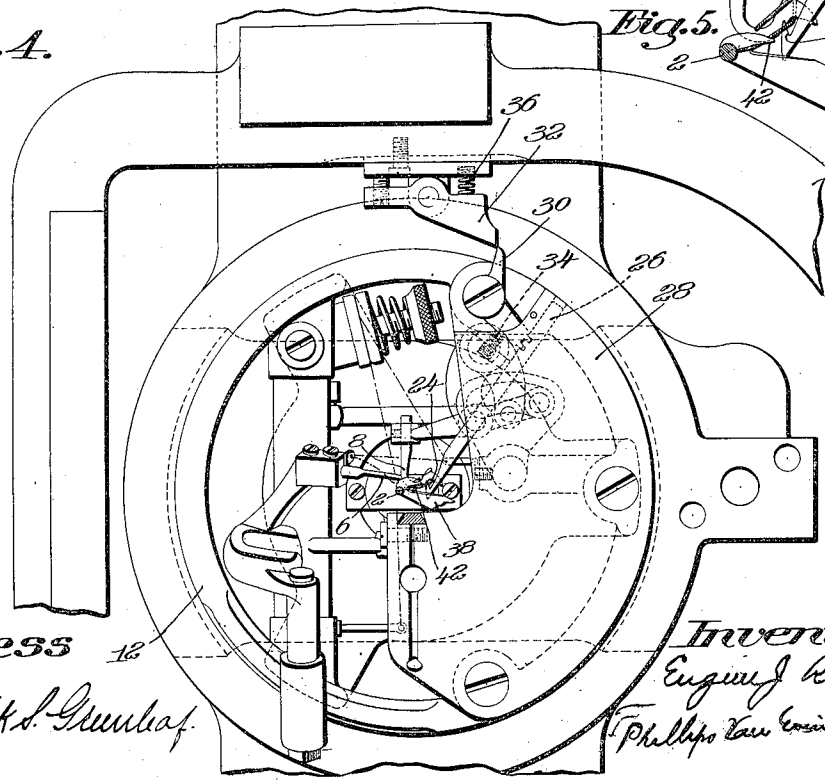


Fig. 5.



Witness

Frederick L. Greenleaf.

Inventor

Eugene J. Ray

Phillips Van Orsdel & Fish

Attys

E. J. RAY.

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4 SHEETS—SHEET 3.

Fig. 6.

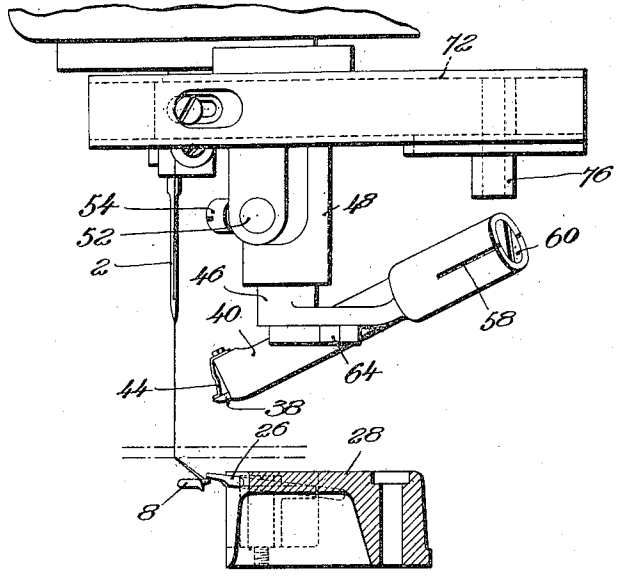


Fig. 9.

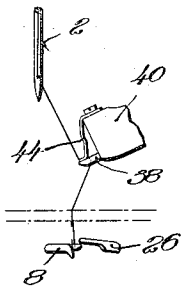


Fig. 10.

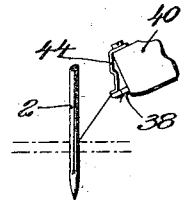


Fig. 7.

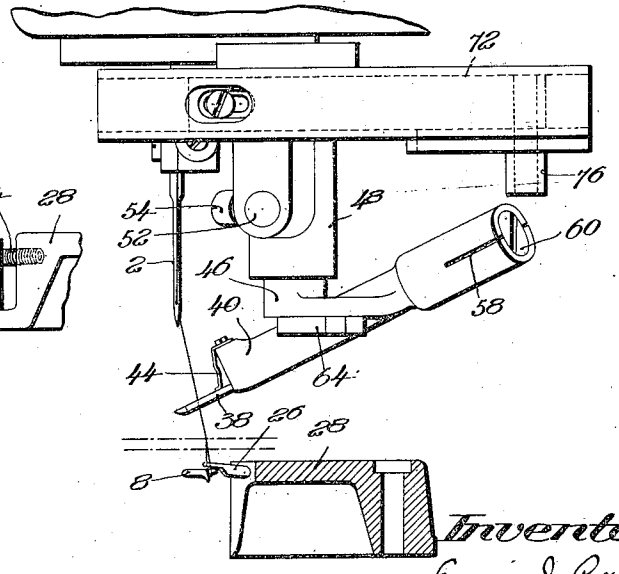
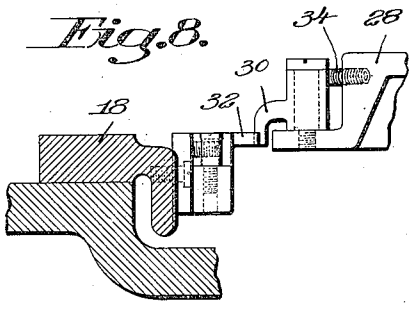


Fig. 8.



Witness

Frederick L. Gunthap.

Inventor

Eugene J. Ray

by Phillips Van Everen Fish & Fish

Atty's

E. J. RAY.

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4 SHEETS—SHEET 4.

Fig. 11.

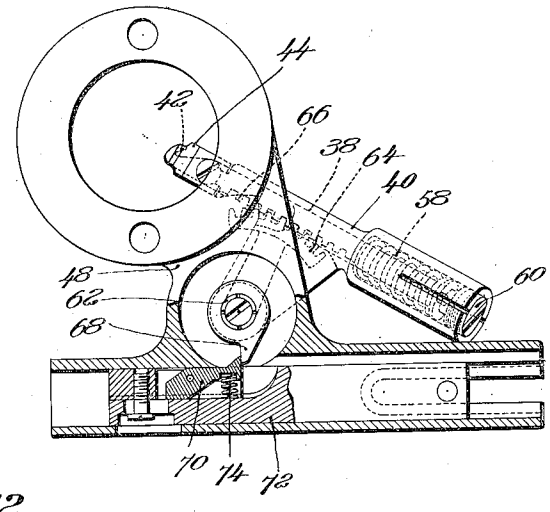


Fig. 12.

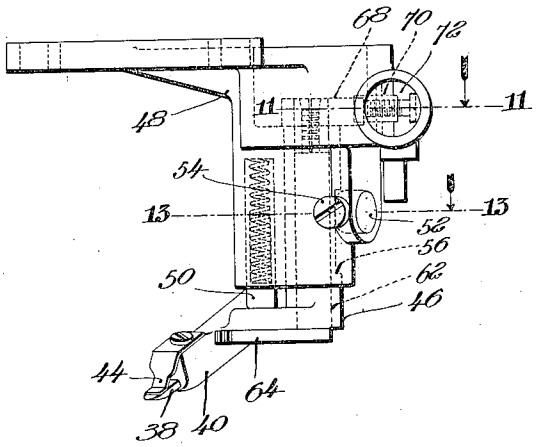


Fig. 13.

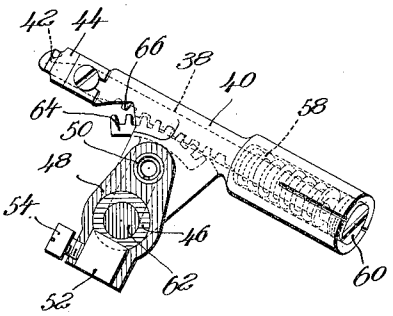


Fig. 14.

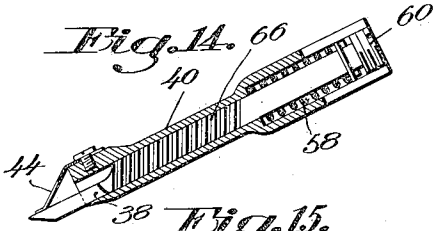
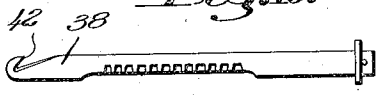


Fig. 15.



Witness

Frederick L. Grumbach.

Inventor

Eugene J. Ray

J. Phelps Van Everen & Fish

Attys

UNITED STATES PATENT OFFICE.

EUGENE J. RAY, OF BEVERLY, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

THREAD SEVERING AND HOLDING MECHANISM.

1,298,786. Specification of Letters Patent. Patented Apr. 1, 1919.

Application filed October 21, 1916. Serial No. 126,902.

To all whom it may concern:

Be it known that I, EUGENE J. RAY, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Thread Severing and Holding Mechanisms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to thread severing and holding mechanisms for sewing machines.

The object of the invention is to provide a novel and improved mechanism which is well adapted for severing the upper needle thread of a buttonhole making machine at the completion of a buttonhole, and for holding the severed end preparatory to the sewing of the succeeding buttonhole, and which will operate to sever the thread close to the seam so that the waste end will not be of sufficient length to be carried up through the work by the sewing mechanism during the sewing of the succeeding buttonhole.

To this end the invention contemplates the provision of means for severing the needle thread below the work, and for holding the severed end above the work. This construction enables the thread to be severed comparatively close to the under side of the work, so that the waste end projecting from the end of the seam will not be of sufficient length to reach to the succeeding buttonhole, and cannot therefore be engaged and carried to the upper side of the work by the thread handling devices in sewing the succeeding buttonhole. It also enables the severed end of the thread to be held in a uniformly reliable manner at the beginning of each sewing operation, so that the proper sewing of each seam is insured.

In embodying the invention in a buttonhole making machine which sews about the eye and about the end of a buttonhole, it is preferred to so arrange the threadholder that it presents the waste end of the thread leading to the initial needle hole in position to be covered by the overseam at the beginning of the sewing.

In addition to the features outlined above, the invention includes certain further features of construction and combinations of parts which will be hereinafter described and set forth in the claims.

The various features of the invention will be readily understood from an inspection of the accompanying drawings and the following detailed description of the mechanisms illustrated therein.

In the drawings Figure 1 is a vertical sectional elevation showing so much of a buttonhole making machine as is necessary to illustrate the embodiment of the invention therein; Fig. 2 is a plan view showing the mechanism carried by the turret, and certain parts coöperating therewith; Fig. 3 is a detail view, on an enlarged scale, showing the relation of the thread severing and thread holding devices to the thread, when the parts are in the position indicated in Fig. 2; Fig. 4 is a view similar to Fig. 2, showing the parts in a different position; Fig. 5 is a view similar to Fig. 3, showing the thread severing and holding devices in the positions corresponding to those shown in Fig. 4; Fig. 6 is a detail elevation showing the thread-severing and threadholding mechanism, the parts being shown in the positions which they occupy at the completion of the sewing; Fig. 7 is a similar view, the parts being shown in the positions which they occupy just previous to the severing and holding of the thread; Fig. 8 is a detail view showing a part of the mechanism for operating the thread-severing device; Fig. 9 is a detail view showing the position of the parts just after the thread severing and holding devices have been operated to sever and hold the thread; Fig. 10 is a view indicating the position of the thread end and holder as the needle completes its initial downward stroke; Fig. 11 is a sectional plan view on line 11—11 of Fig. 12, showing the threadholder and its operating mechanism; Fig. 12 is an elevation looking toward the right in Fig. 11; Fig. 13 is a sectional plan view on line 13—13 in Fig. 12; Fig. 14 is a section through the bearing for the threadholder slide; and Fig. 15 is a detail view of the threadholder slide removed from its bearing.

In the drawings the invention is shown as embodied in a buttonhole making machine

having substantially the construction and mode of operation of the machine shown and described in Patent No. 1,063,880, dated June 3, 1913. In this machine the stitch-forming mechanism comprises an upper needle 2 eccentrically mounted in a vertically reciprocating needle bar 4, an under needle 6, and a looper 8. The upper needle bar and the under needle and looper are mounted respectively in a rotary carrier 10 and a rotary turret 12, which are rotated during the sewing about the eye and end of a buttonhole. The work is held by clamps 14 mounted on work-supporting plates 16 which are, in turn, mounted on a clamp carrier 18. The clamp carrier is moved longitudinally to bring the work into registry with the buttonhole cutter or with the stitch-forming mechanism, and to feed the work during the sewing by a cam groove formed in the cam gear 20, which makes one revolution for each cycle of the machine. The clamp carrier is moved laterally and the stitch-forming mechanism is rotated during the sewing, from suitable connections from a gear 22 which makes one revolution during the sewing of the buttonhole.

At the completion of the sewing of the buttonhole the stitch-forming mechanism is stopped, with the upper and under needles in their retracted positions and with the loop of the upper needle thread held by the looper, as indicated in Figs. 2, 3, and 6. The upper needle thread is then severed by a thread cutter which acts upon the loop of needle thread held by the looper, thus severing the thread comparatively close to the end of the seam. At substantially the same time the thread leading from the eye of the needle to the work is gripped and held by a threadholder arranged above the work. When the work is removed or spaced for the succeeding buttonhole, the severed thread end held by the threadholder is withdrawn from the last needle hole, and this end is retained by the threadholder until the beginning of the next sewing operation. At the beginning of the next sewing operation the threadholder retains the end of the needle thread until the initial stitches of the seam have been formed, after which it is withdrawn from the holder by the feed of the work. It is preferred to so arrange the threadholder that the thread leading from the holder to the initial needle hole will be presented in a position to be covered by the initial stitches of the seam, and in order that the waste end which is thus covered may be comparatively short, means is provided for causing the needle to draw the surplus thread through the holder during its initial stroke. This is conveniently accomplished by so constructing or adjusting the devices which throw on the thread tension at the beginning of the sewing that the tension will be applied at such a point in the first downward stroke of the needle that the needle will draw the surplus thread through the holder, but will not withdraw the end of the thread from the holder.

In the construction shown, the thread-cutting device comprises a hooked cutter blade 24 formed on the forward end of a bar 26 which is mounted to slide in a bracket 28 secured to the turret. The bar is so arranged that, when it is advanced, its forward inclined end will deflect one side of the loop of thread about the looper, so that as the hooked blade 24 passes beyond the side of the loop the thread will spring into position within the hook and will be severed when the bar is retracted. The mechanism for advancing and retracting the bar comprises a lever 30, one arm of which is provided with teeth engaging rack teeth formed in the side of the bar, and the other end of which is arranged to be engaged by a dog 32 carried by the clamp carrier 18. The lever 30 is pressed in a direction to retract the cutter bar by a spring 34. The dog 32 is held in normal position by a spring 36, and is so arranged that it will yield and pass idly by the end of the lever 30 during the forward movement of the clamp carrier, but will engage and operate the lever during the movement of the clamp carrier in carrying the work from sewing to cutting position, after the sewing of a buttonhole has been completed. The cutter bar will therefore be advanced into position to act upon the needle thread, or from the positions indicated in Figs. 2 and 3 to the positions indicated in Figs. 4 and 5 as the clamp carrier is retracted. As the carrier is retracted beyond the position indicated in Fig. 4, the dog 32 will disengage the end of the lever 30, thus releasing the lever so that the spring 34 will quickly retract the cutter bar, and thus severing the thread.

The means for holding the needle thread above the work comprises a reciprocating holder bar 38 mounted to slide in an inclined bearing 40, and provided at its forward end with a hook 42 adapted to engage the thread and carry it under a spring plate 44, which coöperates with the upper surface of the hook in clamping and holding the thread. The bearing 40 is formed on a support 46 which is mounted to slide vertically in a bracket 48 secured to the head of the machine. The support is held in its lower position by a spring-pressed plunger 50 which may yield to permit vertical movement of the bearing 40 and threadholder, when engaged by the opening clamps 14. The downward movement of the support is determined by a stop plug 52 which is secured in the bracket 48 by a setscrew 54, and is arranged to project within a slot 56 formed in the side of the support. The thread-

holder bar is held normally in retracted position by a spring 58, which holds the rear end of the bar against a stop plug 60 screwed into the rear end of the bearing.

The mechanism for advancing and retracting the thread-holder bar comprises a rock-shaft 62 mounted within the support 46 and provided at its lower end with a gear segment 64 which engages a rack 66 formed on the side of the bar. The upper end of the rock-shaft is provided with an arm 68 which projects into the path of a dog 70 carried on a slide 72. The dog is held in normal position by a spring 74, and is so arranged that it will yield and pass idly by the arm 68 when the slide 72 moves toward the left in Fig. 11, but will engage the arm and rock the rock-shaft 62 when the slide moves in the opposite direction. The slide is operated from the clamp carriage through a block 76 which is pivotally mounted on a pin projecting downward from the slide, and which engages a transverse slot formed in a block 78 mounted on the clamp carriage.

When the clamp carriage moves forward from cutting to sewing position, the dog 70 passes idly by the arm 68, and after it has passed the arm, snaps forward into position to engage and move the arm when the clamp carrier is retracted from sewing to cutting position, after the sewing of the buttonhole has been completed. During this movement of the clamp carrier, the dog rocks the rock-shaft 62 and advances the thread-holder bar from the position indicated in Figs. 2 and 3 to the position indicated in Figs. 4 and 5. As the bar advances, its inclined end deflects the thread leading from the last needle hole to the eye of the needle so that the thread will spring forward into the hooked end of the bar. As the movement of the clamp carrier continues, the dog 70 will pass beyond the arm 68, releasing the arm so that the threadholder bar will be suddenly retracted by the spring 58. The hook 42 will engage the thread and carry it laterally under the plate 44 so that it will be clamped and held, as indicated in Fig. 9, the end of the thread extending from the clamp down through the last needle hole, from which it will be withdrawn when the work is removed or spaced. The holder will continue to hold the needle thread until the beginning of the next sewing operation. At the beginning of the sewing operation the tension releasing rod 80 is released by a cam ledge on the gear 20, which controls its movement, and this ledge is so shaped or adjusted that the tension will be applied during the first downward stroke of the needle. When the tension is applied, the needle during the remainder of its downward stroke will draw the thread through the threadholder, since the resistance offered by the holder to the movement of the thread is less than that offered by the tension devices. The tension applying mechanism is preferably so adjusted that the needle will withdraw substantially all of the surplus thread which extends beyond the threadholder, so that the waste end leading to the initial needle hole will be comparatively short. The threadholder is preferably so arranged that this waste end will be covered by the stitches of the overseam and will not project from the upper surface of the work. As the sewing progresses, the feed of the work will finally withdraw the extremity of the thread from the holder.

While it is preferred to employ the specific construction and arrangement of parts shown and described, especially in embodying the invention in a machine of the patent above referred to, it will be understood that this construction and arrangement is not essential to the broader features of the invention, but may be varied and modified as found desirable or best suited to the construction and arrangement of the parts and mechanisms of the machine in which it is to be embodied.

Having explained the nature and object of the invention, and specifically described one form of machine in which it may be embodied, what is claimed is:

1. A sewing machine having, in combination, stitch-forming mechanism, means for automatically severing the thread below the work, and means for holding the severed end portion beyond the needle above the work.

2. A sewing machine having, in combination, stitch-forming mechanism, a thread cutter below the work, a threadholder above the work, and mechanism for operating the cutter and holder to sever the thread and hold the thread beyond the needle at the completion of the sewing.

3. A sewing machine having, in combination, stitch-forming mechanism, means for holding the free end of the thread beyond the needle above the work at the beginning of the sewing, and means for automatically severing the thread below the work at the completion of the sewing.

4. A sewing machine having, in combination, stitch-forming mechanism comprising an upper needle and a complementary under thread mechanism, a thread cutter for cutting the upper needle thread below the work at the completion of the sewing, and a threadholder above the work for holding the severed end of the upper needle thread beyond the needle.

5. A sewing machine having, in combination, stitch-forming mechanism comprising an upper needle and a complementary under thread mechanism, a turret on which the

under thread mechanism is mounted, a thread cutter on the turret, a threadholder above the work, and means for operating the thread cutter and threadholder.

6. A sewing machine having, in combination, stitch-forming mechanism comprising a vertically reciprocating needle, means for severing the needle thread below the work, a threadholder for engaging the thread end beyond the needle above the work, and means for causing the needle to draw thread through the holder during its initial stroke to shorten the waste end held by the holder.

7. A sewing machine having, in combination, stitch-forming mechanism comprising a vertically reciprocating needle, means for severing the needle thread below the work, a threadholder for engaging the severed thread beyond the needle above the work, and means for applying tension to the thread during the initial stroke of the needle.

8. A buttonhole sewing machine having, in combination, a work clamp, stitch-forming mechanism comprising an upper needle and a complementary under thread mechanism, rotary supports in which the stitch-forming mechanism is mounted, means for severing the upper thread below the work at the completion of the buttonhole and for holding the severed end above the work, and mechanism for relatively actuating the stitch-forming mechanism and clamp to sew about a buttonhole.

9. A buttonhole sewing machine having, in combination, a work clamp, stitch-forming mechanism comprising an upper needle and a complementary under thread mechanism, a rotary support for the upper needle, a rotary turret in which the under thread mechanism is mounted, a thread cutter mounted on the turret, a threadholder mounted above the work, mechanism for actuating the holder and cutter to grip and sever the thread at the completion of a buttonhole, and mechanism for relatively actuating the work clamp and stitch-forming mechanism to sew about a buttonhole.

10. A buttonhole sewing machine having, in combination, a work clamp, stitch-forming mechanism comprising an upper needle and a complementary under thread mechanism, rotary supports in which the stitch-forming mechanism is mounted, a thread-severing device below the work, a threadholder above the work, mechanism for relatively actuating the stitch-forming mechanism to clamp and sew about a buttonhole, and mechanism for actuating the thread-severing device and threadholder through the relative movement between the stitch-forming mechanism and work clamp at the completion of a buttonhole.

11. A sewing machine, having, in combination, stitch forming mechanism comprising an upper needle and a complemental under thread mechanism, a thread cutter for cutting the upper thread only below the work at the completion of the sewing, and a thread holder above the work for holding the end portion of the upper thread beyond the needle.

12. A sewing machine, having, in combination, a work clamp, stitch forming mechanism comprising an upper needle and a complemental under thread mechanism, rotary supports in which the stitch forming mechanism is mounted, means for severing the upper thread only below the work at the completion of the buttonhole and for holding the severed end above the work, and mechanism for relatively actuating the stitch forming mechanism and clamp to sew about a buttonhole.

13. A sewing machine, having, in combination, stitch forming mechanism comprising an upper needle and a complemental under thread mechanism, rotary supports in which the stitch forming mechanism is mounted, a work clamp movable lengthwise and laterally of the buttonhole, means below the work clamp for severing the upper thread, means for holding the thread end above the work, and mechanism for feeding the work clamp and rotating the stitch forming mechanism to sew about a buttonhole.

EUGENE J. RAY.