

April 20, 1965

J. S. KAMBORIAN

3,178,743

FLEXIBLE SHOE CONFORMER

Original Filed May 10, 1962

4 Sheets-Sheet 1

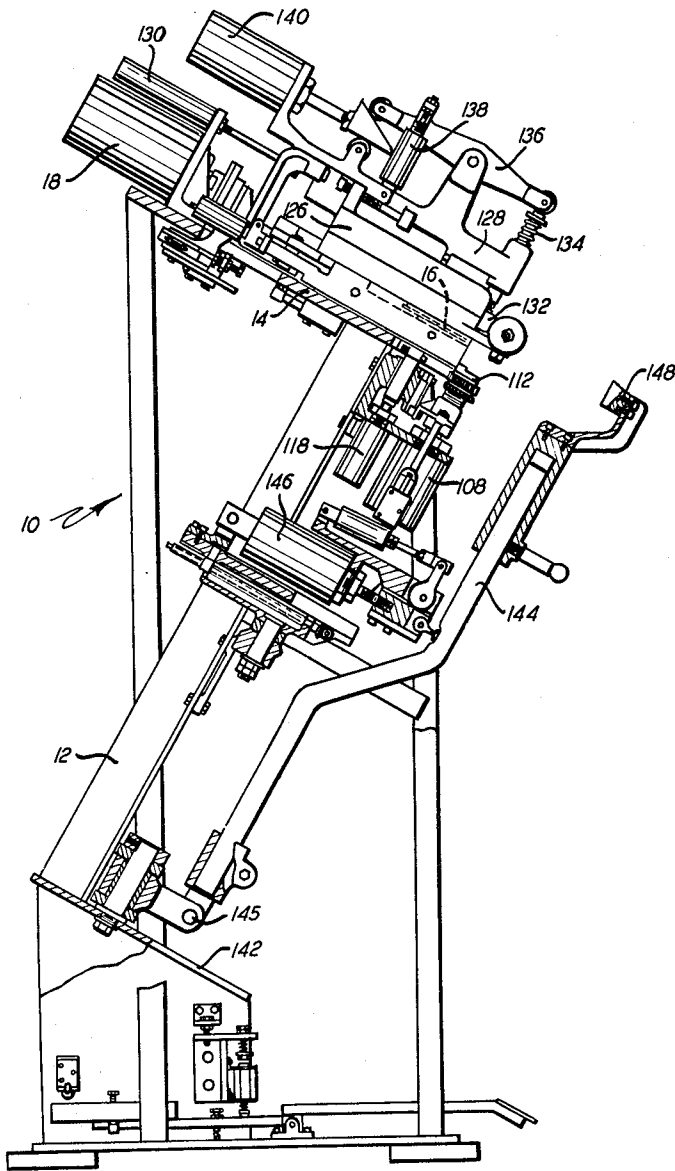


FIG.-1

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4 Sheets-Sheet 2

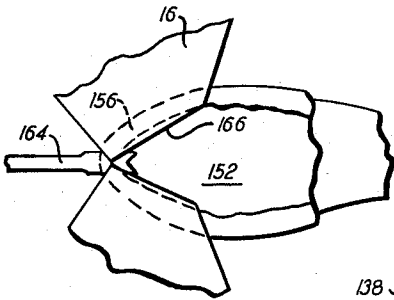


FIG-10A

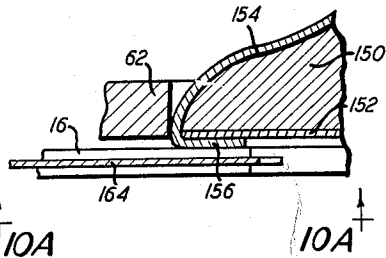


FIG-10

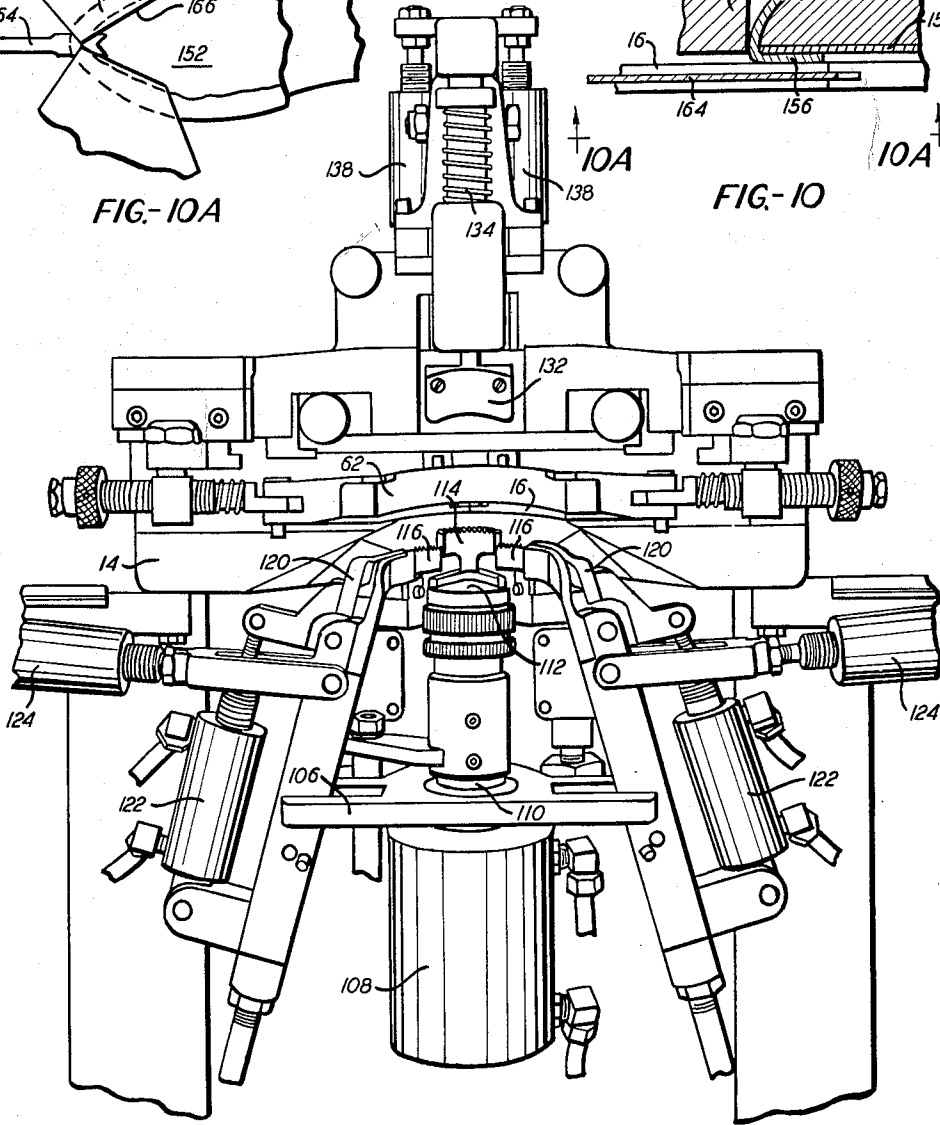


FIG-2

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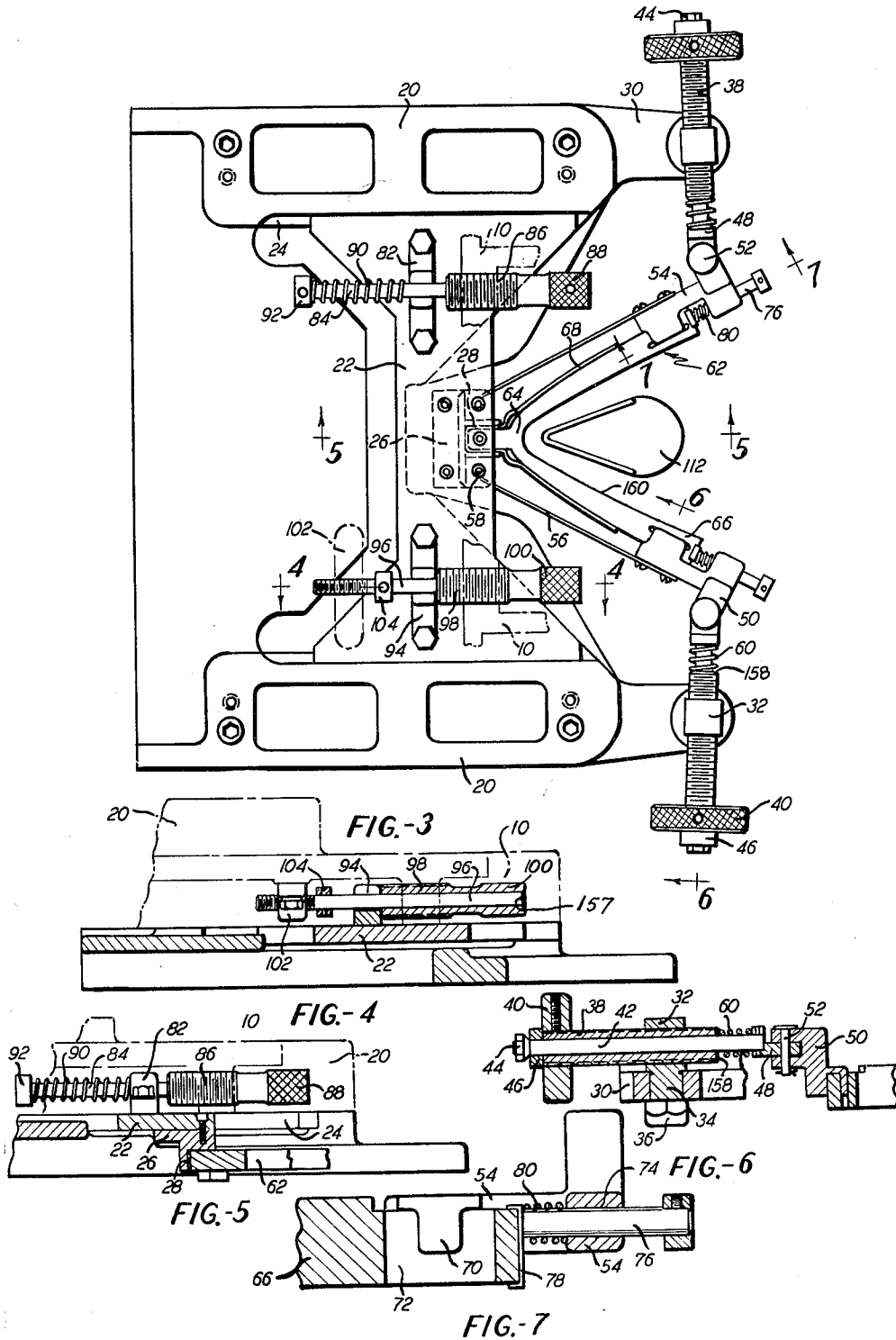
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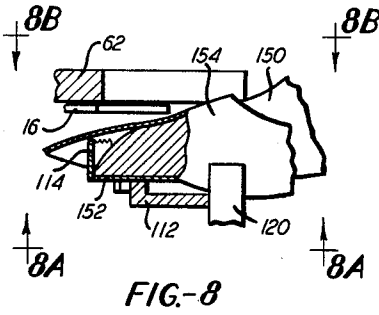


FIG-8

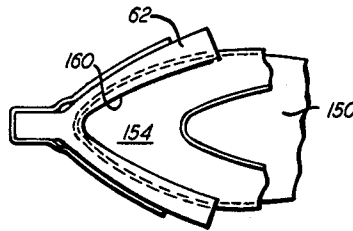


FIG-8B

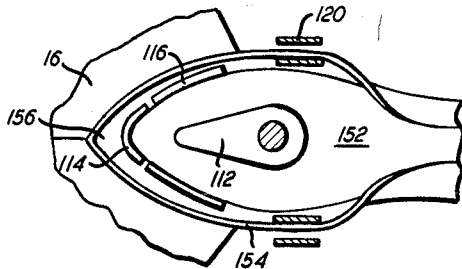


FIG-8A

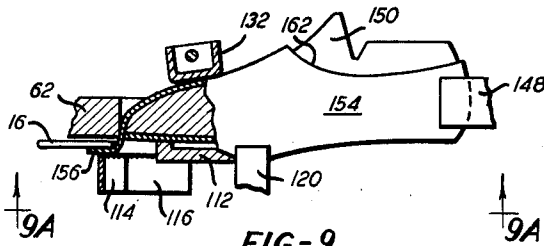


FIG-9

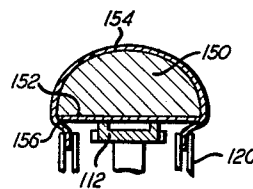


FIG-9B

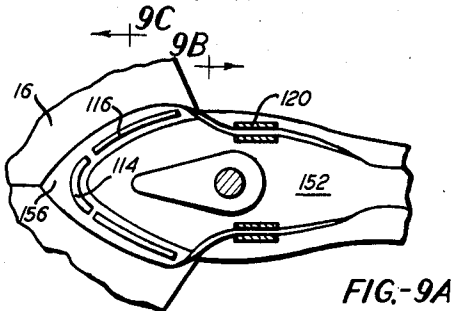


FIG-9A

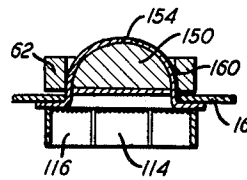
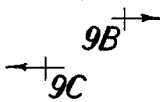


FIG-9C



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3,178,743

FLEXIBLE SHOE CONFORMER

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Original application May 10, 1962, Ser. No. 193,829.

Divided and this application May 6, 1963, Ser. No. 278,104

4 Claims. (Cl. 12—14.4)

This application is a division of pending application Serial No. 193,829 filed May 10, 1962.

The parent application discloses a toe pulling over and lasting machine in which a last having a shoe upper mounted thereon and a shoe insole located on its bottom is supported bottom-down on a last support or stretch plate that is mounted for heightwise movement. The stretch plate is initially located so that the insole is below toe and embracing wipers and is moved during the machine cycle to raise the shoe to a level slightly above the upper surfaces of the wipers. During the rise of the stretch plate the margin of the upper in the region of the toe and forepart is restrained against movement to pull over and assemble the upper on the last and the upper is snugly conformed to the shape of the last by way of a shoe conforming yoke located above the wipers that bears against the last. Subsequent to the rise of the stretch plate the wipers are moved forwardly and inwardly to wipe the margin of the upper at and adjacent the toe end of the shoe against the insole.

The instant invention relates to the structure of the shoe conforming yoke which takes the form of a member having a bight and a pair of legs extending forwardly of the bight on opposite sides of the bight. The bight is seated in a socket formed in a cross-plate slidably mounted in the machine frame and the legs are connected to the frame. A spring connection is provided between the cross-plate and the frame for yieldably urging the cross-plate forwardly to thereby yieldably urge the bight forwardly and a spring connection is provided for yieldably urging the yoke legs rearwardly against the socket so that the yoke yieldably presses the upper against the last during the rise of the last.

Although disclosed as being used to conform the upper to the shape of the last prior to a wiping operation, the conformer has utility in any environment in which it is desired to conform an upper to the shape of a last.

In the accompanying drawings:

FIG. 1 is a side elevation of the machine;

FIG. 2 is a front elevation, to an enlarged scale, of the upper portion of the machine;

FIG. 3 is a plan view of the shoe conforming mechanism;

FIG. 4 is a view taken along the line 4—4 of FIG. 3;

FIG. 5 is a view taken along the line 5—5 of FIG. 3;

FIG. 6 is a view taken along the line 6—6 of FIG. 3;

FIG. 7 is a view taken along the line 7—7 of FIG. 3;

FIG. 8 is a schematic representation of the shoe in the machine at the beginning of the machine cycle;

FIG. 8A is a view taken on the line 8A—8A of FIG. 8;

FIG. 8B is a view taken on the line 8B—8B of FIG. 8;

FIG. 9 is a schematic representation of the shoe in the machine just prior to the actuation of the wipers;

FIG. 9A is a view taken on the line 9A—9A of FIG. 9;

FIG. 9B is a view taken on the line 9B—9B of FIG. 9A;

FIG. 9C is a view taken on the line 9C—9C of FIG. 9A;

FIG. 10 is a schematic representation of the shoe in the machine after the wipers have completed their wiping operation; and FIG. 10A is a view taken on the line 10A—10A of FIG. 10.

The machine comprises a frame 10 (FIG. 1) that in-

cludes inclined struts 12 and an inclined block 14. The machine is inclined approximately 30° from the horizontal so that the operator may more readily have access thereto, but, for the sake of convenience, parts extending in the direction of the struts 12 will be referred to as extending vertically and parts extending in the direction of the block 14 will be referred to as extending horizontally.

Wipers 16 are mounted in the block 14 for horizontal movement. A motor 18 is drivingly connected to the wipers so as to impart forward and inward movement thereto (see FIGS. 1 and 2). Reference is made to the aforesaid application Serial No. 193,829 for a detailed description of this wiper driving mechanism.

The frame 10 is divided into two spaced brackets 20 located above the wipers 16. A cross-plate 22 extends between the brackets 20 and is slidably mounted for forward and rearward movement in gibs 24 located in the brackets 20 (see FIGS. 3—5). A mounting bracket 26, bolted to the underside of the cross-plate 22, has a socket 28 at its forward end. A flange 30 extends forwardly of each bracket 20. An internally threaded sleeve 32 is pivotally connected to each flange 30 by each sleeve having a cylindrical bearing 34 extending downwardly into an opening in its associated flange 30 (FIG. 6). A nut 36 threaded into each bearing 34 serves to restrain upward movement of the bearings 34 in the flanges 30. A threaded shaft 38 is threaded into each sleeve 32 and a knob 40 is rigidly connected to each shaft 38. Each shaft 38 is hollow and slidably receives a rod 42 extending longitudinally therethrough. Adjusting nuts 44 are threaded to the outer ends of the rods 42 and bear against bearings 46 rotatably mounted on the rods 42. The bearings 46 in turn bear against the knobs 40. The inner end of each rod 42 is formed into a head 48 that extends between the jaws of a clevis 50 and is pivoted to the clevis by a pivot pin 52. Each clevis 50 forms an end of a support arm 54, and each support arm 54 has a spring arm 56 secured thereto and extending rearwardly thereof. The rear ends of the spring arms 56 are each entwined about a pin 58, which pins 58 are mounted on the mounting bracket 26 on opposite sides of the socket 28. A compression spring 60 is mounted on each rod 42 and extends from each shaft 38 to each head 48.

A substantially U-shaped shoe conforming yoke 62 is provided having a bight 64 and a pair of legs 66 extending forwardly of the bight on opposite sides of the bight. The yoke is made of a flexible, deformable material such as Teflon and has a pair of bowed springs 68 extending forwardly of each yoke leg from the bight forwardly thereof. The yoke is made substantially in the manner shown in Patent No. 3,060,468.

The bight of the yoke is received in the socket 28, above the wipers 16, and each support arm 54 has a downturned lip 70 (FIG. 7) that is received in an elongated slot 72 in a yoke leg 66. The slots 72 are made longer than the lips 70. Each support arm 54 has an opening 74 which slidably mounts a pin 76. The rearward end of each pin 76 has a clip 78 thereon that is secured to the forward end of the associated yoke leg 66. A compression spring 80 is coiled about each pin 76 between each clip 78 and each support arm 54 to yieldably urge the yoke leg rearwardly and thereby yieldably seat the yoke bight 64 against the socket 28.

Referring to FIG. 5, the cross-plate 22 has a trough 82 extending upwardly thereof in which a rod 84 is slidably mounted. The rod 84 has a threaded extension 86 that is threaded into the machine frame 10, and a knurled knob 88 at its forward end. A compression spring 90 is coiled about the rod 84 and extends between the trough 82 and an enlarged head 92 at the rear of the rod 84.

A second trough 94 (FIG. 4) mounted on the cross-plate 22 has a rod 96 slidable thereon. The forward end of the rod 96 is slidably received in a hollow stud 98 that is threaded into the machine frame 10 and has a knurled knob 100 at its forward end. The rear end of the knob 96 is threaded into a hanger 102 depending from the machine frame 10, and a collar 104 is pinned to the rod 96 intermediate the hanger 102 and the trough 94.

A mounting bracket 106 is secured to the frame 10 and extends forwardly thereof below the wipers 16 and yoke 62 (FIG. 2). An air actuated motor 108 is secured to the bracket 106 and has a piston rod 110 extending upwardly thereof. The piston rod 110 has a stretch plate or last support 112 mounted thereon. A center retarder 114 and side retarder 116 are mounted on the bracket 106. The retarders are located below the wipers 16. The retarder 114 is vertically movable by way of an air actuated motor 118 (FIG. 1) and the retarders 116 are vertically movable through other air actuated motors (not shown).

Referring to FIG. 2, pincers 120 are provided that are located forwardly of the retarder blades. The jaws of the pincers can be opened and closed by way of air actuated motors 122 and can be swung toward and away from the center line of the machine by way of air actuated motors 124.

The uppermost portion of the frame 10 is formed into a head 126 (FIG. 1) in which a slide 128 is slidably mounted. An air actuated motor 130 is connected to the slide 128 to effect forward and rearward movement thereof in the head 126. A toe clamp 132 mounted in the forward end of the head 126 is normally urged upwardly by a spring 134. The toe clamp 132 can be moved downwardly against the force of the spring 134, by the movement of a lever 136 that is fulcrumed to the head 126. The lever 136 can be moved clockwise (FIG. 1) to lower the toe clamp 132 by actuation of air actuated motors 138 or 140.

The frame 10 includes a platform 142 (FIG. 1) to which is swivelled at post 144. The post is mounted to swing forwardly and rearwardly from about a pivot 145 and an air actuated motor 146 is connected to the post to effect these movements. A heel clamp 148 is secured to the top of the post 144.

In the operation of the machine, a last 150 is provided having an insole 152 secured to its bottom and an upper 154 draped over its toe (see FIGS. 8 and 8A). The upper has preferably been heel seat lasted by a heel seat lasting machine such as that disclosed in pending application Serial No. 107,156 filed May 2, 1961. At this time, the wipers are held in their retracted position by the motor 18, the slide 128 is held in a retracted position by the motor 130 to maintain the toe clamp 132 in a rearward out of the way position, the stretch plate 112 is held in a lower position by the motor 108, the spring 134 holds the toe clamp in an upper position in the slide 128, the retarders 114 and 116 are held in a lower position away from the wipers 16, the heel clamp 148 is swung to a forward position by the motor 146, the jaws of the pincers 120 are held open by the motors 122, and the pincers are held in an outer position by the motors 124.

The last, upper and insole assembly is now presented, bottom down, to the machine with the insole 152 resting on the stretch plate 112, the toe end of the last abutting against the center retarder 114 and the lasting margin 156 of the upper 154 extending above the retarders 114 and 116 between the retarders and the wipers 16. The forepart portions of the upper margin are inserted between the open jaws of the pincers 120. At this time the shoe is in the position indicated in FIGS. 8, 8A and 8B.

The operator now actuates the machine to start its cycle in the manner described in the aforesaid application Serial No. 193,829. The retarders 114 and 116 are raised to press the lasting margin 156 of the upper against the undersides of the wipers 16 and the motors 122 are actu-

ated to close the pincers 120 on the forepart portions of the upper margin. After this, the motor 108 is actuated to raise the stretch plate 112 and the motors 124 are actuated to swing the pincers 120 inwardly. The inward movement of the pincers 120 is delayed until the stretch plate 112 has risen a sufficient amount to enable the pincers to clear the bottom of the shoe. The parts 16, 112, 114, 116 and 120 now assume the position shown in FIGS. 9, 9A, 9B and 9C and the machine is brought to a halt.

Prior to the operation of the machine, the yoke 62 had been adjusted for the particular style and size of shoe to be lasted. The aforementioned cross-plate 22 is yieldably urged forwardly in the brackets 20 by the spring 90 bearing against the trough 82. The extent of forward movement of the cross-plate is limited by the engagement of the trough 94 with the stud 98 as indicated in FIG. 4. The cross-plate may be moved rearwardly against the force of the spring 90 until the trough 94 engages the collar 104. The position of the stud 98, which sets the limit of forward movement of the cross-plate 22, may be adjusted by rotating the knob 100 so as to move the threaded stud 98 forwardly or rearwardly in the machine frame 10. The position of the rod 96, which sets the limit of rearward movement of the cross-plate 22, may be adjusted by placing a screw drive bit in a kerf 157 (FIGURE 4) in the forward end of the rod and rotating the rod so as to move the rod forwardly or rearwardly in the hanger 102 in which it is threaded. These adjustments of the stud 98 and the rod 96 operate to set the extent of forward and rearward movement of the bight 64 of the yoke 62. The knobs 40 are rotated to thereby bring the shafts 38 a desired distance apart from each other. Since the nuts 44 act as limit stops due to the springs 60 causing the nuts 44 to abut against the bearings 46, the heads 48 will always be maintained a constant distance from the inner ends 158 of the shafts 38 regardless of the setting of the shafts 38, and the axial movement of the shafts 38 will move the clevises 50 of the support arms 54 toward or away from each other a constant amount. The rotation of the knobs 40 will therefore alter the profile of the inner walls 160 of the yoke 62 and alter the distance between the walls 160. This alteration will provide for a greater or lesser pressure of the yoke legs 66 against the upper, the desired amount of such pressure being dependent on the physical characteristics of the material out of which the upper is fashioned and the shape of the last. The alteration in profile of the walls 160 will also change the length of said walls bearing against the shoe upper. By rotating the nuts 44, the distance between the clevises 48 and the shaft ends 158 may be changed and the tension of the springs 60 may be adjusted. Similarly, the tension of the spring 90, that urges the cross-plate 22 forwardly, may be adjusted by rotating the extension 86 of the rod 84 in the frame 10 (FIG. 5) to thereby adjust the distance between the head 92 and the trough 82.

During the aforesaid raising of the shoe, which is to a level that brings the insole 152 above the upper surfaces of the wipers 16 an amount that is substantially equal to the thickness of the lasting margin 156, the margin of the upper is gripped by the retarders 114 and 116 to draft and stretch the upper about the last. The upper slips to some extent from above the retarders, but only after it has been pulled over the last and cannot be further stretched. Due to the location of the retarders circumscribing the toe of the last, they also tend to exert a heel to toe pull on the last, and dispose the heel of the upper snugly about the heel of the last. The pincers 120 maintain their grip on the upper margin during the raising of the shoe without slippage of the margin therein and thus serve to pull down the forepart of the upper to stretch it tightly on the last and ensure that the topline 162 of the upper is properly disposed on the last. The inward movement of the pincers 120 causes the upper margin at the forepart por-

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tions of the shoe to be laid inwardly on the bottom of the last as indicated in FIGS. 9A and 9B.

The shoe was initially so placed on the stretch plate 112 that the edges of the last overlapped the wall 160 of the pad 62, as indicated in FIG. 8B. When the last is forced upwardly, the yoke wall 160 is initially compressed (FIG. 9C). When the wall can no longer be compressed, the bight 64 of the yoke flexes rearwardly against the pressure exerted by the spring 90, and the legs 66 flex outwardly against the pressure exerted by the springs 68. Should the shoe be substantially wider than the space between the legs 66, the support arms 54 and spring arms 56 will swing outwardly about the pivot pins 58 and compress the springs 60 between the heads 48 and the screw ends 158. During the latter movement, there will be relative swinging movement between the heads 48 and the clevises 50 about the pins 52 and relative swinging movement between the shafts 38 and the flanges 30 about the bearings 34. The yieldable pressure exerted by the springs 60, 68 and 90 and the spring arms 56 and the aforementioned swinging movements will cause the yoke 62 to snugly engage the shoe upper 154 and cause the shoe upper to snugly conform to the shape of the last during the upward movement of the last. The springs 80 urge the yoke legs 66 rearwardly during the raising of the shoe to always maintain the yoke bight 64 securely in the socket 28.

After the machine has come to a halt as described above, the operator examines the shoe to determine whether the forepart portion of the upper is draped evenly over the last as indicated in FIG. 9B with the throat line 162 of the upper properly positioned on the last (FIG. 9). If it is not, he may manipulate the pincers 120 in the manner described in the aforesaid application Serial No. 193,829.

After the operator is satisfied with the positioning of the upper on the last, he actuates the machine to cause it to resume its cycle. The motor 130 is now actuated to bring the slide 128 from its normal out-of-the-way position to a forward working position where the toe clamp 132 is above the forepart of the last. The motors 138 are now actuated under relatively low pressure to swing the lever 136 clockwise (FIG. 1) an amount sufficient to bring the toe clamp 132 into engagement with the forepart of the upper and clamp the shoe and last between the toe clamp and the stretch plate 112. This is followed by an actuation of the motor 146 to bring the heel clamp 148 to bear against the heel portion of the last. The parts now assume the position shown in FIG. 9.

The motor 18 is now actuated to move the wipers 16 in their working stroke. The wipers comprise two plates that are symmetrically disposed along the longitudinal center line of the machine and are mounted for both forward and inward movement. A knife 164 (FIGS. 10 and 10A) is located between the wipers and is mounted to be moved forwardly with the wipers upon actuation of the motor 18. Upon actuation of the motor 18, the wipers 16 are caused to move forwardly and inwardly in a working stroke so that the divergent wiper surfaces 166 (FIG. 10A) move across the edge of the last and wipe or fold the lasting margin 156 up against the insole 152. At the same time the knife 164 is caused to move forwardly of the surface 166 and cut into the upper material gathered by the wipers at the toe of the last to relieve the stresses formed in this region as described in Patent No. 3,082,447. The location of the pincers 120 beneath the insole, as indicated in FIGS. 9A and 9B, lies in the margin of the upper at the forepart portions so that the portions of the upper margin engaged by the wipers are of substantially uniform width and the upper margin does not fade away from the wipers as the wipers move in, but is laid against the toe portion of the insole with a substantially uniform width.

During the aforesaid movement of the wipers 16, the retarders 114 and 116 are moved downwardly away from

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the wipers, the jaws of the pincers 120 are opened by actuation of the motors 122, the motor 108 is actuated to lower the stretch plate 112 so that the shoe is supported on its bottom only by the wipers, and the motors 124 are actuated to move the pincers 120 outwardly. At the termination of the working stroke of the wipers, air is supplied to the motor 140 at a higher pressure than the air supplied to motors 138 to cause the toe clamp 132 to move downwardly with greater pressure than heretofore and thus to apply a relatively heavy bedding pressure between the now wiped in lasting margin 156 and the wipers 16. The parts now assume the position shown in FIGS. 10 and 10A.

After the bedding pressure has been applied for a sufficient length of time, the operator actuates the machine to cause the machine parts to return to their original positions and release the now pulled over and toe lasted shoe.

Prior to placing the shoe in the machine, cement had been deposited on the toe portion of the insole adjacent the edge thereof by an apparatus such as that disclosed in Patent No. 3,079,618 or pending application Serial No. 181,682 filed March 22, 1962.

As a result of the pressures generated during the wiping operation and the application of the bedding pressure described above, the wiped-in upper margin and the insole are adhesively bonded to each other through the cement.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A flexible shoe conformer comprising; a frame; a deformable yoke having a bight and a pair of legs extending forwardly of the bight on opposite sides of the bight; means connecting the legs of the yoke to the frame; a cross piece slidably mounted in the frame; means on the cross piece for receiving the bight of the yoke; means for yieldably urging the cross piece forwardly in the frame; a trough secured to the cross piece; a stud secured to the frame forwardly of the trough; a rod slidably mounted in the stud and trough; a collar secured to the rod rearwardly of the trough; and a connection between the rod and frame rearwardly of the collar.

2. A flexible shoe conformer comprising; a frame; a deformable yoke having a bight and a pair of legs extending forwardly of the bight on opposite sides of the bight; means connecting the legs of the yoke to the frame; a cross piece slidably mounted in the frame; means on the cross piece for receiving the bight of the yoke; a trough secured to the cross piece; a rod having a first portion of relatively small cross section slidably received in the trough and a second portion of relatively large cross section located forwardly of the first portion; a connection between the second rod portion and the frame; spring means interposed between the rearward end of the rod and the trough for yieldably urging the cross piece forwardly; and stop means mounted in the frame for limiting the extent of forward movement of the cross piece in the frame under the influence of the spring means.

3. A flexible shoe conformer comprising; a frame; a deformable yoke having a bight and a leg on each side of the bight extending forwardly of the bight, said yoke being adapted to receive a last-mounted shoe upper interiorly thereof; means mounting the bight of the yoke in the frame; means connecting each yoke leg to the frame; the last named means comprising means permitting relative movement lengthwise of the yoke legs between each yoke leg and the frame part to which it is connected; and a yieldable force means directed lengthwise of each yoke leg in the direction of the yoke bight for yieldably urging each yoke leg lengthwise toward the bight of the yoke.

4. A flexible shoe conformer comprising; a frame; a deformable yoke having a bight and a leg on each side of the bight extending forwardly of the bight, said yoke be-

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ing adapted to receive a last-mounted shoe upper interiorly thereof; means mounting the bight of the yoke in the frame; a lengthwise extending elongate slot in each yoke leg; a support arm associated with each yoke leg, each support arm being connected to the frame and extending alongside the outside wall of its associated yoke leg; a lip connected to each support arm and positioned within each slot, each of said lips being shorter than its associated slot; and spring means interposed between each support arm and the associated yoke leg for yieldably

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urging the yoke leg lengthwise of its slot toward the bight of the yoke.

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10 JORDAN FRANKLIN, *Primary Examiner*.