REGULATING MECHANISM FOR A SEWING MACHINE

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The present invention concerns a regulating mechanism for a sewing machine adapted to control the length of the stitches.

Such a regulating mechanism is of the type which comprises a control rod for a feeder device for moving the pieces to be sewn, adapted to occupy diverse angular positions each determining a particular stitch length, a control member permitting manual actuation on an actuating lever of the rod, this same control member permitting the interlocking of an automatic control device for the variation in length of stitch, comprising a rotatable cam followed by a feeler carried by one end of a return lever, the other end of which is pivoted to a slider carried by the rod, this return lever being pivoted on a support lever oscillating with respect to the machine and the control member being adapted to operate on the support lever.

According to the present invention the control mechanism for the stitch length is characterized by the fact that the control member is a rotatable knob secured to a shaft carrying a cam adapted to co-operate successively in accordance with its angular position with two feelers, one carried by the end of the actuating lever of the rod and the other by the end of the support lever, the part of the profile of the cam operating on the support lever presenting a ramp in such a manner as to permit a correction adjustment of the interlocking position of the automatic control device.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is an elevation of the mechanism constructed in accordance with the invention;

FIGURE 2 is an elevation of the same mechanism at right angle to the view shown in FIGURE 1;

FIGURE 3 is a corresponding plan;

FIGURE 4 is a plan of the mechanism showing the position which the mechanism occupies after automatic control of the variations in stitch length;

FIGURE 5 is a detail of a control cam for the momentary back movements; and

FIGURE 6 is a developed view of a control cam for a stable stitch length regulation.

The control mechanism shown in the annexed drawings is adapted more especially for use with a sewing machine of the type described in the specifications of the U.S. Patents No. 2,682,845 and No. 2,647,481.

In such a sewing machine the feeder device for moving the pieces of material to be sewn is operated from a motor actuating the whole machine mechanism and the amplitude and the direction of movement of this feeder device is controlled by the intermediary of a vertical rod 1.

In fact, to each angular position which it can occupy, this rod 1 corresponds to a forward or backward movement of the feeder for moving the pieces to be sewn. Only the mechanism adapted to give the rod 1 its diverse positions have been shown in the drawings, the rest of the material feeder device is of known construction.

This control rod 1 which is axially fixed, is guided in bearings provided in a frame 2 of the sewing machine. The rod 1 is normally returned by a spring in an anti-clockwise direction with reference to FIG. 3. In its upper part, this rod 1 carries an actuating lever 3 freely engaged around the rod 1. A pin 4 is radially engaged in the rod 1 and is adapted to serve as abutment means for a pin 5 secured to the actuating lever 3. A coil spring 6 is engaged around the rod 1. This coil spring 6 is hooked by its ends 7 to a radial pin 8 secured to the rod 1. The other end 9 of the spring 6 leans against the actuating lever 3 and tends to maintain the pin 5 thereof in contact with the pin 4. The actuating lever 3 carries a feeler 10 at its end constituted by head of a screw 11 screwed in a tapped bore 12 of the actuating lever 3. This feeler 10 can thus be regulated in position after mounting, its definite position being ensured by a nut 13.

This feeler 10 is adapted to co-operate with the profile of a cam 14 secured to a shaft 15, transversely guided in the frame 2 of the machine. A rotatable control knob 16 is fixed on the outer end of this shaft 15.

The profile of the cam 14 shown in the developed view in FIGURE 6 comprises four distinct working zones:

Zone I is adapted to control the length of stitches in a reverse direction from a maximum amplitude (−4) to a zero amplitude (0).

Zone II of this profile, which has a smaller inclination than that of zone I is adapted to control the length of stitches from an amplitude (0) to a determined unit amplitude (+1).

In zone III the profile of the cam 14 controls the stitch length of this unit amplitude (+1) to a maximum forward amplitude (+4). FIGURES 1 to 3 of the drawings show the feeler 10 when it occupies the position A on zone III of the cam 14 precisely. In this zone, the inclination of the profile is practically similar to that of zone I. The inclination of zone II which is less than that of zones I and III, permit the extension of the field of adjustment between the amplitude zero (0) and the unit forward amplitude (+1).

Zone IV of the profile of the cam 14 is adapted to interlock the automatic control device for varying the stitch length.

This automatic control device for varying the stitch length is of the same type as that described in the specification of the above-mentioned U.S. Patent No. 2,682,845.

The machine described in this patent specification comprises a vertical shaft 17 guided in bearings made in the frame 2 of the machine and is continuously rotated from the main shaft of the sewing machine. This vertical shaft 17 is adapted to receive control cams, of which especially a cam 18, the profile of which controls, in the course of functioning the machine, diverse variations of direction and amplitude of the feeder device for moving the pieces of material to be sewn. This cam 18 is adapted to operate on a feeler 19 carried by one end of a return lever 20, the other end of which is pivoted by an axle 21 to a slider 22. This slider 22 can affect a reciprocating movement in a slide 23 carried by the upper end of the control rod 1.

The return lever 20 is oscillatingly mounted, on an axle 24 on a support lever 25. The support lever 25 is itself pivoted by its end 26 on an axle 27 carried by the frame 2 of the machine. The other end 28 of the support lever 25 carries the feeler 29 formed by the head of a screw 30, engaged in a tapped bore 31 of the end 28. This feeler 29 is thus regulatable in position after mounting, its definite position being ensured by a nut 32. A spring 43, hooked to the frame 2 and to the support lever 25, tends to maintain the feeler 29 in contact with the cam 14.

After the knob 16 is brought into the regulating field for automatic movement, the profile of zone IV of the cam 14 oscillates the support lever 25 to bring it from the position shown in FIGURE 3 into the position shown in FIGURE 4. In this position, the feeler 19 enters into contact with the profile of the cam 18 and can follow it. The movements given to the feeler 19 by the cam 18 are transmitted by the return lever 20 to the slider 22 and
thus, to the slide 23 secured to the control lever 1. Different angular positions are given to this rod 1, positions which depend on the profile of the cam 18 and give all desired variations in stitch length in forward or reverse movement.

Zone IV of the profile of the cam 14 is the form of a ramp so as to permit a correction regulation in the automatic control position, such regulation may be necessary in accordance with differences due to the tolerances of manufacture existing in the different cams 18 adapted to be engaged on the vertical shaft 17.

It is to be noted that when the feeder 29 is in contact with zone IV of the profile of the cam 14, the feeder 16 is withdrawn from this profile and thus leaves all movement of the control rod 1 then actuated from the cam 18 through the slider 22.

This control mechanism for the stitch length comprises moreover a second manual control member 33, permitting by pressure thereon, the control of momentary reverse movements of the feeder device from an amplitude equal to that given in the forward direction by the regulating knob 16 and the cam 14, when the feeder 16 is in contact with zones II and III of this cam.

The second control member 33 is formed by a driving lever 34 pivoted by an axle 35 on the frame 2 of the machine. This lever 34 presents three arms, the first of which forms the control member 33. One end 37 of a second arm 36 is adapted to operate on the pin 8. One end 39, of the third arm 38 is adapted to lean against the profile 40 of a cam 41 secured, as is the cam 14, on the shaft 15 controlled by the knob 16.

If, when the control knob 16 is regulated for a determined stitch length in forward movement, the user of the machine desires momentarily to prick stitches in reverse without de-regulating the knob 16, it suffices to exert a pressure on the second control member 33 to tip it up until end 39 abuts against the profile 40 of the cam 41. During this tipping movement of the lever 34, the end 37 displaces the control rod 17 angularly in moving the pin 8. This angular movement of the rod 17 is rendered possible as the feeder 10 leans against the cam 14 due to a resilient coupling by the spring 20 of the actuating lever 3 of the rod 1.

It is to be noted that the profile 40 of the cam 41 presents a circular zone 42 remotely radially from the shaft 15 by a distance sufficient to push back the end 39 and maintain the end 37 of the lever 34 out of contact with the pin 8 when the knob 16 is regulated for automatic control of the variation in stitch length. In this way, the control mechanism 33 remains immobile during the functioning of the machine when the feeder device is controlled from the cam 18.

The control mechanism for the stitch length for the sewing machine described above, with reference to the drawing, thus permits the effecting of the following operations with the use of a single control knob 16:

(a) Adjustment of the stitch length in forward movement in turning the rotatable knob 16 so that the cam 14 acts on the feeder 10 by the zones II and III of its profile. This forward movement adjustment is effected thus with a more extended field between the points "0" and "+1" than between the points "-1" and "+4.4".

(b) Adjustment of the stitch length in reverse movement from "0" to "-4" by turning the control knob 16 bringing the feeder 10 into contact with zone I of the profile of the cam 14.

(c) Interlocking of the automatic control device for the variation in stitch length in forward or reverse movement by turning of the control knobs 16, so as to bring the feeder 29 into contact with the zone IV of the cam 14. The choice of point of contact of the feeder 29 and of the ramp forming the zone IV by angular displacement of the knob 16 permits the effecting of correction adjustment to compensate the differences in dimensions which can exist between certain cams 18.

By means of the second control member 33, this control mechanism can moreover effect:

(a) A momentary regulation for stitch length in reverse (when the control knob 16 is regulated for forward movement), by pressure on the control member 33 bringing the control rod 1 into an angular position for which it controls a reverse movement, the amplitude or the length of the stitches of which is equal to that in forward and the angular position is determined by the position of the control knob 16.

The possibility of effecting (a), (b) and (c) solely by rotation of a single control knob 16 facilitates the manipulation and the adjustment of the sewing machine in avoiding all faulty manipulation.

Numerous variations in the embodiments of the control mechanism described above could be made. Thus instead of using a cam 14 of the "bell cam" type, there could also be used an ordinary cam having a radial profile of the cam 41 type. Of course the form of these cams 14 and 41, likewise the disposition of the diverse levers of the mechanism could be different in accordance with the type of sewing machine on which a similar mechanism is to be mounted.

The cams 14 and 41 which are formed on two distinct pieces in the embodiment shown in the drawing could also be combined in a single cam having two profile faces.

I claim:

1. A mechanism for regulating the stitch length in a sewing machine, comprising a frame, a control rod for a feeder device adapted to move pieces of material to be sewn mounted on said frame, said control rod being adapted to occupy diverse angular positions each determining a particular stitch length, an actuating lever mounted on said rod, a feeder carried by said actuating lever, a shaft having an inner end and an outer end, guided in said frame member, a cam mounted on said inner end of said shaft and a manually rotatable control knob mounted at the outer end of said shaft, an axle carried by said frame, a support lever pivoted to said axle, a feeder carried by said support lever, a return lever pivotally connected to said support lever oscillating with respect to said frame, a feeder carried by said return lever which is pivoted to a slider carried by a slide which is secured to said rod, said feeder carried by said return lever being actuated by a rotatable cam for controlling the variation of direction and amplitude of said feeder device for moving the pieces of material to be sewn, said cam carried by said shaft being adapted to co-operate successively with said feeder carried by said support lever and said feeder carried by said actuating lever in accordance with the angular position of said cam.

2. A mechanism according to claim 1, wherein a driving lever is pivotally connected to said frame, and permits by pressure thereon, the control of the momentary reverse movement of the feeder device for moving the material to be sewn, by an amplitude equal to that given to it in forward movement by said control knob, a second cam secured to said shaft carrying said control knob, said driving lever presenting a part adapted to operate on a lateral projection of said rod to move said rod angularly, and another part adapted to a second cam limiting the angular movement of said driving lever and thus of said rod, said actuating lever being coupled to said control knob by resilient means permitting an angular displacement between said actuating lever and said rod during the working of said driving lever.

3. A mechanism according to claim 1, wherein a driving lever is pivotally connected to said frame, and permits, by pressure thereon, the control of the momentary reverse movement of the feeder device for moving the material to be sewn, by an amplitude equal to that given...
to it in forward movement by said control knob, a second cam secured to said shaft carrying said control knob, said driving lever presenting a first part adapted to operate on a lateral projection of said rod to move said rod angularly, and second part adapted to lean against said second cam limiting the angular movement of said driving lever and thus of said rod, means resiliently coupling said actuating lever with said control knob comprising a spring wound on said rod, one end of said spring being hooked to said lateral projection of said rod and another end of said spring being hooked to said actuating lever, abutment means provided on said rod and on said actuating lever determining the working position thereof on said rod.

4. A mechanism according to claim 3, wherein said second cam has a circular zone radially removed from said shaft by a distance sufficient to move said first part of said driving lever away from said projection of said rod, said circular zone corresponding to a setting for automatic control of said knob.

No references cited.