SHOE UPPER CONFORMING MACHINE

Filed March 23, 1940

Fig. 7

Fig. 9

Fig. 8

INVENTOR

H. Lane

By his Attorney

Victor Colby
This invention relates to machines for working shoe uppers over lasts and is herein illustrated as embodied in a lasting machine having a single gripper for pulling successive portions of the shoe upper heightwise over the last and for laying the margins of said portions inwardly over the insole on the last, and having fastening inserting means for securing these margins in last position by suitable fastenings such as tacks.

When machines of this type are intended to be used for lasting around the toe ends and possibly also around the heel ends of shoes, in addition to the lasting of the shoe sides, they are customarily provided with means by which a lateral movement is imparted to the gripper and by which the gripper is given a twisting motion as it lays the marginal portions of the shoe upper successively over the insole around the toe. In this way, the marginal portions of the shoe upper around the toe are placed one over the other in a compact formation. A machine of this type is fully disclosed in United States Letters Patent No. 584,744, granted June 15, 1897, upon an application filed in the names of Ladd and McGee.

Moreover, when machines having means for imparting a twisting motion to the gripper, as above referred to, are intended particularly to operate on shoes having relatively thick and heavy uppers, such machines are customarily provided with a pair of upper slitting knives, one at each side of the gripper. Either of these knives may be thrown into operation in each cycle of the machine to slit the upper margin at one side or the other of the gripper, according to whether the gripper is twisted toward the right or toward the left of the shoe operated upon, so as to facilitate the shaping to the last of the portions of the shoe upper engaged by the gripper and to facilitate the laying of one last portion partly over the other in a compact formation, thereby avoiding a bulky appearance of the last upper around the toe end of the shoe bottom.

Upper slitting means, suitable for this purpose, are described in United States Letters Patent No. 931,609, granted August 24, 1909, upon an application filed in the name of Edward A. Stiggins. Although such upper slitting knives when constructed and arranged as well as actuated in accordance with the disclosure of the above-mentioned Stiggins patent have proved in practice to operate quite satisfactorily, it has been observed, nevertheless, that the slitting of relatively thick and heavy shoes sometimes lays a considerable strain upon the slitting mechanism and may in some cases result in the slitting being imperfectly performed.

It is, therefore, an object of this invention to improve such upper slitting means for the purpose of enabling the slitting of a shoe upper to be performed more efficiently and for the purpose of reducing the strain upon the slitting mechanism.

In accordance with one feature of this invention, the illustrated embodiment of the present invention has upper slitting means which is actuated to cause a longer stroke than heretofore in the direction of the slitting or upper penetrating movement to be given to the knives, with the result that the knives acquire considerable velocity before they reach the stock. Owing to this fact, each knife, when operated, will have acquired considerable momentum before it enters the work and, therefore, it will enter the upper more easily and with less strain on the knife operating mechanism than is the case where the knife is drawn forwardly from a stationary position in which it has already engaged the upper.

In accordance with another feature of the invention, the mechanism for actuating the slitting knives is so constructed and arranged that it exerts a full and positive control over the knives also during their inoperative movement. More particularly, the knife operated at this time is positively advanced to its starting position from which it begins its slitting stroke under the positive control of the actuating mechanism, the slitting beginning at a point remote from the edge of the marginal portion of the shoe upper and being continued to the said edge and at the conclusion of the slitting operation the knife is positively retracted under the control of its actuating mechanism.

Other objects of the invention and features of the construction will be apparent from the following description and will be pointed out in the claims.

In the drawings,

Fig. 1 is a front view of a portion of the head of the machine in which the present invention is embodied;

Fig. 2 is a left side view of the slitting mechanism and the last gripper;

Fig. 3 is a sectional view of part of the knife actuating mechanism;

Fig. 4 is a plan view, partly in section, of one of the slitting knives and the mechanism for causing its rocking and translational movements;

Fig. 5 is a perspective view of a mechanism for shifting the last gripper laterally to the left or to the right and for simultaneously initiating
the slitting operation of the left or the right slitting knife;

Fig. 6 is a perspective view of the mechanism for actuating the knife supporting slides;

Fig. 7 is a sectional view similar to Fig. 3 and illustrating another embodiment of the invention;

Fig. 8 is a plan view, partly in section, of some of the mechanism illustrated in Fig. 7; and

Fig. 9 is a front view of the knife actuating mechanism illustrated in Fig. 7.

The present invention is illustrated as embodied in a shoe upper lasting machine, similar in construction and operation to the machine disclosed in the above-mentioned Stiggin's patent and hence only so much of its mechanism will be described here as is necessary for the understanding of the present invention.

In the machine of said Stiggin's patent, there is mounted in suitable bearings in the machine frame a rockshaft 10 (Fig. 5) which is continuously oscillated by suitable mechanism and which at its forward end is provided with a crank arm 12 pivotedly secured to the upper end of a vertical bar 14 serving to actuate the slitting mechanism. The lower end of the bar 14 has an enlarged portion, the opposite sides of which are provided with recesses 16 adapted to receive correspondingly formed projections 18 (Fig. 6) provided on rock bars 20 mounted for vertical movement in a fixed guideway at the opposite sides of the bar 14, the guideway being provided as in the machine of the said Stiggin's patent in a bracket attached to the front portion of the machine head. Each rock bar 20 actuates a knife 22 for slitting the margin of the shoe upper operated on after each portion of this margin has been tensioned and laid over the insole in well-known manner by a gripper 21 (Fig. 2) which is caused to tendon the shoe upper step by step around the last.

For the purpose of causing one knife to be operated while the other one remains inoperative, the bar 14 is moved laterally by means of a mechanism also serving to shift the gripper laterally and to impart to it a twisting motion in a manner substantially the same as in the machine of the said Stiggin's patent, this mechanism being illustrated in Figs. 1 and 5. By shifting the gripper either to the right or to the left, the projection 18 on the right or left rock bar 20 will be caused to engage the corresponding recess 16 in the bar 14, thereby coupling the right or left rock bar 20 with the bar 14, which is continuously moving up and down. To this end the bar 14 has a pin 23 extending into a groove 25 provided in a plate 24 guided for horizontal movement transversely in the machine and moved back and forth by a block 26 carrying spring-pressed plungers 28 for engaging the opposite sides of a pin 29 extending laterally from the plate 24. For the purpose of imparting a forth and back movement to the plate 24, which movement, by reason of the provision of the spring-pressed plungers 28, is transmitted yieldingly, the block 26 is oscillated in the same horizontal direction as the plate 24 by means of a suitably shaped cam groove 32 provided in a plate 34, within which groove a pin 30 carried by the block 25 extends. The plate 34 is guided for horizontal movement lengthwise of the machine and is connected by a link 35 to the vertical and forked arm 39 of a bell-crank lever 40 which, in a manner well known from the said Stiggin's patent, serves when rocked in the one direction or the other to move the gripper laterally and to impart to it a twisting movement for the purpose of pleating the shoe upper when the last is oscillated to its forward end. The opposite end of the cam groove 32 is provided with a slot 34 extending into an inclined cam groove provided in a block 40 secured to a two-armed lever 52. The lever 52 is rotated about its fixed pivot by the knee of the operator and for that purpose is provided at its forward end with a knee fork 54.

As in the machine of the said Stiggin's patent, the upper slitting mechanism comprises two knives which are alternatively operated, depending on whether the gripper is shifted to the right or to the left, to slit a portion of the upper margin after that portion has been tensioned by the gripper. In the following the mounting and operation of one only slitting knife and its actuating mechanism will be described, it being understood that the mounting and operation of the other knife is similar to that described but arranged in reverse sequence. The right-hand knife 22, as viewed from above, is secured in the rearward end (as viewed from the front of the machine) of a two-armed lever 56 (Fig. 4) pivotally secured at 58 to a slide 60 movable forwardly and rearwardly of the machine in a horizontal guideway 63, the latter being part of the above-mentioned bracket for supporting the slitting mechanism which is secured to the front of the machine head. The slide 60 is hollow and the forward arm of the lever 56 extends through the interior of the slide and beyond the latter's forward end. The front end of this arm of the lever 56 is curved and rounded for engagement with a cam face 66 provided on a block 64, the latter, as the corresponding block in the machine of the Stiggin's patent, being guided for vertical movement in the frame and being actuated by the bar 14.

Upon initiation of the forward movement (to the right of Fig. 4) of the slide 60, the block 64 is located in its lowest position in which the cam face 66 is located in the path of movement of the forward end of the knife supporting lever 56. The cam face 66 is of considerably greater extent than heretofore, so that upon forward movement of the slide 60 the swinging movement of the lever 56 in the anti-clockwise direction, as viewed in Fig. 4, is initiated at an earlier point in the cycle of operation than in prior machines with the result that the point of the knife is caused to move in the direction of its work piercing stroke at a substantially rate of speed before it enters the work and hence the knife is permitted to acquire considerable momentum before cutting into the work. Consequently, the slitting of the upper is performed more easily and with less strain on the knife and its actuating mechanism. After the point of the knife has penetrated the upper the forward end of the knife supporting lever 56 is caused to move forwardly along the straight edge 67 of the block 64, the latter being still located in its lowest position during this movement along the side face 67 the knife point which has entered the upper at a point remote from the upper margin is moved to the edge of the upper, thereby slitting the said margin.
For the purpose of positively retracting the knife after the completion of its slitting operation, there is provided an additional cam means 68 (Figs. 4 and 6) which is substantially a vertical plate, the main portion of which is elevated in a plane at an angle relatively to the direction of movement of the knife actuating slide 60. The cam plate 68 has a horizontal extension 70 (Fig. 6) at its lower extremity, which extension is secured by means of screws 2 (Fig. 4) to the lower face 62 of the slide 60. Consequently, when the curved forward end of the knife supporting lever 56 rides on the side face 67 of the block 64, the rounded front end of the lever 56 will contact with the cam plate 68 with the result that upon continued forward movement of the slide 60 the knife supporting lever 56 is rotated in the clockwise direction so as to retract the knife 22 positively. The lever 56 is held in the position into which it has been moved by the cam plate 68 by means of a spring-pressed plunger 74 movable in a bore in the rearward arm of the lever 56 and engaging an inclined face provided at the rearward end of the slide 60, a spring bearing against the plunger 74 being seated in the bottom of the said bore.

After the retraction of the knife 22 upon completion of the slitting cycle, the block 64 is raised, as in the machine of the said Stiggins patent, and the movement of the slide 60 is reversed, thereby moving the knife rearwardly in the machine, while the knife is held retracted, in preparation for its next slitting stroke.

For the purpose of moving the knife supporting slide 60 back and forth along its guideway 62, the upper face of the slide is provided with a rack 76 engaged by a gear segment 78 pivotally secured in the frame and having thereon another gear segment 79 meshing with the rack bar 20 which is elevated in a plane at an angle relatively to the direction of movement of the slide 60, and hence of the lever 56, the forward end of that lever is caused to engage the cam face 66, causing the lever to be rotated in an anti-clockwise direction, as viewed in Fig. 4, and the knife-tip to be moved along the dotted line a indicated in Fig. 4. Approximately halfway of this movement along the line a the knife is caused to enter the stock. In previous machines of this type, provided with upper slitting mechanism, the rearward movement of the knife-tip was not a straight-line movement but the last part of this movement was a combined rearward and inward movement, as indicated by the dotted line X in Fig. 4. As a result of this movement, the knife was brought practically into engagement with the upper stock prior to the initiation of its slitting stroke. In the present machine, the upper slitting cycle is provided in such a manner that the raising of the stock occurs, as previously indicated, after the knife has entered the stock with considerable momentum and while the forward end of the knife supporting lever 56 rides along the side face 67 of the block 64, the movement of the knife-tip during this time being along the dotted line c in Fig. 4. After the completion of the slitting operation and upon continued forward movement of the slide 60 the knife is positively retracted as a result of the action of the cam plate 68 on the forward end of the lever 56, the knife point then traveling along the dotted line d indicated in Fig. 4.

As will be readily seen, the movements of the knife are at all times during its cycle under the positive control of the knife actuating mechanism and in particular the retraction of the knife after the slitting of the shoe upper is a positive movement.

The upper slitting mechanism, as above described, is located substantially in front of the last gripping, as viewed from the operator's position when operating the machine.

A somewhat modified embodiment of the invention is illustrated in Figs. 7, 8 and 9 of the drawings. It should be noted that this embodiment of the invention is illustrated as incorporated in a machine of the same type as the machine of the above-mentioned Stiggins patent, and that in many respects it is similar to the above-described first embodiment of the invention, illustrated in Figs. 1 to 6. Hence, only so much of the mechanism as is the second embodiment is shown in Figs. 7, 8 and 9 as appears necessary for its understanding.

The mechanism illustrated in Figs. 7, 8 and 9 includes a pair of slitting knives 103 which are mounted on levers 105. Each knife supporting lever 105 is pivoted at 101 (Fig. 8) on a rack slide 109 which is arranged, in the manner previously described, to be moved in a rectilinear path forward or rearward in the machine, being guided for that purpose in a frame 121 secured to the machine frame in a manner substantially as previously described. The forward end of each lever 105 (right-hand end in Fig. 8) is provided with a cam portion 111 arranged to contact at certain times with an inclined cam face 113 (Fig. 9) formed on the lower face of a vertically moving block 115 corresponding to the extent to the block 64 previously described.

Each lever 105 is located on the lower side of its rack slide 109 and carries on its lower surface, adjacent its forward end, a pear-shaped cam follower 117 arranged to engage in a somewhat U-shaped cam track 119 formed in the frame 121 in which the rack slide 109 is guided for its rectilinear forward and rearward movements.

The forward end of each lever 105 is deflected laterally and is arranged to engage with the lower end of a finger 123 pivotally secured between its ends on an upwardly extending portion of the frame. A small spring 125, bearing on the upper portion of the finger 123, serves to urge the forward end of the lever 105 inwardly or toward the block 115 so that the cam follower 117, after the knife 103 has reached the end of its slitting stroke, will be properly guided into the cam track 119, as will be presently described.

The machine is also provided with a vertically movable bar 127 corresponding to the above-described bar 14, said bar being arranged to cause the movements of the rack slide 109. Since it is desired that the knife 103 be moved rearward (to the left in Fig. 8) as far as is possible prior to its being advanced to slit the upper, the bar 127 is actuated to such an extent that the knives are moved rearwardly until they almost engage the usual tack block (not shown) of the machine.

Upon actuation of the bar 127 in the manner
described above, the rack slide 105 will first be moved rearwardly of the machine (to the left in Fig. 8), and the lever 105, by reason of its pivotal connection 151 to the rock slide 193, will also be moved rearwardly. The movement of the lever 105 being controlled by the engagement of the cam follower 117 with the innermost portion of the U-shaped cam track 119, this portion being illustrated in Fig. 8 as being lowermost. As a result of this movement of the lever 105 the point of the slitting knife 103 is caused to move along the path a→b indicated in Fig. 8. During this rearward movement of the lever 105 the inner side of its forward end abuts against the inner side wall of its rack slide 193 by reason of the action of the spring-pressed finger 123, so that no sliding movement of the lever 105 about the pivot 107 occurs. Moreover, during this movement of the knife point along the path a→b the block 115 occupies its elevated position so as not to interfere with the movement of the knife.

As the cam follower 117 reaches the inner end (left end in Fig. 8) of the innermost portion of the cam track 119, the block 115 is automatically lowered into its operative position so that its cam face 113 will engage the cam portion 111 on the lever 105 with the result that the lever 105 is caused to turn about its pivot 107 in a counter-clockwise direction, as viewed in Fig. 8, to cause the point of the knife 103 to traverse the portion b→c of its path, as indicated in Fig. 8. The direction and extent of this swinging movement of the lever 105 will be controlled by the movement of the cam follower 117 in the crosswise extending portion of the U-shaped cam track 119. Approximately half way of this movement of the knife point along the path b→c the knife is caused to enter the shoe upper, this occurring substantially at the point p. As previously explained, the rearward movement of the knife point in prior machines was not a straight-line movement, but the last part of this movement was a combined rearward and inward movement, as indicated by the line x in Fig. 8. As a result of this movement the knife was brought practically into engagement with the shoe upper stock prior to the initiation of its slitting stroke. In the embodiment of the invention illustrated in Figs. 7 and 8, the engagement of the knife with the stock occurs only when the knife is already moving in the direction of its work-piercing stroke at a substantial rate of speed so that the knife has acquired considerable momentum when it enters the stock. Consequently, the slitting of the upper is performed very easily and with less strain on the knife as to its actuating mechanism.

It should be noted that owing to the shape of the cam follower 117 it will completely fill that corner of the cam track 119 between its innermost portion and the crosswise extending portion, and consequently no free movement of the knife supporting lever can take place.

When the cam follower 117 reaches the outermost portion of the cam track 119 the inward swinging movement of the knife is completed, the bar 127 will be automatically raised, and the slide 103, together with the lever 105, will be moved forwardly (to right in Fig. 8). (If the cam follower 117 moving along the outermost portion of the cam track 119 until the forward end of the lever 105 is engaged by the finger 123. The path of the knife point during this movement is indicated at c→d in Fig. 8.) Immediately after the forward end of the lever 105 has engaged the finger 123, it is urged inwardly or, in other words, the lever 105 is rocked in a clockwise direction, as viewed in Fig. 8, thereby swinging the movement of the lever 105 outwardly to its initial position. The forward movement of the lever 105 ceases about this time and the cam block 115 is raised to its inoperative position. The path followed by the knife point at this stage in the cycle is indicated at d→e in Fig. 8. It should be noted that by reason of the engagement of the cam follower 117 in the cam track 119 the path of the knife will be closely controlled or, in other words, the knife will be positively actuated at all times, that is, not only during the time the actual slitting of the upper takes place, but also during the times the knife is moving forward and away from the work and, consequently, accurate control of the path of the knife is thus assured.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A machine for working a shoe upper over a last having, in combination, means for gripping the upper, upper slitting means, means for positively actuating the said slitting means during its entire cycle, and means for initiating the operative movement of the said slitting means in the direction of its slitting stroke while the said slitting means is still remote from the surface of the shoe upper to be slit.

2. A machine for working a shoe upper over a last having, in combination, means for gripping the upper, upper slitting means, means for moving said slitting means positively during its entire cycle, and means for causing the slitting means to move at a substantial rate of speed before it is caused to cut into the stock.

3. A machine for working a shoe upper over a last having, in combination, means for gripping the upper, upper slitting means located substantially in front of said upper gripping means, and means for actuating the slitting means positively during its entire cycle.

4. A machine for working a shoe upper over a last having, in combination, means for gripping the upper, upper slitting means located substantially in front of the upper gripping means, means for actuating the slitting means positively during its entire cycle, and means for causing the said slitting means to acquire momentum before entering the stock.

5. In a machine for working a shoe upper over a last, the combination with a laterally movable gripper and mechanism for actuating the said gripper laterally in either direction, of upper slitting means comprising two knives, means for alternatively operating said knives, means for positively advancing and retracting each knife, and means for initiating the operative movement of each slitting knife in the direction of its slitting stroke at a point remote from the point of entry into the stock.

6. In a machine for working an upper over a last, the combination with grippers adapted for gripping the upper, of an upper slitting device comprising a plurality of knives, means for turning the grippers, knife actuating mechanism operatively driven, whereby the grippers are turned to actuate said slitting device positively during its entire cycle, and means for causing the knives to move in the direction of their work penetrating stroke at a substantial rate of speed before they are caused to enter the work.
7. In a machine for working a shoe upper step by step over a last, the combination with laterally movable grippers and mechanism for actuating them laterally in either direction, of knife supporting means which is stationary with relation to the laterally movable grippers, a plurality of knives mounted thereon, means for positively actuating the knives during their entire cycles, and means for both rendering the gripper mechanism operative for moving the pincers laterally in the desired direction and rendering the knife actuating mechanism operative to actuate the appropriate knife.

8. In a machine for working an upper over a last, the combination with laterally movable grippers and mechanism for actuating the said grippers laterally in either direction, of upper slitting means comprising two knives, means for alternatively operating said knives, means for positively advancing and retracting each knife, means for initiating the operative movement of each slitting knife in the direction of its slitting stroke at a point remote from the point of entry into the stock, and means for moving the appropriate cutter at a substantial rate of speed before it is caused to cut into the stock.

9. In a machine for working an upper over a last, means for gripping the upper, means for pleating the upper, upper slitting means comprising knives, a reciprocable and rockable support for each of said knives, means for moving each knife support in a rectilinear path, and cam means for positively rocking the said support in both directions.

10. In a machine for working an upper over a last, means for gripping the upper, means for imparting, at will, lateral and twisting movement to the gripper, upper slitting means, means for automatically rendering operative the slitting means when the lateral and twisting movement is used, a reciprocating support for the said slitting means, and cam means for positively rocking the said support in both directions.

11. In a machine for working an upper over a last, means for gripping the upper, means for imparting, at will, a lateral and twisting movement to the gripper, upper slitting means, means for automatically rendering operative the slitting means when the lateral and twisting movement is used, a reciprocating support for the said slitting means, cam means for positively rocking the said support to cause the slitting means to perform its operation, and additional cam means for retracting the said support after the completion of the slitting operation.

12. In a machine for working an upper over a last, means for gripping the upper, means for imparting, at will, a lateral and twisting movement to the gripper, upper slitting means, means for automatically rendering operative the slitting means when the lateral and twisting movement is used, a reciprocating support for the said slitting means, cam means for positively rocking the said support to cause the slitting means to perform its operation, and additional cam means for retracting the said support after the completion of the slitting operation, one of the said cam means being mounted to move heightwise in the machine so as not to interfere with the operation of the slitting means during part of its cycle.

13. In a machine for working an upper over a last, means for gripping the upper, means for pleating the upper, upper slitting means comprising knives, a swingable support for each of said knives, a rectilinearly movable carrier for said support, and cam means for positively swinging said support in both directions on movement of said carrier.

14. In a machine for working an upper over a last, means for gripping the upper, means for pleating the upper, upper slitting means comprising knives, a swingable support for each of said knives, a rectilinearly movable carrier for said support, stationary guiding means for said carrier, and a cam groove provided in said guiding means and cooperating with a follower on said support to cause positive swinging movements of said support in one direction or the other on movement of said carrier.

15. In a machine for working an upper over a last, means for gripping the upper, means for pleating the upper, upper slitting means comprising knives, a swingable support for each of said knives, a rectilinearly movable carrier for said support, stationary guiding means for said carrier, a cam groove provided in said guiding means for positively actuating said support, and spring-pressed means acting on said support at the completion of the upper slitting movement of the knife to swing said support for the purpose of withdrawing the knife from the stock and for holding the knife in its retracted position upon forward movement into starting position.

Harold Lane.