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J. DOERR ET AL

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THREAD SEVERING DEVICE FOR SEWING MACHINES

Filed Dec. 9, 1955

3 Sheets-Sheet 1

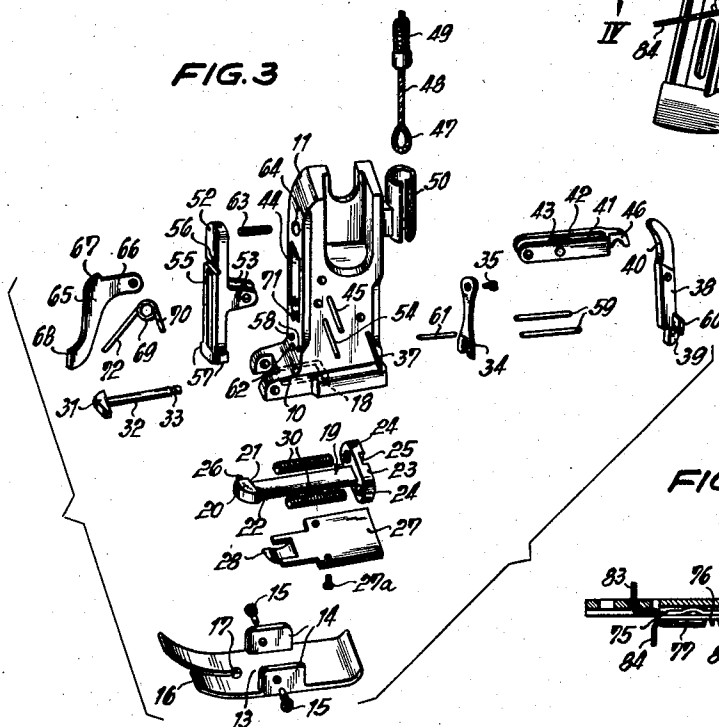
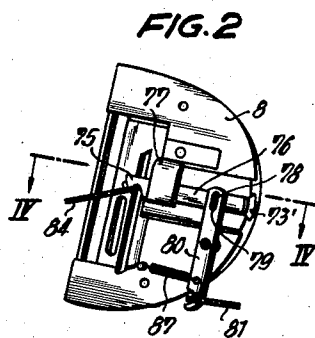
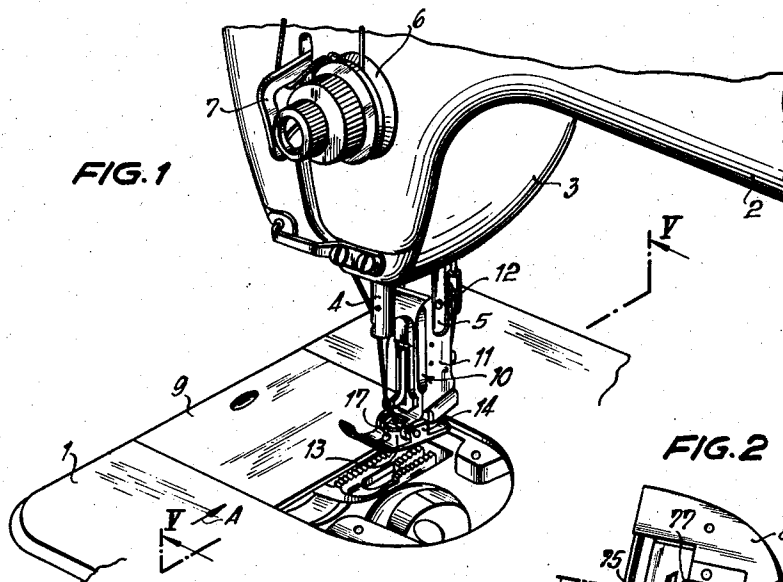
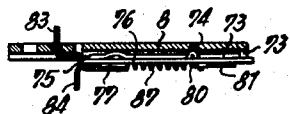


FIG. 4



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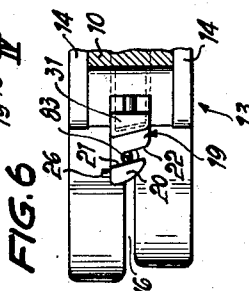
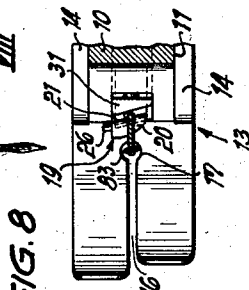
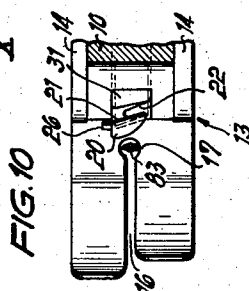
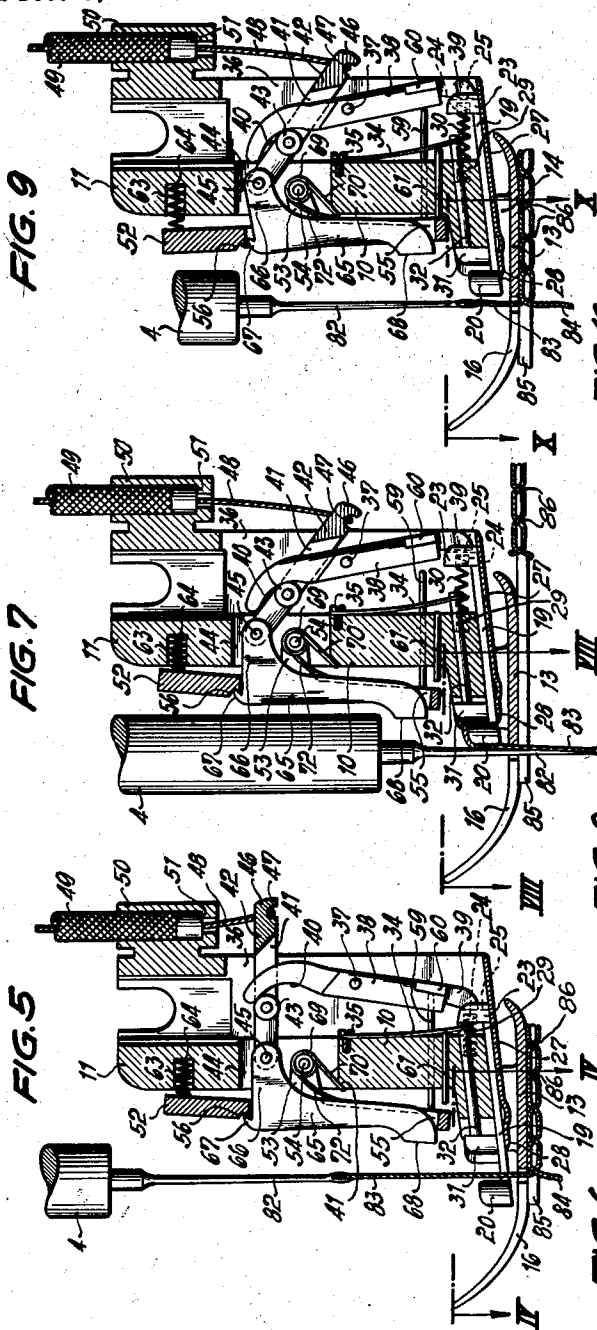
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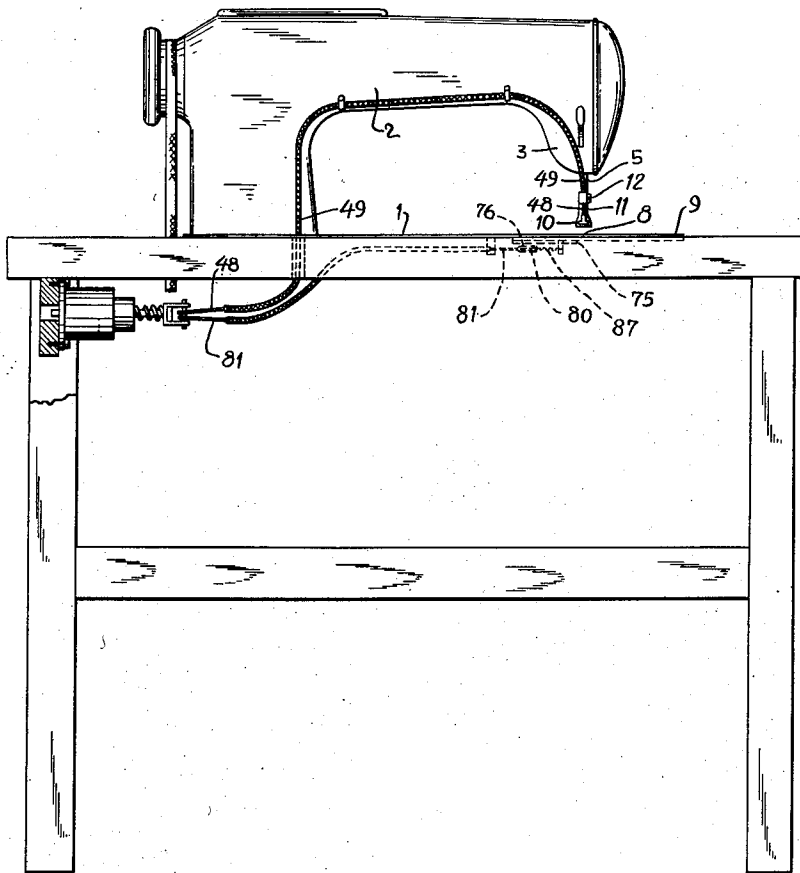
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THREAD SEVERING DEVICE FOR SEWING MACHINES

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Fig. 11



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THREAD SEVERING DEVICE FOR SEWING MACHINES

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12 Claims. (Cl. 112—252)

The invention relates to sewing machines, and relates more particularly to a thread severing device for use in connection with a sewing machine. Still more particularly, the invention relates to a thread severing device for cutting the upper thread as well as the lower thread on a sewing machine.

The invention has among its objects to provide for the severance of the upper and lower threads of a sewing machine, characterized by simple means of actuation and subsequent automatic thread release.

It is a further object of the invention to provide such a device which will cut the upper and lower threads adjacent the upper and lower surfaces of the work-piece.

It is a still further object of the invention to provide such a device which will first clamp the threads, thereafter cut them, and subsequently release them.

The foregoing and other objects of the invention will be best understood from the following description of exemplification thereof, reference being had to the accompanying drawings, wherein:

Fig. 1 is a fragmentary perspective view of a sewing machine with a built-in thread severing device in accordance with the invention; the needle plate has been removed in the illustration of Fig. 1 to expose the parts below the needle plate;

Fig. 2 is an underside perspective view of the needle plate including the parts of the device for use in severing the lower thread;

Fig. 3 is an extended perspective view of the needle severing device;

Fig. 4 is a sectional view of the needle plate, taken on line IV—IV of Fig. 2;

Fig. 5 is a large scale fragmentary vertical sectional view, taken on line V—V of Fig. 1, showing the parts in position during the first step of the severing operation;

Fig. 6 is a fragmentary plan view, partly in section, taken on line VI—VI of Fig. 5;

Fig. 7 is a fragmentary large scale vertical sectional view similar to Fig. 5, but showing the parts positioned as during the second step of the severing operation, when the thread is actually cut;

Fig. 8 is a fragmentary plan view, partly in section taken on line VIII—VIII of Fig. 7;

Fig. 9 is a fragmentary large scale vertical sectional view similar to Fig. 1, but showing the parts released after thread cutting;

Fig. 10 is a fragmentary plan view, partly in section taken on line X—X of Fig. 9;

Fig. 11 is an elevational view of a sewing machine with a thread severing device in accordance with the invention.

In carrying the invention into effect in one of the embodiments which has been selected for illustration in the accompanying drawings and for description in this specification, and referring now particularly to Figs. 1-3, there is provided a sewing machine that is supported on a work table 1, and comprises an arm 2 and a head 3.

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A needle-bar 4, and a presser bar 5 for a sewing foot, are journaled for reciprocal movement in the head 3. The presser bar 5 operates a thread-tensioner 6 as well as a thread regulator 7. In a recess of the work table 1 there is secured a needle plate 8 (Fig. 2), and a bed plate slide 9 is guided in that recess.

A pressure foot 10 is provided which has a hollow body 11 that is removably connected to the lower end of the presser bar 5 by means of a screw 12 (Fig. 1). A sewing foot 13 is tiltably hinged with two lugs 14 to the lower forward end of the pressure foot 10, by means of screws 15. The sewing foot 13 is provided with a sectional slot 16 which includes a needle hole 17.

In the bottom surface of the body 11 there is formed a guide recess in which there is guided for reciprocating sliding movement a slide 19 (Figs. 3 and 5). The slide 19 carries on its front end an outer vise jaw 20 that has a rear edge 21. Adjacent the rear edge 21 there is formed on the slide 19 a slot 22 (Figs. 3 and 6) which extends from a lateral edge of the slide 19 inwardly to a point mid-way of the width of the slide 19. The rear edge 21 as well as the slot 22 are inclined relative to the direction of reciprocation of the slide 19, as best shown in Fig. 6. On the rear end, the slide 19 carries a flange 23 (Figs. 3, 5, and 7) which has two forward facing recesses 24 and a rearward facing groove 25. The vise jaw 20 carries a pin 26 (Figs. 3 and 6), which can abut against the lower front surface of the body 11 (Fig. 8) to limit the rearward movement of the slide 19.

A plate 27 is mounted to the underside of the body 11; it is formed on its front as a cutter 28, and the connection to the body 11 may be made by screws, for instance by screws 27a (Fig. 3). The body 11 has two recesses 29 (Fig. 7) which are disposed opposite to, and in alignment with, the recesses 24 of the flange 23 of the slide 19. Compression springs 30 (Figs. 3 and 7) are disposed in the opposite recesses 24 and 29 and normally urge the slide 19 into the rearwardmost position (Fig. 7) wherein the pin 26 abuts against the body 11.

An inner vise jaw 31 (Figs. 3 and 5) is carried at the forward end of a rod 32, and the rod 32 is guided for reciprocation in the body 11. The inner vise jaw 31 is in sliding engagement with the top surface of the slide 19, rearwardly of the outer vise jaw 20, and co-operates with the said outer vise jaw 20 for releasably clamping the upper thread. The rod 32 extends to the hollow interior of the body 11, and has on the rear end portion an annular groove 33 (Fig. 3). A leaf spring 34 (Figs. 3 and 7) has on its lower end a bifurcation which engages the groove 33 of the rod 32. The spring 34 is disposed uprightly, and is connected with its upper end to the body 11 by means of a screw 35. The rod 32 and the inner vise jaw 31 are movable between a forwardmost position (Fig. 5) and a rearwardmost position (Fig. 9).

The body 11 has a vertical hollow chamber 36, into which there extend the rear portions of the slide 19 and of the rod 32. The spring 34 is disposed in the chamber 36. In this chamber 36 there is furthermore tiltably movable a reciprocable lever 38 (Figs. 3 and 5) which is pivoted at 37. The reciprocable lever 38 is tiltable between two extreme positions, namely an active position (Fig. 5) wherein its lower end is disposed forwardmost, and an inactive position (Fig. 9) wherein its lowermost end is disposed rearwardmost. The lower part 39 (Figs. 3 and 5) of the lever 38 engages the groove 25 of the flange 23. The upper part of the lever 38 is curved and forms a cam follower 40 for a cam roll 43. The roll 43 is carried on a tiltable retractable actuating lever 42 (Figs. 3 and 5) which is pivoted with its forward end about a pin 45 in a recess 44 to the body 11. The lever 42 has a slot 41 through which there extends

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the cam follower 40 of the lever 38. The actuating lever 42 is movable between a substantially horizontal set position (Fig. 5) and an inclined rest position (Fig. 9). When the lever 42 is lifted to the set position, the roll 43 will press the cam follower 40 rearwardly, thereby turning the lever 38 causing the lower end portion 39 thereof to compress the compression springs 30 and to push the slide 19 forwardly. The lifting of the tiltable lever 42 to the set position (Fig. 5) is controlled by a lifting mechanism 49 that includes a rope or cable 48 that engages with a loop 47 (Fig. 3) the free end of the lever 42. The lifting mechanism 49 may be controlled from electromagnetic actuating means 87 (Fig. 11). When the lifting mechanism is released, the springs 30 will turn the lever 38 in the opposite direction, thereby returning the lever 38 as well as the tiltable lever 42 to their inactive positions. The lifting mechanism 49 includes a tube 51 seated in a tubular extension 50 of the body 11.

A tiltable member 52 is hinged to the body 11 and has its major portion disposed frontwardly of the face of the body 11. The tiltable member 52 includes two parallel lugs 53 that extend into the frontal recess 44 of the body 11 and are pivoted to the body 11 about a pin 54. The pin 54 is disposed lower than the pin 45 of the lever 42. The tiltable member 52 is provided with a central upright slot 55 and has a horizontal groove 56 formed in the front face above the slot 55. The lower part of the tiltable member 52 is provided with lateral flanges 57 (Fig. 3) against which there abut from the rear two pressure rods 59 which are slidably guided in horizontal bores 58 of the body 11. The pressure rods 59 extend rearwardly into the hollow chamber 36 of the body 11, and their rear ends extend into the path of lateral flanges 60 which are formed on the lower end portion of the lever 38. A rod 61 is provided which is guided in a horizontal bore 62 of the body 11, and disposed mid-way between the pressure rods 59 and located below the same. The front end of the rod 61 is disposed for abutment with a bridge portion of the tiltable member 52 that is formed below the slot 55 thereof, and the rear end of the rod 61 extends to the chamber 36 and is adapted to abut against the front face of the upright leaf spring 34.

A compression spring 63 (Fig. 5) extends from a recess that is formed in the front surface of the body 11, and exerts pressure with its front end against the top portion of the tiltable member 52, urging the latter into a rest position (Fig. 9) wherein the tiltable member 52 presses rearwardly the pressure rods 59 and the rod 61, whereby the rods 59 will press rearwardly the lower portion of the lever 38, and the rod 61 will press rearwardly the lower end of the leaf spring 34.

A latch member 65 (Figs. 3 and 5) extends through the slot 55 of the tiltable member 52, and has an extension 66 which is pivoted about the pin 45 to the body 11. The upper end of the latch member 65 forms a rearwardly projecting finger 67 which is adapted, when in the active position (Figs. 5 and 7), to engage the groove 56 of the front face of the tiltable member 52. The lower forward end of the latch member 65 is pointed frontwardly and forms a nose 68 which is adapted to cooperate with the needle bar 4; the nose 68 projects in the active position of the latch member 65 (Figs. 5 and 7) into the path of the needle bar 4, and may be engaged by the needle bar 4 to tilt the latch member 65 into the rest position (Fig. 9) thereof.

A spiral spring 69 (Fig. 5) surrounds the pivot pin 54, and exerts pressure with one arm 70 against the lower edge 71 of the slot 44 of the body 11, and with its other arm 72 exerts pressure from the rear against the latch member 65. The spring 69 tends to turn the latch member 69 into the active position (Figs. 5 and 7).

On the underside of the needle plate 8 (Figs. 2 and 4) there is mounted a thread severance device, of con-

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ventional construction, for the lower thread 84. It comprises a guiding groove 72 that extends at right angle to the work feeding direction A (Fig. 1). A cutting knife 73 (Fig. 4) is secured to the needle plate 8 by means of a counter-sunk screw 74. A slide 76 is in a sliding engagement with the cutting knife 73, and is guided in the groove 72, and includes a hook 75. A spring 77 presses the slide 76 towards the cutting knife 73. A pin 78 extends downwardly from the slide 76, and projects into a slot 79 of one arm of a lever 80 that is journaled on the underside of the needle plate 8. The other arm of the lever 80 is connected to a pulling device 81 and to a retraction spring 87.

The operation of the above described device is as follows:

A work piece 85 (Figs. 5, 7) is provided with a seam 86. The needle thread or upper thread 83, and the lower thread 84, are to be cut off. As a first step, the operator will move the needle bar 4 approximately to the topmost position (see Fig. 5) and thereafter will cause the cable 48 to be pulled upwardly to lift the lever 42 into its horizontal upper position (Fig. 5). The lifting of the cable 48 of the lifting mechanism 49 may be accomplished by the actuation of the electromagnetic actuating means 87 to which the cable 48 is connected. The lifting of the cable 48 causes turning of the tiltable lever 42 from the rest position (Fig. 9) to the set position (Fig. 5).

During the upward tilting movement of the actuating lever 42, the roll 43 thereof will push to the rear the cam follower portion 40 of the reciprocable lever 38, thereby tilting the lever 38 about the pivot 37, from the inactive position (Fig. 9) to the active position thereof (Fig. 5). The lower part 39 of the lever 38 engages the groove 25 of the flange 23 of the slide 19, and during the tilting to the active position will push the slide 19 together with the outer vise jaw 20 forwardly towards the upper thread 83. In the raised position of the needle bar 4 (Fig. 5) the upper thread 83 is tensioned vertically and, when the slide 19 is pushed forwardly, the upper thread 83 will be engaged by the inclined slot 22 of the slide 19 (Figs. 5 and 6).

During the tilting movement of the lever 38 to the active position, the lateral flanges 60 thereof will push forwardly the pressure rods 59, causing rotation of the tiltable member 52 from the rest position (Fig. 7) into the active position (Fig. 5). This turning of the tiltable member 52 is about the pivot 54, and against the pressure of the spring 63. During this turning of the tiltable member 52 to the active position, the latch member 65 will, under the pressure of the spring 69, be tilted about the pivot pin 45, and will engage with its finger 67 the horizontal groove 54 of the tiltable member 52, coming to rest in the active position in which the nose 68 projects into the vertical path of the needle bar 4 (Fig. 5).

By the forward movement of the lower part of the tiltable member 52, the rearward pressure that had been exercised against the rod 61 will be released, thereby releasing the leaf spring 34 which will push forwardly the rod 32 and thereby place the inner vise jaw 31 in the forwardmost position (Fig. 5).

Upon release of the pedal (not shown) of the lifting mechanism 49, the lever 42 will be released and will rotate downwardly about the pivot pin 45 to its rest position (Fig. 7). Thereupon the springs 30 will retract the slide 19, and the latter will return the lever 38 from the active position (Fig. 5) into the inactive position (Fig. 7).

The upper thread 83 which passes through the slot 22 (Fig. 6) will by the rearward movement of the slide 19 first be pressed by the outer vise jaw 20 against the inner vise jaw 31 which is pressed forwardly by the leaf spring 34. Both vise jaws 20 and 31, which form clamping means for the upper thread 83, thereafter will slide together rearwardly for a distance while still gripping the thread 83, until the outer vise jaw 20 is arrested in its rearward

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movement by the abutment impact between the pin 26 and the lower front surface of the body 11 (Fig. 8). During this tied rearward movement of the two jaws, the thread will be cut by the cutter 28 which is disposed below the slide 19. The underside of the outer vise jaw 20 forms a shearing edge that cooperates with the cutter 28 to sever the upper thread 83.

After the lever 38 has been returned to the inactive position (Fig. 7), the latch member 65 will still remain in the upwardly tilted position wherein its nose 68 projects forwardly into the path of the needle bar.

Simultaneously with the cutting of the upper thread 83 there will be cut the lower thread 84. The electromagnetic actuating means 87 which actuates the pulling mechanism 49, also pulls at the same time the pulling device 81 (Fig. 2), to tilt the lever 80 to move thereby the hook 75 of the slide 76 towards the needle path until the slot behind the hook 75 is positioned in registry with the stitching hole of the needle plate 8. The hook 75 will engage the lower thread 84 and, upon release of the pulling device 81, the spring 87 will retract the slide 76 and the thread 84 will be cut by the knife 73. The end of the lower thread 84 will be engaged between the spring 77 and the underside of the slide 76.

The pressure foot 10 may be lifted in a conventional manner for the removal of the work piece 85, and work may be resumed thereafter at any desired place of the work piece 85 following lowering of the pressure foot 10.

When the work on the sewing machine is resumed by the needle 82, the upper thread 83 will remain gripped between the jaws 20 and 31 (Fig. 7) until the needle bar 4 by impact actuation with the nose 68 returns the latch member 65 to the rest position (Fig. 9). Upon such impact, the finger 67 will be moved out of the groove 56 and will be positioned as shown in Fig. 9. At the same time, the movable member 52 will be tilted by the force of the spring 63, whereby the rod 61 will again tension the leaf spring 34 causing a further rearward movement of the inner jaw 31 (Figs. 9 and 10). By this further rearward movement of the inner jaw 31, the vise grip of the upper thread 83 will be released, and the thread 83 thereafter be moved by the needle 82 into the work piece 85 almost to its severed end, rendering possible the forming of a new seam after picking up the lower thread 84.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent, is as follows:

1. In a thread severing device for sewing machines having a pressure foot and a needle plate and a needle bar carrying a needle, in combination, a first mechanism disposed below said needle plate for severing the lower thread, and a second mechanism operable for severing the upper thread and comprising a body connected to said pressure foot a cutter connected to said body and a releasable vise including jaws guided in said body for movement adjacent said cutter reciprocally in opposite directions towards and from the path of said needle and engaging and being settable for gripping said upper thread, said vise and cutter cooperating for severing said thread, means operable for moving said jaws from a rest position towards said needle path, and resilient means urging said jaws to return to said rest position, vise release means connected to said body and being movable between an active position wherein it projects into the path of said needle bar and blocks the return of one jaw and, respectively, an inactive position wherein it is spaced from said path and unblocks said one jaw, and means moving said release means into said active position during movement of said vise towards the needle path, said needle bar actuating said release means by impact during the last phase of the next succeeding downward stroke to return

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the release means to the inactive position thereby to release said vise.

2. In a thread severing device for sewing machines having a pressure foot and a needle plate and a vertically movable needle bar carrying a needle, in combination, a first mechanism disposed below said needle plate for severing the lower thread, and a second mechanism connected to said pressure foot and operable for severing the upper thread and comprising a body connected to said pressure foot, a cutter connected to said body, and releasably actuable thread clamp means guided in said body and being adjacent said cutter movable towards, and retractable from, the path of said needle for first clamping said thread, said clamp means cooperating with said cutter for severing said thread thereafter, said clamping means being releasable for subsequently releasing the upper thread, means operable for moving said jaws from a rest position towards said needle path, and resilient means urging said jaws to return to said rest position, vise release means connected to said body and being movable between an active position wherein it projects into the path of said needle bar and blocks the return of one jaw and respectively, an inactive position wherein it is spaced from said path and unblocks said one jaw, and means moving said release means into said active position during movement of said vise towards the needle path, said needle bar actuating said release means by impact during the last phase of the next succeeding downward stroke to return the release means to the inactive position thereby to release said vise.

3. In a device as claimed in claim 2, together with, means for actuating said clamping means comprising a retractable first lever pivoted to said body and including a cam, a reciprocally movable second lever movable to and from a position of engagement with said clamping means and operable to actuate the same upon engagement and including a cam follower for said cam and operable to be moved by said first lever to said position to actuate said clamping means to engage said thread, and resilient means operable to return said second lever and to close and to retract said clamping means following retraction of said lever.

4. In a device, as claimed in claim 2, the underside of one of said vise jaws forming a shearing head cooperating with said cutter to sever said upper thread.

5. In a device, as claimed in claim 2, said vise release means including a tiltable member pivoted to said body for tilting about a horizontal axis, and a latch member pivoted to said body and operable to be tilted for setting together with said control member and having a nose projecting in the set position into the path of said needle bar.

6. In a device, as claimed in claim 5, said tiltable member having parallel of its tilting axis a groove, said latch member being pivoted at a point below the pivot of said tiltable member and including a finger engaging in the set position said groove to latch said tiltable member in said position.

7. In a device, as claimed in claim 5, together with, resilient means urging said latching member towards the set position and urging said tiltable member from the set position.

8. In a thread severing device for sewing machines having a pressure foot and a needle plate and a needle bar carrying a needle, in combination, a first mechanism disposed below said needle plate for severing the lower thread, and a second mechanism operable for severing the upper thread comprising a body connected to said pressure foot, a cutter connected to said body, and thread clamp means guided in said body for movement adjacent said cutter towards and from the path of said needle and being operable for clamping the upper thread and subsequently cooperating with said cutting means for thread severing and thereafter releasing the upper thread, said clamp means including two jaws, resilient means urging said jaws to close, means for moving one jaw to engage

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said thread and subsequently releasing it for gripping the thread between said jaws, resilient means operable for moving said clamp means with closed jaws past said cutter for thread severance and means for moving the other jaw away from the first to release the thread thereafter, said means for moving said other jaw including a tiltable member pivoted to said pressure foot and tiltable between a set position and a clamp releasing position, a spring connected to said other jaw and normally urging said other jaw towards said one jaw, and a rod guided in said pressure foot and operable to be moved by said tiltable member upon release thereof into abutment with said spring to move the same against its tension to move said other jaw away from said one jaw thereby breaking the grip of said clamp means.

9. In a device, as claimed in claim 8, together with, means for setting said tiltable member comprising at least one pressure rod guided for shifting in said body and operable to abut against said tiltable member for tilting it into the set position, said means for moving said one jaw including a movable lever, an extension formed on

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said lever, said pressure rod extending into the path of said extension, whereby said extension of said lever will shift said pressure rod to set said tiltable member.

10. In a device, as claimed in claim 8, together with, 5 abutment means between said one jaw and said body for limiting the movement thereof in the direction from said needle path.

11. In a device, as claimed in claim 8, together with, 10 pulling devices for said mechanisms operable from the exterior of said sewing machine.

12. In a device, as claimed in claim 11, said pulling devices comprising electromagnetic pulling means.

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