July 27, 1943. F. A. KEANEY 2,325,137

SHOE UPPER LACING MACHINE

Filed June 24, 1940

Fig. 1

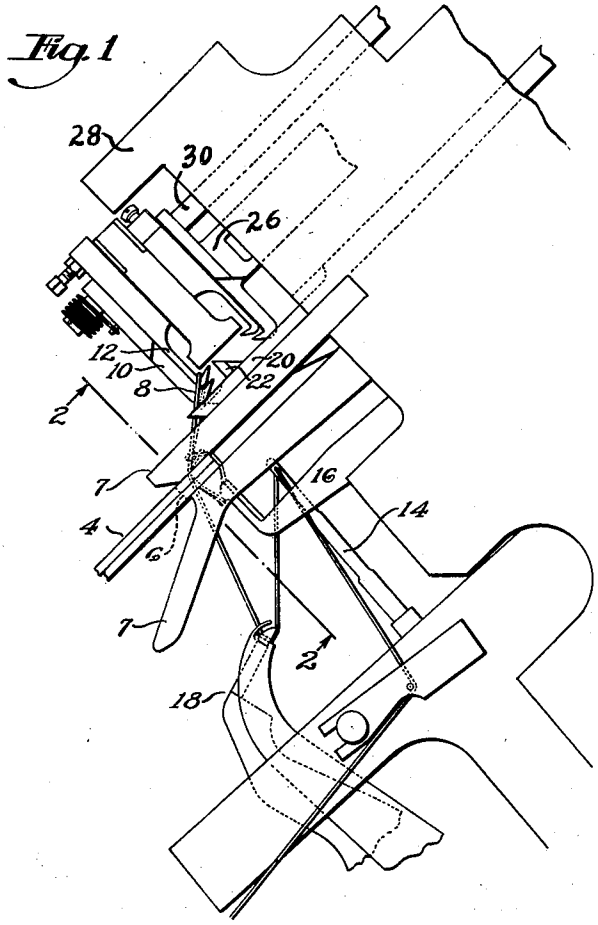


Fig. 2

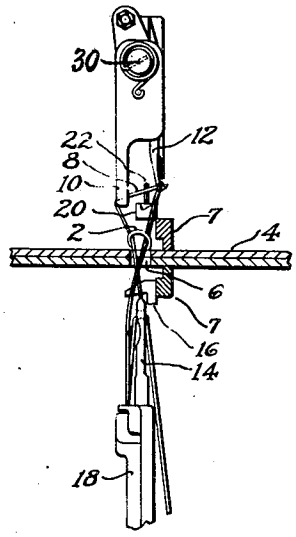


Fig. 3

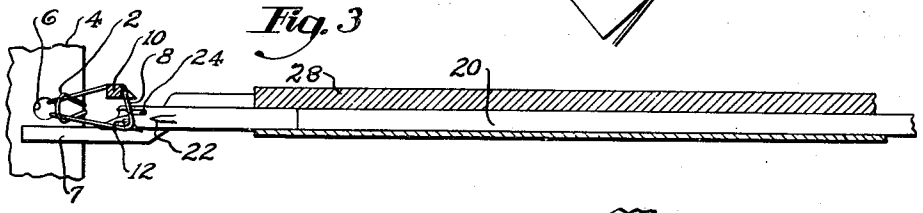


Fig. 4

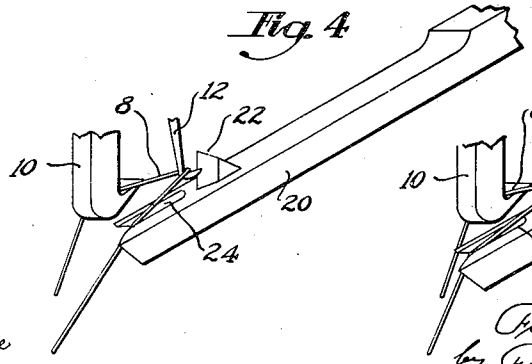
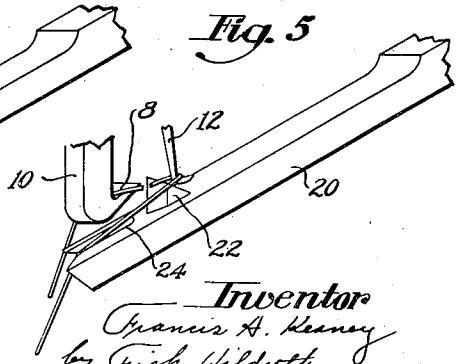


Fig. 5



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2,325,137

SHOE UPPER LACING MACHINE

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Application June 24, 1940, Serial No. 342,043

4 Claims. (Cl. 112—5)

The present invention relates to improvements in shoe upper lacing or similar machines and more particularly to lacing cord cutting devices for machines of the type disclosed in the U. S. Letters Patent of Fossa No. 2,106,320, dated January 25, 1938, and No. 2,281,686, dated May 5, 1942, and pending application of the same inventor Serial No. 335,724, filed May 17, 1940, in which successive loops of lacing cords are passed alternately across eyeletted edges of a shoe upper and through the eyelets in the upper during lacing operations.

In the machine of the patents and application, after a series of loops have been passed through each pair of eyelets of an upper, the final loop of the series is severed and an end withdrawn to prevent the series from unravelling. To carry the cord through the eyelets and to hold each loop open as a succeeding loop is being inserted, a needle is provided in the machine for each pair of eyelets operated upon and a looper is arranged to enter each loop carried by a needle, releasing it only after the succeeding loop has been inserted. After the series has been completed, one side of the final loop held by the looper is severed between the looper and the upper so that the end of cord connected to the supply may be withdrawn. The cutter for severing the cord in this machine operates in such a way that the remaining end of cord connected to the completed lacing and engaged by the looper is longer than necessary and may, in some instances, require a further trimming operation in order to prevent entanglement with adjacent cords or other parts during subsequent operations on the upper.

The objects of the present invention are to reduce the length of cord at the end of a shoe upper lacing inserted in a machine of the type disclosed in the above identified patents and application and to improve the construction and mode of operation of a cutter for severing the ends of the cords of each lacing in a lacing machine of this type so that further trimming of the cord ends remaining connected to the lacings will be unnecessary.

With these and other objects in view, a feature of the present invention relates to the provision in a shoe upper lacing machine having upper clamping means, one or more lacing needles and a corresponding number of loopers provided with looping and spreading elements for holding each loop of cord open to receive the needle carrying the succeeding loop of cord, of one or more cutters for severing the final loops of cord between the looping and spreading elements of the loopers, instead of between the loopers and the upper, so that the severed ends of cord connected with each completed lacing will be shorter than in the machine of the patents and application. In the form of this feature hereinafter described, the cutter consists of a reciprocating bar acting to engage one leg of each final loop of cord to impart a tension to the cord before being severed and a knife projecting from a surface of the bar for severing the cord at the proper location after being tensioned. In order to prevent escape of the leg of the loop engaged by the bar, the bar is grooved and arranged after contacting the cord to draw that portion engaged by the bar into the groove while the cord is being tensioned.

These and other features consist in the constructions, combinations and arrangements of the parts hereinafter described and claimed, the advantages of which will readily be understood from the following description taken in connection with the accompanying drawings in which Fig. 1 is a view in right-hand side elevation of a portion of a lacing machine embodying a cord severing cutter in which the features of the present invention reside; Fig. 2 is a front view, partly in section, taken along the line 2—2 of Fig. 1, illustrating the relationship between the cord cutter and the final loop of cord in a lacing; Fig. 3 is a sectional plan view of certain of the cutter parts; Fig. 4 is a perspective view of the same parts with the cutter bar advanced sufficiently to tension the cord; and Fig. 5 is a similar perspective indicating the manner of severing the cord.

The illustrated lacing machine, in construction and mode of operation of its lacing devices, is the same as the machine of the patents and application above identified. The lacings are inserted while the upper is held clamped in folded relation with 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 enchained loops, alternate ones of which are passed through a pair of aligned eyelets and the others of which are passed across the eyeletted edges of the upper, the bight portion of each loop acting to lock the previously formed loop in place, the final loop being severed along the bight portion and the severed supply end being withdrawn. In this way, the next to the last loop of cord is locked in such a way that a pull on the free end connected with the lacing will not unravel the completed lacing but merely 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 enchained cord loops. As illustrated, these loops of cord are in the positions of the next to last and final loops formed just before a single lacing is completed. In Figs. 2 and 3, one loop 2 is shown as having been passed across the eyeletted edges of a folded shoe upper 4 and drawn close to the surface of the upper adjacent a pair of aligned eyelets 6, the upper being secured in position by clamping members 7. The bight of a final loop 8 has been inserted in the loop 2 and is illustrated as being held in spread relation by a reciprocating looper having relatively movable looping and spreading elements 10 and 12 which enter each succeeding loop together 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 movable members and the cord of the final loop is severed along the bight portion which is held by the looper.

In the machine of the patents and application, a cutter is provided in the form of a reciprocating bar 20 and is actuated relatively to the looper to cause its forward sharpened end to intersect the path taken by one leg of the loop between the spreading element 12 and the aligned eyelets 6, which leg of the loop extends through eyelets in the upper to the needle. Thereafter, the cord gripper partly releases its grip and the needle and cord gripper are actuated to cause the supply end of the severed cord extending to the needle to be drawn through the loop 2 into a position close to the cord gripper. The grip on the cord is then tightened to hold the cord preparatory to a new lacing operation. As the final movements of the needle occur, the upper clamping members 7 release the laced upper and the machine is brought to rest.

When the cord cutter acts to sever the supply leg of the loop between the looper and the upper in this way, the end of cord extending from the completed lacing is of such length that when the sides of the upper are separated and a last inserted, the cord end may become entangled with the cord ends of adjacent uppers or with cord ends extending from lacings of adjacent eyelets from the same upper.

In order to prevent entanglement of the cord ends in a laced shoe upper, according to the present invention, the final loop in each lacing is severed between the looping and spreading elements of the looper, while holding the loop in spread condition, instead of between the spreading element and the upper. The reciprocating cutter bar 20 has secured to its upper side surface a triangular knife 22 which passes across the path of the cord stretched between the looping and spreading elements in opposition to the direction of looper movement during the severing operation. By so locating the knife, the cord is severed closer to the completed lacing, leaving a shorter end after severing than in the previous machine. To prevent injury of the cord by the forward end of the bar which in the machine of the patents and application is sharpened with a knife edge, the forward end of the bar 20 of the present machine is formed with a rounded and smoothed forward end along which the cord slides. The forward end of the bar in the machine of the patents and application also is grooved to provide a knife edged recess into which the cord will be drawn with certainty during the cutting stroke of the bar. The edge of the recess at the forward end of the bar 20 in the present machine is so rounded and smoothed that the cord will be drawn into the groove indicated at 24, causing a tension to be applied to the cord before the knife 22 becomes effective (Fig. 4). The arrangement is such that when the knife 22 intersects the cord, the tension will be sufficient to insure a quick, clean cutting action (Fig. 5). The tension applied by the bar 20 to the cord also serves to tighten more effectively the next to last loop 2 of each lacing, thus causing an accurate measurement by the measuring finger 16 of the cord surrounding the finger and the eyeletted edges of the upper. Each looper is arranged in a manner more fully described in the patents and application and is rigidly mounted on the forward end of a rod 26 slidable in a frame member 28 of the machine. The looper element is composed of a pair of spaced hooks with aligned loop entering points at their ends directed towards each other. The spreading element is of similar shape with a pair of aligned hooked loop entering points parallel to the looping points, but instead of being rigid with the rod 26, the spreading element is secured to a rock shaft 30 rotatably and slidably mounted in parallel relation to the rod 26 in the frame member 28.

To insure that the triangular knife 22 on the cutter bar 20 will sever the loop of lacing cord held by the looper between the looping and spreading elements of the present machine, the cutter bar is slidably mounted in the frame member in parallel relation to the rod 26 and shaft 30 after the manner set forth in the patents and application and the sharpened edge of the triangular knife, when actuated, passes along one side of the looper element 10 between the pair of points upon the looper element on one side and the pair of points on the spreader element on the other side when the spreader element is in loop spreading position. The machine is so timed that the cutter bar will be actuated when a final loop of a lacing is held on adjacent looping and spreading points which are directed and actuated while entering the cord loop in opposition to the sharpened edge of the triangular knife 22, the knife thus acting positively to sever the final loop of the cord in a lacing mid-way of its length which projects from the eyelets. Thus, there will remain a free end of cord attached to the upper of one-half the length of the final loop instead of a free end of substantially greater length than one-half the loop, as with the prior machine. At the same time, the free end of cord remaining connected to the completed lacing will not be so short that there will be danger of unravelling.

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

1. In a machine for lacing shoe uppers, the combination with upper clamping means, a reciprocating needle for inserting a series of loops of cord in an upper secured by the clamping means, and a looper provided with looping and spreading elements having substantially parallel points movable together into each needle loop and rela-

tively in a direction transverse to the movement in entering a needle loop to separate the sides of the loop, of a cutter mounted in the machine and guided for movement substantially parallel to the movement of the looper while entering the needle loop and along a suitable path to cause its sharpened edge to pass between the points of the looping and spreading elements of the looper while holding the final loop of a lacing in spread condition to sever the cord of the loop.

2. In a machine for lacing shoe uppers, the combination with upper clamping means, a reciprocating needle for inserting a series of loops of cord in an upper secured by the clamping means, and a looper provided with looping and spreading elements having substantially parallel points movable together into each needle loop and relatively in a direction transverse to the movement in entering a needle loop to spread the loop, of a cutter comprising a bar mounted in the machine and guided for lengthwise sliding movement parallel to the movement of the looper while entering a needle loop, and a knife projecting from a side surface of the bar with its cutting edge directed in opposition to the direction of looper movement while the looper is entering a loop and arranged to sever the cord between the points of the looping and spreading elements while the looper is holding the final loop of a lacing in spread condition.

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 secured by the clamping means, and a looper provided with looping and spreading elements having substantially parallel points movable together into each needle loop and relatively in a direction transverse to the movement in entering a needle loop to spread the loop inserted by the needle, of a cutter comprising a bar movable in opposition to the direction of looper movement while entering a needle loop to engage one leg of the final loop in a lacing and impart a tension to the cord held by the looper, and a knife projecting from a side surface of the bar with its cutting edge acting on the cord stretched between the looping and spreading elements while the cord is being tensioned by the bar to sever the final loop of a lacing.

4. 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 secured by the clamping means, and a looper provided with looping and spreading elements having substantially parallel loop entering points movable together while entering each needle loop, of a cutter comprising a grooved cord tensioning bar movable to engage the cord between the looper and the upper and to draw one leg of the final loop in a lacing held by the looper into the groove of the bar, and a knife projecting from a side surface of the bar with its cutting edge passing between the looping and spreading elements of the looper during movement of the bar in opposition to the movement of the looper while entering a needle loop.

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