Feb. 10, 1970 R. J. ROSS 3,494,316

THREAD WIPING DEVICE

Filed Dec. 2, 1968 2 Sheets-Sheet 1

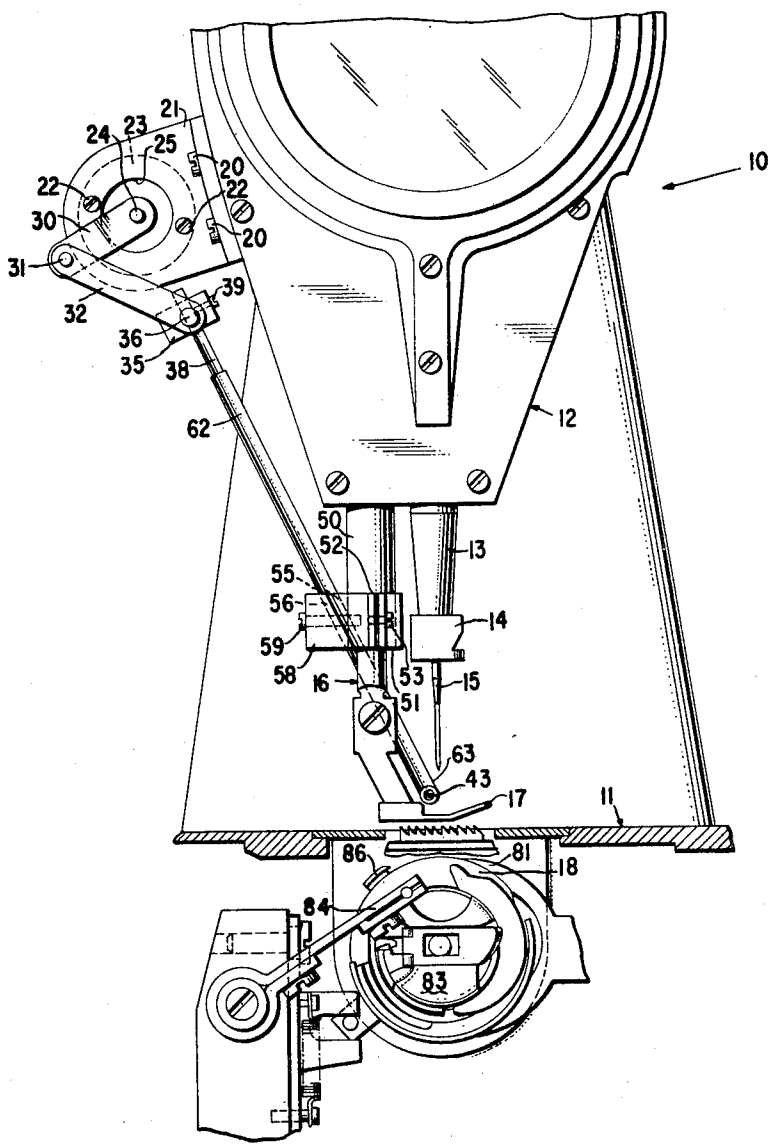


Fig. 1

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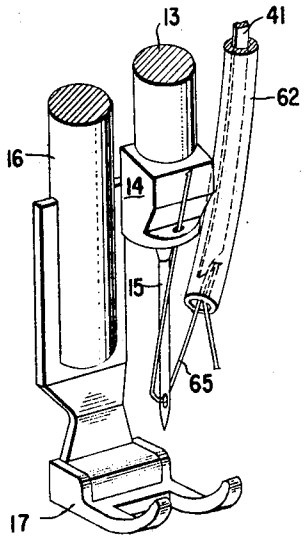


Fig. 2

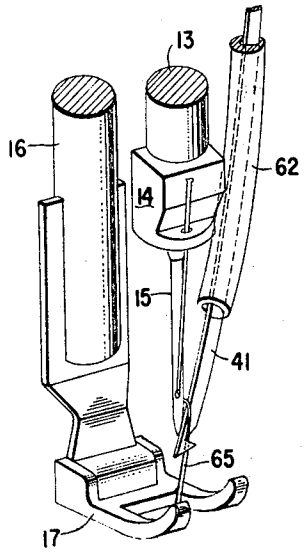


Fig. 3

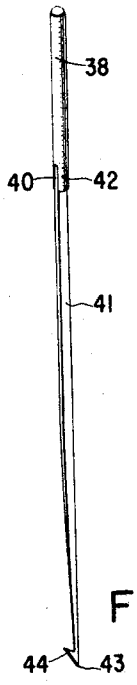


Fig. 6

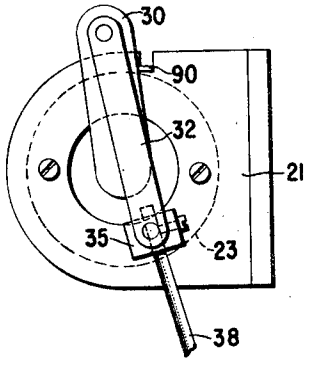


Fig. 4

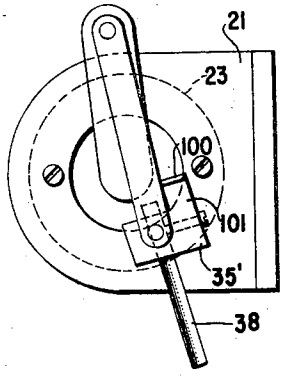


Fig. 5

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THREAD WIPING DEVICE

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Int. Cl. D05b 53/00
U.S. Cl. 112—253 5 Claims

ABSTRACT OF THE DISCLOSURE

A mechanism on a sewing machine for engaging and withdrawing a severed sewing machine needle thread-end from the work fabric at the completion of a line of stitches. The thread wiper includes a member for engaging and withdrawing the needle thread-end, a rotary solenoid having a crank and associated driving linkage for moving the needle thread engaging member, and an abutment fixed relatively to the linkage against which the crank engages upon its retraction to a position over-center thereby locking the linkage in its deactivated at-rest position.

SUMMARY OF THE INVENTION

This invention relates to structure for wiping a severed sewing machine needle thread from the work fabric at the completion of a stitching operation, and temporarily retaining the severed thread-end until the beginning of the succeeding stitching operation.

Generally, it is the object of this invention to provide a needle thread wiper and thread-end holder which will reliably withdraw the severed thread-end from the work fabric in the limited space available, and which will automatically mechanically lock itself in its deactivated at-rest position.

More particularly, it is the object of this invention to provide a needle thread wiper having a thread-engaging member which is safe and predictably free from being undesirably drawn into the path of needle reciprocation upon thread severing failure, effectively preventing damage to the sewing needle and/or being damaged thereby.

It will be understood that what is disclosed in the drawings is merely a preferred embodiment of the invention. The gist of the invention lies in the combination of structure and the orientation thereof.

It is recognized that a conventional rotary solenoid may have built-in stop positions or, in effect, a maximum deactivated retractable position and a maximum activated throw position, within which limits the solenoid is operable. Should a rotary solenoid so equipped be employed, this invention, nonetheless, lies in the particular orientation of the built-in stop positions relative to the driving linkage, which orientation accommodates an over-center position of the driving linkage.

The over-center position is that critical position beyond which the solenoid actuated crank must retract upon deactivation so as to facilitate a temporary self-imposed locking of the thread wiping assembly in its deactivated state.

Should the particular structure be incorporated without the particular orientation disclosed such that the maximum deactivated retractable position would not accommodate the aforementioned over-center position, then upon a failure of the thread trimmer to sever the needle thread, thread, the thread-wiping-element would be undesirably drawn into the path of the reciprocating needle during the successive stitching operation by the unsevered needle thread, which thread the wiping element has seized, thereby subjecting the thread-wiping-element and/or the sewing needle to potential damage upon their mutual collision.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 represents an elevational view, partly in section, of a portion of a sewing machine having the present invention applied thereto.

FIG. 2 represents a perspective view of a sewing machine presser-foot, a thread carrying needle and a portion of the thread-wiping-element in a state of retraction and seizing a severed needle thread-end.

FIG. 3 represents a perspective view similar to FIG. 2 but showing the thread wiper in its extended thread engaging position.

FIG. 4 represents an elevational view with a modification in which a rotary solenoid with a crank and connecting rod are illustrated in a position over-center with the crank engaging an abutment fixed over-center.

FIG. 5 represents an elevational view of a further modification in which an alternate locking means is illustrated with the connecting rod engaging an extended abutment-shoulder on the thread-wiping-element.

FIG. 6 illustratess the assembled thread-wiping-element.

DETAILED DESCRIPTION OF THE INVENTION

The present invention as shown in FIG. 1 is illustrated as embodied on a conventional lockstitch sewing machine, indicated generally at **10**, having a frame including a work supporting bed **11**, over which is supported a bracket arm (not shown), terminating in a sewing head **12**. Supported for endwise reciprocation in the sewing head **12** is a needle-bar **13** having at its lower end a conventional needle clamp **14** in which is detachably secured a needle **15**. Shiftably supported for vertical movement in the sewing head **12** is a spring depressed presser-bar **16** carrying at its lower end a presser-foot **17**. In the bed and cooperating with the needle **15** to form stitches is a conventional loop-taker or rotating hook **18**.

Rigidly fastened on the back of the sewing head **12** by means of a pair of screws **20—20**, is a support plate **21**. Mounted on the support plate **21** by means of a pair of screws **22—22** is a conventional rotary solenoid **23** having an armature **24** which extends through an opening **25** in the support plate **21**. Supported on, and driven by, the armature **24** is a crank **30**. Connected to the crank **30** by means of a pin **31** is one end of a connecting link **32**. The other end of the connecting link **32** is connected to a block **35** by means of a driving stud **36**.

Formed in the block **35** is a cylindrical bore accommodating one extremity of a cylindrical rod **38**, which extremity is secured in the block **35** by a set screw **39**. The other extremity of the cylindrical rod **38** has an axially formed slot **40**, shown in FIG. 6, within which a thread-wiping spring-finger **41** is secured by means of a pin **42**. The thread-wiping spring-finger is preferably made of flat resilient material such as spring steel having its lower free extremity formed with a point **43** and at one side a barb **44**.

Mounted in sewing head **12** is a bushing **50**, which bushing shiftably supports a presser-bar **16**. Fastened to the bushing **50** is a mounting block **51** formed with a split aperture **52**, which aperture accommodates the presser-bar bushing **50**. The mounting block **51** is detachably secured to the bushing **50** by a clamping screw **53**.

The mounting block **51** is formed with an inclined semi-cylindrical groove **55**, which groove **55** is complemental to an enclosed semi-cylindrical groove **56**

formed in the clamping bar **58**. The clamping bar **58** may be secured to the mounting block **51** by means of the screw **59**.

Upon securing the clamping bar **58** to the mounting block **51**, the opposing complemental semi-cylindrical grooves **55** and **56** from a rigid supporting brace for the thread-wiping guide tube **62** having a bend at **63** so as to direct the thread-wiping spring-finger **41**, being shiftably supported therein, toward the reciprocating needle **15**.

It will be understood that the crank **30** and connecting link **32** have a mutually overlapping position as shown in FIG. 4, which position will hereinafter be referred to as an over-center position.

The rotary solenoid **23** is fixed relative to frame **10** on the support plate **21** such that the limits of deactivated retraction and maximum activated throw of the rotary solenoid or, in effect, the solenoid range of operability, include the aforementioned over-center position of the crank **30** relative to the connecting link **32**.

Reference may be made to my pending U.S. application No. 648,385, filed June 23, 1967, for a complete disclosure of the electrical control system which may be incorporated with the present invention for selectively exciting the thread-wiping mechanism described herein.

Reference may also be made to my said pending U.S. application and also to my U.S. Patent No. 3,386,402 for a complete disclosure of the thread trimming device which cooperates in combination with the thread-wiping mechanism herein, which trimming device selectively severs the needle thread **65** at the end of a line of stitches immediately prior to the activation of the thread-wiping rotary solenoid **23**.

Briefly, however, FIG. 1 includes an illustration of a conventional sewing machine rotating hook **18** formed with a needle thread seizing beak **81** for seizing and carrying a loop of needle thread **65** about a bobbin thread (not shown), the bobbin thread issuing from a bobbin case **83**. The thread trimming device includes a thread-catching-element **84** selectively shiftable for engaging and seizing both the bobbin thread and needle thread **65** and for drawing these threads into the path of a thread cutting knife **86**.

It sometimes happens during the operation of mutually cooperating mechanisms acting in sequentially timed stages, that one of the elements in the combination suffers mechanical difficulty and functionally fails, which failure may present a detrimental environment to those members which continue to function. The particular problem overcome by the present invention relates to just such a case.

The structure disclosed herein greatly depends on the functional stability of the thread-trimming mechanism. Should the thread-trimming mechanism fail to sever the needle thread at the end of a line of stitches, then during the successive stitching operation the thread-wiping spring-finger **41** may be subsequently pulled into the path of the reciprocating needle by the unsevered needle thread, which thread the spring-finger **41** has timely seized. This may occur in the absence of an accommodation of the over-center position by the operable range of the solenoid, thereby subjecting the needle **15** and thread-wiping spring-finger **41** to potential damage upon their mutual collision.

With the rotary solenoid **23** affixed relative to frame **10** such that the solenoid range of operability includes the over-center position of the crank **30** relative to the connecting link **32**, the collision and potential damage as discussed and described above would be prevented. Upon the deactivated retraction of the crank **30** into a position over-center, a force exerted downwardly against the spring-finger **41** tending to urge the spring-finger **41** into the path of needle reciprocation, as, for instance would be exerted by an unsevered needle thread after having been timely seized by the spring-finger **41**, would

merely urge the crank and the solenoid armature internal structure into a state of further retraction against the solenoid built-in at-rest structure, which structure would effectively prevent the spring-finger **41** from being undesirably drawn into the path of needle reciprocation. With the arrangement of this invention, the thread if not severed by the thread-trimming mechanism, upon initiation of a subsequent sewing operation would be broken before it would draw the spring-finger **41** toward the needle path.

FIG. 4 illustrates a modified form of construction in which an abutment stop lug **90** is carried by, or formed as a part of, the support plate **21**. The stop lug is positioned for cooperative engagement with the crank **30** in a position of the crank slightly beyond the aforementioned over-center position. The stop lug **90** may replace the built-in stops with which the rotary solenoids may be equipped. The stop lug **90** may also be used together with, and in addition to, a rotary solenoid equipped with built-in stops in which case the stop lug **90** provides for a more selectively predeterminable and more structurally rigid locking means.

A further modification is illustrated in FIG. 5 in which a stop abutment **100** is carried by, or formed as a part of, the block 35^1. Preferably, the block 35^1 in this modification is formed with a shoulder **101** extended in the direction of the cylindrical rod **38** so as to position the abutment **100** for cooperative engagement with the connecting link **32** in a position over-center upon the deactivated retraction of crank **30**.

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

1. A needle-thread-wiping device adapted for use on a sewing machine having a frame, a thread-carrying needle supported in said frame for reciprocation in an endwise path, and a thread-trimming mechanism associated with said sewing machine including a thread-severing element, said thread-wiping device comprising in combination:

(a) a guide means carried by said frame and having a termination remote from said needle path;

(b) a thread-wiping element shiftably supported in said guide means and having a portion movable beyond the termination of said guide means;

(c) a needle-thread-engaging means carried on one extremity of said portion of said thread-wiping element;

(d) a linkage means including a crank and a link connecting said crank with said thread-wiping element, said linkage means having an over-center position defined by a mutually overlapping relationship of said link with said crank;

(e) an energizing means supported relatively to said frame and operatively connected to said linkage means for selectively driving and retracting said linkage means;

(f) an abutment engageable with said linkage means, and

(g) means for fixing said abutment relatively to said linkage means for engagement with said linkage means in said over-center position upon the deactivated retraction of said linkage means, thereby preventing said thread-engaging extremity on said thread-wiping element from being undesirably drawn into the path of reciprocation of said needle upon failure of said thread-severing element on said thread-trimming mechanism to sever said thread.

2. A needle-thread-wiping device as set forth in claim **1** in which said energizing means is a rotary solenoid.

3. A needle thread-wiping device as set forth in claim **2** including support means for said rotary solenoid, said abutment being secured to said support means.

4. A needle-thread-wiping device as set forth in claim **2** wherein said thread-wiping element includes a second extremity to which said linkage means is connected, said

abutment being formed as a portion of said second extremity.

5. A needle-thread-wiping device adapted for use on a sewing machine having a frame, a thread-carrying needle supported in said frame for reciprocation in an endwise path, said thread-wiping device comprising in combination:

(a) a guide means carried by said frame;

(b) a thread-wiping element shiftably supported in said guide means;

(c) a needle-thread-engaging means carried on one extremity of said thread-wiping element;

(d) a linkage means including a crank and a link connecting said crank with said thread-wiping element, said linkage means having an over-center position defined by a mutually overlapping relationship of said link with said crank;

(e) an energizing means operatively connected to said linkage means for selectively driving and retracting said linkage means, said energizing means

having a range of operability including an activated and a deactivated position; and

(f) means for supporting said energizing means relative to said frame with said linkage means in said over-center position when said energizing means is in said deactivated position.

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