Oct. 7, 1969 B. F. SAGANOWICH ET AL 3,470,835

THREAD SEVERING MECHANISM

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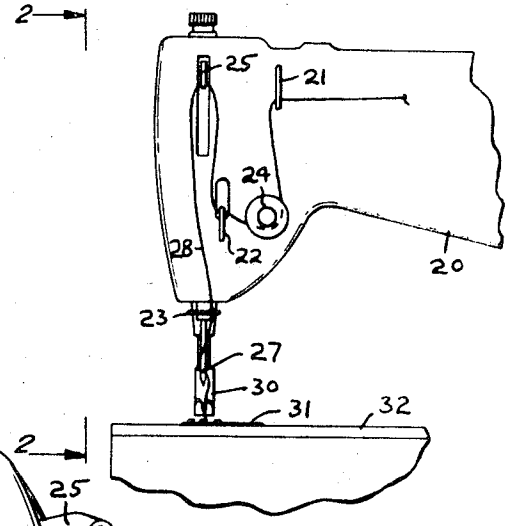
FIG. 1



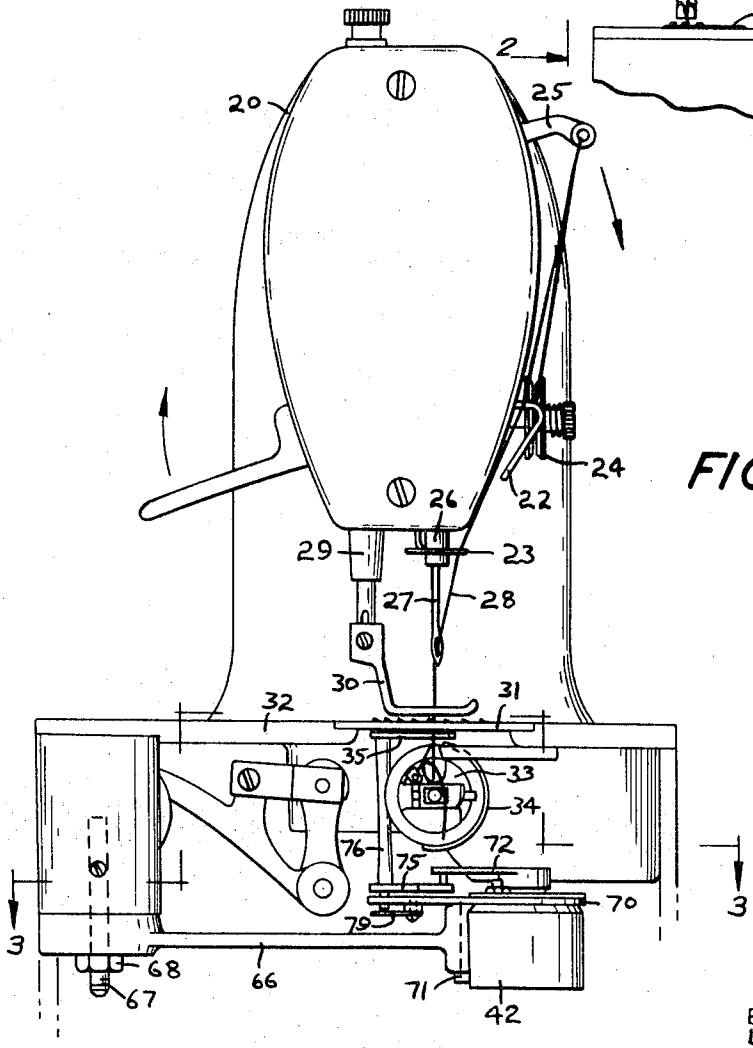


FIG. 2

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THREAD SEVERING MECHANISM

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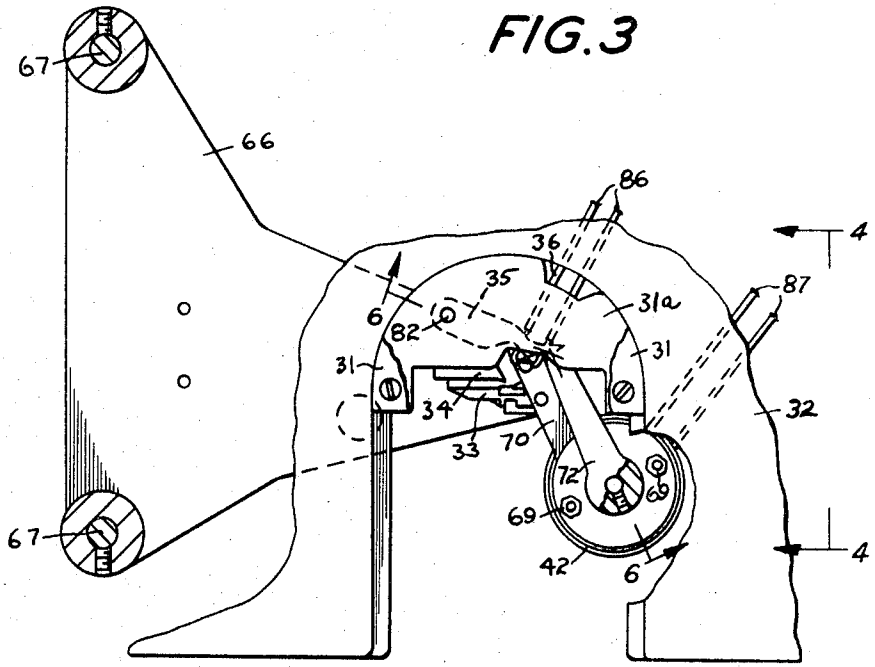
FIG. 3



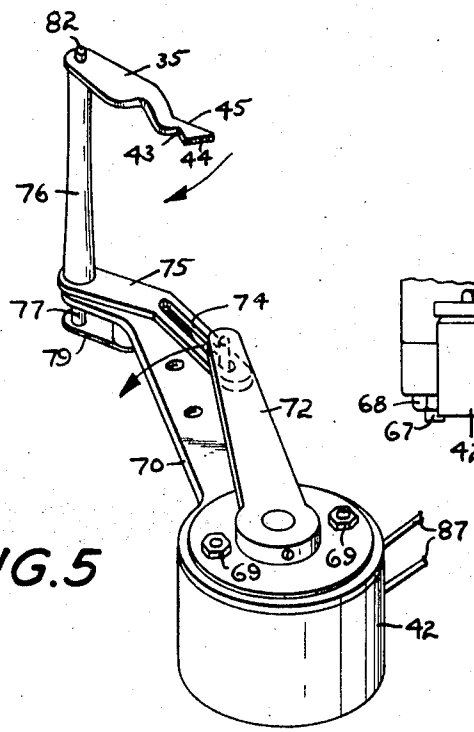


FIG. 5

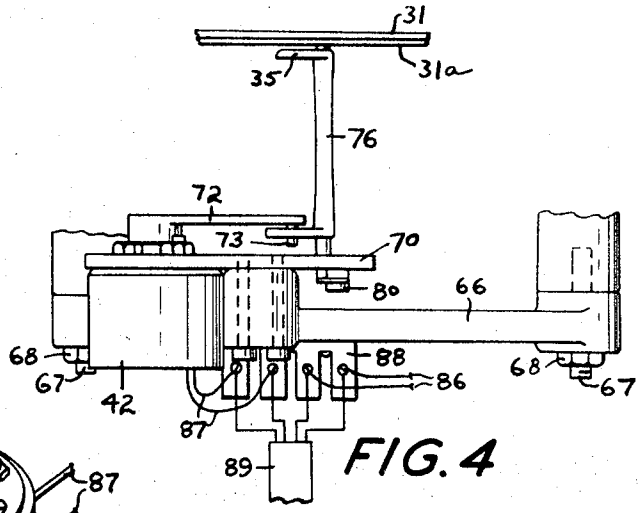


FIG. 4

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THREAD SEVERING MECHANISM

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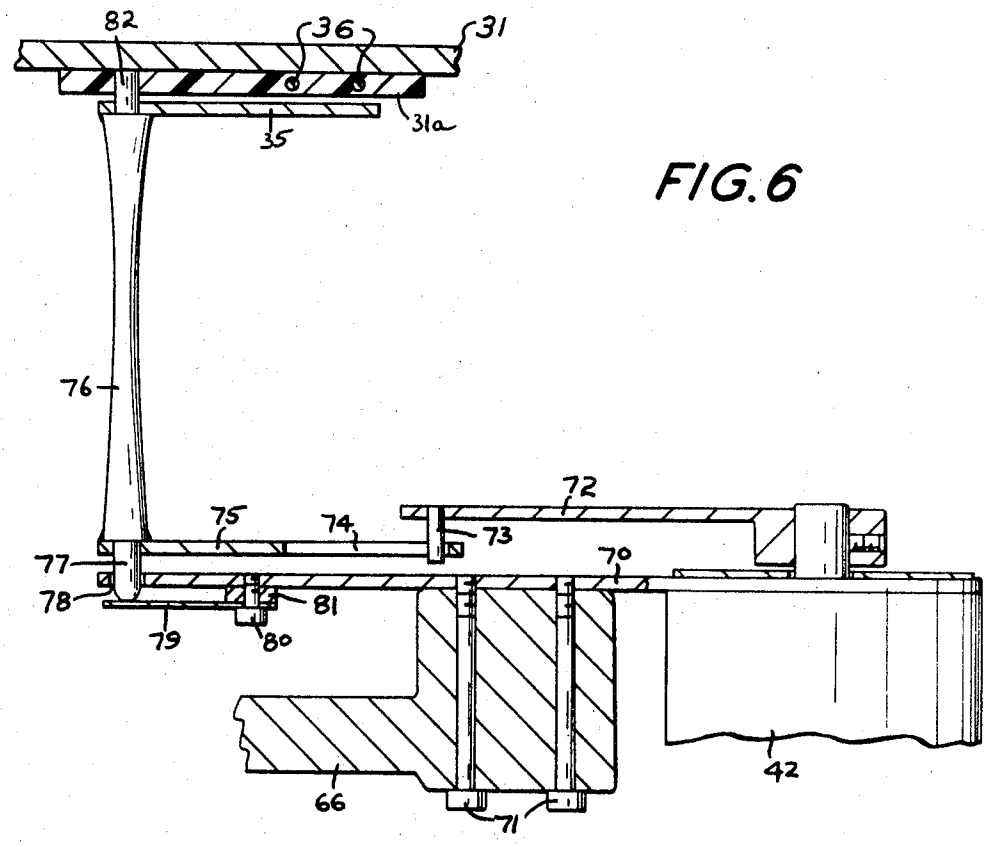

FIG. 6

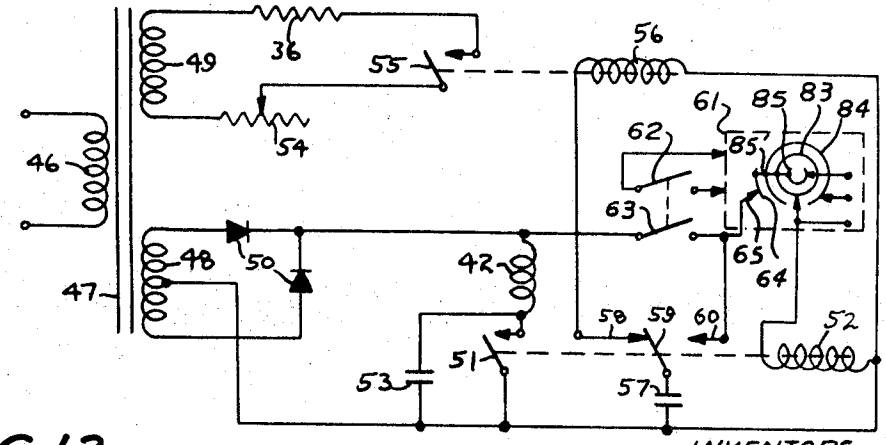

FIG. 13

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THREAD SEVERING MECHANISM

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FIG. 7

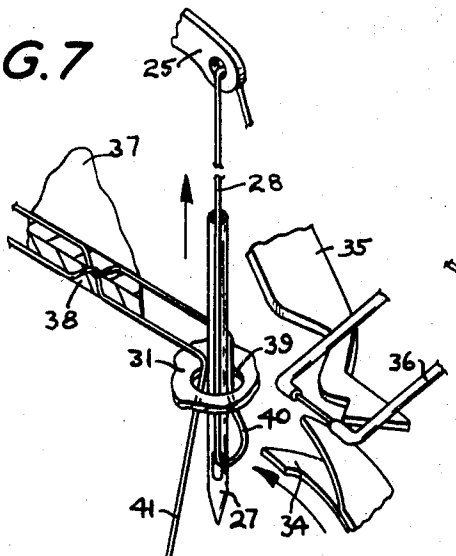
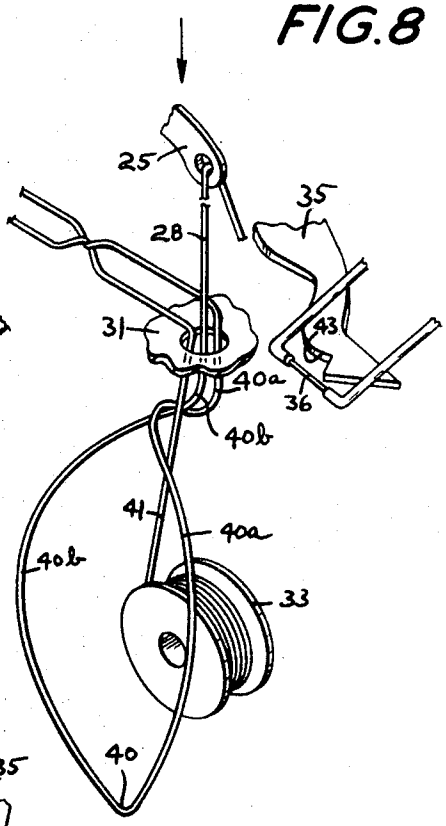


FIG. 8



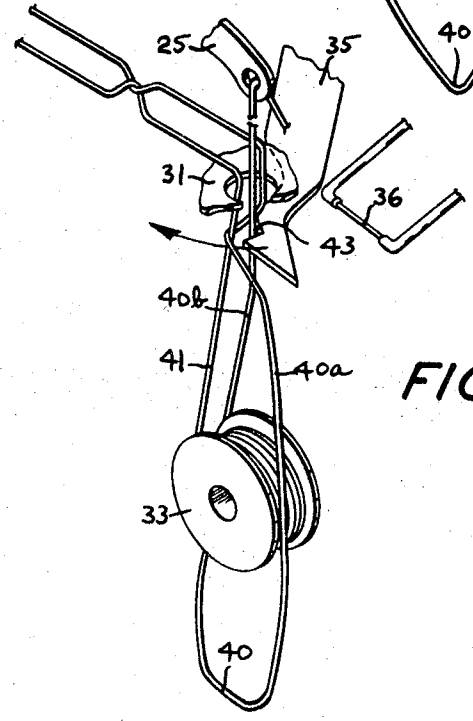


FIG. 9

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FIG. 10

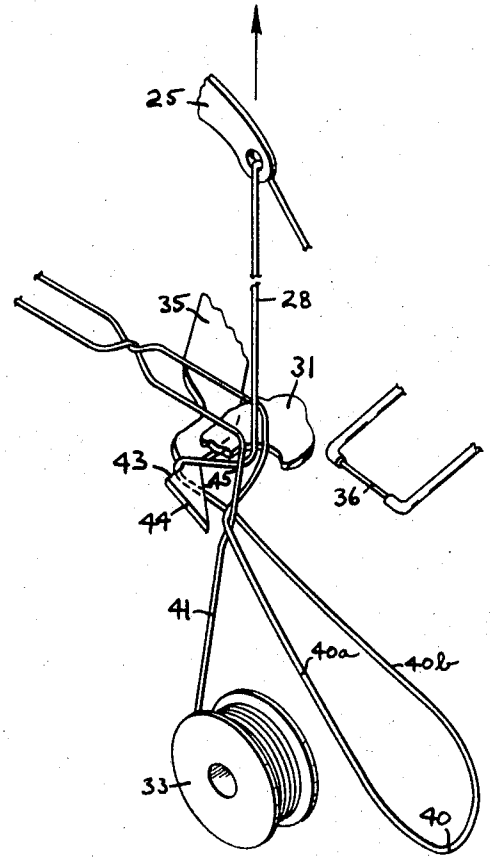
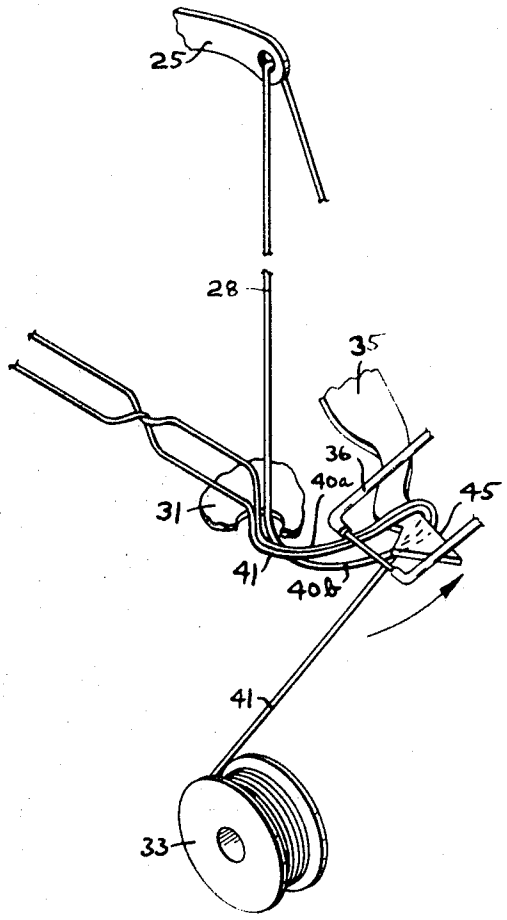


FIG. 11



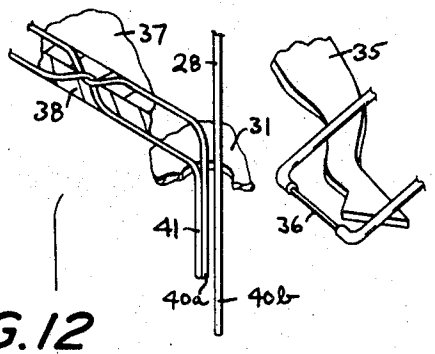
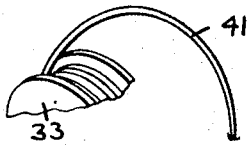


FIG. 12



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United States Patent Office

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3,470,835

THREAD SEVERING MECHANISM

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Filed Nov. 2, 1967, Ser. No. 680,266
Int. Cl. D05b 65/00
U.S. Cl. 112—252 18 Claims

ABSTRACT OF THE DISCLOSURE

Special sub-throat plate apparatus for a sewing machine to provide simultaneous severance of both needle thread and bobbin thread close to the undersurface of the work by first catching the needle thread with a solenoid actuated thread pick-up arm and drawing thread from the needle thread supply for the next stitch at the time when the needle thread take-up lever has descended to its lowest position, then catching both needle and bobbin threads with the same thread pick-up arm and carrying them against a heatable wire carried by the sub-throat plate, and severing both threads by heating the heatable wire after the thread pick-up arm has completed its movement drawing thread for the next stitch. The apparatus is preferably operated in conjunction with a needle positioner mechanism as described.

In commercial operations utilizing sewing machines for the mass production of stitched articles, such as in the garment trade, the sale price of the stitched article produced is necessarily related to the labor cost involved in producing the same. Accordingly, reductions in the fabrication time of a stitched article result in the ability to sell such articles at a lower price, and labor saving devices are therefore of great interest to the trade. During the stitching process, it is frequently necessary to sever the needle and bobbin threads while the fabric being stitched is centrally located relative to the needle, that is, when the line of stitching does not terminate at or near the edge of the fabric.

Generally, in such a case, the work must be displaced from its position at the end of the line of stitching so that sufficient needle and bobbin threads become available for hand cutting, the work being then repositioned in the proper place of starting the next line of stitching. After the stitching operations have all been completed it is then necessary to trim off all the projecting thread ends so that the stitched article may present a neat and finished appearance. Such a thread cutting operation is time consuming and can contribute materially to labor costs associated with the production of a particular stitched article.

In order to alleviate this thread trimming problem, attempts have been made in the past to provide automatic thread cutting means designed to leave a minimum of thread to be trimmed and which in most cases could be ignored. One such thread cutting means has been mounted to the rear of the presser foot to cut the thread by a vertical down stroke of a cutting edge. This type of apparatus, of course, could only be used at the edge of a fabric where the fabric is shifted out from under the needle and behind the vertical cutting device, in order that the cutting stroke should cut only the thread and not the underlying fabric as well. The vertical cutting devices are therefore of limited use, being helpful only in those cases where the line of stitching terminates at the edge of the stitched article.

Other mechanical cutting arrangements have been devised which cut the thread by a cutting stroke in a plane parallel to the surface of the fabric being stitched. Such devices can of course be utilized when the fabric is centrally located under the needle without requiring that the fabric be removed from the sewing machine. However, even cutters of this type generally leave thread ends of undesirable length and the need for subsequent trimming of the short ends remains. This invention on the other hand provides for severing of the needle and bobbin threads simultaneously and very close to the fabric surface, and consequently eliminates the need for subsequent trimming.

Previously known hot wire thread severing devices, as for example that shown in U.S. Patent No. 3,191,562 assigned to the assignee of this invention, have utilized separate hot wire devices to independently sever the needle thread and bobbin thread with a needle thread being severed by a hot wire carried by a specially constructed presser foot. The present invention eliminates the need for such a special presser foot and thereby permits sewing machine operation with the standard types of presser feet normally employed. Moreover, other thread trimming devices have required the use of auxiliary needle thread clamping devices to prevent dethreading of the needle after severing has been effected and stitching has been recommenced. Such clamping devices are not required with the present invention.

Briefly, our invention accomplishes thread severing by apparatus including a single hot wire mounted under the cloth in association with the sub-throat plate of the sewing machine which rapidly burns through both the needle and bobbin threads to be severed. This single hot wire is only energized when so desired by the sewing machine operator, so that during a normal stitching operation there is no tendency whatever for needle thread and bobbin thread to be prematurely severed. Additionally, means are also provided for insuring that the sewing machine may be again immediately utilized after a thread severing operation without having to re-thread the needle. Accordingly, it is a primary object of this invention to provide a novel thread severing apparatus effective when actuated to sever the needle thread and bobbin thread of a sewing machine very close to an outer surface of an article being stitched to thereby eliminate the need for subsequent hand trimming of short thread ends.

Another object of this invention is to provide a novel thread severing apparatus for severing the needle thread and bobbin thread of a sewing machine close to the surface of a stitched article by means of an operator controlled and selectively energizable hot wire.

Yet another object of this invention is to provide novel thread severing apparatus which permits the needle thread and bobbin thread associated with the sewing machine to be severed simultaneously without displacing the article being stitched from the position it occupies at the end of the stitching operation.

A further object of this invention is to provide novel thread severing apparatus including means for insuring that the thread severing operation does not unthread the needle of the sewing machine.

The foregoing and other objects of the invention will become clear from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIGURE 1 is a fragmentary elevational view showing the working end of a sewing machine head as seen looking into the front of the presser foot;

FIGURE 2 is an end elevational view of the sewing machine head illustrated in FIGURE 1 as would be seen when viewed along the line 2—2, and illustrating details of the thread severing mechanism not visible in FIGURE 1;

FIGURE 3 is a horizontal sectional view with a vertical jump of the thread severing apparatus which is seen in FIGURE 2 as would be viewed along line 3—3 thereof;

FIGURE 4 is a side elevational view of the apparatus according to the invention as would be seen when viewed long the line 4—4 of FIGURE 3;

FIGURE 5 is an enlarged perspective view of the thread pick-up arm and its actuating solenoid;

FIGURE 6 is a vertical sectional view of the solenoid actuated thread pick-up arm, on an enlarged scale and as would be seen when viewed along line 6—6 of FIGURE 3;

FIGURES 7 through 12 illustrate the thread trimming operation at selected progressive stages from inception to completion and relate the movements of the thread pick-up arm to the sewing machine needle, sewing hook and needle thread take-up arm; and

FIGURE 13 illustrates in schematic form the electrical circuitry associated with the thread trimming device for actuating the same under control of the sewing machine operator.

In the several figures, like elements are denoted by like reference characters.

Turning to an examination of the figures, there is seen in FIGURES 1 and 2 a sewing machine head designated generally as **20** provided with a plurality of thread guides **21**, **22** and **23**, thread tensioner **24**, thread take-up lever **25**, needle bar **26** carrying needle **27** through which is threaded in usual fashion a thread **28**. Disposed behind the needle bar **26** is the presser foot bar **29** carrying presser foot **30** shown in operative position seated downward upon the feed dogs projecting upward through the cloth plate **31** of the sewing machine. The cloth plate **31** is secured to the sewing machine bed plate **32** below which is operatively mounted in the usual manner the bobbin **33** within the rotary sewing hook **34**. The presence of all of the foregoing described elements in a sewing machine is conventional. However, in the apparatus of the present invention there is additional included under the cloth plate **31** a sub-throat plate **31***a* having incorporated therein an electrically energizable hot wire **36** for severing the needle and bobbin threads, as well as as a thread pick-up arm **35** disposed immediately beneath the sub-throat plate **31***a*. Before describing the additional mechanism for energizing and actuating the thread severing device per se, it will be conducive to a more complete understanding of the invention to first examine the mode of operation of the entire apparatus.

Operation of the apparatus is best understood by referring to FIGURES 7 to 12 of the drawings and involves the timed positional inter-relationships of the thread take-up **25**, needle **27**, sewing hook **34**, thread pick-up arm **35** and heatable wire **36**. FIGURE 7 illustrates the needle **27** in its down position where it has passed through upper and lower plies of cloth **37** and **38**, through the needle hole **39** in the cloth plate **31** and has thrown out a needle thread loop **40** about to be caught by the point of the counterclockwise rotating sewing hook **34** for the purpose of stitch forming with the bobbin thread **41**, the sewing hook **34** being at the twelve o'clock position.

It should be noted that the sewing machine is not motionless but is in the process of stitch formation and the sequence of events now being described involves proper timing of the sewing machine stitch forming cycle with actuation of the thread severing mechanism in the manner being now set forth. At this point of the operation as shown in FIGURE 8 the needle **27** is rising but the needle thread **28** does not rise with it since the loop **40** has been engaged by the sewing hook **34** and is being enlarged and carried down and around the bobbin **33**, the needle thread being loose at this point so as to be pulled out into a large loop with legs **40***a* and **40***b* by the sewing hook due to the fact that the thread takeup **25** is moving downward, the sewing hook having advanced to substantially a seven o'clock position. The needle **27** continues to rise upward and out of the cloth plate and fabric toward its upper position, and as shown in FIGURE 9 the needle thread loop **40** has been looped about the bobbin thread **41** by the sewing hook **34** which has advanced the loop to the six o'clock position, and the thread take-up **25** has reached the bottom of its travel so that all of the needle thread slack is gone from the system. The needle thread tensioner **24** has now been opened by means to be disclosed hereinafter.

At this ponit in the cycle the thread pick-up arm **35** is swung in an arc by electrical actuation of its driving solenoid **42** (shown in FIGURES 2 to 6) so that it moves from its normal rest position, as shown in FIGURES 7 and 8, transversely across the path of the needle **27** just beneath the sub-plate **31***a*, catching the needle thread leg **40***b* in the notch **43** on the leading edge of the thread pick-up arm **35** and pulling thread for the next stitch from the thread supply through the opened thread tensioner **24**, the final position of the arm **35** being shown in FIGURE 10. Leg **40***a* of the needle thread loop and bobbin thread **41** are not caught in the notch **43** of the pick-up arm **35** but are deflected laterally by the sloping end surface **44**, these threads **40***a* and **41** falling in behind the trailing edge **45** of the pick-up arm **35** in position to be picked-up on the return swing of the arm **35**. The thread take-up arm **25** has started upward and begins to shorten the needle thread loop **40** as the loop is carried around the bobbin by the sewing hook to the four o'clock position shown in FIGURE 10, the loop decreasing in size and effectively moving upward toward the cloth plate **31**.

The timing of the apparatus is such that as seen in FIGURE 11, the needle thread leg **40***a* and bobbin thread **41** are picked-up by the trailing edge **45** of the pick-up arm **35** as the latter swings backward to its normal rest position upon deactuation of arm driving solenoid **42**, to thereby carry the needle thread loop **40** and bobbin thread **41** against the heatable wire **36**. At this time the thread take-up arm **25** is still rising and the sewing hook **34** has advanced to substantially a two o'clock position although no longer carrying the thread loop. Upon completion of this return movement of the thread pick-up arm **35** the heatable wire **36** in the sub-plate **31***a* is energized to sever the needle thread and bobbin thread held thereagainst by the thread pick-up arm **35**, as seen in FIGURE 11. The wire **36** is then deenergized.

From the foregoing description it will be appreciated that the thread severing operation has been completed in such manner as to leave a very short thread tail extending downward from the lower ply **38**, on the order of half a stitch length, and at the same time all of the thread necessary to form the next stitch has been drawn from the needle thread supply so that initiation of the next sewing operation does not unthread the needle **27**. Moreover, the needle **27** is in an upper position so that the stitched work may be easily removed and new work placed in stitching position.

Operation of the thread severing system according to the invention is best carried out automatically in combination with operation of an automatic needle positioning mechanism which causes the sewing machine needle to rise to an upper position. A suitable automatic needle positioning mechanism for this purpose is described in U.S. Patent No. 2,961,591 entitled "Automatic Needle Positioning Mechanism." Operation of the thread severing mechanism as has hereinbefore been described may be effected by electrical circuitry as illustrated in the showing of FIGURE 13 of the drawings to which reference should now be made.

Power for operation of the thread severing apparatus is supplied by a source of alternating current which connects to the primary winding **46** of the transformer **47** having secondary windings **48** and **49**. Connected across

primary winding 48 is a half wave rectifier circuit 50 which supplies energizing current to the coil of rotary solenoid 42 through relay switch 51 when the switch is closed by energization of relay coil 52. The relay switch 51 is protected by arc suppression capacitor 53 connected thereacross. Secondary winding 49 provides alternating current to the thread severing heatable wire 36 through a series connected control rheostat 54 and relay switch 55 which latter is closed and opened by energization and de-energization of relay coil 56. The energization of relay coil 56 is effected by direct current delivered from capacitor 57 through the normally closed contact 58 and relay switch pole 59, the capacitor 57 being charged, as will be described, through normally open contact 60 and switch pole 59 when relay coil 52 is energized under control of the synchronizer.

The needle positioning mechanism used in combination with the thread severing apparatus and designated generally as 61, normally causes the needle to come to rest in its down position as shown in FIGURE 7. The trimming operation however requires that the needle be moved to its "up" position, and energization of the positioning mechanism for this purpose is controlled by switch 62 which completes the needle positioner energization circuit from its own power supply. Switches 62 and 63 are ganged together for closure by a knee operated actuating lever such as that numbered 113' in previously identified U.S. Patent 2,961,591, it being pointed out that the sewing machine pressure foot is raised by means also operated by the actuating lever 113'.

The synchronizer rotor shown schematically in FIGURE 10 of U.S. Patent 2,961,591 is also shown herein in FIGURE 13, and the conductive rings 83, 84 and 85 together with interconnecting buss bar 85' are identically numbered. The synchronizer rotor utilized with the instant invention has however an additional conductive segment 64 connected by buss bar 85' to ring 83 and also through an additional brush 65 to normally open relay switch contact 60 and the open contact of switch 63. Synchronizer ring 83 connects to one end of relay coil 52 while also being connected to the positioner circuitry in the known way for effecting needle positioning.

The positioning of rotor segment 64 is such that it contacts its brush 65 when the sewing machine needle is rising and the bobbin sewing hook 34 has rotated to the position corresponding to that shown in FIGURE 9. It will be recalled that at this time all of the needle thread slack is gone from the system so that a pull exerted on the needle thread will now cause thread to be drawn from the needle thread supply. Consequently, it is at this time that it is desired to actuate thread pick-up arm 35 by energizing solenoid coil 42. The operation is as follows.

The sewing machine operator strikes the knee operated actuating lever 113' which raises the presser foot to open the needle thread tensioner 24 and also closes switches 62 and 63. The needle positioner starts to move the needle from its "down" position to its "up" position thus initiating the sequence shown in FIGURES 7 to 12 as already described. When the condition of FIGURE 9 occurs, synchronizer rotor segment 64 contacts its brush 65 and current flows from the rectified supply through closed switch 63 and the synchronizer ring system to energize relay coil 52, which closes switch 51 and transfers switch pole 59 to contact 60. Closure of switch 51 energizes the coil of solenoid 42 and swings the thread pick-up arm 35 to the position shown in FIGURE 10. Capacitor 57 begins to charge from the rectified supply through closed switch 63 and relay pole 59 and contact 60.

The continued rotation of the synchronizer rotor causes segment 64 to ride past and disconnect from brush 65 which deenergizes relay coil 52 thereby opening switch 51 and causing switch pole 59 to transfer from contact 60 to contact 58. The opening of switch 51 deenergizes solenoid 42 so that thread pick-up arm 35 swings back to its normal at rest position as shown in FIGURE 11. The transfer of pole 59 to contact 58 causes capacitor 57 to discharge through relay coil 56, thus energizing the latter and closing switch 55 to close the electrical circuit of heatable wire 36 to energizing winding 49. Current flows in the heatable wire 36 until the current through the relay coil 56 decreases to the dropout value due to the continuous discharge from the capacitor, at which time switch 55 opens and the heating of wire 36 ceases. The needle comes to rest in its "up" position and the operation is terminated. The entire sequence of events takes only a fraction of a second to complete after the knee lever 113' is actuated by the sewing machine operator.

Understanding now the operation of the apparatus, consider now FIGURES 2 to 6 which illustrate the structural part of the apparatus which is operative to sever the needle and bobbin threads of the sewing machine. This portion of the apparatus is illustrated in combination with the sewing machine in FIGURES 2 and 3 and is substantially separately illustrated in the showings of FIGURES 4 to 6. As best seen in the showings of FIGURES 2 and 3 the thread pick-up arm apparatus is carried by a mounting base 66 which latter is rigidly secured to the sewing machine frame by studs 67 and nuts 68. As best seen in FIGURES 5 and 6, rotary solenoid 42 is secured by nuts 69 to one end of an elongated solenoid pivot mount plate 70 which latter is removably fixedly secured substantially medially to mounting base 66 by machine screws 71.

Secured upon the shaft of rotary solenoid 42 is one end of an actuator arm 72 extending in substantially overlying relation to the elongated mount plate 70 and terminating in a downwardly projecting pin 73. The pin 73 is disposed in an elongated slot 74 formed in one arm of an open-V pivot link 75 which is fixed at its opposite end on pivot post 76, the lower cylindrical end 77 of pivot post 76 being closely rotatably sleeved through the free end of pivot mount plate 70, as at 78, and pivotally resiliently supported on underlying leaf spring 79 which is secured beneath and to pivot mount plate 70 by machine screw 80 and spacer 81. The upper end of pivot post 76 is provided with an axially extending cylindrical pivot end 82 projecting through and above previously described thread pick-up arm 35 which latter extends laterally from and is fixedly secured to pivot post 76. As best seen in FIGURE 6 the pivot post upper pivot end 82 is journalled for rotation in sub-plate assembly 31*a* within which latter is molded the heatable thread severing wire 36.

Energization of solenoid 42 swings actuator arm 72 as shown by the arrow in FIGURE 5 to thereby similarly swing thread pick-up arm 35 in the previously described manner through the intervening linkage of pivot link 75 and pivot post 76.

As is most clearly seen in FIGURE 3 the sub-plate assembly 31*a* mounts into the sewing machine immediately beneath the cloth plate 31 and is readily installed by merely temporarily removing the cloth plate to install the sub-plate. As shown in FIGURE 4 the heatable wire 36 and solenoid 42 are respectively connected by conductors 86 and 87 to a terminal block 88 carried by mounting base 66, these conductors being electrically connected into the circuitry of FIGURE 13 via cable 89.

Having now described our invention in connection with a particularly illustrated embodiment thereof, modifications and variations of our invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of our invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed to be new and useful is:

1. In combination with a sewing machine having, a cloth plate provided with a needle hole therethrough, a reciprocating needle cyclically carrying a needle thread upward above the cloth plate and downward therebelow through the needle hole in the cloth plate, a needle thread

tensioner, a bobbin below the cloth plate carrying a bobbin thread, a rotating sewing hook below the cloth plate operative to pick up the needle thread and interloop the same with the bobbin thread to form lock stitches drawable upward into work disposed on the cloth plate, an oscillating needle thread take-up arm moving in synchronism with the movements of said needle and sewing hook to draw the formed stitches up into the work as aforesaid and to thereafter normally draw thread through said tensioner from a needle thread supply to form the next stitch, the combination comprising,

(a) a normally deenergized electrically energizable heat generating element disposed closely beneath the cloth plate adjacent to the cloth plate needle hole and effective when energized to burn through threads contacting the same, and

(b) thread pick-up means disposed beneath the cloth plate in such positional relationship to said needle and bobbin threads and electrically energizable heat generating element that said thread pick-up means is operative when actuated to first pick only the needle thread extending downward through the needle from the thread supply and draw thread from the thread supply and then catch both the needle thread and bobbin thread which extend from the stitched work and shift the same together against said electrically energizable heat generating element.

2. The apparatus as set forth in claim 1 wherein said thread pick-up means comprises, a pick-up arm having a leading edge and a trailing edge and pivoted at one end for arcuate swinging movement of the other end transversely to and across the path of the running lengths of the needle and bobbin threads, said pick-up arm leading edge being provided with a thread picker and a thread deflector while said trailing edge is provided with a thread catcher, and electrically energizable actuating means coupled to said pick-up arm operative when energized to swing the latter leading edge first to thereby pick up with the thread picker the needle thread extending from the thread supply and deflect with the thread deflector the needle and bobbin threads extending from the work around behind the pick-up arm, and operative when deenergized to retract said arm to thereby catch the needle and bobbin threads extending from the work with the pick-up arm trailing edge thread catcher and carry these threads into engagement with the said heat generating element.

3. The apparatus as set forth in claim 1 further including,

(a) a selectively operable needle positioning device for moving the needle upward out of the cloth plate to its "up" position,

(b) means for selectively operating said needle positioning device as aforesaid,

(c) control means effective when operated to actuate and deactuate said thread pick-up means and energize and deenergize said heat generating element in timed relation to one another and to the positions of the thread take-up arm and sewing hook so that,

(1) thread for the next stitch is drawn from the needle thread supply by actuation of said thread pick-up means when the thread take-up arm is at its lowest point of travel and has delivered all of the needle thread slack to the needle thread loop formed by the sewing hook,

(2) said needle and bobbin threads are caught and shifted against said heat generating element as aforesaid by deactuation of said thread pick-up means, and

(3) said threads are thereafter severed by energization of said heat generating element, which latter is then deenergized.

4. The apparatus as set forth in claim 3 wherein said control means is coupled to and operated by said needle positioning mechanism when the latter is operated to move the sewing machine needle to the "up" position.

5. The apparatus as set forth in claim 3 wherein said needle positioner device comprises a synchronizer including a rotor secured to the spindle shaft of the sewing machine for rotation therewith and also including a stator, said rotor having a plurality of electrically conductive rings which together with ring engaging electrical contact brushes carried by the stator are operative to stop the sewing machine needle at either its "down" or its "up" selected position, said rotor and stator additionally carrying respectively a conductive ring segment and electrical contact brush which contact one another for a predetermined time interval when said sewing machine needle moves from its "down" to its "up" position and at no other time during the complete cycle of needle movement, said last named conductive ring segment and electrical contact brush of said rotor and stator comprising part of said control means.

6. The apparatus as set forth in claim 3 wherein said means for operating said needle positioning device to move the sewing machine needle to its "up" position and at least part of said operable control means are simultaneously operated, said control means including lock-out means which prevents operation of said thread pick-up means and heat generating element during the "up" movements of the needle during normal stitching.

7. The apparatus as set forth in claim 3 wherein said control means includes first means for actuating said thread pickup means and second means for energizing said heat generating element, operation of said second means being controlled by said first means in such manner that said heat generating element is energized only after said thread pick-up means has been actuated.

8. The apparatus as set forth in claim 3 wherein said control means includes first means for actuating said thread pick-up means and second means for energizing said heat generating element, operation of said second means being controlled by said first means in such manner that said heat generating element is energized only after said thread pick-up means has been actuated and deactuated.

9. The apparatus as set forth in claim 3 wherein said thread pick-up means comprises, a pick-up arm having a leading edge and a trailing edge and pivoted at one end for arcuate swinging movement of the other end transversely to and across the paths of the running lengths of the needle and bobbin threads, said pick-up arm leading edge being provided with a thread picker and a thread deflector while said trailing edge is provided with a thread catcher, and electrically energizable actuating means coupled to said pick-up arm operative when energized to swing the latter leading edge first to thereby pick up with the thread picker the needle thread extending from the thread supply and deflect with the thread deflector the needle and bobbin threads extending from the work around behind the pick-up arm, and operative when deenergized to retract said arm to thereby catch the needle and bobbins threads extending from the work with the pick-up arm trailing edge thread catcher and carry these threads into engagement with the said heat generating element.

10. The apparatus as set forth in claim 5 wherein said control means includes first means for actuating said thread pick-up means and second means for energizing said heat generating element, operation of said second means being controlled by said first means in such manner that said heat generating element is energized only after said thread pick-up means has been actuated and deactuated.

11. The apparatus as set forth in claim 10 wherein said thread pick-up means comprises, a pick-up arm having a leading edge and a trailing edge and pivoted at one end for arcuate swinging movement of the other end transversely to and across the paths of the running lengths of the needle and bobbin threads, said pick-up arm leading edge being provided with a thread picker and a thread de-

flector while said trailing edge is provided with a thread catcher, and electrically energizable actuating means coupled to said pick-up arm operative when energized to swing the latter leading edge first to thereby pick up with the thread picker the needle thread extending from the thread supply and deflect with the thread deflector the needle and bobbin threads extending from the work around behind the pick-up arm, and operative when deenergized to retract said arm to thereby catch the needle and bobbin threads extending from the work with the pick-up arm trailing edge thread catcher and carry these threads into engagement with the said heat generating element.

12. In combination with a sewing machine having, a cloth plate provided with a needle hole therethrough, a reciprocating needle cyclically carrying a needle thread upward above the cloth plate and downward therebelow through the needle hole in the cloth plate, a needle thread tensioner, a bobbin below the cloth plate carrying a bobbin thread, a rotating sewing hook below the cloth plate operative to pick up the needle thread and interloop the same with the bobbin thread to form lock stitches drawable upward into work disposed on the cloth plate, an oscillating needle thread take-up arm moving in synchronism with the movements of said needle and sewing hook to draw the formed stitches up into the work as aforesaid and to thereafter normally draw thread through said tensioner from a needle thread supply to form the next stitch, and an automatic needle positioning device automatically operative to position the needle in its down position at the end of a stitching operation and including selectively actuatable position control means operative when actuated to raise the sewing machine needle to its "up" position, the combination comprising,

(a) a normally deenergized electrically energizable heat generating element disposed closely beneath the cloth plate adjacent to the cloth plate needle hole and effective when energized to burn through threads contacting the same,

(b) thread pick-up means disposed beneath the cloth plate in such positional relationship to said needle and bobbin threads and electrically energized heat generating element that said thread pick-up means is operative when actuated to first pick only the needle thread extending downward through the needle from the thread supply and draw thread from the thread supply and then catch both the needle thread and bobbin thread which extend from the stitched work and shift the same together against said electrically energizable heat generating element,

(c) selectively operable control means effective when operated to actuate and deactuate said needle positioning device position control means and said thread pick-up means and energize and deenergize said heat generating element in automatically timed relation to one another and to the positions of the thread take-up arm and sewing hook so that,

(1) thread for the next stitch is drawn from the needle thread supply by actuation of said thread pick-up means when the thread take-up arm is at its lowest point of travel and has delivered all of the needle thread slack to the needle thread loop formed by the sewing hook,

(2) said needle and bobbin threads are caught and shifted against said heat generating element as aforesaid by deactuation of said thread pick-up means, and

(3) said threads are thereafter severed by energization of said heat generating element, which latter is then deenergized.

13. The apparatus as set forth in claim **12** wherein said control means comprises a position sensing device effective to determine when the needle thread take-up arm has descended to its lowest point of travel and generate a signal at such time, and means operatively coupled to said position sensing device and responsive to the said signal generated by the latter to actuate said thread pick-up means.

14. The apparatus as set forth in claim **12** wherein said control means comprises a position sensing device effective to determine when the needle thread take-up arm has descended to its lowest point of travel and thereupon generate a first signal and effective to determine when the needle thread take-up arm has thereafter risen to a predetermined point on its upward travel and thereupon generate a second signal, and first means operatively coupled to said position sensing device responsive to said first signal to actuate said thread pick-up means and responsive to said second signal to deactuate said thread pick-up means.

15. The apparatus as set forth in claim **13** wherein said position sensing device is coupled to the spindle shaft of the sewing machine to thereby sense at least one particular angular position of the spindle shaft corresponding to the lowest position of the needle thread take-up arm.

16. The apparatus as set forth in claim **14** wherein said control means further includes second means effective when actuated for energizing said heat generating element, said second means being coupled to and controlled by said first means so that it is actuated by said first means only after the latter has actuated and deactuated said thread pick-up means.

17. The apparatus as set forth in claim **14** wherein said control means further includes second means effective when respectively actuated and deactuated to energize and deenergize said heat generating element, said second means being coupled to and controlled by said first means so that it is actuated by said first means for a pre-set time interval after the latter has actuated and deactuated said thread pick-up means and is then automatically deactuated.

18. The apparatus as set forth in claim **17** wherein said thread pick-up means comprises, a pick-up arm having a leading edge and a trailing edge and pivoted at one end for arcuate swinging movement of the other end transversely to and across the paths of the running lengths of the needle and bobbin threads, said pick-up arm leading edge being provided with a thread picker and a thread deflector while said trailing edge is provided with a thread catcher, and electrically energizable actuating means coupled to said pick-up arm operative when energized to swing the latter leading edge first to thereby pick up with the thread picker the needle thread extending from the thread supply and deflect with the thread deflector the needle and bobbin threads extending from the work around behind the pick-up arm, and operative when deenergized to retract said arm to thereby catch the needle and bobbin threads extending from the work with the pickup arm trailing edge thread catcher and carry these threads into engagement with the said heat generating element.

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