A. R. WOOD.

THREAD CUTTING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED APR. 18, 1918.

1,291,335.

Patented Jan. 14, 1919.

2 SHEETS—SHEET 1.

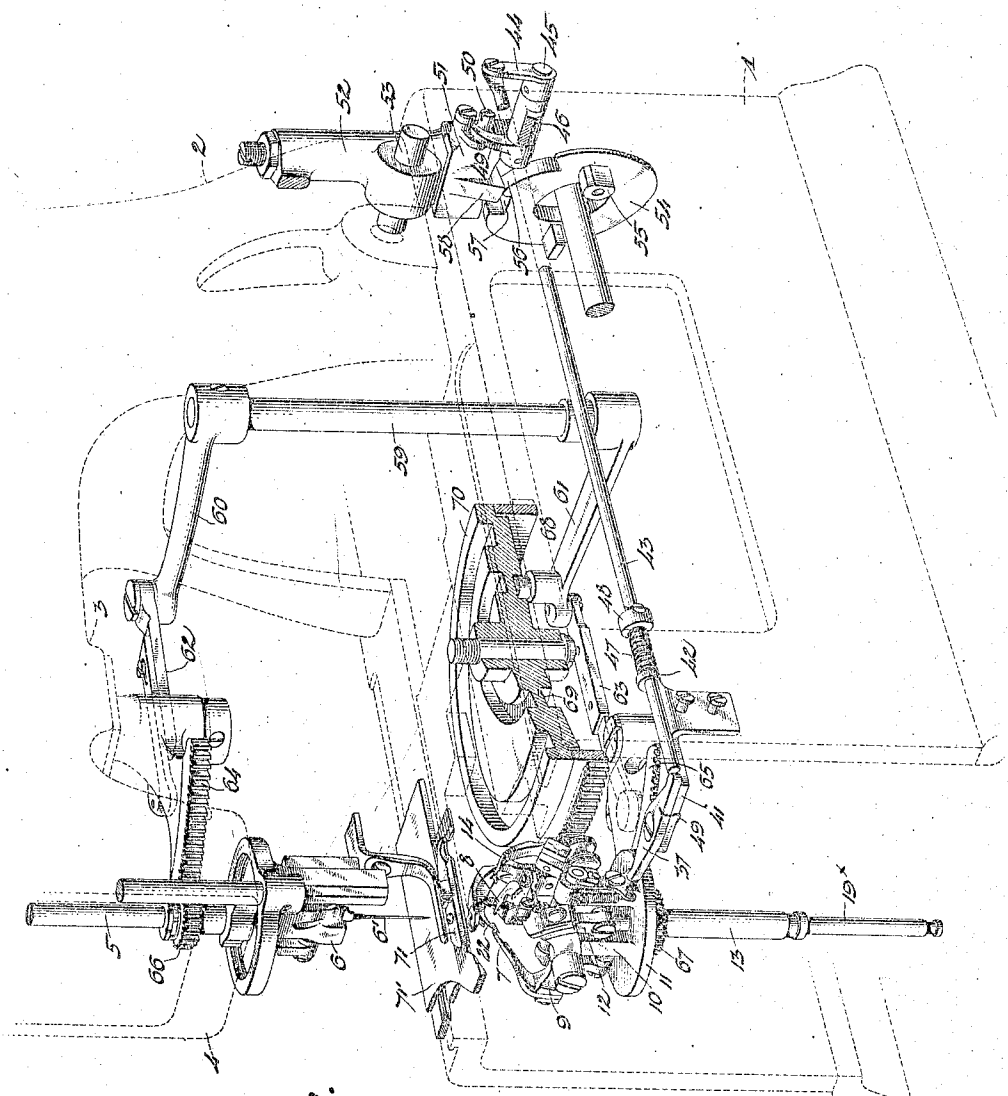


Fig. 1.

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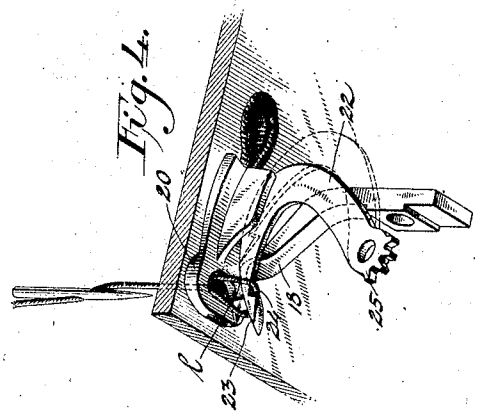


Fig. 4.

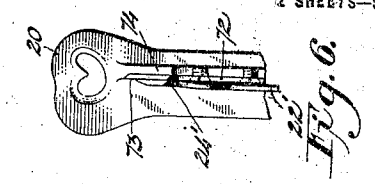


Fig. 6.

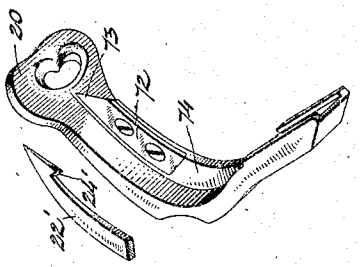


Fig. 5.

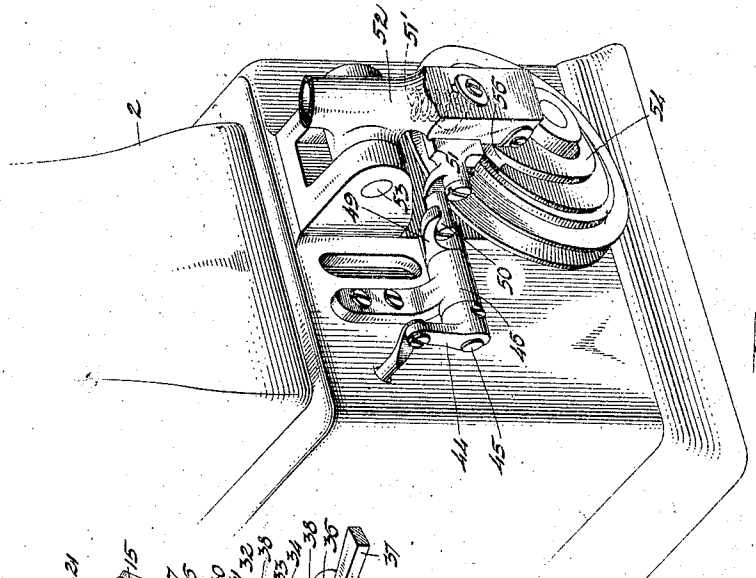


Fig. 2.

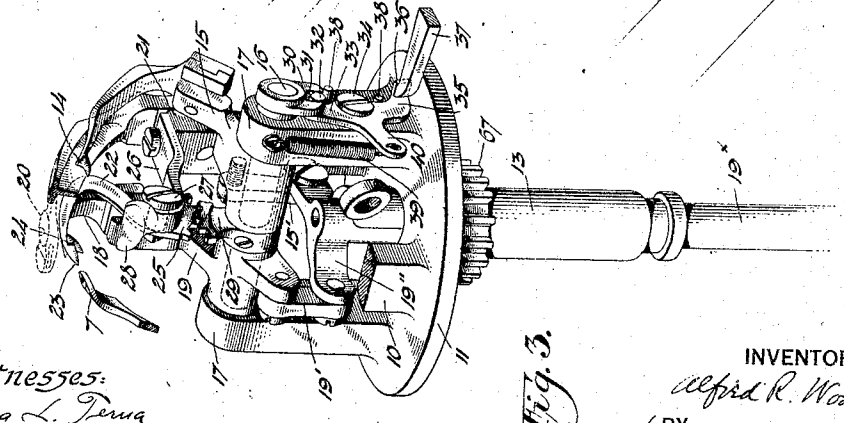


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALFRED R. WOOD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

THREAD-CUTTING MECHANISM FOR SEWING-MACHINES.

1,291,335. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed April 18, 1918. Serial No. 229,237.

To all whom it may concern:

Be it known that I, ALFRED R. WOOD, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Thread-Cutting Mechanisms for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to thread-cutting mechanism for sewing machines, more particularly of the buttonhole type employing a reciprocating needle and lower thread-handling implements mounted in a rotary turret and coöperating therewith to form a group of overseaming stitches. An object of the invention is to provide an improved mechanism for cutting the needle-thread in a machine of the class described at a point below the work and close to the under side of the latter, in order that the cut end of needle-thread leading to the last stitch will be short and so that a relatively long length of thread will be left hanging from the eye of the needle to facilitate the starting of the next stitching operation.

A further object of the invention is to provide a thread-cutting mechanism particularly adapted for embodiment in a machine making the type of stitch disclosed in the United States Patent to E. B. Allen No. 1,030,046, dated June 18, 1912, and which will not interfere with the movements of the necessary thread-handling implements or loopers close to the under surface of the work.

Still further, the invention has for an object to provide a thread-cutting mechanism which will sever the thread with certainty even though the cutting blade should become slightly dulled through long continued use.

Further objects of the invention will appear from the following description and claims.

Although the invention is susceptible of embodiment in sewing machines of various types, I have chosen to illustrate it as embodied in the buttonhole sewing machine disclosed in the application of E. B. Allen, Serial No. 179,139, filed July 7, 1917; said machine being fitted with stitch-forming mechanism of the improved type disclosed in the application of E. B. Allen and H. C. Faulkner, Serial No. 222,071, filed March 13, 1918. Buttonhole sewing machines of the types disclosed in the said applications are commonly provided with buttonhole cutting mechanism which operates to cut the buttonhole either before or after the stitching operation, the cutting being accomplished when the stitch-forming mechanism and the work-holder are differently positioned relatively to each other than when the machine is stitching.

When the machine has been brought to rest at the end of a buttonhole-producing cycle, the stitch-forming mechanism and work-holder are in buttonhole cutting position and when the machine is again started the work is clamped in a new position. If the machine is one that cuts the buttonhole before stitching, the buttonhole-cutter next comes into action to cut the buttonhole-slit after which the work-holder and stitch-forming mechanism partake of a relative movement to carry the parts to stitching position. The stitch-forming mechanism is then started and, during a further relative stitch-positioning movement of said stitch-forming mechanism and work-holder, the overseaming stitches are placed around the buttonhole.

If the machine is adapted to sew a series of radial stitches at the end of the buttonhole, the stitch-forming mechanism is given a partial rotation after the first side of the buttonhole has been stitched to position stitches radially around the end of the buttonhole. After the second or return side of the buttonhole has been stitched, the stitch-forming mechanism is stopped and the stitch-forming mechanism and work-holder have a further relative movement to bring the parts to buttonhole cutting position again whereupon the machine is brought to rest. By adjustment of the time of operation of the stitch-forming mechanism, buttonholes of various lengths may be stitched; the stitch-forming mechanism starting earlier and finishing later to stitch a longer buttonhole. The total relative travel of the stitch-forming mechanism and work-holder is fixed for all lengths of buttonholes produced by the machine and slightly exceeds the longest buttonhole which the machine is designed to produce.

When the machine is brought to rest it has heretofore been customary to cut the needle-thread by hand at the upper side of

the work; the thread extending through the work, around a lower thread-handling implement and back to the last stitch. The cutting of the needle-thread above the work therefore necessitates a considerable waste of thread since a relatively long thread-end is left hanging from the under side of the work after it is removed from the machine. Moreover there is danger that the needle may become unthreaded due to the drawing back of the short thread-end hanging from the needle-eye. It has also been proposed, in a machine of the present character, to cut the thread of the last needle-loop below the work but, in the latter case, the limb of the needle-loop leading to the needle has been cut and consequently a long end of thread has been left hanging from the work and a short end has been left hanging from the needle-eye.

The foregoing difficulties are overcome and the objects of the invention are attained by the employment of a specially formed thread-cutting blade which is mounted upon the usual rotary turret sustaining the thread-handling instrumentalities which coöperate with the needle. In the preferred embodiment of the invention, the thread-cutting blade is sickle-shaped and is formed at a short distance back of its tip-end with a reduced neck affording a rearwardly directed and sharpened cutting edge. The blade is pivotally mounted at its shank-end upon a needle-guide bracket which, in turn, is rigidly sustained by a post rising from the turret. The cutter-blade is substantially flat and is so disposed as to operate in a substantially vertical plane. A series of gear teeth are formed integrally with the shank-end of the cutter-blade and mesh with a segmental gear fixed to a transverse fulcrum-pin which sustain certain of the lower thread-handling implements for oscillatory movement relatively to said pin. The said fulcrum-pin carries a crank member which is acted upon by a spring-actuated lever also carried by the turret and adapted to yieldingly retain the cutter-blade in retracted position.

Through suitable connections with the stop-motion which controls the period of operation of the stitch-forming mechanism, an actuator-lever mounted upon the machine frame to swing horizontally is first caused to engage and shift the lever mounted on the turret in opposition to its spring, thereby projecting the cutter-blade into the last needle-loop held by one of the lower thread-handling implements. As the stitch-forming mechanism comes to rest the actuator-lever is released thus permitting the spring-actuated lever to withdraw the cutter-blade to inoperative position and in so doing to sever that limb of the thread-loop which leads to the last stitch.

While stitching down the first side of the buttonhole, the turret is not in position for the spring-actuated lever mounted thereon to be engaged by the actuator-lever. As soon as the turret has been rotated the usual 180° in stitching around the end of the buttonhole, the spring-actuated lever is carried into operative position relatively to the actuator-lever and is in position to be shifted by the actuator-lever whenever the stop-motion is tripped.

In the accompanying drawings, Figure 1 is an assembled perspective view of the parts of the buttonhole sewing machine relating to the present invention. Fig. 2 is a rear perspective view of the base-portion of the machine showing the stop-mechanism and the thread-cutter actuating connections. Fig. 3 is a perspective view of the turret for the lower thread-handling implements showing the present improvement mounted thereon. Fig. 4 is a perspective view illustrating the thread-cutting operation and Figs. 5 and 6 are perspective and bottom plan views, respectively, of a modification of the invention.

To facilitate a better understanding of the invention it will be described specifically as embodied in the eyelet-end buttonhole cutting and stitching machine disclosed in the application of E. B. Allen above referred to. The machine-frame comprises a hollow rectangular base 1 sustaining the standard 2 and overhanging bracket-arm 3 terminating in the hollow head 4 in which the needle-bar 5 is journaled for reciprocation. At its lower end it carries the usual laterally jogging needle-block 6 in which is mounted the needle 6′ which coöperates with suitable lower thread-handling implements preferably such as disclosed in the said Allen and Faulkner application to produce overseaming stitches.

The lower thread-handling implements comprise threaded and non-threaded loopers 7 and 8, respectively, which are carried by a looper-lever 9 pivoted to the post 10 rising from the turret 11 journaled as usual within the base 1. The looper-lever 9 is rocked by means of the usual link connection 12 with the rising and falling sleeve 13 common to machines of this type.

Coöperating with the threaded looper 7 which projects its loop through an overedge needle-loop, is a loop-retainer 14 mounted on a carrier-lever 15 fulcrumed to turn on the cross-pin or rock-shaft 16 journaled in the posts 17 rising from the turret 11. The retainer 14 seizes a loop of looper-thread and holds it in spread condition in the path of the needle on its depth-stitch descent. Coöperating with the non-threaded looper 8 is a second loop-retainer 18 mounted upon a carrier-lever 19 fulcrumed to turn upon the cross-pin 16. The second retainer 18 seizes a depth-stitch needle-loop from the

non-threaded looper and holds it in spread condition in the path of the needle in its overedge descent. The retainer levers are oscillated simultaneously in opposite directions by means of link connections 15′, 19′ with a cross-head 19″ formed at the upper end of the usual rising and falling rod 19ˣ common to mechanisms of the present type. The retainers 14 and 18 operate in substantially parallel paths close to the under surface of the work and below the usual throat-plate or button 20 which is fixed to the post 21 rising from the turret.

The thread-cutting mechanism comprises, in its preferred embodiment, a sickle-shaped cutting blade 22 formed with a pointed tip-end 23. The inner edge of the blade 22 is notched near the extremity 23 to form a reduced neck defining a rearwardly directed edge 24 which is sharpened. The shank-end of the cutting blade 22 is formed with gear teeth 25 integral therewith and is fulcrumed to the needle-guide bracket 26 by means of the screw-pin 27; the bracket 26 being fixed to the top of the post 21 and formed at its free end with the needle-guiding plate 28 which insures the positioning of the needle forwardly of the paths of movement of the threaded and non-threaded loopers so that it will not be struck by said loopers while the latter are seizing needle-loops. The cutting blade 22 is so fulcrumed that the path of movement of its free end is close to the path of movement of the retainer 18 for the depth-stitch needle-loop; the beaks or tip-ends of the retainer 18 and thread-cutter 22 being pointed in substantially the same direction.

Meshing with the gear-teeth 25 is a segment gear 29 fixed to the cross-pin 16 to one end of which is fixed a crank-arm 30 slotted at 31 to embrace a pin 32 fixed to the upwardly extending arm 33 of a three-armed lever fulcrumed at the juncture of the arms to the post 17 by means of the screw 34. The depending arm 35 of the three-armed lever is formed with a lateral extension 36 which, when the turret is rotated to the position shown in Fig. 3, is in position to be struck by the actuator-lever 37. Stops 38, 38 for the lever-arms 33 and 35 determine the extreme positions of the cutter-blade 22. A spring 39 is fixed at its upper end to one of the posts 17 and at its lower end to the arm 40 of the three-armed lever and yieldingly returns the cutter-blade 22 to retracted position.

The actuator-lever 37 is fulcrumed on the bracket 41 screwed to an inside wall of the base 1 and formed with an apertured guide-ear 42 for the forward end of the slide-rod 43 the rearward end of which is connected to the crank-arm 44 fixed to the rock-shaft 45 journaled in the bracket 46 fixed to the machine frame. A spring 47 surrounding the slide-rod 43 and bearing against the ear 42 and a collar 48 on said slide-rod, urges the latter toward retracted position. The actuator-lever 37 is also provided with a spring 49 which yieldingly maintains said lever in contact with the front end of the slide-rod 43.

The rock-shaft 45 carries another crank-arm 49 which extends across the path of vertical movement of the lateral pin 50 fixed to the usual downwardly spring-pressed slide-block 51 mounted at the lower end of the stop-motion lever 52 which is fulcrumed at 53 to the machine frame. As stop-motions of the type herein referred to are well known a specific description thereof is thought to be unnecessary. These stop-motions commonly employ a clutch ring 54 which is fulcrumed at 55 to the driven member of the clutch and is formed with an outwardly inclined surface portion 56 leading to a stop-notch 57. When the stop-motion lever 52 is tripped to stop the machine the stop-tooth 58 is shifted inwardly to a position wherein it will be lifted in opposition to the spring 51′ by the eccentric surface 56 of the clutch-ring. When so lifted, the pin 50 will lift the crank-arm 49 thereby shifting the slide-rod 43 in opposition to its spring 47 and causing the actuator-lever 37 to deflect the laterak projection 36 of the three-armed cutter-controlling lever mounted on the turret. The cutter-blade will thus be projected into the last needle-loop *l* which is held by the retainer 18, as shown in Fig. 4, the loop being drawn up snugly about the reduced neck of the cutter by the usual take-up mechanism before the machine comes to rest. When the tooth 58 snaps into the stop-notch 57, the pressure of the slide-rod 43 upon the actuator-lever 37 will be relieved and, as a result, the spring 39 will act upon the arm 40 of the three-armed lever to cause the withdrawal of the cutter-blade 22 from full to dotted line position, Fig. 4, to effect the serverance of that limb of the needle-loop which leads to the last stitch.

It will be readily appreciated that, by virtue of the foregoing construction, the cutter 22 cannot glance by and fail to sever the needle-loop even though the cutting edge 24 should become slightly dulled through long continued use.

The machine is fitted with the usual mechanism for turning the needle-bar 5 and turret 11 in placing the radial stitches around the end of a buttonhole and for reversely turning these parts to initial position after the buttonhole has been stitched or before the next stitching operation.

The vertical shaft 59 is formed at its opposite ends with crank-arms 60 and 61 of substantially the same length and connected by means of links 62 and 63, respectively, with similar sector-gear levers 64 and 65,

meshing with pinions 66 and 67 which transmit turning movements to the needle-bar and turret, respectively, in the usual manner. The crank-arm 61 is formed with a follower 68 which enters the cam-groove 69 in the usual feed-wheel 70.

In the present machine the work-holder is of the well known type including lower and upper clamping members 71 and 71′ partaking of longitudinal and lateral components of motion through suitable connections with the feed-wheel.

In the modification of the invention shown in Figs. 5 and 6 the ledger-blade 72 formed with an inclined and sharp cutting edge 73 is let into the rib 74 at the under side of the throat-plate shank. In this instance the cutting blade 22′ is formed with a cutting edge 24′ which acts to sever the thread with a shearing cut. The blade 22′ is made of flat springy material and at its extremity bears yieldingly against the exposed face of the ledger-blade during the cutting operation.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle and coöperating thread-handling implements, means including a rotary turret for turning said stitch-forming mechanism in stitching around the end of a buttonhole, a rock-shaft journaled in said turret, said thread-handling implements being mounted on said turret for coöperation with said needle and including a loop-retainer fulcrumed to turn upon and relatively to said rock-shaft, a thread-cutter mounted on said turret, actuating connections between said rock-shaft and thread-cutter, and means for actuating said rock-shaft at the end of the stitching operation.

2. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle and coöperating thread-handling implements, means including a rotary turret for turning said stitch-forming mechanism in stitching around the end of a buttonhole, said thread-handling implements being mounted on said turret and including a loop-retainer having a beak for seizing a needle-loop and detaining it for subsequent entry by said needle, a thread-cutting implement mounted on said turret, means for advancing said cutting implement in the direction of loop-seizing movement of said detainer to insert it into the last needle-loop held by said detainer, and means for retracting said thread-cutter to cause it to sever the needle-thread.

3. In a sewing machine, in combination, stitch-forming mechanism, means including a rotary turret for turning said stitch-forming mechanism in stitching around the end of a buttonhole, a cutter-blade detachably fulcrumed on said turret and having integrally formed gear-teeth, and a segment actuator-gear mounted on said turret and meshing with said gear-teeth.

4. In a buttonhole sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, and complemental loop-taking means, rotary supporting means therefor including a turret sustaining said loop-taking means, a needle-guide carried by said turret, and a thread-cutter blade pivotally mounted on said needle-guide.

5. In a sewing machine, in combination, stitch-forming mechanism, rotary supporting means therefor including a turret, a thread-cutting blade mounted on said turret and formed with a forwardly directed point and a rearwardly directed and sharpened cutting edge, and means for advancing and retracting said thread-cutting blade to cause the latter to first enter the needle-loop and to subsequently sever one limb thereof.

6. In a sewing machine, in combination, stitch-forming mechanism, rotary supporting means therefor including a turret, a stop-motion for controlling the period of action of the stitch-forming mechanism, a thread-cutter mounted on said turret and thread-cutter actuating means connected to said stop-motion for causing the thread-cutter to first enter and subsequently draw back upon and sever the last needle-loop.

7. In a sewing machine, in combination, stitch-forming mechanism, rotary supporting means therefor including a turret, a stop-motion for controlling the period of action of the stitch-forming mechanism, said stop-motion including a spring-pressed stopping tooth and a driven element formed with a stop-notch, a thread-cutter mounted on said turret, and thread-cutter actuating means connected to said stopping tooth for causing the thread-cutter to first enter and then draw back upon and sever the last needle-loop.

In testimony whereof, I have signed my name to this specification.

ALFRED R. WOOD.