J. FOSSA

SHOE UPPER LACING MACHINE

Filed June 25, 1940

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Witness

[Signatures]

Inventor

[Signatures]
The present invention relates to improvements in cord cutting devices and is herein illustrated as being embodied in a shoe upper lacing machine of the type disclosed in U. S. Letters Patent of the present inventor No. 2,106,320, dated January 25, 1938, and No. 2,281,686 dated May 8, 1942, and in the present inventor's pending application Serial No. 339,724, filed May 17, 1940, in which a needle, a looper and a cord cutting knife act to form a lacing of enchainged loops in a single length of cord and to sever the cord at the end of each lacing so that the upper operated upon may be freed readily from the machine.

In the application for U. S. Letters Patent of Keaney, Serial No. 342,043, filed June 24, 1940, there is described a lacing machine of the type referred to having a reciprocating cord cutter bar actin with the looper, the machine to sever the lacing cord at the end of a lacing operation along that portion supported by the looper. In that machine, a cutter bar has projecting from its upper surface a triangular knife edged member integral with the bar which, when the bar is actuated, moves across the path of the cord between the looping and spreading elements of the lacer. The knife edged member is relatively small and frequently becomes shortened after being sharpened so that it is no longer effective in severing the cord.

The object of the present invention is to simplify and improve the construction of a thread cutter for a lacing or similar machine in which the cutting knife is carried by a bar mounted for reciprocation in a guide, in such a way that the knife may readily be sharpened without complication in adjustment or difficulty in removal of parts from the machine. Accordingly, a feature of the present invention consists in the provision in a machine having upper clamping means, a needle for inserting a series of loops of cord in the clamped upper, and a looper for enchainging the inserted loops, of a quickly disconnectable cutter knife secured to a bar actuated relatively to the looper, while the final loop of a lacing is held by the looper to sever the cord in the final loop. To render the cutter knife quickly disconnectable, according to the construction illustrated, the knife has a shank secured to the bar within the guide in which the bar is mounted for sliding movement to prevent removal of the knife, excepting when the bar is partly withdrawn from the guide. Suitable interlocking tang and notch elements on the shank portion of the knife and the bar also are provided in this form of the invention to render the knife readily disconnectable without difficult manipulations or adjustments. Such an arrangement is desirable particularly in the type of shoe upper lacing machine referred to because of the relatively close spacing between adjacent parts of the machine and to the difficulty frequently encountered in making adjustments of any kind as a result.

These and other features consist in the constructions, combinations and arrangements of parts hereinafter described and claimed, the advantages of which will readily be understood from the following description taken in connection with the accompanying drawing in which Fig. 1 is a view in right-hand side elevation of a portion of a lacing machine embodying a cord severing cutter of the present invention; Fig. 2 is a front view, partly in section, taken along the line 2—2, illustrating the relationship between the cord cutter and the final loop of cord in a lacing; Fig. 3 is a sectional plan view of the cutter bar and guide; Fig. 4 is a perspective view of the cutter knife separated from the bar; and Fig. 5 is a perspective view of the forward end of the cutter bar without the knife attached.

The illustrated lacing machine, in construction and mode of operation of its lacing devices, is the same as the machine of the patent and applications above identified. The lacerers are inserted while the upper is held clamped in folded relation with pairs of eyelets in opposite upper sides in alignment. Each pair of aligned eyelets operated upon has inserted therein a length of cord formed into a series of enchainged loops, alternate ones of which are passed through the eyelets and the others of which are passed across the eyeleted edges of the upper, the light portion of each loop acting to lock the previously formed loops in place, the final loop being secured along the light portion and the severed supply end being withdrawn. In this way, the next to the last loop of cord is so locked that a pull on the free end connected with the lacing will not unravel the completed lacing but draw it tighter.

Referring more particularly to the drawing, the illustrations in Figs. 1, 2 and 3, in order to avoid confusion, indicate two only of the series of enchaigned cord loops in a lacing. As illustrated, these loops of cord are in the positions of the next to last and final loops formed just before the lacing is completed. In Figs. 1 and 3, one loop 3 is shown as having been passed across the eyeleted edges of a folded shoe upper 4 and is drawn close to the surface of the upper adjacent a pair of aligned eyelets 6, the upper being secured in position by clamping members 1. The bight of a final loop 8 has been inserted in the loop 3 and is illustrated as being held in spread relation by a looper having relatively movable looping and spreading elements 10 and 12 which enter each succeeding loop after releasing the previous one. Each loop is inserted by the upward stroke of a reciprocating eye pointed needle 14 which is moved laterally with a jogging
action. In order to provide slack for opening out of the upper, the lacing cord between successive loops is carried about the hooked end of a thread finger 16 spaced a short distance from the upper. During the final movements of the needle 14, the lacing cord is carried into the grasp of a cord gripper 18 consisting of two relatively moveable members and the cord of the final loop 8 is severed along the height portion which is held by the looper.

In the Kenney application above referred to, the cutter knife member is triangular in shape and projects only a short distance above the upper surface of the cutter bar corresponding to the cutter bar, indicated at 29, in the present application. The cutter knife is so small that it is not only difficult to sharpen but if sharpened frequently, it soon becomes worn away until it no longer projects sufficiently from the upper surface of the bar to reach the cord between looping and spreading elements of the looper. As a result, the whole cutter bar must be removed and a new one substituted.

In order to simplify the removal of the cutter knife for sharpening, replacement or other purposes, in the machine of the present invention, the bar 20 is provided with a quickly detachable knife formed with an elongated spring shank 22, a sharpened cutting edge 24, an angularly bent tang 25, a tab 29, and an offset portion 30. The width of the shank 22 of the knife is the same as the height of the cutter bar 20 and the cutter bar is reduced in width at one side to receive the shank of the knife within a guide 32 in which the bar is mounted for sliding movement in the lacing machine. The guide 32 is formed in a frame for supporting all of the parts of a single lacing unit, there being a number of lacing units in the machine corresponding to the number of pairs of eyelets operated upon.

Within the guide 32, when the bar 20 is in normal operating position, the bar has an opening 34 to receive the tab 29. The forward end of the bar has a notch 35 to receive the tang 25. To increase the grip of the knife on the bar, the forward cutting edge end of the bar outside of the guide is provided with a recess 36 into which fits the offset portion 30 of the knife. When the knife is secured to the bar, with the bar in normal operating position within the guide, removal of the knife from the bar is rendered impossible. In order to remove the knife from the bar, the bar is disconnected from its actuating mechanism and moved forwardly to a position where the opening 34 in the bar is exposed outside of the guide. The tab 29 then may be withdrawn from the opening 34 and the forward end of the knife disengaged from the recess and notch in the bar. No special tools are required for the removal of the knife and no separate-fastenings which would be likely to become misplaced or to cause difficulty in use are required, there being insufficient space between adjacent lacing units to enable the use of tools. Also, when the knife is removed from the bar, the knife edge 24 is more easily sharpened than when the edge is formed on a member integral with the bar. If after numerous sharpening operations, the knife edge 24 is so shortened as to render it ineffective, a new knife may readily be substituted for the one removed without the expense and difficulty of fitting an entirely new cutter bar in the machine.

The rearward upper end of the reciprocating cutter bar 20 in the present machine is connected to an actuating mechanism in a manner which simplifies the adjustments required in sliding the bar forwardly to a position where the opening 34 of the cutter bar is exposed outside of the guide 32. The upper rearward end of the bar is grooved and fits one edge of a cap plate 40 of L-shaped cross-section secured to a horizontal flanged rod 42 supported at its ends in a pair of parallel actuating arms arranged to move simultaneously at the end of each lacing operation, as more fully described in the patent referred to. To retain the grooved end of the bar in operative relation to the cap plate, the flange portion of the rod forms a supporting surface against which the bar rests and the cap plate is releasably clamped in place by a pair of screws, one of which is indicated at 44. By loosening or removing the screws, the plate 40 may be raised sufficiently to clear the notched end of each bar and permit its release from the rod 42. The bar may then be forced forwardly to a position where the knife may be replaced in the manner referred to.

The nature and scope of the invention having been indicated and a specific construction embodying the present invention having been described, what is claimed is:

1. In a machine for lacing shoe uppers, the combination with upper clamping means, a needle for inserting a series of loops of cord in an upper, and a looper cooperating with the needle to enchain the inserted loops, of a cutter comprising a bar actuated relatively to the looper while the final loop of a lacing is held by the looper, a guide in which the bar is mounted for sliding movement, and a knife having a cutting edge outside the guide and a spring shank secured to the bar within the guide to prevent removal of the knife when the bar is in operative position in the machine.

2. In a machine for lacing shoe uppers, the combination with upper clamping means, a needle for inserting a series of loops of cord in an upper and a looper cooperating with the needle to enchain the inserted loops, of a cutter comprising a bar actuated relatively to the looper while the final loop of a lacing is held by the looper, a guide in which the bar is mounted for sliding movement, and a knife having a cutting edge outside the guide and a spring shank secured to the bar within the guide to prevent removal of the knife when the bar is in operative position in the machine, said knife shank having an angular tang fitting the notch in the projecting end of the bar to prevent displacement of the knife from the bar outside the guide.

3. In a machine for lacing shoe uppers, the combination with upper clamping means, a needle for inserting a series of loops of cord in an upper and a looper cooperating with the needle to enchain the inserted loops, of a cutter comprising a bar having a notched forward end and a recess adjacent the forward end actuated relatively to the looper while the final loop is held by the looper, a guide in which the bar is mounted for sliding movement and from which the notched end projects, and a knife having a cutting edge outside the guide and a spring shank with a bent tab fitting an opening in the bar within the guide and having an angular tang and an offset portion fitting the notched and recessed portions at the projecting end of the bar to prevent displacement of the knife from the bar outside the guide.

JOSEPH FOSSA.