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Patented Oct. 5, 1909.
4 SHEETS—SHEET 1.

Fig. 1

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SEWING MACHINE.
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935,662.

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4 SHEETS—SHEET 2.

Fig. 3,

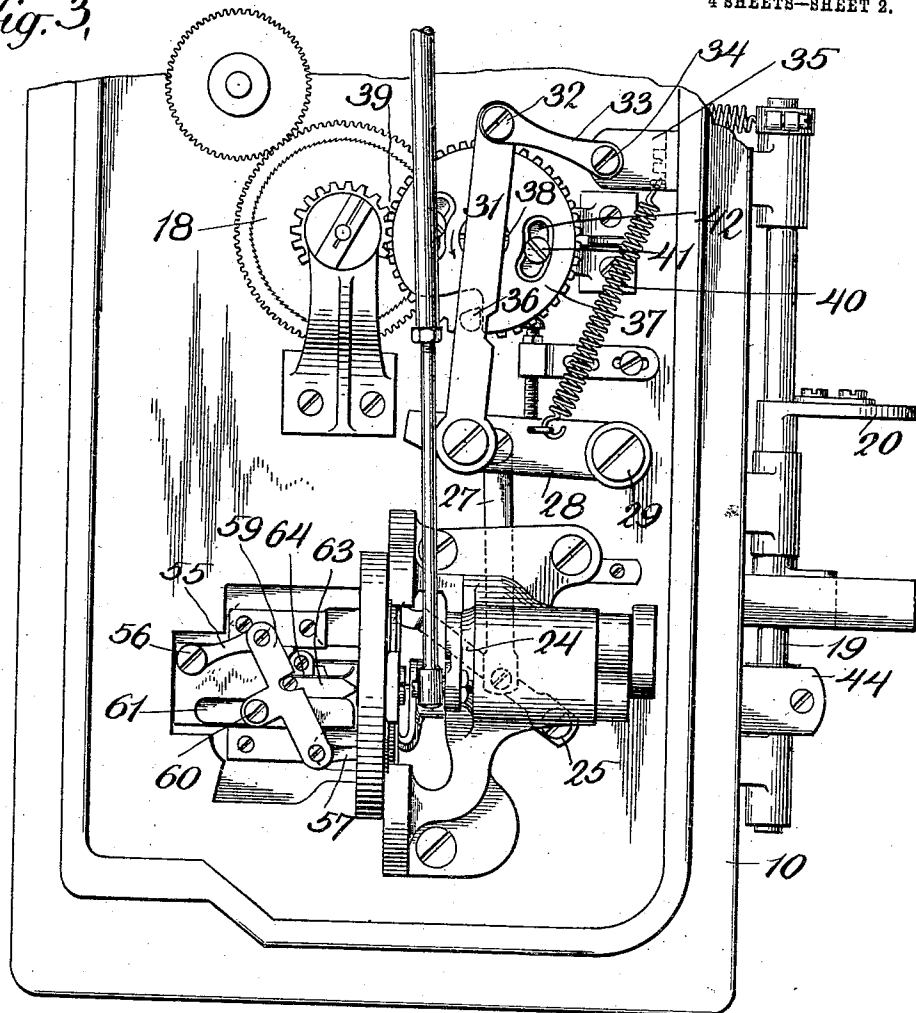
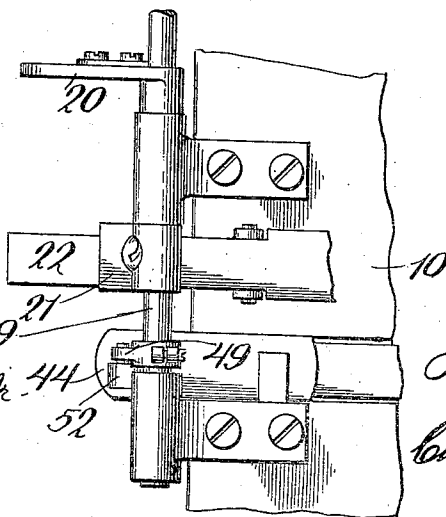


Fig. 4,



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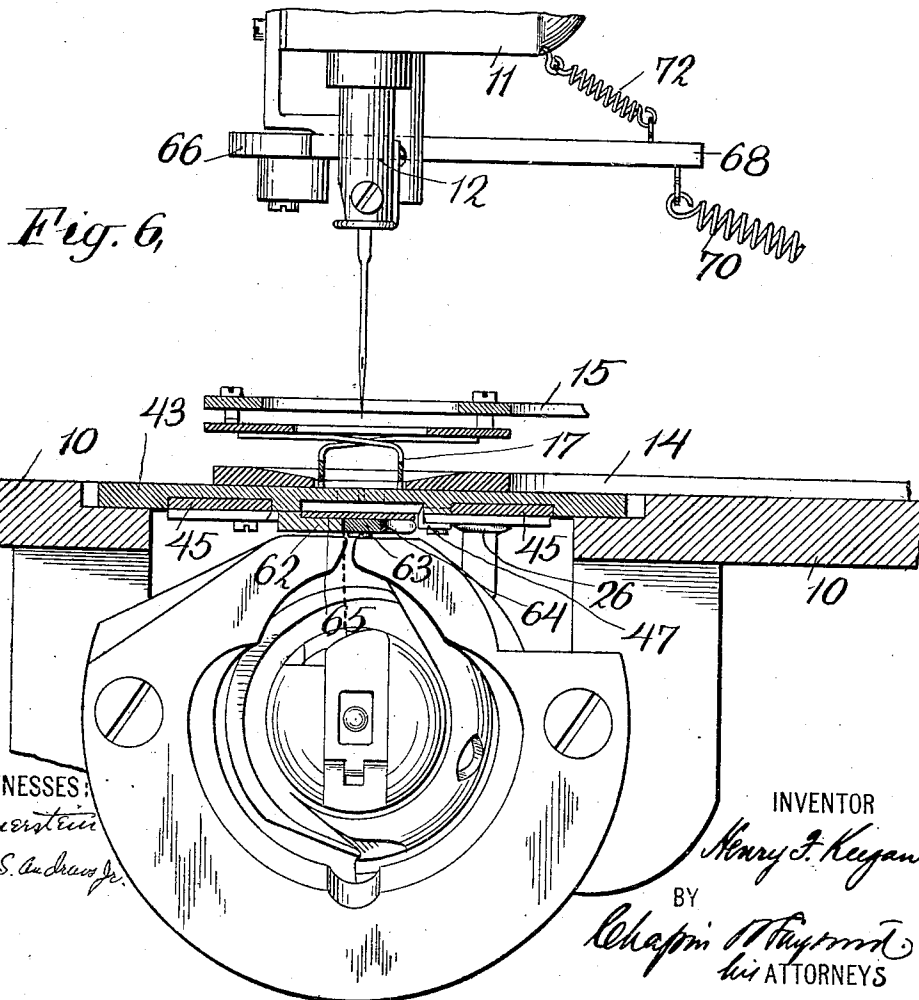
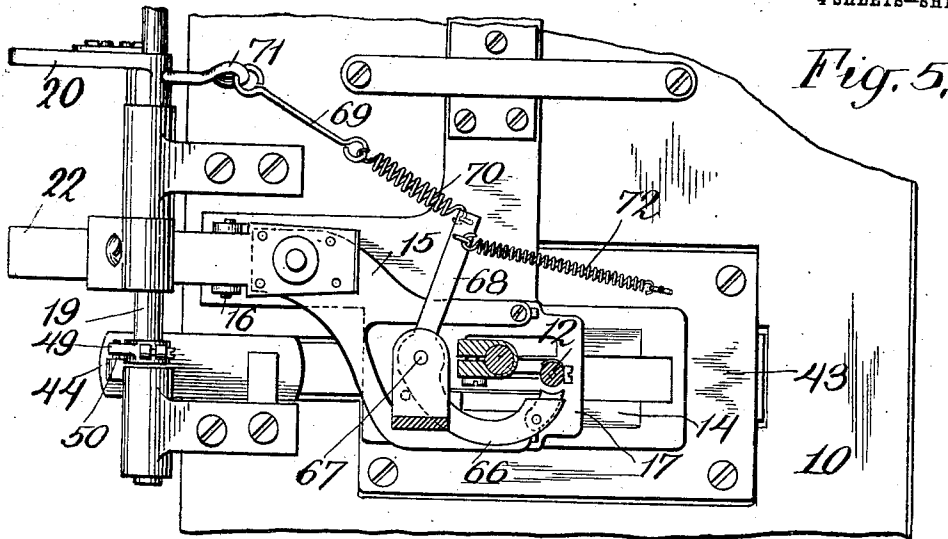
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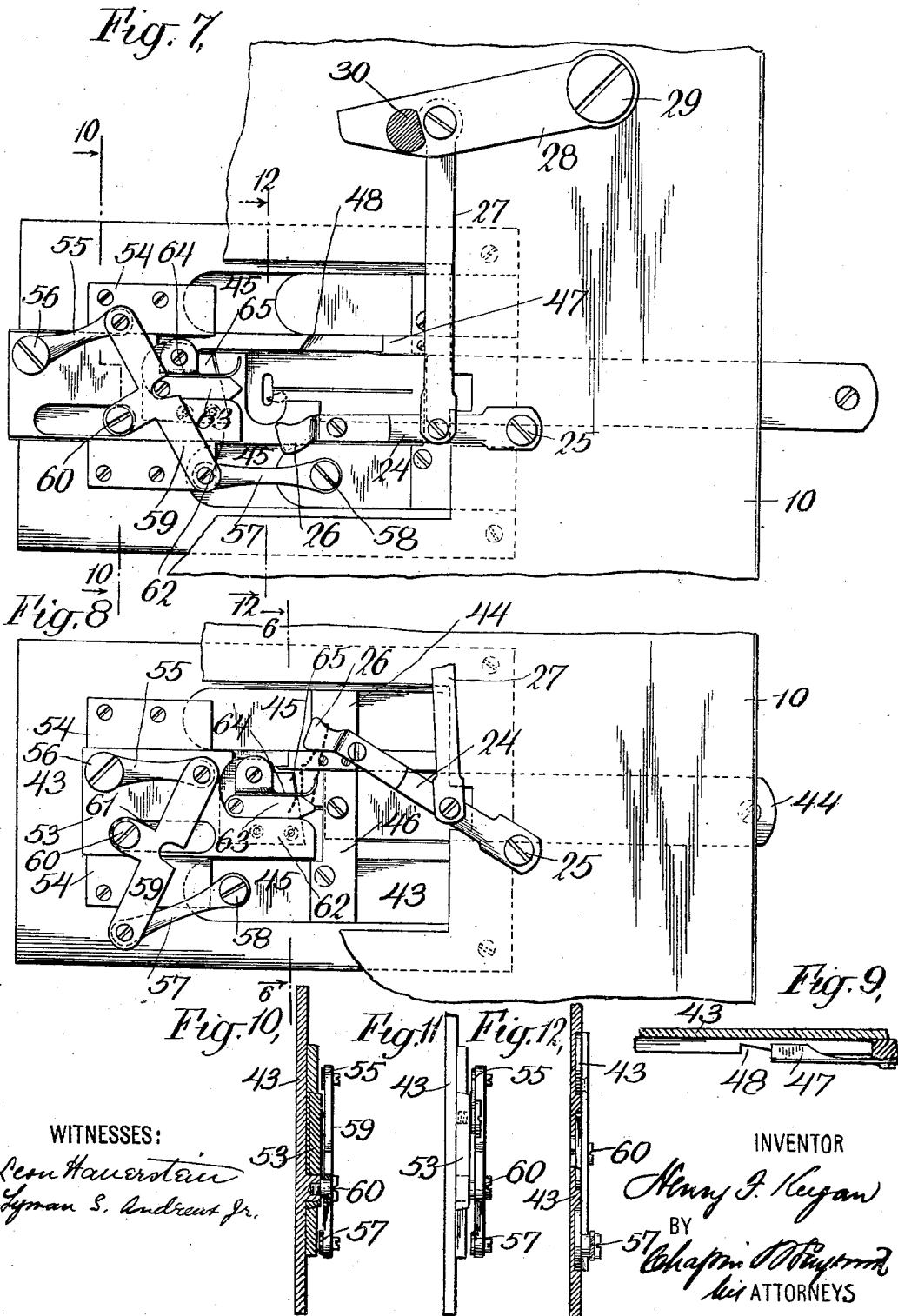
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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE.

935,662.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY F. KEEGAN, a citizen of the United States of America, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to sewing machines, and particularly to thread trimming devices employed therein.

The main object of my invention is to trim both upper and lower threads of a machine employing two threads, as close to the work as possible, while providing for the proper picking up of the threads at the commencement of a new sewing operation.

The class of machine to which I specially apply my present invention is buttonhole sewing machines, the trimming devices being arranged to sever the threads upon the completion of one buttonhole, and to hold the ends ready for operation when commencing a new buttonhole.

The mechanism includes a pull-off device for pulling off sufficient thread through the needle to prevent withdrawing of the thread through the needle when the thread is severed, a thread cutter for the needle thread, a thread nipping device for the lower or shuttle thread, and a trimmer for such thread. The pull-off for the needle thread is automatically operated by the machine prior to the completion of a buttonhole sewing operation, while the other mechanism is arranged to be manually operated by the operator.

My invention consists in many novel details of construction and combinations of parts, and, in order that the same may be fully understood, I will now describe in detail an embodiment thereof with reference to the accompanying drawings illustrating same, and will then point out the novel features in claims.

In the drawings: Figure 1 is an end view of a sewing machine employing a thread trimming device embodying my invention, the bed plate being shown in transverse section. Fig. 2 is a detail view in transverse section and on an enlarged scale through the bed plate and parts supported thereby, the line of section being taken substantially in a plane with the line of sewing. Fig. 3 is an under side view of the end of the sewing ma-

chine at which the thread trimmer is located. Fig. 4 is a detail top view of certain parts included in the means for operating the work clamp, the thread trimmer and a thread holder. Fig. 5 is a detail view showing certain parts by which a gripper employed in connection with the needle thread is operated. Fig. 6 is a detail sectional view on a considerably enlarged scale, the plane of section being taken substantially upon the line 6, 6 of Fig. 8. Figs. 7 and 8 are detail views on an enlarged scale looking at the under side of the machine, showing the thread trimming mechanism in different positions. Fig. 9 is a small diagrammatic view showing the relationship of the needle thread trimmer to a portion of the thread plate with which the same co-acts. Fig. 10 is a detail sectional view of the throat plate and certain parts of the thread trimming device which are supported thereunder, the plane of section being taken substantially upon the line 10—10 of Fig. 7. Fig. 11 is a detail edge view of these parts. Fig. 12 is a similar sectional view taken upon the plane of the line 12—12 of Fig. 7.

The sewing machine illustrated comprises the usual bed plate 10 and overhanging arm 11. A laterally vibrating and longitudinally reciprocating needle bar 12 is mounted in the end of the said overhanging bar 11, the work to be operated upon being carried by means of a work clamp 13. The work clamp comprises a lower work supporting plate 14 and an upper member 15 pivoted thereto at 16, the latter said member carrying a presser foot 17. The work is clamped between the plate 14 and the presser foot 17, all as is well known and as will be well understood by those skilled in this art. The work clamp as a whole has feeding movements imparted to it whereby the work will be moved to successive positions with respect to the needle, for receiving overseaming side and end stitches in the production of a buttonhole, as is usual in this type of sewing machine. The means for producing and controlling these movements includes a feed wheel 18 (see Fig. 3), said feed wheel having a set of ratchet teeth by which step by step movements are imparted thereto through suitable mechanism not shown. It is usual in operating sewing machines of this type to bring the machine to a stand still after the completion of each buttonhole, so that the

work may be shifted to a proper position for a new operation. The stopping is usually done automatically and is controlled by the position of the feed wheel, but the work clamp is operated manually by the operator to release the work, after the machine has thus been stopped. The means herein shown for thus operating the work clamp includes a rock shaft 19, an operating lever 20, and a cam 21 carried by the said rock shaft, said cam arranged to bear against a portion 22 of the upper clamp member 15 and which extends at the rear of the pivotal point 16. A spring 23 bears upon the said upper clamp member and opposes operation of the said cam 21 to lift the member 15.

All of the above is old and thoroughly well understood by those skilled in this art, so that further detailed description herein is unnecessary. The several parts and the operation thereof are merely alluded to so as to properly connect the parts constituting the invention and the operation of same therewith. These parts comprise a pull-off for the upper or needle thread automatically operated at the completion of the stitching for a buttonhole and just prior to the stopping of the machine, and parts controlled in their operation by the same means by which the work clamp is manually operated to release the work as above set forth, such parts including a knife for severing the needle thread, a gripper for nipping the lower or shuttle thread, and a knife for cutting the thread above the point nipped.

The pull-off comprises a lever 24 pivoted to the under side of the bed plate at 25, said lever having a thin hook-shaped blade 26 which is adapted to engage the needle thread when moving about its pivot 25, and to carry a loop of the said thread over with it. In Fig. 7 of the drawings the lever is shown in its normal position to one side of the line of sewing, in which position the said lever is entirely clear of the needle thread and, in fact, of all the working parts. In Fig. 8 the lever is shown as thrown from this position to a position upon the other side of the line of sewing, the said lever at this time having picked up the needle thread and carried a loop thereof over with it as above set forth. The said lever is connected by means of a link 27 with an arm 28 pivoted at 29 to the under side of the bed of the machine, said arm connected by means of a pivotal connection 30 with a link 31, the opposite end of which is pivoted at 32 to a rocking link 33 itself pivoted at 34 to a bracket 35 secured to the machine at the under side of the bed thereof, the link 31 carrying a cam follower 36 arranged to be engaged by a cam 37. The cam 37 is rotatably mounted upon a stud 38 beneath the machine, and is connected to revolve with the feed wheel 18 by means of a

spur-gear and pinion connection 39. The cam 37 moves in the direction of the arrow Fig. 3, the said cam being so constructed as to gradually throw the lever 24 over to its normal position, but to trip the same quickly to permit rapid movement of the said lever to form the loop of the needle thread. A spring 40 holds the cam follower 36 up to its position against the cam 37, and brings about this rapid movement when permitted to do so by the shape and form of the cam, as will be well understood by reference to Fig. 3. This movement actually takes place during the formation of the last stitch of a buttonhole, the fact that the said cam 36 is positively connected with the feed wheel 18 permitting accurate timing to this end, as will be well understood. A slight adjustment of the cam 37 is provided for in order to correct any inaccuracy of timing, such means comprising screws 41 which enter slots 42 in the said cam, the said screws being tapped into the spur gear of the gearing 39.

Mounted in ways in the under side of the throat plate 43 of the machine is a slide comprising a central longitudinal member 44, and two side wings 45 connected thereto by means of a cross bar 46. A cutter or trimmer 47 is carried by the said slide, being secured to the said cross bar 46, the said cutter being arranged to move against and past one portion of the loop of the needle thread when the same has been formed by the lever 24. It will be noted that the throat plate 43 is provided with a notch or groove 48, which is adapted to receive this portion of the loop of the needle thread, the shoulder of said notch forming an abutment against which the thread may rest when the trimmer is performing its cutting operation. This relationship is shown in the small diagrammatic view Fig. 9.

Reciprocating movements of the slide which carries the cutter 47 are produced by means of a connection with the rock shaft 19, the said rock shaft being provided with an arm 49 which carries a stud 50 near the end thereof, said stud fitted to a slot 51 in a bracket 52, which is rigidly secured to the member 44 of the said slide. When the operator rocks the shaft 19 by manipulation of the lever 20, the first effect thereof is to press the slide forward to effect this cutting operation, the connection being such as to cause the immediate movement of the said slide directly the rock shaft commences its movement, while the cam 21, which lifts the upper member of the work clamp 15, as aforesaid, does not operate until a later period owing to the fact that there is a certain lost movement before it engages the part 22, as will be well understood by reference to Fig. 1.

The gripper and upper thread trimmer

are carried by a second slide 53 mounted in ways 54 upon the under side of the throat plate 43, said slide arranged to move backward and forward to and from the first said slide. The two said slides are compelled to move together by means of a link connection comprising a link 55, pivoted at 56 to the slide 53, another link 57 pivoted at 58 to one of the side wings 45 of the slide 44, 45, 46, and a rocking lever 59 pivoted at opposite ends to the free ends of the links 55, 57, and, at the middle, arranged to rock upon a stationary pivot secured to the throat plate through a slot 61 in the second slide 53. This connection compels simultaneous movements of the two said slides in opposite directions, so that, when the first said slide is moved in one direction by means of the rock shaft 19, the second said slide will be simultaneously moved in an opposite direction. The gripper comprises a stationary member 62, here shown as formed as a part of the slide 53 itself, a pivoted block 63 pivotally mounted upon said slide 53, and a leaf spring 64 which bears against the block 63. This construction provides two sets of gripping surfaces, one between the spring 64 and the block 63, and the other between the block 63 and the stationary gripping surface 62.

The block 63 is pointed at the end so as to properly guide the thread between either of gripping surfaces. These two sets of gripping surfaces are formed because, in sewing machines of this description where vibrating movements are imparted to the needle bar to produce over-seaming stitches, there are two sewing positions of the needle and the last stitch might occur in either one of these two positions. The two sets of gripping surfaces are therefore formed in line with the two possible positions of the needle, so that one or other of the sets of gripping surfaces will be ready to receive a thread under either of the conditions. A flat steel knife 65 is secured to the slide 53 immediately above the said gripping surfaces, said knife being arranged to move across the path of the lower thread as the slide 53 is reciprocated. In Fig. 7 the said slide is shown in its rearmost position, while in Fig. 8 it is shown as having been moved forward to sever a thread. This knife and the gripping surfaces operate upon the under or shuttle thread, one or other of the pairs of gripping surfaces first operating to grip the thread as the slide moves forward, and the knife 65 then operating to sever the thread.

It will be noted that the thread will be severed quite close to the work, the trimmer being a distance therefrom only equal to the thickness of the throat plate at this point. In actual practice the throat plate at this point is not much more than a thirty-second

of an inch thick, as will be seen by reference to Figs. 6 and 12. The thread being cut thus close to the work, the portion of the thread beneath same will be held by the gripping surfaces ready for a fresh sewing operation.

It will be noted that the cutting operation will take place early in the movement of the slide 53, and that after such cutting of the thread the slide and gripper thereon will move forward for quite a little distance. The effect of this latter movement will be to draw sufficient thread out of the bobbin for a fresh sewing operation, the gripper holding same until it is finally drawn out by movement of the work. In the matter of the needle thread, the severance is arranged to take place quite near the work, the major portion of the loop which has been drawn out by the looping lever 24 being allowed to hang down free, such end being amply sufficient when first starting up to insure proper stitching. To prevent the accidental drawing of the thread through the eye of the needle at this time, I have provided a gripper 66, which is pivoted at 67 to the end of the upper arm 11, said gripper being arranged to swing toward the needle bar and to press the thread against the needle bar when the trimming operation is effected. This gripping lever 66 is operated from the rock shaft 19, so as to insure its operation at the time the trimmer is acting, said gripping lever being provided with an arm 68 connected by means of a link 69 and spring 70 with a stud 71 secured to the said rock shaft 19. A light spring 72 normally holds the gripper away from the needle bar, but, when the rock shaft is caused to turn, the spring 70, being stronger than the said spring 72, acts to transmit rocking movement to the said gripping member 66 to force same against the needle bar 12. The spring 70 permits continued movement of the rock shaft after the member 66 has engaged the needle bar and has so been prevented from moving farther. By this means completion of movement of the member 66 may be insured before a trimming operation.

What I claim is:

1. In a sewing machine the combination with a bed plate, a work clamp mounted above the bed plate, feeding means for the work clamp, and a reciprocating needle bar arranged to carry a needle for operation upon work carried by the said work clamp, of a pull-off lever pivoted to the bed plate and arranged to move in a horizontal plane beneath the bed plate to engage and pull off a loop of the needle thread, means timed from the work clamp feeding means for imparting movements to the said lever, and a trimmer for severing the thread in the loop formed by the said pull-off lever.
2. In a sewing machine the combination

with a throat plate, a slide mounted therein to reciprocate beneath same, a trimming knife carried by said slide, and a pull-off lever for drawing a thread of the sewing machine laterally away from the sewing position across the plane of movement of the said knife, the said throat plate provided with a notch for receiving the said thread and arranged to coact with the trimming knife in the severance thereof.

3. In a sewing machine the combination with a throat plate, of two slides mounted beneath same, means for simultaneously moving the slides backward and forward with respect to each other, an upper thread trimming knife carried by one said slide, a lower thread trimming knife carried by the other said slide, gripping means carried also by the last said slide, and a pull-off member for forming a loop in the needle thread for presenting the said needle thread for severance by the first said trimming knife.

4. In a sewing machine the combination with a work clamp and manually operated means for opening and closing same, of a throat plate mounted beneath said work clamp, slides mounted beneath said throat plate, a connection beneath said slides for causing the same to move simultaneously in opposite directions, means connected with said work clamp, operating means for operating the said slides, an upper thread trimmer carried by one said slide, a lower thread trimmer carried by the other said slide, and a gripping device also carried by the last said slide.

5. In a sewing machine the combination with a work clamp, feeding means therefor and means for manually operating the work clamp to open and close same, of a throat plate mounted beneath said work clamp, reciprocating slides mounted beneath the throat plate, means connecting the slides together whereby they will be compelled to move simultaneously in opposite directions, a connection between said slides and the operating mechanism for the work clamp, an upper thread trimmer carried by one said slide, a lower thread trimmer carried by the other said slide, a thread gripping device also carried by the last said slide, a pull-off lever for the needle thread pivotally mounted beneath said throat plate, and means in timed relation with the movement of the work clamp and its feeding means for operating the said pull off lever.

6. In a sewing machine the combination with a throat plate, of two slides mounted beneath same, a rocking lever pivoted to a point stationary with said throat plate, links from opposite ends of said rocking lever connected with said slides, means connected with one of said slides for reciprocating same, an upper thread trimmer carried by

one said slide, a lower thread trimmer carried by the other said slide, and a gripper for the lower thread also carried by the last said slide.

7. In a sewing machine the combination with a throat plate and a reciprocating slide mounted beneath same, said slide having a portion constituting a gripping surface stationary relatively to said slide, a gripping member pivoted to said slide arranged for co-action with said gripping surface, a spring arranged to bear against the opposite side of said pivoted gripping member, said pivoted member and spring also co-acting to form a second set of gripping surfaces, and a trimming knife rigidly secured to said slide between the gripping surfaces and the throat plate.

8. In a sewing machine the combination with a throat plate, of two slides mounted to reciprocate beneath same, a connection between the slides compelling simultaneous movement thereof in opposite directions, a horizontally arranged trimming knife carried by one said slide, gripping means carried by the same slide immediately beneath the said trimming knife, a trimming knife carried by the other said slide arranged with its cutting edge at right angles to the cutting edge of the other said knife, said throat plate arranged with a shoulder for co-action with the said trimming knife, and means for moving a thread of the machine laterally in front of said shoulder across the path of movement of the last said knife.

9. In a sewing machine the combination with a reciprocating needle bar and a needle thread trimming device, of a gripping member pivoted to a stationary point adjacent the said needle bar, said gripping bar having a portion adapted when operated to directly engage the said needle bar and to grip the needle thread between itself and the said needle bar, manually operated means for effecting a cutting operation of the said trimmer, and a connection between the said gripper and the said manually operated means for causing the operation of the said gripper just prior to the operation of the said trimmer.

10. In a two thread sewing machine, the combination with a bed plate, lower thread mechanism arranged beneath the bed plate, and upper thread mechanism including a reciprocating needle arranged above the bed plate, of a throat plate located in an opening in the said bed plate, a slide mounted to reciprocate immediately beneath the said throat plate, a trimming knife for the lower thread carried by the said slide near its upper surface whereby said knife rests immediately against the under surface of the throat plate, a gripper carried by the slide beneath the trimming knife, and means for reciprocating

the slide to sever the thread, grip the thread end and draw thread from the source of supply.

11. In a two thread sewing machine the
5 combination with a throat plate, of a slide
mounted beneath the throat plate, a trim-
ming knife for the lower thread mounted
upon the said slide and relatively stationary
therewith, a gripper mounted upon the said
10 slide beneath the knife, said gripper adapted
to engage and grip the said lower thread, and

means for reciprocating the said slide to
cause the gripper to engage the lower thread,
the trimmer to sever same and the gripper in
its further movement to draw out thread 15
from the source of supply after it has been
severed by the trimming knife.

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Witnesses:

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