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E. SCHENKENGEL

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THREAD CUTTING DEVICE FOR SEWING MACHINES

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FIG. 1

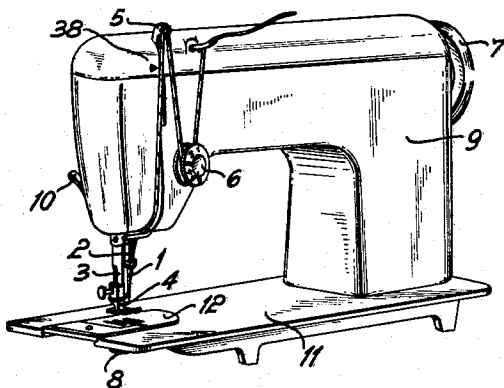


FIG. 5

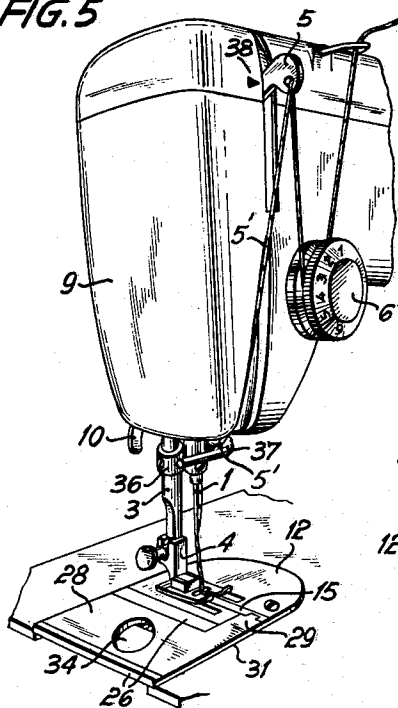


FIG. 2

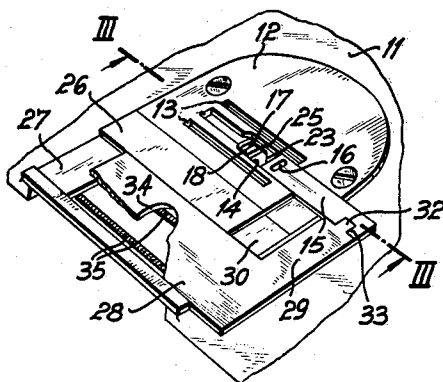


FIG. 3

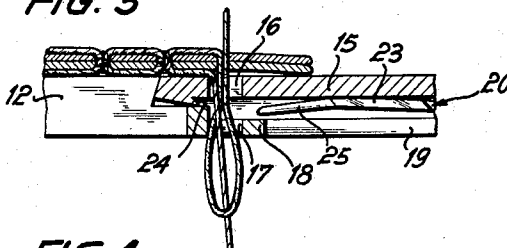
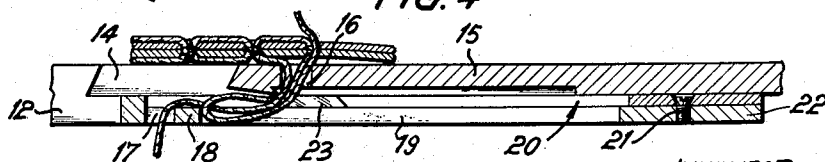


FIG. 4



INVENTOR:
EMERICH SCHENKENGEL
BY

W. H. 764
ATTORNEY

1

2

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THREAD CUTTING DEVICE FOR SEWING MACHINES

Emerich Schenkengel, Kaiserslautern, Pfalz, Germany, assignor to G. M. Pfaff AG, Kaiserslautern, Pfalz, Germany, a corporation of Germany

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11 Claims. (Cl. 112—252)

The present invention relates to a thread cutting device for sewing and the like machines, more particularly to improved means for cutting the upper or needle thread and the lower or looper thread of a lockstitch sewing machine upon the completion of a sewing operation.

Among the objects of the invention is the provision of a device of this type for effectively and expeditiously cutting or severing the needle and looper threads of a lockstitch sewing machine at a point close to and without displacement of the work being operated on and at a relative position of said threads subsequent to release of the needle thread loop by the loop taker of the machine.

It has already become known, in order to sever the threads of a sewing machine, to lift the work from the worktable or cloth plate, after the formation of the needle thread loop by the loop taker of the machine and after raising of the work presser foot, and to thereafter cut the stretched portions of the needle and looper threads by means of a cutting knife or the like instrument. A method of thread cutting of this type, aside from having other drawbacks and defects, has the disadvantage of causing slippage or of displacement of the work or sewing material during the presser foot lifting and thread cutting operations. As a consequence, an excessive length of both the needle and looper threads may be extracted, whereby to make it necessary for the operator to carry out the cutting of the threads with great care blindly or sightlessly underneath the work. As a result, this method of thread cutting is both time consuming and subject to the further drawbacks of damaging the work by the cutting knife and the fact that unequal lengths of the cut threads cannot be avoided in practice.

Accordingly, a more specific object of the present invention is the provision of improved thread cutting means structurally embodied in a lockstitch sewing machine by which the above and related difficulties and drawbacks are substantially overcome and which may be operated easily and expeditiously, substantially without requiring any special skill, while ensuring a uniform and efficient cutting or severing of the threads of the machine upon the termination of a sewing operation.

Another object of the invention is the provision of a thread cutting device of the above type which is both simple in construction and which may be readily structurally embodied in conventional lockstitch sewing machines without requiring essential changes of the construction of the machines.

Yet another object of the invention is the provision of a needle and loop taker thread cutting device of the type referred to being structurally embodied in a lockstitch sewing machine and which will result in the free or cut ends of the threads having a uniform and minimum length adequate for the commencement of a subsequent stitching operation by the machine.

The invention, both as to its ancillary objects and novel aspects, will be better understood from the following detailed description taken in conjunction with the accompanying drawing forming part of this specification and wherein:

FIG. 1 is a perspective view of a conventional lockstitch sewing machine having embodied therein thread

cutting mechanism constructed according to the principles of the invention;

FIG. 2 is a partial view on an enlarged scale showing in greater detail the construction of the thread cutter forming part of FIG. 1, the cutting device being shown in the operative or extended position;

FIG. 3 is a partial sectional view on a still greater scale, taken on line III—III of FIG. 2 and showing the cutting device in the inoperative or retracted position;

FIG. 4 is a view similar to FIG. 3 with the cutting device being shown in the operative or extended position; and

FIG. 5 is a further and enlarged partial perspective view of FIG. 1, showing the head of the sewing machine and the thread cutter in the retracted or inoperative position.

Like reference numerals denote like parts in the different views of the drawing.

With the foregoing objects in view, the invention involves generally the provision of improved thread cutting mechanism for lockstitch sewing machines, whereby the upper or needle thread, in its position subsequent to its release by the loop taker is situated as to form a loop below the stitching plate, or before passing the stitching opening therein and after stoppage of the machine and lifting of the work presser foot, is locked at a point between the needle thread take-up lever and the needle, such as by clamping the thread simultaneously with the raising of the presser foot against the head or housing of the machine, whereupon after pulling off a maximum of thread supply from the upper thread tension device, a slide having a cutting edge and mounted upon the stitching plate of the machine is operated together with the work overlying the same in a direction opposite to the work feeding direction against and into operative position with the edge of a fixed cutting knife, in such a manner as to extract the looper thread and to cut or sever the needle thread loop and the extracted looper thread at a point close to the undersurface of the work or sewing material being operated on.

As a consequence, the severing of the upper and lower threads, in a lockstitch sewing machine is greatly simplified and improved by the device and method of the invention, primarily by reason of the fact that the cutting or severing of the threads is effected without lifting or displacing the work during the cutting operation.

According to a preferred constructional embodiment of the invention, the thread cutter slide is provided with a lateral extension of adequate size and provided with a gripping hole or recess, whereby by engagement of said hole and in turn of the work or sewing material overlying the same by the finger of the operator, the work will be displaced together with and in the same direction as the cutter, in such a manner as to extract an adequate amount of the lower or looper thread required for and to facilitate the thread cutting operation. The slide and its extension advantageously have an upper surface being flush with the surface of the work or stitching plate of the machine, to avoid any projecting parts interfering with the operation of the machine, while enabling a safe and positive gripping and movement of both said slide and the work during a thread cutting or severing operation, as will become further apparent as the following description proceeds.

Referring more particularly to the drawings, FIG. 1, there is shown a sewing machine comprising a needle 1 attached to a reciprocating needle bar 2, a work presser foot bar 3 carrying a work presser foot 4, an oscillating take-up lever 5 for the upper or needle thread 5', a thread tension device 6, a hand wheel 7 and a looper or loop taker 8, all of conventional construction and arranged for operation by suitable drive and actuating means

3

mounted within the housing 9 and underneath the worktable or cloth plate 11 of the machine and omitted in the drawing for simplicity of illustration and as being unnecessary for the understanding of the present invention. Furthermore, means are provided to release the upper thread tension produced by the device 6 upon raising of the presser foot 4 by means of the presser foot actuating lever 10 mounted in the head of the machine, in a manner well known in the design and operation of conventional sewing machines.

Mounted upon the cloth plate 11 of the machine is a work or stitching plate 12 which, in addition to the usual recesses or slots 13, FIG. 2, to accommodate the work feeding dogs (not shown), is provided with a dove-tailed slot or recess 14 forming a guide for a first slide or actuating plate 15 being flush with the upper surface of the stitching plate 12 and movable outwardly or opposite to the work feeding direction, as understood from the drawing. The slide 15 is provided with a stitching opening 16 for passing the needle 1 which opening in the inoperative or retracted position of the slide, FIG. 3, is in register with the main stitching opening 17 in the plate 12.

Mounted above a slot 19 provided in the plate 12 underneath the slide 15 and spaced from the stitching opening 17, FIGS. 3 and 4, by a bridge or connecting member 18 at one end of said slot, is a knife or cutting blade 20 being secured to the further bridge or connecting member 22 of said plate at the opposite end of the slot 19 by means of a screw 21 or by any other securing means. The cutting edge 23 of the knife blade 22 is arranged to project into the path of a further cutting edge 24 provided upon the undersurface of the slide 15 and located normally behind the stitching opening 16 in respect to the movement of said slide. A guide 25 of the knife 22 disposed laterally of the cutting edge 23 is slightly bent in the downward direction to resiliently engage the bridge or connecting member 18 as shown in FIG. 3.

Mounted at a point adjacent to the stitching plate 12 and displaceable along the lengthwise axis of the sewing machine is a further slide or plate 26, FIG. 2, being provided with a slot or recess 27 wherein is mounted a further actuating slide or plate 28 displaceable in a direction transverse to plate 26 or parallel to the main slide or cutter actuating plate 15. Slide 28 has an angular extension 29 which in the retracted position of the knife or cutter occupies a depression 30 of the base plate 26 and a depression 31 of the stitching plate 12, whereby all the elements are flush with each other and the upper surface of plate 12 and projecting parts liable to interfere with the sewing operation are avoided. Extension 29 has a nose or projection 32 engaging a recess of the slide 15.

In order to manually operate the actuating slide 28, the latter is provided with a digital gripping opening or recess 34 and a pair of tension coil springs 35 are connected between the plate 26, on the one hand, and the slide 28, on the other hand, in such a manner as to normally urge the slide 28 and with it the main actuating slide 15 to the retracted or inoperative position within the stitching plate 12, as shown in FIG. 5.

Mounted upon the work presser foot bar 3, FIG. 5, by the aid of a support or holder 36 is a resilient clamping frame or the like 37 which with the presser foot being operated to its raised position serves to clamp the upper or needle thread 5' against the head or housing 9 of the sewing machine. An index or adjusting mark 38 upon the housing and disposed next to the thread take-up lever 5 serves to indicate the position of the latter corresponding to the position of the stitch forming tools at which the upper thread after release by the looper 8 still forms a small loop underneath the stitching plate 12 as shown in FIG. 3.

The operation of the thread cutter according to the invention will now be described in the following. After completion of a sewing operation or seam, the hand wheel 7 is rotated manually to a position such that the

4

thread take-up lever 5 is opposite to the index mark 38, as shown in FIG. 5. In this position, the needle thread has been released by the looper 8 and still forms a small loop underneath the stitching plate 12 or has not yet passed the stitching openings 16 and 17, as shown in FIG. 3. Operation of the presser foot lever 10 to move the presser foot to the raised position then causes the upper thread to be clamped by the frame 37 against the underside of the head of the housing 9, while at the same time releasing the upper thread tension 6 in a manner customary with conventional sewing machines. The hand wheel 7 may then be rotated to a position corresponding to the upper dead center point of the thread take-up lever 5, FIG. 1, whereby to result in the feeding of an adequate length of the upper or needle thread.

Cutting of the threads may then be effected by manually extending the slide 28 outwardly from the plate 12 as shown in FIG. 2 by digital engagement of the hole or recess 34, whereby the work or sewing material overlying said slide will be clamped against the edge of said hole, in such a manner as to displace the work together with and in the direction of the slide 28 and in turn of the slide or cutter operating member 15, as more clearly shown in FIG. 4. During this operation, the inside wall of the stitching opening 16 acts to exert a pull on the tensioned lower or looper thread which by passing over the bridge or connecting member 18 not only will be extracted from the looper bobbin but will additionally assist in the displacement of the work in the operating direction of the slide 15.

As a consequence, the next to the last stitching point from which protrudes the lower thread is displaced in a direction towards the stitching opening 16 of the slide 15, whereby to effect a severing of the lower thread and of the upper thread loop by the cutting edges 23 and 24 at an approximate position of the work where the two last preceding stitching points are spaced equally from said stitching opening. This will result in the cut ends of the threads remaining in the work to be of about the same length, on the one hand, and in the projecting ends of the threads left in the machine having a minimum length adequate for the commencement of a subsequent sewing operation.

The cut off ends of the upper thread loop in the meantime having entered the slot 19 are thus removed by gravity. Upon release of the slide 28, the latter together with the slide 15 returns to the inoperative or retracted position as a result of the action of the return springs 35.

In the foregoing, the invention has been described with reference to a specific operative device. It will be apparent, however, that variations and modifications as well as the substitution of equivalent parts or elements for those shown herein for illustration, may be made without departing from the broader scope and spirit of the invention as set forth in the appended claims. The specification and drawing are accordingly to be regarded in an illustrative rather than in a restrictive sense.

I claim:

1. In a sewing machine having a cloth plate, a head above said plate having mounted therein a reciprocating needle carrying a needle thread, a loop taker mounted below said plate and carrying a looper thread, for producing a lockstitch seam in the work fed along said plate by cooperation of said needle and loop taker, thread cutting means comprising clamping means to lock said needle thread, a stitching plate mounted upon said cloth plate and having a recess extending to an outer edge thereof and a stitching opening in the bottom of said recess for passing said needle, a slide plate movable within said recess, spring means to normally urge said slide plate to retracted position within said recess, said slide plate having a stitching opening in register with said first opening in the retracted position, index means in cooperative relation to a stitch-forming organ of said machine to indicate a predetermined position of said needle thread forming a

5

loop below said stitching plate after release from said loop taker, a cutter blade secured to said stitching plate underneath said slide and having a cutting edge spaced from said first stitching opening, said slide plate being provided with a cutting edge for cooperation with said first cutting edge and having a gripping recess for digital engagement by the operator, to enable operation of both said slide plate and the work overlying the same in the outward direction from said stitching plate against the action of said spring means, thereby to sever the needle and looper threads by said cutting edges at a point close to the undersurface of the work being operated on by said machine.

2. In thread cutting means according to claim 1, a work presser foot slidably mounted within said head, and means operably connecting said clamping means with said presser foot, to lock said needle thread in the raised position of said presser foot.

3. In thread cutting means according to claim 1, an oscillating needle thread take-up lever synchronized with said needle and said loop taker, said index means arranged upon said head for cooperation with said lever to indicate said predetermined position of said needle thread.

4. In thread cutting means according to claim 1, a presser foot bar slidably mounted in said head and carrying a work presser foot at its lower end, said clamping means consisting of a resilient loop connected to said presser foot bar, to clamp said needle thread against said head in the raised position of said presser foot.

5. In thread cutting means according to claim 1, a slot in the bottom of said recess of said stitching plate adjacent to said first stitching opening, to facilitate removal of the cut-off ends of the needle and looper threads.

6. In a sewing machine having a cloth plate, a head above said plate having mounted therein a reciprocating needle carrying a needle thread, a looper mounted below said plate and carrying a looper thread, for producing a lockstitch seam in the work fed along said plate by cooperation of said needle and said looper, thread cutting means comprising clamping means to lock said needle thread against said head, a stitching plate mounted upon said cloth plate having a recess extending to an outer edge thereof and having a stitching opening in the bottom of said recess for passing said needle, a slide plate within said recess flush with the upper surface of said stitching plate and movable between an operative and a fully retracted position within said recess, said slide plate having a stitching opening in register with said first opening in its retracted position, index means in cooperative relation to a stitch-forming organ of said machine to indicate a predetermined position of said needle thread forming a loop below said stitching plate after release from said loop taker, a stationary cutting blade underneath said slide plate having cutting edge spaced from said first stitching opening, said slide plate provided with cooperating cutting edge adjoining the stitching opening therein, a first right angular extension of said slide plate flush with and adjoining the outer edge of said stitching plate and a second extension from said first-mentioned extension and adjoining the edge adjacent to said first edge of said stitching plate, said last-mentioned extension being provided with a gripping recess for digital engagement by the operator, spring means to urge said slide plate and extensions to retracted position within said first recess, to enable operation of said slide plate and extensions and the work overlying the same in the outer direction from said stitching plate against the action of said spring

6

means, thereby to sever the needle and looper threads by said cutting edges at a point close to the undersurface of the work operated on by said machine.

7. In thread cutting means according to claim 6, an oscillating needle thread take-up lever synchronized with said needle and said looper and mounted upon said head, said index means arranged upon said head for cooperation with said lever to indicate said predetermined position of said needle thread.

8. In thread cutting means according to claim 6, a presser foot bar slidably mounted within said head and carrying a work presser foot at its lower end, said clamping means consisting of a resilient frame connected to said bar, to clamp said needle thread against said head in the raised position of said presser foot.

9. In thread cutting means according to claim 6, said stitching plate having a slot underneath said slide plate and extending to a position close to said first stitching opening, to facilitate removal of the cut off ends of said threads.

10. In combination with a sewing machine having a stitching plate, a reciprocating needle carrying a needle thread, a looper cooperating therewith and carrying a looper thread, to produce lock stitches in a work piece fed along said plate, an oscillating thread take-up lever synchronized with said needle and said looper index means in cooperative relation to a stitch-forming organ of said machine to indicate a predetermined position of said needle thread forming a loop below said plate after release from said looper, unitary cutting means mounted upon said plate to sever the interlinked needle thread loop and looper thread at a point close to the undersurface of the work, means to temporarily lock said needle thread at a point between said lever and said needle, and means operatively related to said cutting means to initially displace the work by said cutting means in the direction opposite to the work feeding direction and prior to the cutting of said needle and looper threads.

11. In combination with a sewing machine having a stitching plate, a reciprocating needle carrying a needle thread, a looper cooperating therewith and carrying a looper thread, to produce lock stitches in a work piece fed along said plate, an oscillating needle thread take-up lever synchronized with said needle and looper, visual index means in cooperative relation to a stitch-forming organ of said machine, to indicate the predetermined position of said needle thread forming a loop below said plate after release from said looper, means to temporarily lock said needle thread at a point between said lever and said needle, unitary cutting means supported by said plate, to sever the interlinked needle thread loop and looper thread at a point close to the undersurface of the work, and further means operatively related to said cutting means to initially displace the work by said cutting means in a direction opposite to the work feeding direction and prior to the cutting of said needle and looper threads.

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