PRESSER FOOT CONTROL FOR SEWING MACHINES

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This invention relates to a mechanism on boot-makers' sewing machines for the control of the presser-foot, particularly on machines for sewing double-soles.

With a sewing machine of this kind the work-piece is, during the sewing operation, alternatively clamped between a presser-foot and a work-piece support, and released again, an automatic adjusting device being provided of necessity in association with the operating rod system used therefor which device adjusts itself according to the thickness of the material of the work-piece so that, independently of said thickness of material, the desired clamping pressure is always obtained. These devices consist essentially of a threaded spindle and an adjusting nut which hitherto required a special operating cam for its control because, in the embodiments heretofore known, the threaded spindle is not directly linked into the operating rod system of the presser-foot which is controlled by an operating cam, but is arranged as an additional device outside this rod system.

An object of the present invention is to provide an improvement and a simplification of the operating mechanism of the presser-foot of a bootmaker's sewing machine, the presser-foot of which receives, in operation, temporarily an additional pressure for the purpose of strongly clamping the work-piece.

The invention comprises a threaded spindle together with an adjusting nut for the adaptation of the position of the presser-foot to various thicknesses of material of the work-pieces, which is inserted directly into the rod system which derives the additional pressure from a cam disc or any other driving element of the machine.

Accordingly, this arrangement permits the control of the presser-foot by means of a single cam so that—as distinguished from arrangements heretofore known—not only is the cam for the adjusting device eliminated, but also the corresponding operating rod system. This simplification is made possible particularly by the construction of the threaded spindle, which after braking the rotation of the adjusting nut, forms an integrally movable unit with the latter which accordingly is also suited for the transmission of force of the desired clamping pressure to the presser-foot.

The foregoing and other features of the invention will become apparent from the following description of one embodiment which is illustrated by way of example on the accompanying drawings and to which reference will now be made:

Fig. 1 shows a general arrangement of an operating rod system for the presser-foot of a double-sole sewing machine; and

Fig. 2 shows, on a larger scale, the automatic adjusting device, partly in section.

The presser-foot 1, which carries in appropriate manner a knife or scriber 2 for making the incision in the sole, is supported by the upper arm of a two-armed lever 3 which is fulcrumed about a pivot 4 fixed to a bracket 5. This bracket has another pivot 6 by which are carried in suitable manner a feeder cam 7, a support 8 for the awl 9, and a support 10 with guide 11 for the sewing needle 12. The work-piece rests during the sewing operation on a support 13.

At the lower end of the two-armed lever 3 is a ball joint 14 to which is attached one end of a connecting rod 15 the other end of which engages a ball joint 16 on a crank lever 17. This lever 17, together with a lever 18, forms a mechanical unit fulcrumed at 19 on the machine frame. The ball joints 14, 16 for the connecting rod 15 are necessary because the lever 3 performs lateral feeder movements together with the bracket 5 in addition to its oscillating movements.

The lower part of the lever 18 is subjected to the pull of a spring 20 attached to the machine frame at 21 and to a pin 22 attached to the lever. Further, the pin 22 is engaged by the upper arm 23 of a bell-crank lever fulcrumed at 24 and operated, through a link 25, from a pedal 26 fulcrumed at 27. The fulcrum 24 and 27 are fixed to the machine frame. The spring 20 acts permanently in the sense of pressing the presser-foot 1 towards the work-piece support 13, whereas the depression of the pedal 26 acts in the opposite sense, i.e. to lift the presser-foot 1 off the work-piece support 13.

The pin 22 of the lever 18 is also engaged by a connector 28 which is forked at its free end and carries, in this bifurcation, a pivot 29 for the attachment of a threaded rod 30 which is shaftwise guided in the bushings 31, 32 of a U-shaped bracket 33 fixed to the machine frame.

On a threaded portion of the rod 30 is an adjusting nut 34 which carries a thrust bearing 35 serving as a abutment for one end of a compression spring 36 surrounding the rod, the other end of the spring bearing on the left arm of the bracket 33. The said spring presses the bearing 35 and the adjusting nut 34 towards the right in Fig. 2 and consequently holds the adjusting nut 34 in engagement with the front end of the bushing 32. The right hand portion of the nut 34 is provided with a conical chamfer 37 which matches a corresponding conical recess 38 in a
brake ring slidably fitted to the smooth outer surface of the bushing 32. This bushing is screwed into the arm of the bracket 33 and is equipped with a head 41 by the turning of which the bushing in the bracket is axially adjusted and consequently also the abutment of the adjusting nut 34 with respect to the brake ring 38. The brake ring is in connection with the driving cam 42 (Fig. 1) through the lever and rod system 44, 46, 47 and 48, the cam being keyed to the driving shaft 43 of the machine. The pivot 45 of this rod system is rotatably journalled in the machine frame and carries at one end the lever arm 47 which is connected, through the connecting rod 48, with the pivot 49 (Fig. 2) of the brake ring 38. A spring 50 (Fig. 1) acts on the lever and rod system so as to hold the roller 45 at the free end of the lever 44 permanently in engagement with the driving cam 42.

The operation of the described device is as follows:

In the rest position of the machine, prior to the application of a work-piece, the presser-foot 1 is in its lowest position under the influence of the pull of the spring 20, the threaded rod 30 then assuming its extreme left end position; moreover, the adjusting nut 34 is freely rotatable and is pressed by the spring 36 against the bush 32, as shown in Fig. 2. To place a work-piece on the support 13, the operator presses down the pedal 26 and thereby lifts the presser-foot 1 against the pull of the spring 29, so that the work-piece can be freely put on to the support. The pressing down of the pedal 26 also causes a shifting of the threaded rod 30 towards the right, the adjusting nut 34 rotating freely about its axis, without changing its position in relation to its abutment on the bushing 32. The thrust ball bearing 35 permits this rotation of the adjusting nut 34 without any appreciable resistance, provided a sufficiently high pitched thread is used. After the work-piece has been correctly positioned, the operator releases the pedal 26 whereupon, under the action of the spring 20, the presser-foot 1 comes to rest upon the work-piece; at the same time the threaded spindle 30 assumes a position depending on the thickness of the material in the work-piece (i.e., the thickness of the sole leather) while the adjusting nut 34 still remains in engagement with the bushing 32.

When during the sewing operation the presser-foot 1 is to be pressed harder against the work-piece, the driving cam 42 comes into action. This cam pushes the brake ring axially forward against the adjusting nut 34 at the appropriate moment and carries the nut with it, the engagement of the conical surfaces 37, 38 then preventing any turning of the nut which thereupon becomes a kinematically solid mechanical unit. Accordingly, from the moment of engagement of the conical surfaces 37, 38 the brake ring 39 carries with it the nut 34 together with the threaded rod 30 and causes thereby a shifting of all of them towards the adjusting nut 34 still remaining in engagement with the bushing 32.

With the clearance between the conical surfaces 37 and 38 being increased or reduced as the case may be.

The additional pressure force ought normally to act on the presser-foot 1 only during the phases of the sewing when the awl 9 or the needle 12 is engaging the work-piece, whereas during the feeding of the work-piece from one stitch to the next and during the return strokes of the feeder members the clamping action of the presser-foot should cease. This takes place by removing the brake-ring 39 from the adjusting nut 34 under the action of the cam 42 and allowing the nut to abut against the bushing 32. The presser-foot 1 then remains only under the influence of the comparatively weak spring 20. The described action repeats itself with each stitch of the sewing machine. After termination of the sewing operation, the operator presses down the pedal 26 again in order to take off the sewn work-piece and to insert another work-piece.

For a better understanding of the correlation of the parts of the mechanism of my invention and the cycle of operation of the sewing machine, reference is made to the disclosures in my copending applications Serial No. 730,614 filed February 24, 1947, for Mechanism for Feeding Workpieces in Double Soling Machines; and Serial No. 794,754 filed March 14, 1947, for Shoe Sewing Machine now Patent No. 2,962,810, dated July 31, 1951. While I have described my invention in certain of its preferred embodiments, I realize that modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

I claim:

1. In a bootmaker's sewing machine, a driving means, a presser-foot, a work-piece support, spring means for urging said presser-foot towards the work-piece support and an associated lever and rod system operable by the driving means for temporarily subjecting the presser-foot to additional pressure during sewing operation for the purpose of tightly clamping the work-piece, a bracket, a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of said arms being screw threaded, and said adjustably normally fixed abutment having a pair of spaced substantially parallel arms, each of said arms having an opening through which the rod extends, the opening in one of
a U-shaped bracket mounting said adjusting device, the arms of said bracket being spaced to enable the nut to move laterally, and a brake-ring co-operating with said nut and displaceable by the driving means, the clearance between said brake ring and said nut being variable for the purpose of adjusting the additional pressure of the presser-foot.

5. A machine as set forth in claim 1, including means for adjusting the said abutment for the purpose of adjusting the said additional pressure, the said means including a bushing surrounding the threaded rod, which bushing is screwed into an arm of said bracket, said bushing having an adjusting head thereon.

6. In a bootmaker’s sewing machine, a driving means, presser-foot, a work-piece support, spring means for urging said presser-foot towards the work-piece support, and an associated lever and rod system operable by the driving means for temporarily subjecting the pressure-foot to additional pressure during sewing operation for the purpose of tightly clamping a work-piece on the work-piece support, a device for adjusting the position of the presser-foot to various thicknesses of materials comprising a threaded rod and an adjusting nut threadedly engaged with said rod and directly linked into the said lever and rod system, an adjustable normally fixed abutment for the nut, spring means pressing said nut against said abutment, and a thrust bearing between said nut and said spring.

7. A machine as set forth in claim 6, including a U-shaped bracket mounting said adjusting device, the arms of said bracket being spaced to enable the nut to move laterally.

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REFERENCES CITED

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