United States Patent

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[33] Germany
[31] U 13 630
Continuation of application Ser. No. 710,555, Mar. 5, 1968, now abandoned.

[54] **THREAD WIPER FOR SEWING MACHINES INCLUDING A THREAD-SEPARATING ARRANGEMENT**
15 Claims, 2 Drawing Figs.

[52] U.S. Cl. 112/252, 112/254
[51] Int. Cl. D05b 65/02
[50] Field of Search 112/252, 254, 255, 237, 239, 253, 238, 65

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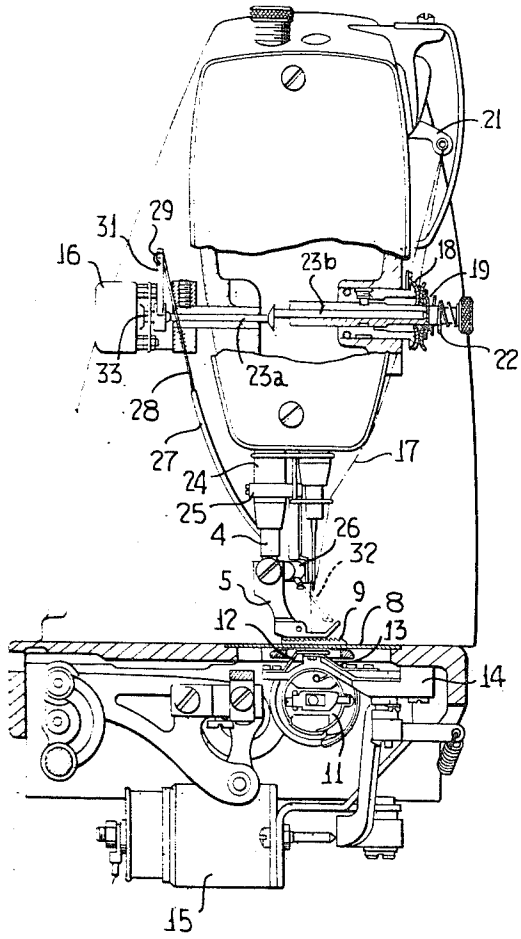
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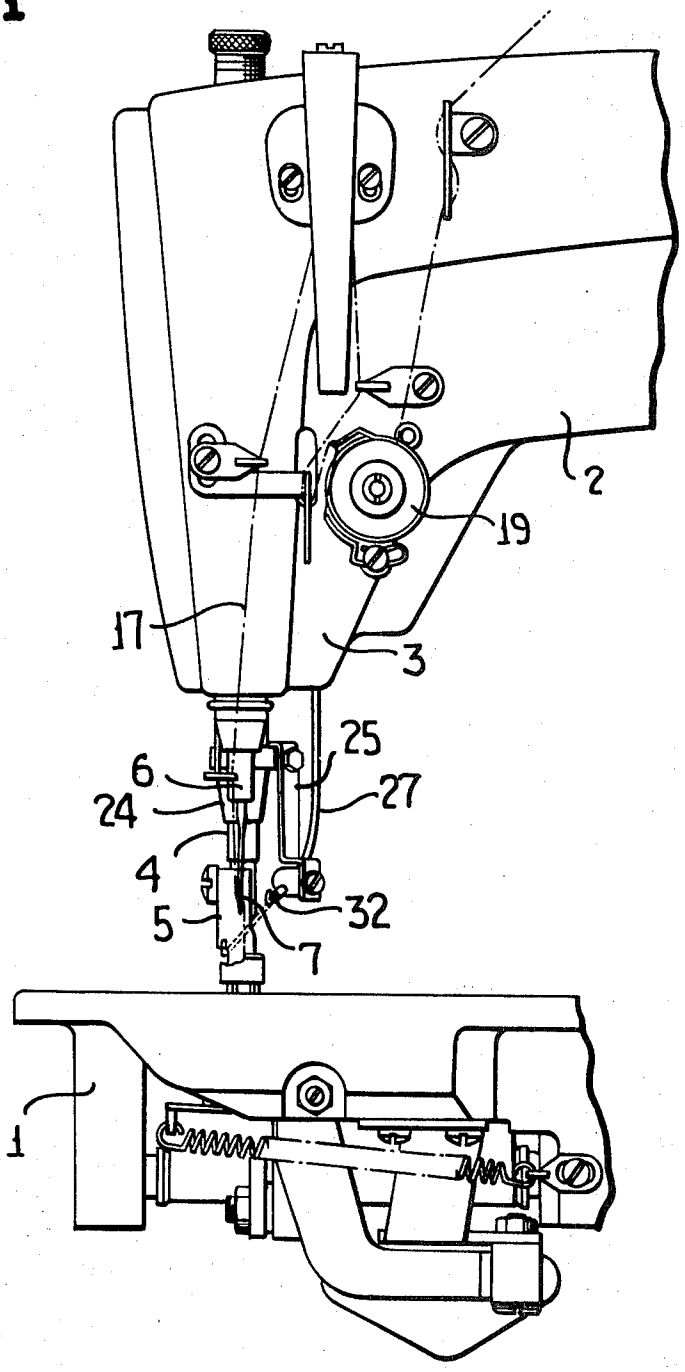
ABSTRACT: There is disclosed a thread wiper or deflector means for sewing machines having therein a thread-severing device and a thread tensioning and releasing means, the thread wiper means being mounted for projection and retraction and coupled with a rotary solenoid effective upon energization to release the thread tension for the needle thread during the automatic process of severing the threads, and also for projecting the thread wiper to move it into thread-trapping position during said releasing of thread tension, and upon deenergization to return the wiper to its starting position after the restoration of the thread tensioning, thus to deflect the needle thread part extending down from the needle eye and prevent objectionable clamping thereof under the presser foot.



Patented Aug. 24, 1971 3,601,074

2 Sheets-Sheet 1

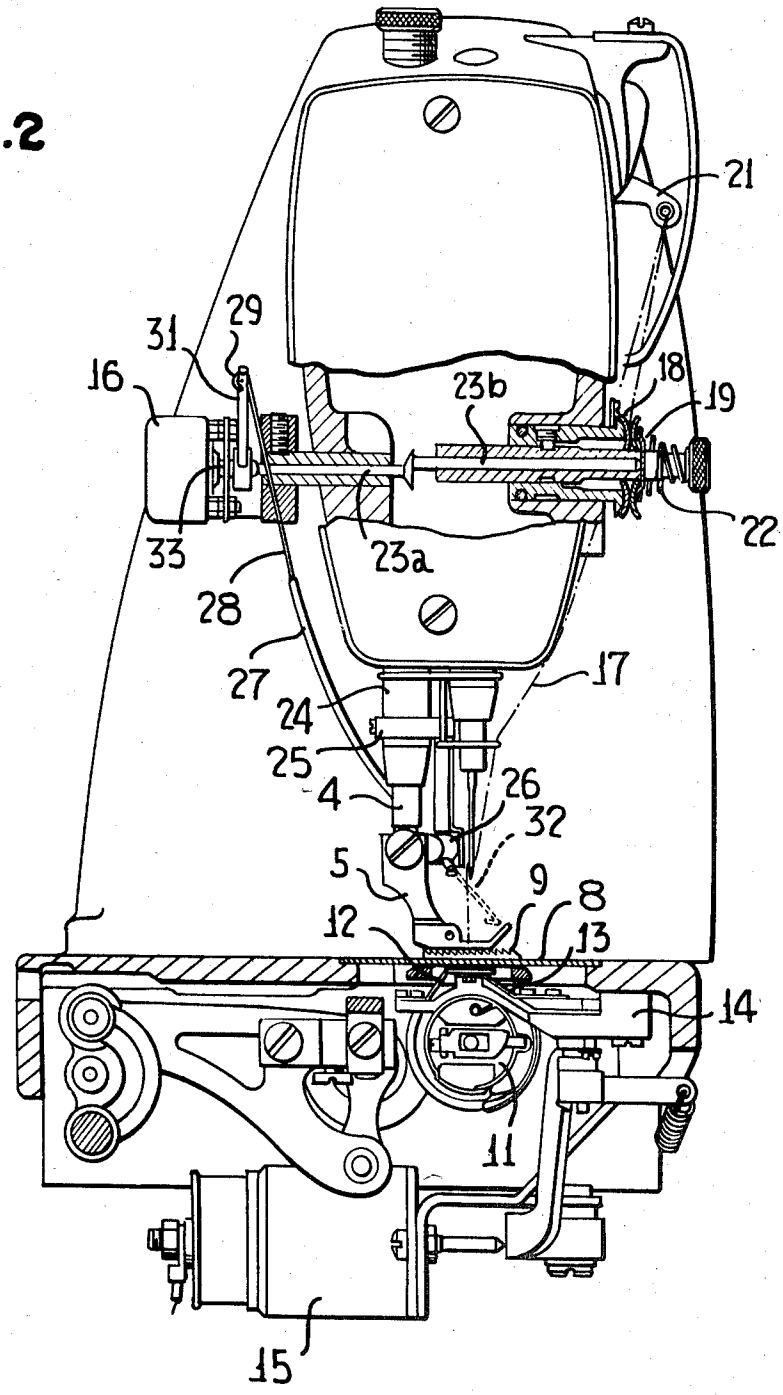
FIG. 1



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FIG.2



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THREAD WIPER FOR SEWING MACHINES INCLUDING A THREAD-SEPARATING ARRANGEMENT

This is a continuation of Application Ser. No. 710,555, filed Mar. 5, 1968, now abandoned.

The invention concerns a thread wiper for sewing machines, such as buttonhole machines, button sewers and tackers, for example, wherein there are included means for separating or severing of the thread.

In such sewing machines having included therein means for separation of the thread, it is necessary to deflect the end of the needle thread which has been separated and is hanging from the needle eye in such a manner that it will not be clamped underneath the presser foot when the next piece of material is inserted, since otherwise this separated thread end extremity will protrude at the beginning of the seam at the upper side of the material. In order to avoid this clamping of the severance freed terminus of the needle thread, the seamstress must have considerable skill. Thread wipers which serve the purpose of deflecting the severance freed end of the thread hanging from the eye of the needle so that it will not be jammed underneath the presser foot are known. However, such thread wipers known heretofore have been costly, susceptible to operational difficulties and have not always fulfilled the desired purpose with complete satisfaction.

The invention has for an object the provision of a novel thread wiper which can be provided at relatively small cost and which will satisfactorily deflect the end of the thread hanging from the eye of the needle, in such a manner that it will not be jammed below the presser foot at the beginning of the seam.

A further object of the invention is the provision of an arrangement wherein the thread wiper has been cooperatively coupled with a rotary solenoid for controlling the thread tension of the needle thread in association with the process of automatic severing of the threads, in such a manner that the thread wiper will move into a needle thread trap position upon severing of the tension disks or the releasing of needle thread tension and will move back to its starting or at rest position after closing of the tension disks and restoration of tension on the needle thread.

Preferably, a commercially known and procurable rotary magnet or rotary solenoid is employed in the combination whose longitudinal movement serves to release and again apply the thread tension and whose rotary movement serves for the operation of the thread wiper, as aforesaid.

A further characteristic of the invention consists in this, that a lever has been clamped onto the longitudinally movable bolt of the rotary solenoid armature, to which lever the spring steel wire of a Bowden wire means has been attached at one end, the other end of said core being shaped into a hook to pull and wipe or deflect the needle thread for the purpose stated.

This development and arrangement of a thread wiper is particularly simple, since an operating combination is employed for its operation, in a sewing machine wherein an arrangement for severing of the thread and rotary solenoid-operated release of the thread tension may already be present. Through the use of the rotary solenoid serving for control of thread tension and also for operation of the thread wiper, one will achieve, without any special control elements, a movement of the thread wiper at the proper time within the course of the separating process for the threads.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

IN THE DRAWINGS

FIG. 1 shows a front view of a part of a sewing machine embodying the invention.

FIG. 2 shows an end portion of the sewing machine looking at the sewing head, parts being broken away.

The sewing machine has a base **1** and an overhanging arm **2** carrying the usual sewing head **3**. In the head **3** a presser foot bar **4** carrying a presser foot **5**, and a needle bar **6** carrying a needle **7**, are guided in the usual manner. The presser foot **5** acts in cooperation with a needle plate **8** on the base **1** and with a feed dog **9**. In addition, the customary rotary gripper **11** is located in the base **1**. Between the gripper **11** and the needle plate **8** there is a knife **12** of an arrangement for separating the thread, which cooperates with a thread catcher **13**. The thread catcher **13** is swingably mounted on the bobbin case retainer **14** and is operated by a magnet means generally designated **15**. Another magnet means or rotary solenoid **16** serves to control the thread tension on the needle thread **17**, along with another purpose to be described hereinafter.

The needle thread is guided in the customary manner through the tension disk means **18**, **19** and the thread takeup lever **21** to the needle **7**. The thread tension disk means **19**, being under an adjustable pressure from a spring **22**, is moved away from the disk **18** upon switching on or energization of the rotary solenoid means **16** by an axial shift of the disk means **19** by a bipartite bar or rod means 23^a, 23^b and this will release the needle thread tension.

As before stated, the rotary solenoid means **16** is a well known and commercially available unit, an example being covered in U.S. Letters Pat. No. 2,496,880 issued to G. H. Leland on Feb. 7., 1950. This unit well known in the trade as the LEDEX ROTARY SOLENOID, includes an armature having a stud or bolt projecting axially therefrom and employs the inclined plane to convert linear motion to rotary motion. Upon energization a powerful magnetic pull closes an air gap, drawing in the armature. The armature, in addition to moving along its axis, partakes of rotary movement because it is supported by three ball bearings that travel around and down inclined ball races. Rotation continues until the balls have travelled to the deep ends of the races. The result is almost frictionless conversion from linear motion to rotary motion. Upon deenergization, reverse rotation and axial or return movement of the armature and bolt is imparted by spring means in the manner well known in the art and disclosed in said patent.

A holder **25** has been attached to the guide bushing **24** for the presser foot bar **4** which holder carries an adjustable clamp **26** for clamping on the end of the jacket or casing **27** of a Bowden wire means. The wire **28**, which is guided within the jacket of the Bowden wire means, has been attached with one end **29** to a lever **31** as clearly shown in FIG. **2**. Its other end **32** is hook-shaped and serves for trapping and pulling out the end of the needle thread hanging down from the eye of the needle **7**. The lever **31** is secured on and projects from the bolt **33** projecting from the rotary solenoid armature. As before stated, the rotary solenoid **16** is well known, and upon energization and deenergization its armature partakes simultaneously of both axial or longitudinal and rotary movement, as previously mentioned.

It should be apparent from the foregoing that upon the customary stopping of the machine with the needle in the raised position shown in FIG. **2** and upon energization of the solenoid **15** to actuate the knife **12** and bring about the thread severance, energization of the rotary solenoid **16** will bring about the previously described rotary and axial movements of the stud or bolt **33**, thus acting through the thrust members 23^a, 23^b to separate the tension disk means **18**, **19** and release tension on the thread **17**, and at the same time swing the lever **31** to project the Bowden wire **28** from in its casing-retracted position shown in full lines in FIG. **2** to its projected, dotted line position shown in said FIG. **2** to place its hooked end extremity in position for trapping the needle thread portion depending from the needle hole upon retraction of the wire. Then, upon deenergization of the rotary solenoid **16**, the thrust members 23^a, 23^b will be immediately returned to the left by the spring **22** which also immediately resets the tension, and swinging of the lever **31** back to its starting position shown in full lines in FIG. **2** will fully return the hooked end of the wire to its starting position shown in full lines in FIG. **2**.

While preferred part structure and arrangement are shown herein by way of example, it is to be understood that variations in parts and the arrangement thereof may be made without departing from the spirit and scope of the invention.

I claim:

1. A thread wiper for the needle thread of a sewing machine of the type including a thread-severing device and thread tensioning and releasing means, said thread wiper comprising engaging means (32) for engaging said needle thread, actuating means (16) for causing said thread tensioning and releasing means to release the tension in said needle thread as said thread-severing device severs said thread, and connection means (28) connecting said engaging means (32) to said actuating means (16) for moving said engaging means (32) from an initial position into needle thread-catching position simultaneously with the release of said tension and for returning said engaging means to said initial position upon restoration of said tension.

2. A thread wiper as defined in claim 1 wherein said actuating means comprises a rotary solenoid having a linear stroke motion and a rotational motion, and means for transmitting said linear stroke motion to said thread-tensioning and releasing means and for transmitting said rotational motion to said engaging means of said thread wiper.

3. A thread wiper as defined in claim 1 wherein said actuating means comprises a rotary solenoid including an armature and a pin projecting therefrom, said connection means (28) comprising a Bowden wire having said engaging means at one end thereof in the form of a hook, and a lever (31) secured to said pin and connected to said Bowden wire remote from said hook.

4. A thread wiper as defined in claim 2 wherein said rotary solenoid includes an armature and a pin projecting therefrom, said connection means comprising a Bowden wire having said engaging means at one end thereof in the form of a hook, and a lever (31) secured to said pin and connected to said Bowden wire remote from said hook.

5. In a sewing machine wherein there are included a needle-thread-tensioning means and a needle-thread-deflecting means, the combination of a rotary solenoid having a part to which both rotary and longitudinal movement is imparted upon energization of the solenoid, means for actuating member, means for actuating the thread deflector means and including an releasing the thread-tensioning means to release thread tension and including an actuator member, means for simultaneously transmitting motion to both said members from said part upon energization of the solenoid to release the tension and place the thread deflector in thread-trapping position, and means effective upon deenergization of the solenoid to impart reverse movement to said members to restore the tension and retract the thread deflector to its at rest position.

6. In a sewing machine wherein there are included a needle thread tension means and a needle-thread-deflecting means, the combination of a rotary solenoid having a part to which both rotary and longitudinal movement is imparted upon energization of the solenoid, means for actuating the thread deflecting means and including a first actuating member, means for releasing the thread-tensioning means to release thread tension and including a second actuator member, and means for transmitting rotary movement from said part to said first member and means for transmitting longitudinal movement from said part to said second member upon energization of the solenoid to place the thread deflector in thread-trapping position and to release the thread tension respectively, and means effective upon deenergization of the solenoid to impart reverse movement to said members to restore the tension and retract the thread deflector to its at rest position.

7. In a sewing machine wherein there are included a needle-thread-tensioning means and a needle thread deflecting means, the combination of a rotary solenoid having a bolt to which both rotary and longitudinal movement are imparted in one direction upon energization of the solenoid and in reverse direction upon deenergization, means for actuating the thread-deflecting means and including a first actuating member, means for releasing the thread-tensioning means to release thread tension and including a second actuating member, said first actuating member being effective to transmit the rotary motion of the bolt to the thread-deflecting means to first project the thread deflector to a thread-tapping position upon energization of the solenoid and then upon deenergization of the solenoid to retract the thread deflector to its at rest position, and said second actuating member being effective through engagement with and longitudinal movement of the bolt on energization and subsequent deenergization of the solenoid to first release the thread-tensioning means and then restore the thread-tensioning means during the thread-deflecting action of the thread deflector.

8. In a sewing machine wherein there are included a sewing head with reciprocable needle bar, presser foot and needle-thread-tensioning means, the combination of a solenoid, a needle thread deflector including a hook ended Bowden wire means supported by the head in position for having the hooked end of the wire of the Bowden wire means projectable and retractable across the general path of needle movement, and means operable upon energization and deenergization of the solenoid to project the free hooked end of the wire across the needle path into position for trapping a needle thread portion extending between the needle eye and the presser foot and then retract the same to deflect said thread portion and prevent clamping thereof under the presser foot.

9. The machine structure defined in claim 8 wherein the means operable upon energization and deenergization of the solenoid includes a bolt to which forward and reverse rotary motion is imparted, and an actuator arm extending generally radially from the bolt and attached at its free end to the wire of the Bowden wire means.

10. The machine structure defined in claim 8 wherein there also are included means operable from the solenoid upon energization and deenergization thereof for releasing the thread tension means as the wire of the Bowden wire means is projected into thread-trapping position and for again restoring the thread tension as the wire is retracted to deflect the needle thread portion.

11. The machine structure defined in claim 9 wherein the bolt also has a reciprocation along its axis upon energization and deenergization of the solenoid, and thrust rod means are provided engaging between the bolt and the thread-tensioning means and effective to control the tensioning to release thread tension as the wire of the Bowden wire means is projected and restore said tension when the wire is retracted.

12. The machine structure defined in claim 9 wherein the bolt also has a reciprocation along its axis upon energization and deenergization of the solenoid, and thrust rod means are provided engaging between the bolt and the thread-tensioning means and effective to control the tensioning to release thread tension as the wire of the Bowden wire means is projected and restore said tension when the wire is retracted, said rod means comprising end abutting bipartite rods slidable in bearing means traversing the sewing head.

13. In a sewing machine whererin there are included a sewing head with a reciprocable needle bar and presser foot, the combination of a solenoid, a needle thread deflector including a Bowden wire means having a wire with a hook at a free end thereof, mounting means for locating said Bowden wire means in position for projecting and retracting said hook across the general path of needle movement, and means operable upon energization and deenergization of said solenoid for projecting said hook across the needle path for seizing a needle thread portion extending between the needle eye and the presser foot and then retract said wire to deflect said needle thread portion for preventing clamping thereof under said presser foot.

14. Apparatus as defined in claim 13 wherein mounting means are provided for mounting said solenoid on said sewing head.

15. Apparatus as defined in claim 13 wherein a lever (31) is connected to said solenoid, and means for connecting said wire to said lever.

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,601,074 Dated August 24, 1971

Inventor(s) WOLF-RUDIGER VON HAGEN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, Claim 5, read lines 5, 6 and 7 as follows: --upon energization of the solenoid, means for actuating the thread deflector means and including an actuating member, means for releasing the thread-tensioning means to release--.

Signed and sealed this 29th day of February 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents