ABSTRACT: Linkage device for coupling control bars of sewing machines having a coupling motor and a pedal for controlling the speed of the motor, where the linkage has a latching device connected to one bar that provides the connection between the two bars and where when pressure is applied to both bars by way of an abutment element connected to one of the bars, the device is movable out of latched position and operable to restore the latched position.
LINKAGE DEVICE FOR COUPLING CONTROL BARS ON SEWING MACHINES

BACKGROUND OF THE INVENTION

The invention relates to connecting linkage that connects a coupling motor for driving a sewing machine and a foot pedal provided for controlling the speed of the motor.

After disconnecting the sewing machine motor at the ends of a sewing operation if, for example, the motor is provided with a control device for stopping the sewing machine in a predetermined position of the needle, it is known to stop independently of the handling by the machine operator until the machine stops in a predetermined position of the needle. If the sewing machine is also equipped with a thread-cutting device that cuts the threads at the end of the seam, then the cutting device is actuated simultaneously with the stopping operation for the motor. In this situation the cutting operation is initiated with the needle in the bottom position and terminates before the needle has arrived in its upper position.

Inasmuch as the control of the cutting tool takes place due to the necessity of its coincidence with the parallely occurring stitch formation operation, this operation may not exceed a predetermined upper limit until the cutting operation is ended. However, in order to preclude any damage to the cutting device it is also necessary to prevent any actuation of the coupling motor and thus any increase in the speed of the cutting operation by the machine operator.

The cutting operation is initiated in a known machine after the stopping of the machine in the bottom position of the needle in that the foot pedal is swung backwards by the machine operator into its end position, whereby the cutting operation is initiated while the sewing machine is simultaneously running. The sewing machine in this condition effects one-half turn of the arm shaft from the bottom position of the needle to its top position.

The linkage connection installed in the bars between the foot pedal and the coupling motor must safely preclude any actuation of the sewing motor during this operation which is initiated by the rearward moving of the foot pedal and then terminates its course automatically.

A known linkage connection is provided with latching means for this purpose which are controlled by an electromagnet. This form of control is relatively expensive and is also subject to defects due to necessary cable connection disposed alongside of the moving linkage and can, moreover, lead to destruction of the cutting device if the release of the magnet fails as a result of breaking of the cable.

SUMMARY OF THE INVENTION

It is, therefore, an object of the invention to improve the known release means with a view to safety of operation as well as also to provide simplification of the structural design of the arrangement in order to lower the production costs.

In order to accomplish this the invention is based on the technical problem of coupling the two parts of the gear with a linkage that automatically prevents the initiation of the normal coupling operation of the motor until the cutting operation is terminated.

In accordance with the invention this problem is solved by the latching means provided on one of the bars which effects the connection between the two bars as tensile load is applied and which under tensile load of the two bars is movable out of the latched position by an abutment connected or associated with the other bar. This measure is entirely sufficient with normal operation of the sewing machine, namely when the operator upon initiation of the cutting operation by moving the pedal backwards, permits the same to return to its normal intermediate position, while the needle remains in its upper position by virtue of a stop provided within the control device.

Some machine operators, however, do not work in accordance with these directions where the foot pedal is to be permitted to return immediately upon upward movement into its normal position, but they hold the foot pedal in its

backward position until a new sewing operation is initiated. The new sewing operation is then frequently initiated and accelerated from the rearward position of the foot pedal by sudden depressing into its sewing position. In such cases the shifting from the rearward position of the foot pedal can take place so rapidly that the stop latch can no longer engage and the two bars are uncoupled although the thread cutting operation has long since been terminated.

In order to avoid in such instances the unnecessary release of the linkage connection the abutment is movably mounted in accordance with an advantageous embodiment of the invention and projects in force-transmitting connection into the supporting position for the latch while an arm connected with the latch moves the abutment from this supporting position.

A simple arrangement of the abutment and protection against unintentional release is obtained in that the abutment is pivotally mounted at a distance from the supporting or abutting location between it and the latch and that an abutment surface on a free end portion of the abutment is disposed so that its distance from the pivot point of the abutment decreases towards said free end.

BRIEF DESCRIPTION OF THE DRAWINGS

The lever connecting means or linkage and details thereof are explained in the following description of the one embodiment of the invention with reference to the drawings, in which:

FIG. 1 is a front view of a sewing machine with its drive means and the linkage connection provided between the motor and the foot pedal;

FIG. 2 shows the linkage connection in front view and to an enlarged scale;

FIG. 3 is a similar illustration of the linkage connection in uncoupled condition, and

FIG. 4 is a side view of the linkage connection.

DESCRIPTION OF THE INVENTION

In FIG. 1 a sewing machine is shown with its needle 2 that is driven by a coupling motor 3 provided below the sewing machine and by way of a V-belt 4 in a manner known per se. Here the coupling motor 3 provided with an auxiliary drive means, known per se and not illustrated, for stopping the sewing machine 1 in predetermined positions of the needle 2.

The coupling motor 3 has a control lever 6 pivotally mounted on a bolt 5 secured to the housing, by means of which the speed of the motor can be controlled in a known manner. A pressure spring 8 arranged between an arm 7 secured to the coupling motor 3 and the control lever 6 biases the control lever 6 normally into its end position shown in FIG. 1.

A rocking lever 9 is pivotally supported upon the bolt 5, which lever when moved in counterclockwise direction engages abutment 10 of the control lever 6 which projects into the path of movement of the lever. The movement of the lever in clockwise direction is limited by an abutment 11 provided on the coupling motor 3.

The rocking lever 9 is connected by way of linking bars or rods 12 and 13 with foot pedal 14. The bars 12 and 13 are coupled with one another by means of a latching device 15 which comprises a support member 16, a latching element 17 and an abutment device 18. The support member 16 is connected with the bar or rod 13 by means of a screw 19, while the bar 12 is slidable guided in a slot 22 of the support 16 by means of a bolt 20 and a collar screw 21.

The latching member 17 is fixed to the bolt 20 with its lateral arms 23, and the bridge member 24 which connects the arms 23 is biased against the support 16 by a biasing spring 25 that is journaled on the bolt 20. The bridge member 24 has an inclined surface 26 which engages a correspondingly inclined shoulder surface 27 provided on the support plate 16.

Abutment element 18 is linked by means of a bolt 29 to the supporting plate 16 and is held in engagement with an eccen-
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3 tric pin 31 secured to the support 16, by means of a spring 30 mounted upon the bolt 29 whose strength is less than that of the biasing spring 25.

Thus, an abutment surface 32 formed on the abutment member 18 engages a corresponding formed counter surface 33 on the latch member 17, while the arm 34 provided on the latch member 17 extends alongside of an abutment surface 35 of the abutment member 18 when the latch member is in latched position. The abutment surface 32 of the member 18 is of such construction that the distance at any time of the individual surfaces resting against the free end 36 decreases with respect to the pivot point of the abutment member 18.

The controlling of the speed of sewing is effected in a known manner by stepping onto the foot pedal 14, which way of the bar 14 and the latching bar 15 moves the bar 12 and the rocking lever 9 that engages the abutment 10, rocks the control lever 6 of the coupling motor 3 against the pressure of spring 8 and thus changes the driving speed of the coupling motor 3. The biasing spring 25 in this connection keeps the latch element 17, when the foot pedal 14 is operated as described, in engagement with the inclined shoulder surface 27 of the support member 16.

Upon releasing of the foot pedal 14 it accommodates itself in an intermediate position which is determined by the end position of the control lever 6. In this intermediate position the coupling of the motor 3 is disengaged and the sewing machine 1 stops in the lower position of the needle 2 which is determined by the control means.

The initiation of the thread-cutting operation and the simultaneous driving of the sewing machine to move the arm shaft one-half turn in order to raise the needle 2 from the downward position to the upward position is effected by swiveling the foot pedal 14 upwardly. During this operation the bar 13 presses the support 16 with the abutment 18 upwardly so that the engagement or abutment surface 32 engages the counter surface 33 of the latch member 17. As a consequence of the design of the surface 32 as described above, the abutment member 18 is not rocked, but it remains in its latching position.

The latch member 17 when carried along by the abutment 18 effects by way of the bar 12 a turning of the rocking lever 9 until it engages the abutment 11. Upon raising the abutment 18 further, the abutment surface 32 rocks the latch member 17 as illustrated in FIG. 3 about the bolt 20 against the pressure of spring 25 upwardly so that it releases the shoulder 27 of the support 16. Thus the connection between the bars 12 and 13 is released.

Simultaneously with this operation the driving of the sewing machine through one-half turn of the arm shaft and the initiation of the thread-cutting operation is effected in a known manner by actuating switch means (not illustrated) with the foot pedal 14.

Due to the rocking movement of the latch member 17 the arm 34 presses against the engagement surface 35 and thus rocks the abutment surface 32 of the member 18 out of its range of engagement with the latch member 17, so that the latter is delayed by the force of the biasing spring 25 that exceeds the force of the biasing spring 30, and returns the bridge 24 into engagement with the support member 16, thus restoring the connection between the bars 12 and 13. This position is indicated in FIG. 3 in dot and dash lines.

Under the effect of the biasing spring 30, the abutment surface 35 of the member 18 comes to rest laterally alongside the corresponding counter surface of the latch member 17.

The delaying period for reengagement of the latch 17 needs only to last so long until the cutting operation occurred or, respectively, the time required for the sewing machine 1 to move the needle 2 from the lower position to its upper position. Inasmuch as this operation takes place very rapidly, the delay period caused by inertia may be very short so that after stopping and cutting of the thread the sewing with the sewing machine 1 may immediately continue.

Due to the time period that depends on the mass of the latch member 17 and the spring 25 associated therewith which occurs upon the initiation of the release in the upper position of the foot pedal 14, the linkage 15 releases only upwardly in response to a particularly rapid switching operation of the foot pedal 14 and then immediately again downwardly, because then the time is not sufficient that the surface 26 on the bridge 24 of the latch 17 can come into engagement behind the shoulder surface 27 of the support 16. The bridge 24 then engages the support 16 laterally above the surface 27. The support 16 now drops downwardly with the bar 13 by the length of the path between the collar scrutable on the upper end of the slot 22 in the support 16 without carrying along the bar 12 and thus again cutting in the motor 3. By raising the bar 13 until the shoulder surface 26 of the latch member 17 engages behind the surface 27 of the support 16, the connection between bars 12 and 13 can be restored.

After a stop of the foot pedal 14 in its upper end position that exceeds the resetting delay of the linkage 15, the connection of the two bars 12 and 13 is restored, so that only with a particularly rapid sequence of the starting of the thread-cutting operation and the starting of the new sewing operation, caused for example by faulty operation of the machine, uncoupling of the linkage 15 takes place.

Having now described the invention with reference to the embodiment illustrated in the drawings, what we desire to protect by letters patent is set forth in the appended claims.

We claim:
1. A linkage device for connecting a first rod which is jointed to the speed control lever of a sewing machine motor and a second rod which is jointed to a trolley, said device comprising a supporting plate having a rigid connection with one of said rods and a slidable connection with the other, said supporting plate having a stop face, a latching member supported by said other rod in adjustable relation thereto; resilient means operatively connected with said latching member for yieldingly maintaining the latter in thrust transmitting engagement with the stop face of said supporting plate and thereby establishing a positive thrust transmitting connection between said speed control lever and said trolley; and an abutment member mounted on said supporting plate and provided with a projection which upon relative displacement of said rods in response to upward swinging of said trolley, engages said latching member and swings the latter out of engagement with said stop face in opposition to said resilient means.

2. A linkage device as set forth in claim 1, and further comprising joint means swingably mounting said abutment member on said supporting plate; resilient means operatively connected with said abutment member for pivotally urging the latter against said latching member; and an arm portion on said latching member in cooperative relation to said abutment member for rocking the latter out of engagement with said latching member upon movement of the latter out of engagement with said stop face of said supporting face.

3. Linkage device in accordance with claim 2, where said abutment member is pivotally supported at a distance from the abutment location with said latching member and an abutment surface on a free end of said abutment is so disposed that its distance from the pivot point of the abutment member decreases toward said free end thereof.