

[54] **AUTOMATIC SHOE LASTING MACHINE**

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[58] Field of Search 12/8.1, 8.2, 10.1, 10.5,
12/12, 12.4, 12.5, 8.3, 127

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[57] ABSTRACT

A shoe lasting machine having wipers and a shoe support relatively movable lengthwise to progressively last a shoe. The support locates one end of the shoe at a reference point and has a movable measuring device engageable with the other end of the shoe to measure the shoe length and determine the relative working positions of the wipers and support according to shoe length.

9 Claims, 11 Drawing Figures

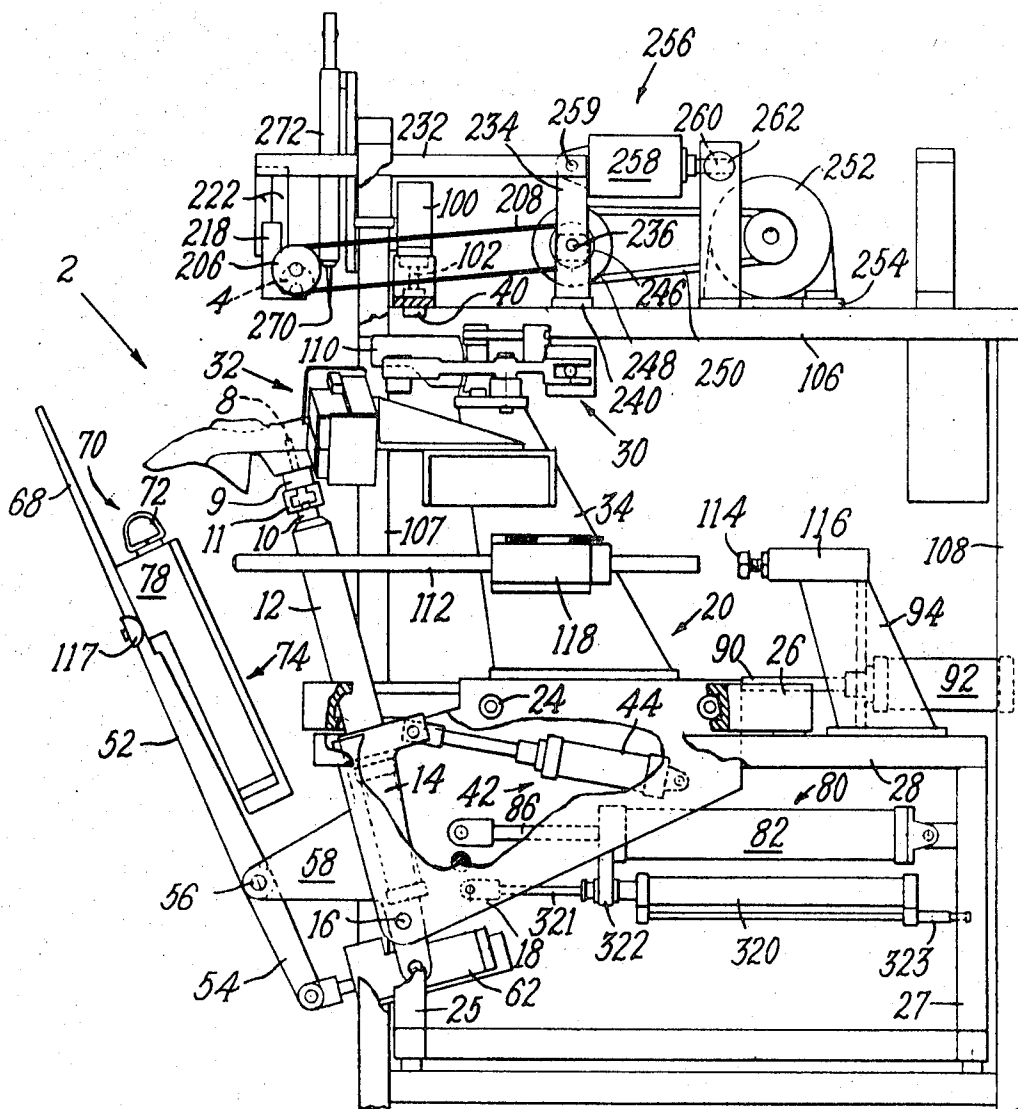


Fig. 1

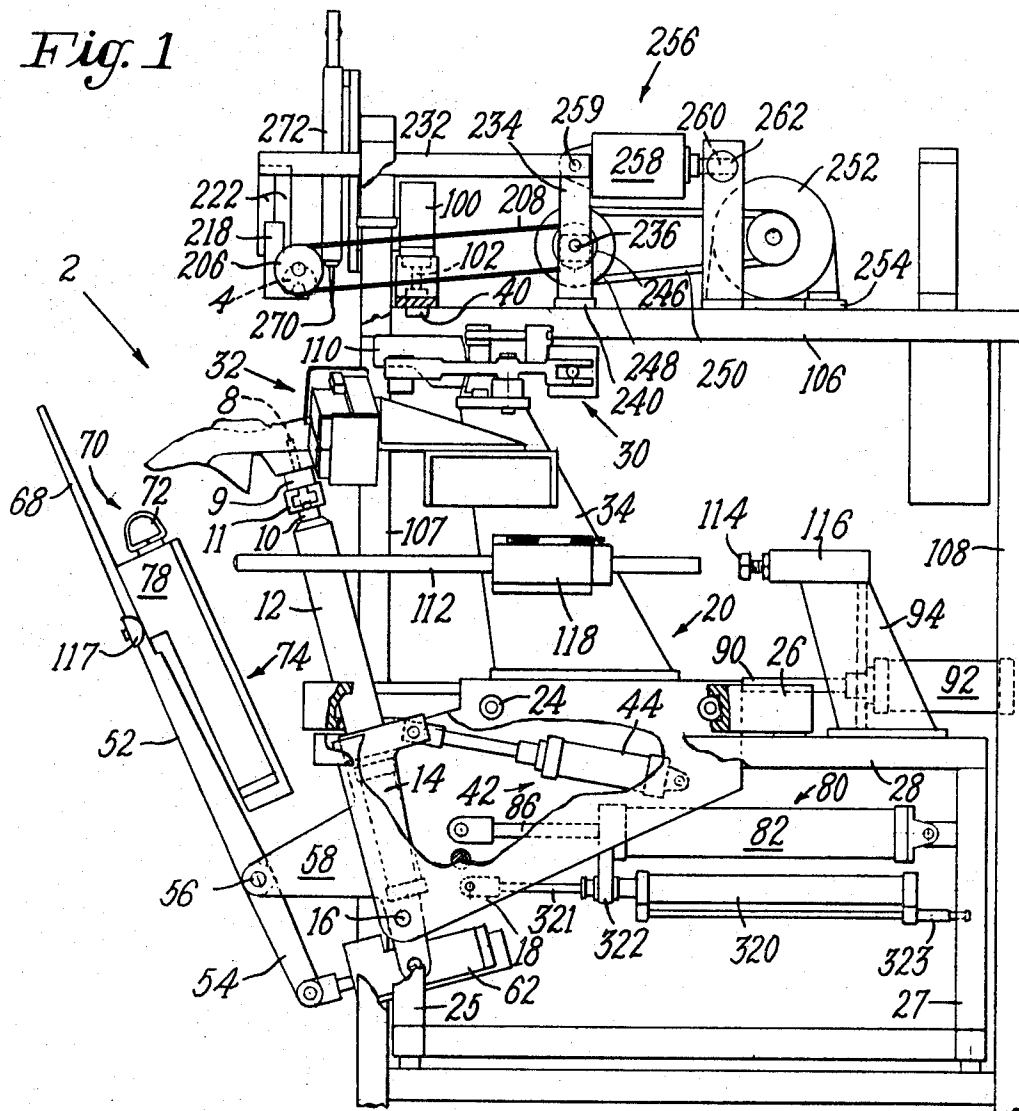


Fig. 2

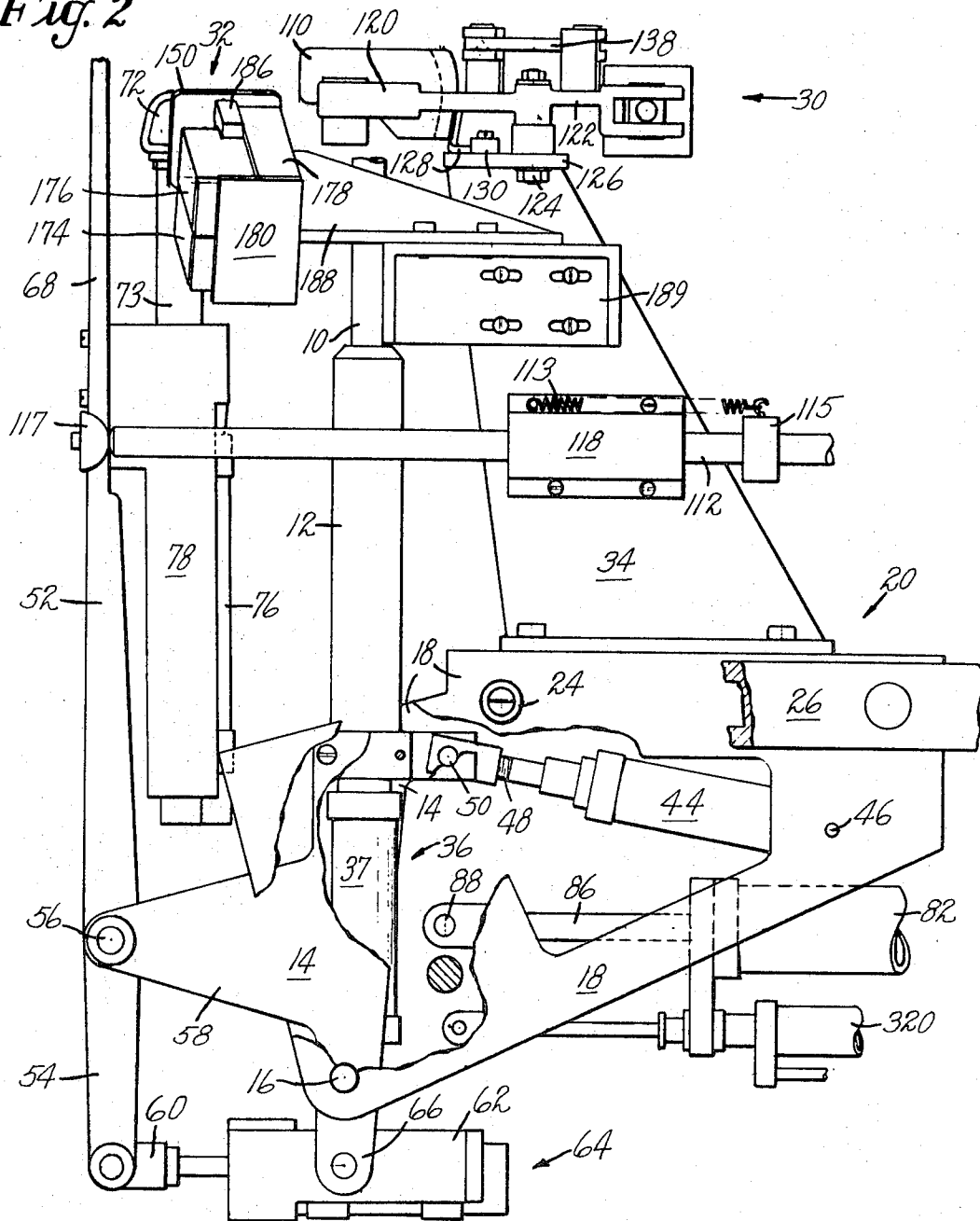


Fig. 3

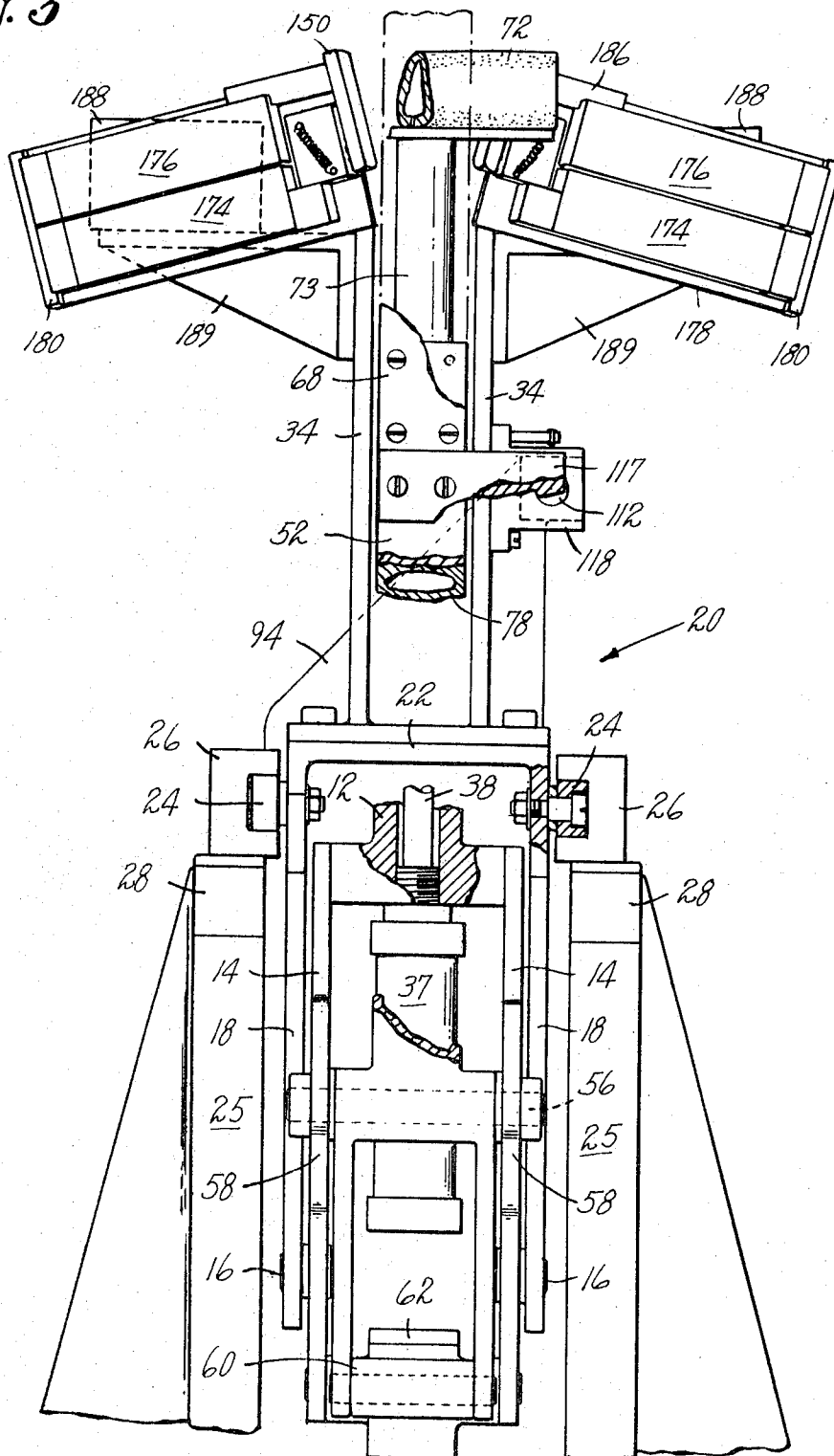


Fig. 4

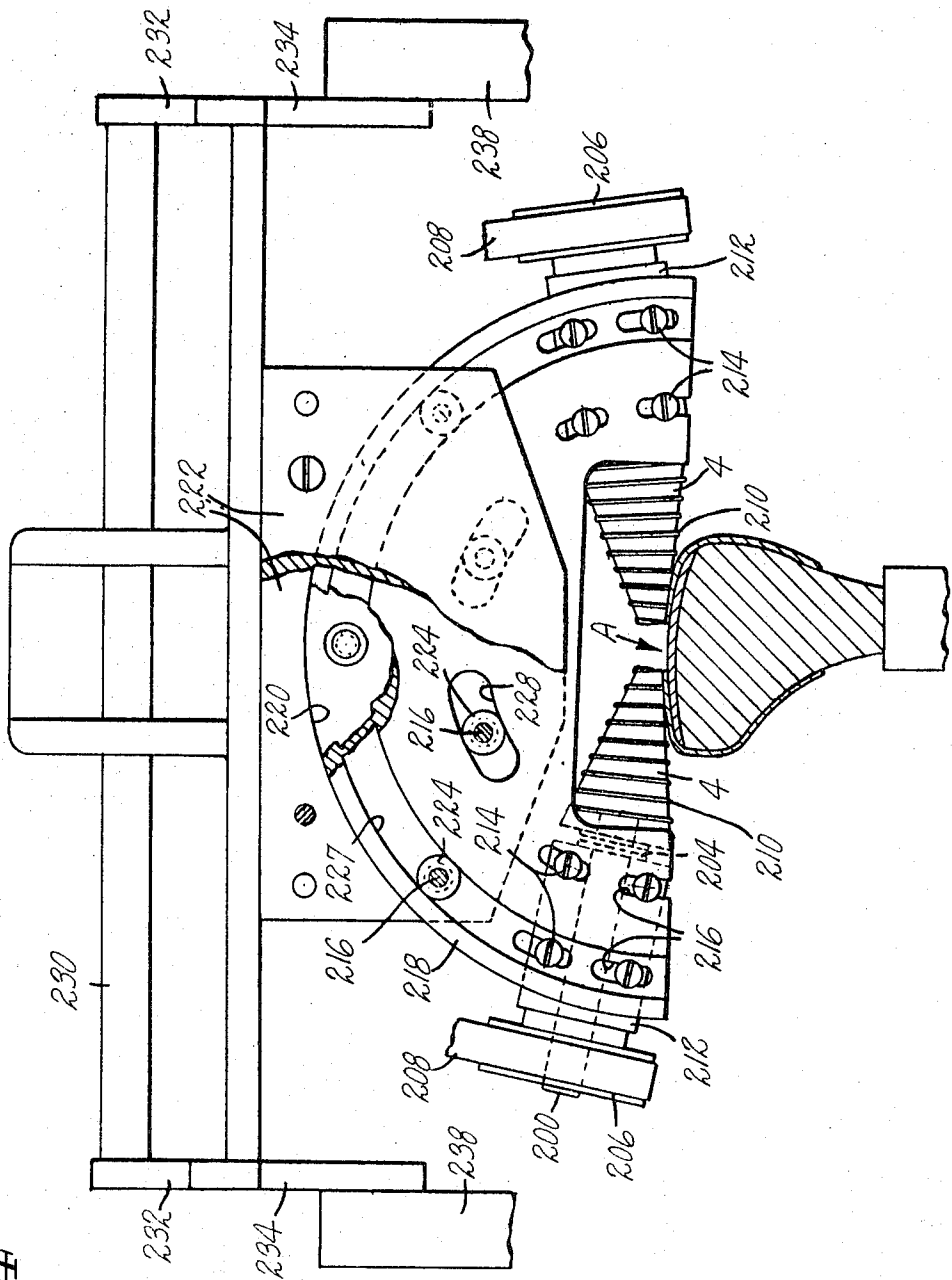


Fig. 5

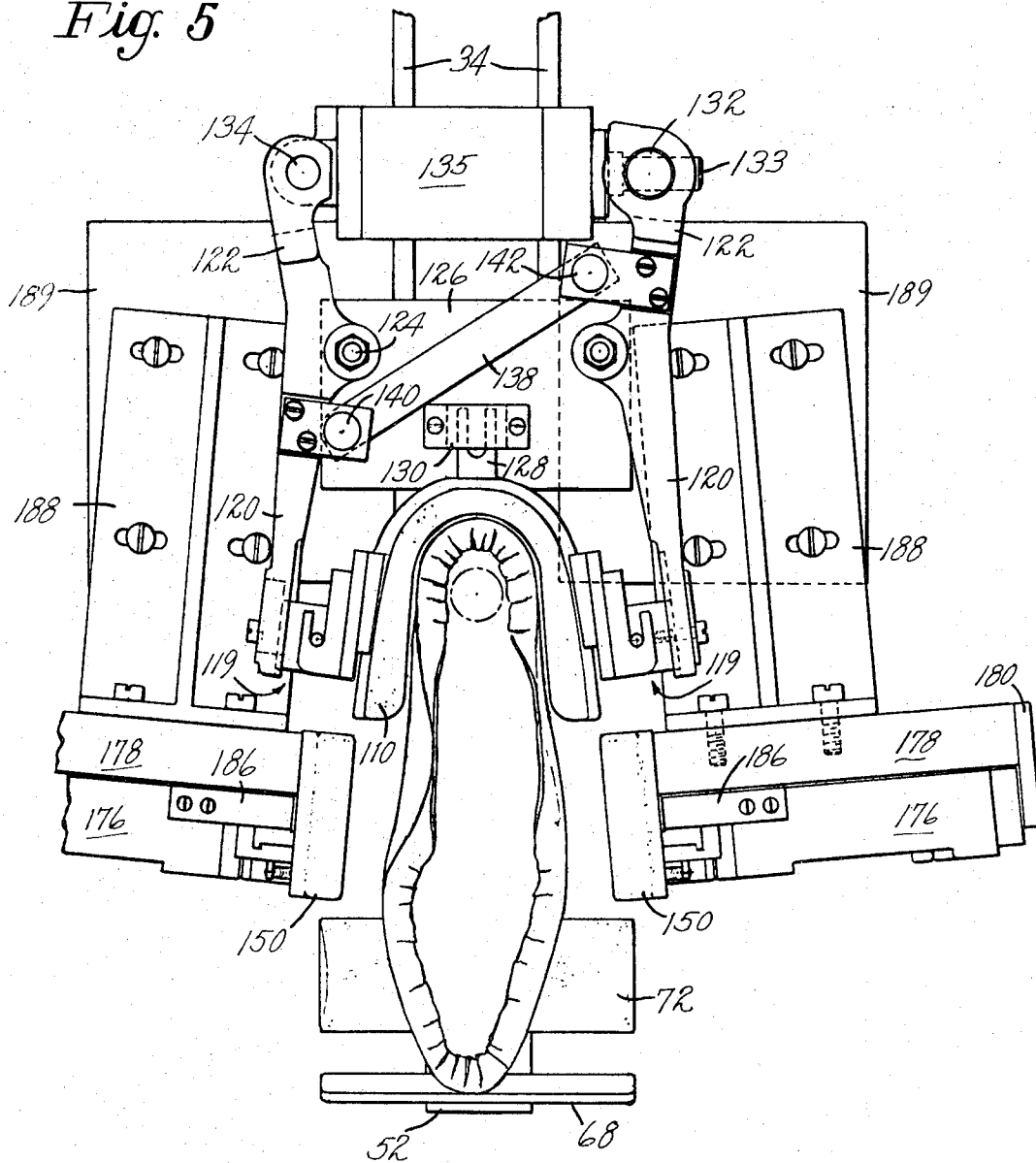


Fig. 6

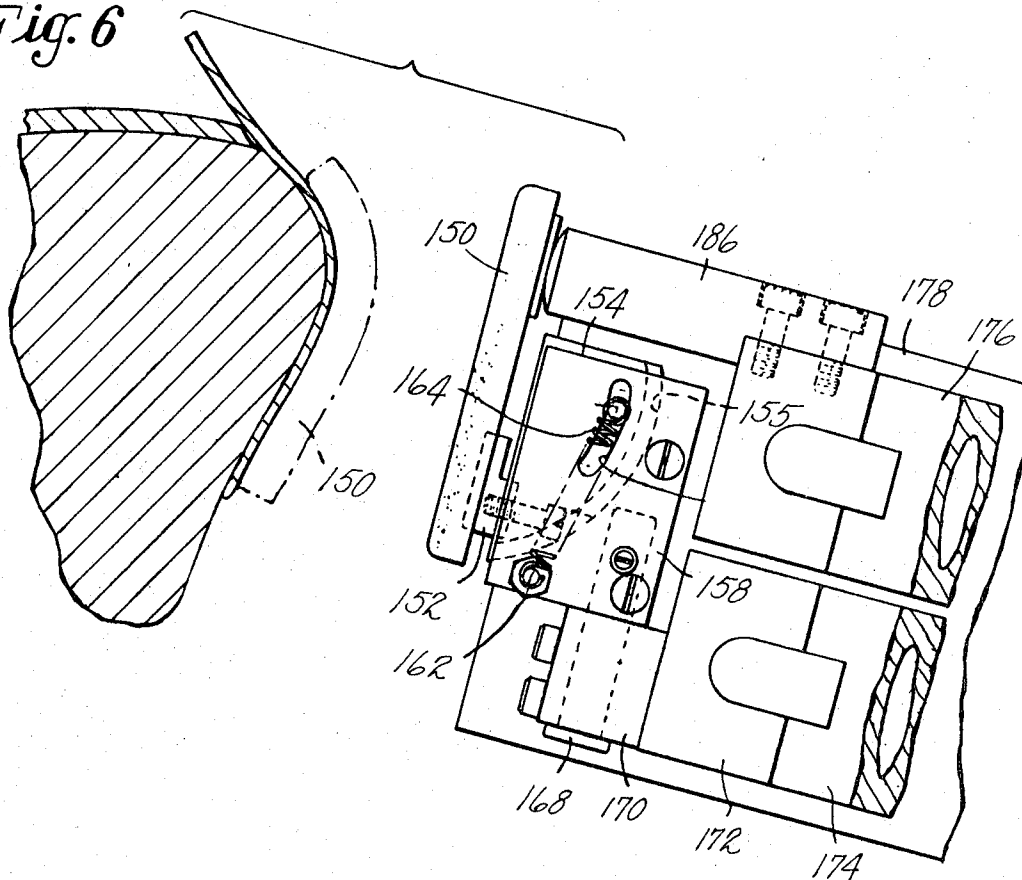


Fig. 7

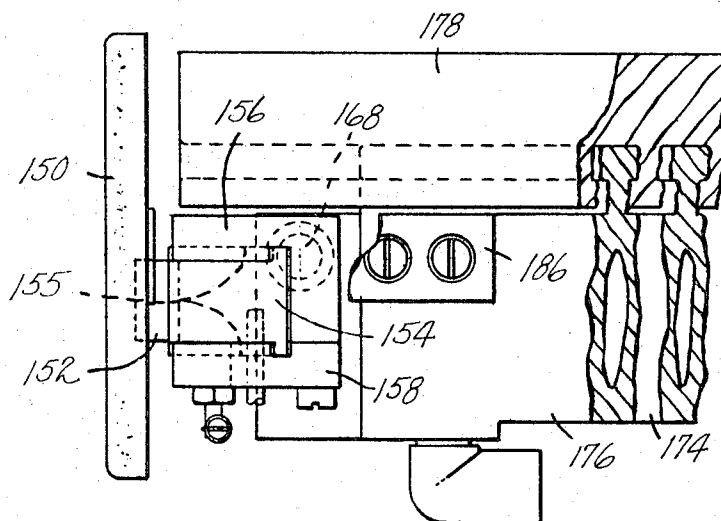


Fig. 8

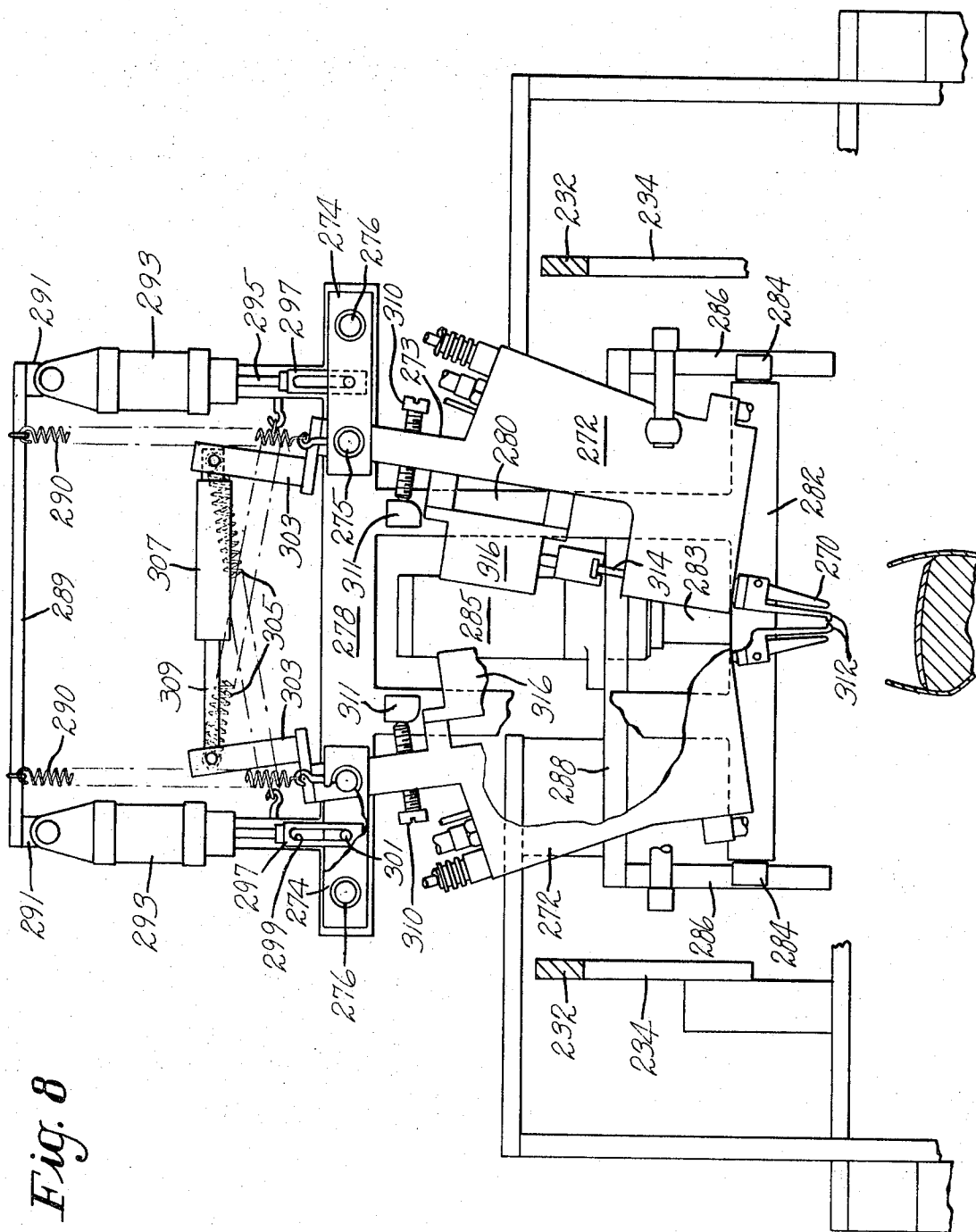


Fig. 9

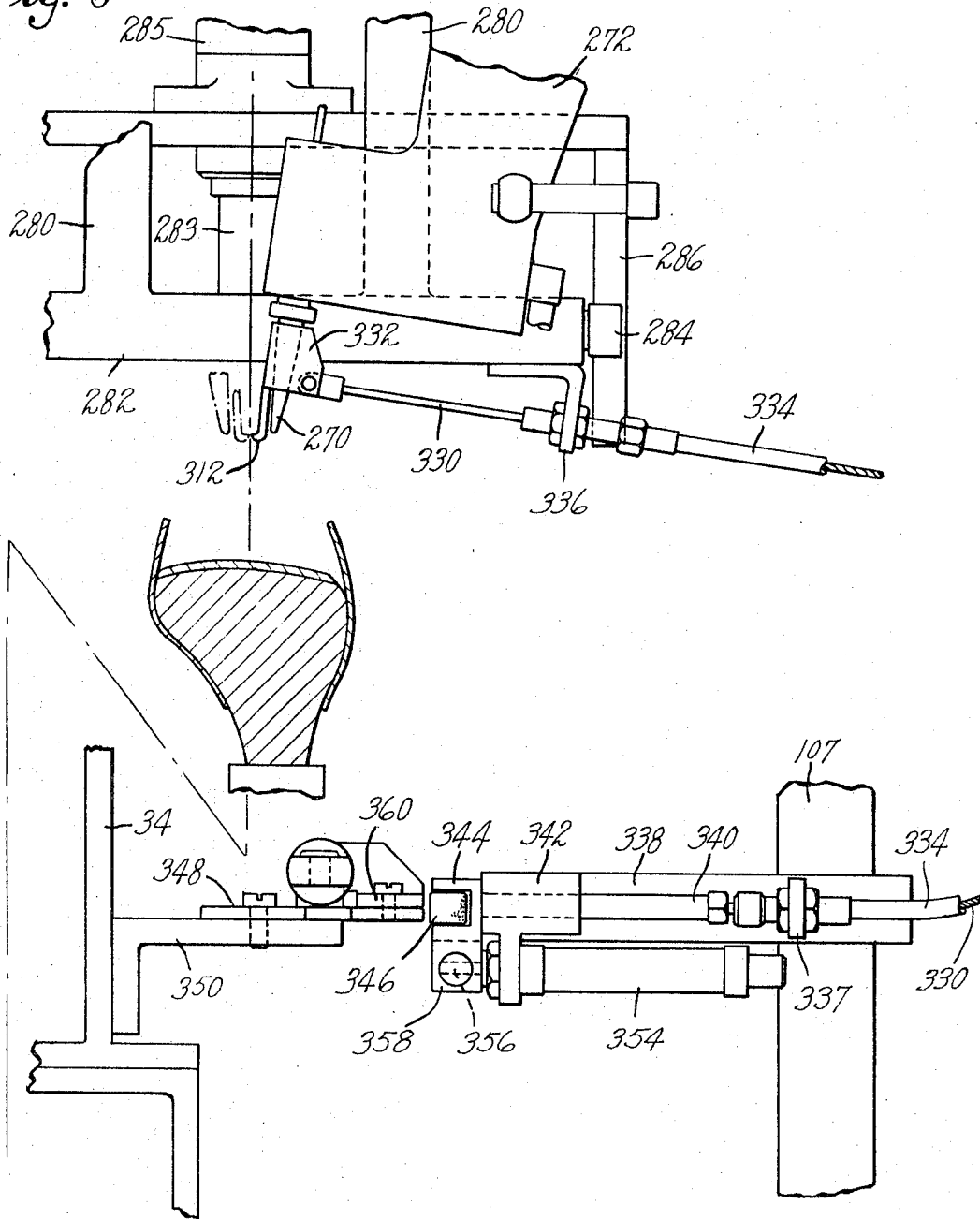
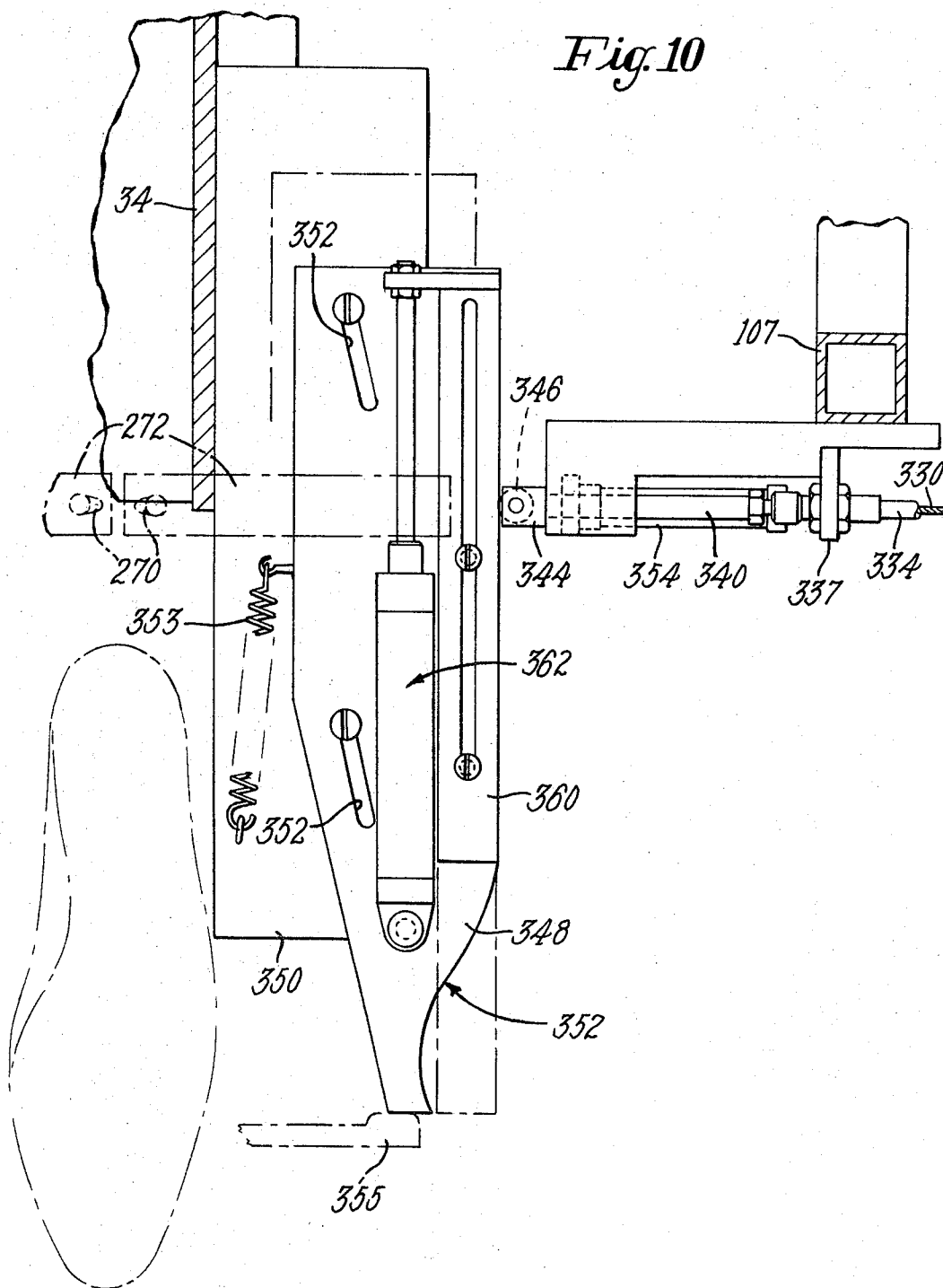
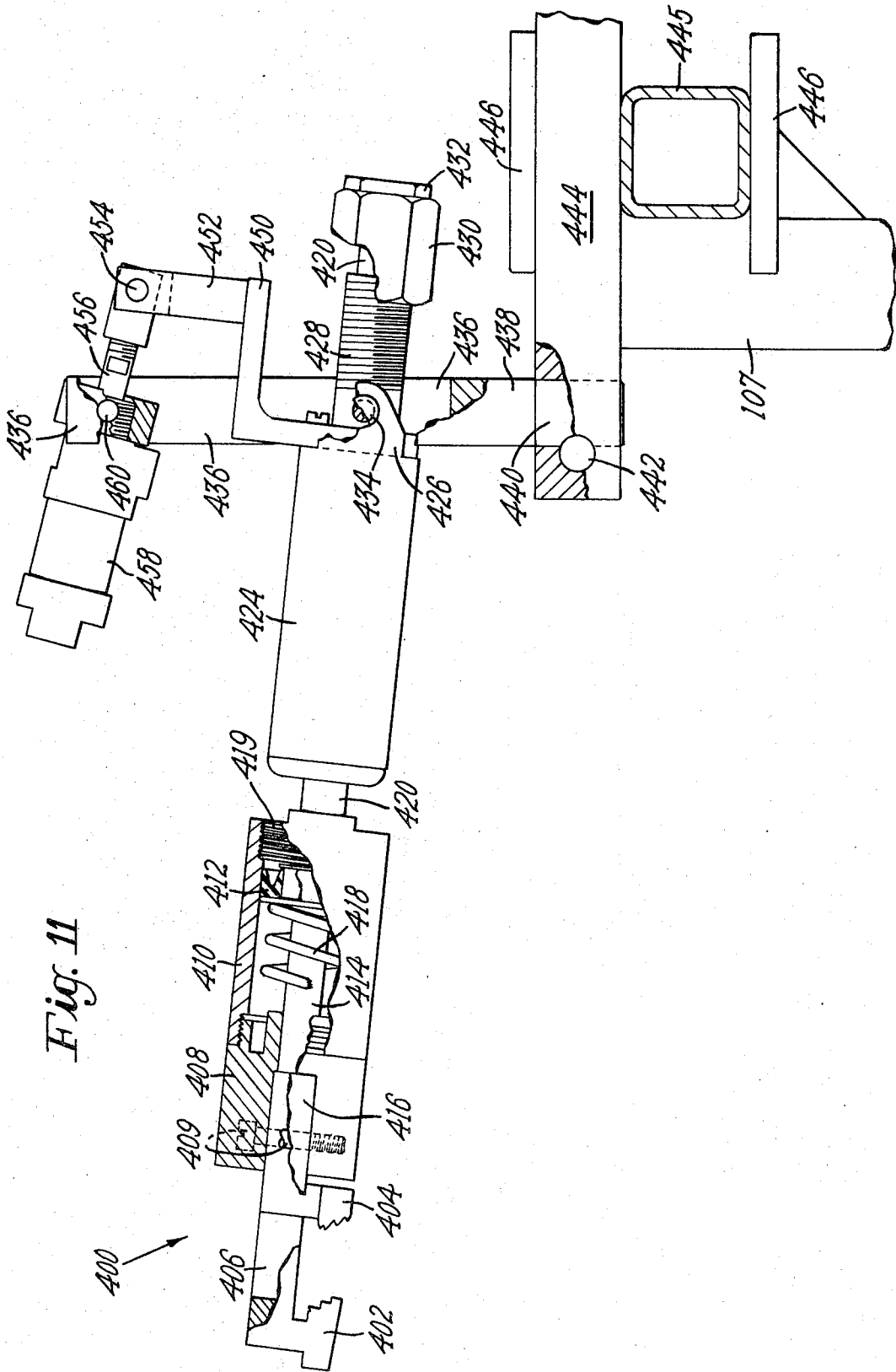


Fig. 10





AUTOMATIC SHOE LASTING MACHINE

BACKGROUND OF THE INVENTION

In the manufacture of shoes it is well known to use a combined pulling over and toe lasting machine for tensioning an upper of a shoe assembly about a last and securing the margin of the upper in the forepart in inwardly wiped relationship. Proposals have been made for providing such machines with lasting instrumentalities to last the upper along the sides behind the ball region at the same time as the remainder of the forepart is lasted. However, such machines usually unduly complicated and slower in operation than a machine lasting about the last, mold the heel end portion of the upper and to wipe in the upper margin and secure them to the insole. Side portions of the shoes have often been lasted by tack side lasting machines or by cement side lasting machines well known in the shoe manufacturing industry. Thus, the complete lasting of a shoe may require the use of three machines each having a different operator and attempts have been made to make the shoe manufacturing process less expensive by reducing the number of operators involved by providing for some form of automaticity in shoe handling. However, where shoe assemblies are to be lasted automatically along side portions it is necessary to determine the location at which the side lasting operation is to commence.

OBJECTS OF THE INVENTION

Accordingly, it is one of the various objects of the present invention to provide means whereby this may be effected automatically without the need for the attention of an operator.

With this object in view the invention provides a shoe upper conforming machine for lasting opposite side portions of shoes comprising shoe supporting means, means for causing the supporting means to position a shoe assembly to be operated upon by lasting instrumentalities arranged to wipe the upper at opposite sides of the shoe, means for effecting relative movement lengthwise between the lasting instrumentalities and the shoe supporting means to cause the lasting instrumentalities progressively to operate along side portions of the shoe assembly, and means for engaging at least one end of the shoe to determine its length and automatically set means to determine at least the initial relative positions of the shoe supporting means and the lasting instrumentalities. Conveniently, the lasting instrumentalities are mounted in a stationary position and the shoe supporting means comprises a carrier movable first to position the shoe lengthwise with respect to the lasting instrumentalities to determine the starting point of the lasting operation and then to move the shoe lengthwise to cause the lasting instrumentalities to progressively act on the lasting margin along the side portions to be lasted. The means for engaging the end of the shoe is movable on the carrier to engage the shoe and thereby to position a stop member mounted on the carrier in accordance with the length of the shoe, after which, the stop member engages a relatively

fixed abutment to position the carrier in the desired position for the lasting instrumentalities to commence their lasting operation.

Where shoe assemblies are to be lasted progressively along side portions, it is desirable to provide the machine with means providing correct alignment of the shoe assembly with respect to the direction of relative movement between the lasting instrumentalities and the shoe assembly. With this in view the invention further provides shoe supporting means including a jack post, upon which a heel end of a shoe is placed, means for moving the jack post between a loading position and an operative position in which a heel seat of the shoe is located lengthwise against a hold-down member of the machine and a clamping arrangement which, by engaging opposite sides of the shoe, positions the shoe widthwise with respect to the lasting instrumentalities and aligns the portion of the shoe to be lasted in the desired direction of relative movement of the support and the lasting instrumentalities. Conveniently, the clamping means comprises a heel band and means for clamping the heel band around the heel end portion of the shoe assembly after it has been positioned against the hold-down member. Preferably, additional clamping means is provided to engage side portions of the shoe assembly at locations towardly of the heel band. Such clamping means may comprise a pair of flexible pads which engage and clamp the upper at opposite sides first in the vicinity of the top line and then progressively towards the feather line so as to wrap the upper against the last.

Preferably, the shoe supporting means also includes a toe support connected with the tow end engaging and measuring member so as to provide support beneath the toe end portion of the shoe assembly. Conveniently, the toe end engaging member, by its measuring movement, also causes the desired positional relationship between the shoe assembly and the lasting instrumentalities.

In order that the various objects and the several features of the invention may become more clear there will now be given, with reference to the accompanying drawings, a more detailed description of the illustrative machine it being clearly understood that the illustrative machine is selected for description merely by way of exemplification of the invention and not by way of limitation thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of an illustrative machine, with parts broken away, showing a shoe assembly supported upon shoe supporting means of the machine in loading position;

FIG. 2 is a side view, with parts broken away, of a lower portion of the machine shown in FIG. 1 but in scale and showing, in particular, shoe supporting means, shoe length sensing means, and shoe clamping means of the machine;

FIG. 3 is a front view, with parts broken away, of the lower portion of the machine seen in FIG. 2;

FIG. 4 is a front view, with parts broken away, of lasting rolls of the machine and of supporting means therefor;

FIG. 5 is a plan view of the shoe clamping means;

FIG. 6 is a front view of one of a pair of side clamp arrangements forming part of the shoe clamping means;

FIG. 7 is a plan view of parts seen in FIG. 6;

FIG. 8 is a front view of adhesive applying means of the machine;

FIG. 9 is a fragmentary front view of a nozzle and associated template means of a modified form of the machine;

FIG. 10 is a plan view of the template means; and

FIG. 11 is a front view of a gripper of the modified form of the machine.

DESCRIPTION OF A PREFERRED EMBODIMENT

The illustrative machine is a shoe upper conforming machine for simultaneously lasting opposite side portions of shoes in the shank region thereof. The machine includes shoe supporting means 2 and means for causing the shoe supporting means to position a shoe assembly in position to be operated upon by lasting instrumentalities of the machine. The lasting instrumentalities comprise a pair of lasting rolls 4 arranged to wipe the margins of the upper at opposite sides of the shoe assembly inwardly over an insole for securement, for example, by adhesive applied by adhesive applying means including a pair of nozzles 270. The rolls 4 are caused to operate progressively, simultaneously along opposite side portions of the shoe assembly by relative lengthwise movement between the rolls 4 and the shoe support means.

The shoe support 2 includes a last pin 8 upstanding from a block 9 supported for limited widthwise movement in a head portion 11 of a jack post 10. The post is slidable heightwise in a sleeve 12 which at its lower end, is secured between a pair of parallel two-armed plate members 14 (see FIGS. 2 and 3 in particular) which are pivoted on a pair of aligned cross pins 16 extending from side plates 18 of a carriage 20. The upper ends of the side plates 18 are connected by an integral cross plate 22 (FIG. 3), and are each provided with a pair of rolls 24. The rolls ride in horizontal guideways in channel members 26 supported on horizontal frame members 28 carried by vertical frame members 25, 27 from a base portion of the machine framework. The carriage 20 together with the shoe support 2 is thus movable lengthwise relative to the lasting rolls 4.

For raising and lowering the jack post 10 in the sleeve 12, a piston and cylinder device 36 (FIG. 2) is provided, having a cylinder 37 connected between the plate members 14 and a piston rod 38 (FIG. 3) connected to a lower end of the jack post. For swinging the jack post 10 about the cross pins 16 from a forwardly inclined loading position as seen in FIG. 1 to a position with the heel seat of a shoe assembly carried by the last pin 8 located beneath a holddown member 40, there is provided a piston and cylinder device 42. A cylinder 44 of the device is pivoted on a cross pin 46 extending between the side plates 18 of the carriage, while a piston rod 48 is connected, by a pin 50, to lugs extending rearwardly from the plate members 14 supporting the sleeve 12.

A two-armed lever 52, 54 is pivoted on a cross pin 56 extending between forwardly extending arms 58 of the plate members 14. The lower arm 54 is connected to a piston rod 60 extending from a cylinder 62 of a piston and cylinder device 64, the cylinder 62 being pivotally supported between downwardly extending arms 66 of the plate members 14. The upper arm 52 carries a toe-engaging plate 68 and a toe pad arrangement 70. The

toe pad arrangement forms part of the shoe supporting means and includes a toe pad 72 mounted upon a piston rod of a piston and cylinder device 74, a cylinder 76 of which is carried by a bracket 78 secured to the arm 52 as shown in FIGS. 1 and 2. When air under pressure is admitted to the cylinder 62 behind a piston therein, the two-armed lever 52, 54 is swung clockwise as seen in FIG. 1 about the pin 56 to carry the plate 68 into engagement with the toe end portion of a shoe assembly supported upon the last pin 8. By this means, the length of the shoe assembly is measured for a purpose hereinafter referred to and the toe pad 72 is located beneath the forepart of the shoe assembly ready to be moved into supporting engagement with the shoe assembly.

Initially, the carriage 20 with the shoe support is held in what may be termed a shoe-loading position by engaging of the carriage with a stop 90 provided by a piston rod extending from cylinder 92 which is fixed to a bracket 94 mounted on the frame members 28. Air under pressure is admitted to the rear end of the cylinder 92 to hold the piston rod 90 in an extended forward position as shown in FIG. 1. For moving the carriage and shoe support lengthwise, there is provided a piston and cylinder 80 including a cylinder 82 pivoted on a pin 84 in a bracket supported on the frame members 27. A piston rod 86 of the device 80 is connected, by a pin 88, to the side plates 18 of the carriage. Air under pressure applied to the front end of the cylinder 82 urges the piston rod 86, and the carriage 20 rearwards until the carriage engages the stop provided by the piston rod 90. It will be understood that the pressures applied to the cylinders 82 and 92 and the dimensions of those cylinders and associated pistons are such that the force urging the stop member 90 forward is greater than the force urging the carriage rearwards. Hence, the carriage is arrested in a loading position determined by the fully extended condition of the piston rod 90.

With the carriage 20 located with the jack post occupying its forwardly inclined position shown in FIG. 1, a shoe assembly may be placed on the jack with the last supported upon the last pin 8 and the top surface of the last engaging an upper surface of the block 9. A cycle of operations of the machine may then be initiated, as by depression of a threadle (not shown) operating a valve in a control circuit of the machine, which supplies air under pressure to cylinders 44 and 37 to swing the sleeve member 12 and jack post 10 therein rearwardly in the machine and at the same time to raise the jack post 10 thus moving the shoe assembly rearwardly and upwardly until the heel end of the shoe assembly is nested within a heel band 110 of a heel band assembly 30 and the seat portion of the insole is located against the hold-down member 40. At this time the hold-down member is held in a lowered operative position by means of air pressure supplied to an upper end of a cylinder 100, a piston rod 102 of which is secured to the hold-down member 40. The cylinder 100 is secured to a supporting member carried by side frame members 106 supported by front and rear vertical frame members 107, 108. It will be understood that the stop member provided by the piston rod 90 is also arranged to locate the carriage 20 in a position in which the heel seat of the shoe assembly is correctly positioned for engagement with the hold-down member 40 as just above described. After the jack post has been raised to locate the heel seat portion of the shoe assembly against the

hold-down member a pawl and ratchet device (not shown) is effective to prevent retraction of the jack post upon removal of air pressure from the lower end of the cylinder 37. The heel band 110 is then closed about the heel end of the shoe assembly and side clamps of side clamping assemblies 32 engage opposite sides of the shoe assembly as hereinafter described to centralize the shoe assembly whether the shoe be one for a left foot or for a right foot.

Air under pressure is then supplied to the rear end portion of cylinder 62 to extend the piston rod 60 to swing the two-armed lever 52, 54 clockwise (as seen in FIGS. 1 and 2) until the plate 68 engages the toe end of the shoe assembly. This locates the toe pad 72 beneath the forepart of the shoe assembly and, as hereinafter described, sets a stop provided by a rod 112 in a lengthwise position related to the length of the shoe assembly. After the toe pad 72 has been positioned as just above described, air under pressure is supplied to the cylinder 76 to raise the toe pad 72 into supporting engagement with the forepart of the shoe assembly. After the toe pad 72 engages the forepart a pawl and ratchet arrangement (not shown) prevents retraction of the piston rod 73 and air pressure can be removed from the cylinder 76. The shoe assembly is now firmly clamped and supported on the shoe support ready for the side lasting operation. The supply of air pressure to the upper end of cylinder 100 is removed so that a spring (not shown) therein can lift the hold-down member 40 to inoperative position, and, at the same time, the supply of air under pressure to the rear end of cylinder 92 is removed so that the stop member 90 may be withdrawn allowing the carriage 20 to move to the right (as seen in FIG. 1) to a position determined by engagement of a rear end of the stop rod 112 with the head of an adjustable screw 114 extending from a boss 116 on the bracket 94. It will be understood that the stop rod 112 is maintained against movement at this time by pressure applied, as will shortly be described, to the front end of the stop rod by the action of the two-armed lever 52, 54. The lengthwise position of the carriage 20 and of a shoe assembly supported thereon thus is dependent upon shoe length as measured by the extent of movement of the toe engaging plate 68. The various parts are so proportioned and positioned that for a given change in length of shoe assembly the position taken up by the stop rod 112 changes in the proportion of about 13:24. Thus, each shoe assembly is correctly positioned lengthwise with respect to the lasting instrumentalities, whatever the length of shoe assembly supported on the shoe supporting means, for the commencement of the side lasting operation in the vicinity of the ball of the shoe assembly.

As will be seen from FIGS. 1-3 the stop rod 112 is slidably received in a horizontal bore in a bearing member 118 secured to one side of the bracket 34, and is normally urged to the left by springs 113 connected between a collar 115 on the stop rod 112, and a pin on the bearing member 118. Displacement of the stop rod 112 toward the right, against the action of the springs 113, is effected by engagement of an abutment 117 extending transversely from the arm 52. Such engagement takes place as a consequence of movement of the arm in a clockwise direction as seen in FIG. 1 to carry the toe engaging plate 68 into contact with the toe end of the shoe assembly.

The heel band assembly 30 is substantially like that of a heel seat lasting machine and will only be briefly described. The heel band 110 is detachably supported at 119 in well known manner upon forwardly extending arms 120 of two armed levers having rearwardly extending arms 122. The levers 120 122 are pivoted on studs 124 on a plate 126 fixed on the bracket 34. A forked tongue 128 extending rearwardly from the heel band is received in a bridge piece 130 on the support plate 126 to restrain the central portion of the heel band against heightwise movement while permitting a limited amount of sideways and lengthwise movement when the heel band is closed about the heel end portion of a shoe assembly. The arms 122 are pivotally connected at 132, 134, respectively, with a piston rod 133 and a cylinder 135 of a piston and cylinder device for imparting closing movements to the band 110 by swinging the levers 120, 122 at opposite sides in opposite directions about the studs 124. The arms 120 are caused to move to equal extents to centralize the heel end portion of a shoe assembly embraced by the heel band through a tie rod 138 cross connected to one of the arms 120 at 140 and the other arm 122 at 142 as shown in FIG. 5.

The side clamping assemblies 32 are each similar but opposite so that only one will be described in detail. As best seen in FIGS. 5-7, a flexible side clamping pad 150, in the form of a block of plastic material such as having a low coefficient of friction, has a member 152 detachably connected to a block 154 provided with arcuate ribs slidable within arcuate guideways 155 formed in a supporting block 156 and a plate 158 secured thereto. The center of curvature of the arcuate guideways 155 is substantially at the shoe engaging face of the pad 150 at about a mid position heightwise thereof (see FIG. 6). The support block 156 is pivotally mounted on a pin 168 secured in the block 156 and received in a bore in a further block 170 secured to an end cap 172 of a cylinder 174. A second cylinder 176, lies parallel to, and just above, the cylinder 174. As best seen in FIG. 7, the cylinders 174, 176 each have an integral slide member slidably mounted in parallel guideways formed in a guide member 178 which extends generally widthwise of the machine and is secured at an outer end to a plate 180 which is secured to piston rods extending from the cylinders 174, 176. The cylinder 176 has secured to it a plunger 186 having a rounded end which may be engaged with an upper portion of the associated side clamping pad 150 for a purpose hereinafter described.

Initially, air under pressure is admitted to the outer ends of the cylinders 174 and 176 to urge the cylinders outwardly so that the various parts of the clamp assemblies occupy the inoperative positions shown in FIG. 6. To this end, the plates 180 and guide members 178 are secured to brackets 188 (FIGS. 2 and 5) secured, one at either side of the machine to the other brackets 189 which are mounted for adjustment lengthwise of a shoe assembly on the bracket 34 secured to the carriage 20. After the heel band 110 has been applied in clamping engagement with the heel end portion of the shoe assembly by the admission of air under pressure to cylinder 135 as above mentioned, air under pressure is supplied to the inner end portions of the lower cylinders 174 of the side clamping arrangements (the outer ends being connected to exhaust), to move the clamping pads 150 toward the opposite sides of the shoe assembly.

bly. As each pad 150 engages the shoe assembly it may tilt about the center of curvature of the associated arcuate guideways 155 on continued movement of the cylinders 174 toward the shoe assembly, to result in clamping pressure being applied by the pad 150 to the shoe upper first adjacent the top line. Air under pressure is then admitted to the inner ends of cylinders 176 (the outer ends being connected to exhaust) to move the cylinders 176 and the plungers 186 toward the shoe assembly and cause the plungers to engage and deflect the upper end portions of the clamping pad 150 into firm engagement with the upper (as seen in broken lines in FIG. 6). The progressive wrapping of the pads 150 about the upper beginning at the top line of the shoe assembly ensures that the upper is laid smoothly against the last up to about the feather line.

The lasting rolls 4 (FIGS. 1 and 4) are frusto-conical in shape and are provided with wiping elements in the form of helical ribs 210 opposite hand. When the rolls are rotated the helical ribs 210 act to wipe marginal portions of the upper inwardly over the corresponding marginal portions of the insole. The rolls 4 are supported by roll carrying means so that the axes of the rolls are arranged to extend at least substantially widthwise of a shoe assembly being operated upon. The rolls are provided with shafts 200 rotatably mounted in bearing sleeves received within bores in bearing blocks 212 forming part of the roll carrying means. The blocks are adjustably secured to an arcuate carrier 218 by screws 214 extending through arcuate slots 216 in the carrier. Thrust bearings 204 are provided between the rolls 4 and the bearing blocks 212 and the rolls are driven by means of belts 208 passing around pulleys 206 on the shafts 200. The belts and the pulleys may be coggd to ensure that the rolls 4 are rotated positively. The arcuate carrier 218 is guided for limited arcuate movement (about an axis, indicated at A in FIG. 4, extending lengthwise of a shoe assembly being operated upon at about the level of the insole and centrally disposed between the inner end portions of the rolls 4) so as to provide for an equalizing effect on the pressures exerted by the two rolls 4 operating at opposite sides of the shoe assembly. For this purpose a support for the arcuate carrier 218 comprises a pair of supporting plates 222 bolted together and provided with an arcuate guide surface 220 and with two series of pins 226 extending inwardly from the supporting plates. The pins 226 carry freely rotatable rolls 224, one series of rolls riding in arcuate grooves 227 formed in front and rear faces of the carrier 218 and the other series of rolls riding in arcuate slots 228 also formed in the carrier 218. The supporting plates 222 are secured to a cross-bar 230 extending widthwise of the machine between forwardly and rearwardly extending arms 232 of a pair of bell crank levers (one at each side of the machine) having other arms 234 depending therefrom. Lower end portions of the arms 234 are pivoted on studs 236 extending transversely from upstanding pillars 238 supported on a bridge member (FIG. 1) 240 extending between the side frame members 106. The studs 236 are coaxial with a counter shaft (not shown) rotatable in bearings in pillars (not shown, but spaced inwardly of the pillars 238) upstanding from the bridge member 240, the counter shaft having secured thereon (at opposite end portions) coggd pulleys 246 for driving the belts 208. The counter shaft has a pulley 248 driven by a belt 250 from an electric motor 252 supported on

bridge members 254 extending between the side frame members 106. For raising and lowering the rolls 4 between operative and inoperative positions and for yieldably pressing the rolls against the lasting marginal portions of the upper of the shoe assembly being operated upon, there is provided a piston and cylinder device 256 (FIG. 1), the cylinder 258 of which is pivotally connected to a rod 259 extending between the bell crank levers at the junction of the arms 232, 234, while a piston rod 260 is pivotally connected by a pivot pin 262 to a fixed bracket 264 mounted on one of the bridge members 254.

For applying adhesive to marginal portions of the insole in advance of the action of the rolls 4 there is provided adhesive applying mechanism now to be described. The mechanism comprises a pair of nozzles 270 (FIGS. 8-10) (one for each side of the shoe assembly) through which thermoplastic adhesive in molten condition may be extruded on to the marginal portions of the insole as the latter is traversed past the nozzles as hereinafter described. The nozzles 270 extend downwardly from nozzle body members 272 which at upper end portions 273 are pivoted on pins 275 on inner end portions of links 274. The links are pivotally supported at their outer ends on pins 276 in a cross bar 278 extending across the upper ends of a pair of bars 280 upstanding from a carrier block 282. The carrier block extends crosswise in the machine and is secured to a lower end portion of a piston rod 283 which extends downwardly from a cylinder 285 secured to a bridge 288 mounted on the machine frame. The carrier block 282 is provided with rollers 284 riding on forward and rearward faces of guide members 286 depending from the bridge member 288. The admission of air under pressure to the lower end of the cylinder 285 raises the carrier block 282 to lift the adhesive applying mechanism well clear of a shoe assembly as it is presented to the machine and moved to operative position as above described. Connecting the lower end of the cylinder 285 to exhaust enables the adhesive applying mechanism to be lowered to operative position, downward movement of the carrier block 282 being limited by a suitable stop (not shown). The nozzle body members 272, and associated nozzles 270 may rise and fall relatively to the cross bar 278 by reason of the pivots 275, 276 and links 274. Such rising and falling movement enables the nozzles to follow heightwise contours of the insole of a shoe assembly as it is moved past the nozzles. Springs 290 connected between the pins 275 and a cross bar 289 (which is supported from the cross bar 278 by members 291) serve to counterbalance the major portion of the weight of the nozzle body members 272 and parts mounted thereon so that the nozzles 270 are lightly urged toward the insole, when permitted as hereinafter described. For urging each of the links 274 up about the pins 276 so as to raise the nozzle body members and nozzles relatively to the cross bar 278, there is provided a cylinder 293 from which depends a piston rod 295, an upper end portion of the cylinder being connected to the associated member 291 and the piston rod being provided with a head portion 297 having a lengthwise extending slot 299 therein which receives a pin 301 extending from the associated link 274. The nozzles 270 may move transversely of a shoe assembly supported in the machine by movement of the nozzle body members 272 about the pivot pins 275. L-shaped brackets 303 are fixed on the upper end por-

tions 273 of the nozzle body members and springs 305 are connected, one between each upwardly directed arm of the brackets 303 and the opposite member 291 tending to urge the nozzles outwardly toward the edge portions of an insole. However, a cylinder 307 and a piston rod 309 are connected between the upstanding arms of the brackets 303. This piston and cylinder arrangement is double acting and, when air under pressure is supplied to one end of the cylinder 307, the upstanding arms of the brackets 303 are urged outward (against the action of the spring 305) to swing the nozzles 270 inwardly into positions in which they lie close together above a mid portion of the insole as limited by adjustable stop screws 310 engaging fixed stop members 311. Fixedly secured to each nozzle member 270 is a foot 312 which extends slightly below the lower end portion of the nozzle and, by engagement with the insole, supports the nozzle just out of contact with the insole when the nozzle is in operative position. The independent mounting of the two nozzles as above described allows each nozzle to follow changes in the heightwise contour of the shoe assembly.

In the operation of the illustrative machine, after a shoe assembly has been positioned as hereinbefore described ready for the commencement of the lasting operation, the lower end portions of the cylinders 293 are supplied with air under pressure to hold the nozzle body members 272 raised with respect to the cross bar 278 and the nozzles are held in their closely adjacent positions by air pressure applied to the cylinder 307 to extend the piston rod 309. At the same time the lower end of the cylinder 285 is connected to exhaust thus lowering the adhesive applying mechanism to operative position in which the nozzles and the feet 312 are spaced just about the surface of the insole. The air supply to the cylinders 293 is then reversed to lower the piston rods 295 and allow the nozzles to be lowered until the feet 312 engage the insole. The air pressure supply to the cylinder 307 is also reversed to urge the nozzles outward (while the feet 312 remain in contact with the insole) to limits determined by engagement of the nozzle body members with adjustable stop members (not shown) to locate the nozzle outlets just above marginal portions of the insole at opposite sides of the shank area. Movement of the nozzles in the manner above described is likely to ensure that the nozzles in moving out, do not ride over the lasting marginal portions of the upper. Air pressure supplied to the cylinder 307 is then exhausted leaving the nozzles urged outwardly only by the action of the springs 305 thus minimizing pressure of the nozzle body members against the adjustable stop members to facilitate rising and falling movements of the nozzles as the insole is traversed therepast. The carrier 20 of the shoe supporting means is then moved lengthwise by the action of the piston and cylinder arrangement 80 so the shoe assembly is traversed lengthwise beneath the nozzles 270 and the lasting rolls 4 (which will have been lowered into engagement with the shoe assembly by air under pressure being supplied to the right hand end portion of cylinder 258, FIG. 1). During the traversing movement of the shoe assembly past the nozzles, the nozzles rise and fall to follow the heightwise contours of the portions of the shoe bottom engaged by the feet 312, as the pins 301 ride heightwise in the slots 299 in the head portions of the piston rods 295, FIG. 8. The nozzles are held in stationary positions (considered in a direction extending

widthwise of the shoe assembly) as the body members are held against the adjustable stop members above referred to so that the nozzles deposit adhesive upon the marginal portions of the insole in two parallel straight lines. The rate of traversing movement of the shoe assembly is controlled by an adjustable hydraulic dash pot arrangement 320 (FIG. 1) a piston rod 321 of which is connected to the carrier 20. The cylinder of the dash pot arrangement 320 is secured to a bracket 322 depending from the cylinder 82 and an adjustable valve 323 controls the rate of flow of oil in the dash pot arrangement and hence controls the speed of movement of the carrier 20 under the action of air pressure in the cylinder 82 of the piston and cylinder arrangement 80.

The nozzle body members 272 are electrically heated by suitable thermostatically controlled electric cartridge type heaters (not shown) inserted in appropriate bores therein and contain passages between inlets 292 and the nozzles along which adhesive may pass, the adhesive being fed, in well known manner, into the inlets in rod form so that it becomes melted in the passages extending through the body member 272 and forced out of nozzles 270 as more rod is fed into the inlets 292 by suitable rod feeding means (not shown). Associated with each nozzle 270 is a needle valve which is arranged to control the flow of adhesive through the nozzle. To cut off the flow of adhesive the needle valve is arranged to seat (in well known manner) against a seat within the nozzle it being urged toward the closed position by means of a spring. For opening the valve a stem portion 314 (FIG. 8) is connected to a solenoid device 316 which, when energized, lifts the needle valve off its seating so that as rod adhesive is fed into the inlet of the heated nozzle body portion 272 molten adhesive is extruded through the nozzle, the needle valve serving, when closed, to cut off the flow of adhesive and minimize any tendency for drooling of adhesive from the nozzle between successive cycles of operation of the machine.

If it is desired to last side portions of shoe assemblies in regions which extend into the more sharply curved ball region (especially at the inside ball region) it is desirable to modify the illustrative machine as will now be described, to enable the nozzle which is to apply adhesive at the side of the shoe assembly including the inside joint region to be displaced sideways during at least a portion of the traversing movement of the shoe assembly to follow the outline of the more sharply curved portions of the shoe bottom. For this purpose the illustrative machine, in its modified form, includes template means for controlling widthwise movement of the nozzle members during traversing movement of the shoe assembly. As shown in FIG. 9, one end of a flexible cable 330 is connected to a block 332 on the associated nozzle 270 and which also supports the associated foot 312. Each cable extends through a sheath 334 secured at one end to a bracket 336 fixed to the carrier block 282 and secured at the other end to a lug 337 extending from a bracket 338 secured to one of the frame members 107. The other end of the cable 330 is connected to a rod 340 slidable widthwise in a bearing portion 342 of the bracket 338. Each rod 340 has a head 344 carrying a roller 346 engageable with a template. The template means comprises a pair of templates 348, one for each nozzle, which are supported, as hereinafter described, upon brackets 350 secured to, and ex-

tending sideways from, opposite side portions of the bracket 34 of the carrier 20. The templates 348 are thus arranged to partake of the lengthwise traversing movements of the carrier. For moving each roller 346 into engagement with an edge face 352 of an associated template 348 there is mounted upon each bracket 338 a cylinder 354 having a piston rod 356 connected to a block 358 depending from the head portion 344 of the associated rod 340. In this modified form of the machine the springs 305 (FIG. 8) are removed, the nozzles being urged inwards by air pressure applied to the cylinder 307. Admission of air under pressure to the outer end portions of the cylinders 354 will urge the associated rollers 346 into engagement with the faces 352 of the templates 348. As will be seen from FIG. 9, movement of a roller 346 toward its associated template acts through the associated cable 330 to urge the nozzle 270 connected therewith outwardly (against the action of air pressure in the cylinder 307 which acts to maintain the cables in tension) toward the edge of the insole of the shoe assembly being operated upon.

The outline shape of the edge face 352 of each template 348 is shaped inversely to correspond to the outline shape of the corresponding portions of an insole (at the inside edge thereof) for a shoe of model size. Associated with each template 348 is a mask 360 comprising a straight bar which is slidable lengthwise with respect to the template and is arranged to mask the edge face 352 when the mask 360 is in its extended position, so that the associated roller 346 engages the outside straight edge of the mask and not the edge face 352 of the template. The masks 360 are connected with pneumatic piston and cylinder devices 362 indicated schematically in FIG. 10 for advancing and retracting the masks relatively to the templates 348. A single template 348 with an outline shape corresponding (inversely) to that of the curved portion of the insole extending from the ball into the relatively straight shank portion of a shoe of model size may be used to guide the nozzle operating to apply adhesive at the inside curved portion of insoles of shoes within the whole size range provided that the template is positioned correctly lengthwise in accordance with shoe size (length) and is "graded" widthwise to take account of the variation of shoe width with size. Accordingly, each template 348 is mounted upon its supporting bracket 350 so that it is movable lengthwise and widthwise, guided by rolls and slots 352. Springs 353 normally urge the templates to the left as seen in FIG. 10 so that front end portions of the templates are engaged by lugs 355 extending widthwise from the arm 52. When the arm 52 is swung clockwise (FIG. 1) to cause the toe engaging plate 68 to engage the toe end portion of the shoe assembly supported by the shoe supporting means, the templates 348 are moved (heelward) proportionately (7:16) along the inclined slots 352 a distance appropriate to position the templates correctly lengthwise with respect to the shoe assembly to be operated upon, and in the desired widthwise position. This positioning of the templates therefore occurs simultaneously with the lengthwise positioning of the stop rod 112 which determines, as above described, the relative position taken up by the shoe assembly and by the lasting rolls 4 and nozzles 270 for the start of a lasting operation.

When a shoe assembly for a right foot is supported upon the shoe supporting means the more sharply curved inside waist region lies to the left hand side of

the machine as seen from the front. The control circuit arrangement is such that, when the heel band is closed about the heel end of the shoe assembly to align the shoe correctly with respect to the direction of travel of the carrier 20 and to position the shoe widthwise, the band as it were senses that a shoe assembly for a right shoe is present in the machine and "signals" the supply of compressed air to the piston and cylinder devices 362 such that the mask 360 at the right hand side of the machine is moved to its masking position covering the edge face 352 of the template 348 at that side of the machine, while the mask 360 at the left hand side of the machine is withdrawn leaving the edge face 352 of that template exposed. After the nozzles have been lowered to operative position as above described, air pressure is applied to the cylinders 354 to cause the rollers 346 to be moved into engagement with the edge face of the template 348 at the left hand side of the machine and with the straight edge face of the mask 360 at the right hand side of the machine to move the nozzles 270 outwards appropriate amounts toward the edge portions of the insole. As the shoe is traversed past the nozzles that at the left hand side of the machine follows the more sharply curved portion of the insole edge whilst that at the right hand side of the machine remains stationary (widthwise). When a shoe assembly for a left foot is being operated upon the positions are reversed, i.e., the template at the left hand side of the machine is masked and that at the right hand side is exposed.

Where shoe assemblies are to be lasted along side portions which extend along the relatively straight shank portion only it is likely that portions of the upper at opposite sides of the shoe assembly will be hugging the last fairly closely (it being borne in mind that the upper will have been pulled over and toe lasted and probably heel seat lasted) so that adequate lasting of the upper is likely to be achieved relying on the use of the inwiping rolls for wiping the lasting marginal portions of the upper inwardly across marginal portions of the insole. However, if the side lasting operation is to extend over the joint region it is likely that, due to the more sharply curved nature of the outline of the insole particularly at the inside joint region of the shoe assembly, portions of the upper may tend to bridge the shoe concavity found in the last at the inside waist region just behind the joint. The modified version of the machine is therefore provided with upper gripping means comprising a pair of grippers 400, arranged one at either side of the machine, and pneumatic means for operating the grippers. The arrangement is such that only the gripper which is to operate at the inside of the shoe assembly is caused to operate, the operation of the other gripper being automatically cancelled. As has been hereinbefore described the shoe clamping means comprising the heel band 110 automatically senses whether the shoe assembly present in the machine is for a left shoe or a right shoe and this automatic sensing of the shoe assembly is employed to signal the control circuit arrangement in such a manner as to cancel the operation of the gripper which lies over the outside portion of the shoe assembly. The grippers at each side of the machine are similar, so that only the gripper at the right hand side of the machine is shown in FIG. 11 and will now be described.

Each gripper comprises an inner jaw 402 under-slung from two bifurcated portions 406 by which it is secured by screws 409 to an end cap 408 of a cylinder 410. The

cylinder has a piston 412 from which extends a piston rod 414 having a square-sectioned end portion 416 slidable between the bifurcated portions 406 of the inner jaw 402. The outer jaw 404 is secured to the portion 416 so as to depend therefrom in cooperative relation to the inner jaw. A return spring 418 in the cylinder 410 normally holds the piston 412 to the right hand end of the cylinder 410 as seen in FIG. 11 to hold the jaws in opened condition. An end cap 419 of the cylinder 410 is secured to an end portion of a hollow piston rod 420 through which air under pressure may be supplied to the cylinder 410 to move the piston 412 to the left and close the jaws of the gripper. The piston rod 420 extends through a cylinder 424 and has mounted thereon a piston not shown. The cylinder 424 has lugs 426 extending therefrom and an end cap of the cylinder has a threaded stem portion 428 through which an outer end portion of the piston rod 420 extends. By means of aligned pins 434 the lugs 426 of the cylinder 424 are pivotally mounted upon arms 436 of a U-shaped member 438 which extends upwardly from a stem portion 440 by which it is clamped in a bracket 444 by means of a clamping member 442. The bracket 444 in turn is clamped to a frame member 445 by means of clamps 446. By means of the arrangement just described the support for the cylinder 424 may be adjusted lengthwise of the shoe assembly, widthwise of the shoe assembly and rotationally about the axis of the stem portion 440. Threaded on to the stem portion 428 is a stop nut 430 which, by engagement with a flange portion 432 on an outer end portion of the piston rod 420 limits the movement of the gripper in a direction extending toward the center line of the machine. This, it will be understood limits the extent of indrawing movement which can be imparted to the gripper jaws. A bracket 450 is secured to the outer end cap of the cylinder 424 and carries an upstanding arm 452 which is pivotally connected by a pin 454 to a head portion of a piston rod 456. The piston rod extends from a cylinder 458 which is pivotally mounted on aligned pins 460, in upper end portions of the arms 436 of the U-shaped member 438. As will be seen from FIG. 11, the application of air under pressure to the left hand end portion of the cylinder 458 will move the piston rod 456 to the right rocking the cylinder 424 clockwise about the pivot pins 434 to raise the gripper jaws to an inoperative position in which they are shown in FIG. 11. In this position the jaws will be well clear of a shoe assembly as it is loaded into the machine and moved to operative position. At the commencement of a cycle of operations of the machine, air under pressure is applied to the right hand end of cylinder 424 to move the jaws of the gripper (which are in open condition) to the left as seen in FIG. 11 to a limit determined by engagement of the flange portion 432 with the stop nut 430. Air pressure is then removed from the cylinder 458 to allow the gripper which is to operate on the shoe assembly to drop until the jaw 402 engages a mid portion of the insole. Air pressure is then removed from the outer end of the cylinder 424 to allow a return spring within the cylinder to move the piston therein to the right to move the jaw 402 toward the outside edge of the insole to a limit adjustably determined by a stop arrangement not shown. At this time the outer jaw 404 will lie outwardly of an upstanding portion of the lasting margin and air under pressure applied to the right hand end portion of the cylinder 410 (as seen in FIG.

11) will move the outer jaw 404 toward the inner jaw 402 to cause the jaws to grip the marginal portion of the upper extending between the jaws. Air pressure is once again applied to the right hand portion of the cylinder 424 to move the jaws to the left to cause them to draw the upper snugly against the last.

In order to hold the shoe assembly firmly against the action of the gripper the cylinder 174 of the side clamping arrangement at the opposite side of the machine may be energized to apply the clamping pad 150 at that side of the machine against the top line of the upper just prior to the operation of the gripper. After the gripper has operated the side clamps 150 are fully applied to the shoe as hereinbefore described so that the gripper jaws may then release the upper margin and may be once again moved to inoperative position out of the way of the lasting operation. In the modified form of the machine the hold-down member 40 may be conveniently mounted upon the bracket 34 instead of upon a stationary portion of the machine frame as hereinbefore described. In this case a simple form of hold-down member may be used and it is not necessary to retract it from engagement with the heel seat portion of the insole. Furthermore, the operation of the machine may be simplified in that the stop member 90 and cylinder 92 may be removed, the jacking of the shoe assembly occurring when the carrier 20 is in its fully forward (that is loading) position.

We claim:

1. A machine for lasting shoes including means for wiping the margin of a shoe upper inwardly over the shoe bottom, a carriage, means for causing relative movement between the wiping means and the carriage lengthwise of a shoe supported on the carriage for progressively wiping selected portions of the shoe upper, means for supporting the shoe with one end at a predetermined location on the carriage, a measuring device movable on the carriage toward said location into engagement with the other end of the shoe for measuring the shoe length according to the extent of movement of the device, and means settable according to the shoe length for determining the relative operating positions of the wiping means and the carriage.

2. A machine according to claim 1 in which there is provided locating means on the carriage and the support means for the shoe is movable from an exposed loading position toward the locating means for engaging the one end of the shoe with the locating means.

3. A machine according to claim 1 in which the support means includes a jack on which the heel end of the shoe is supported, the jack being movable from the exposed loading position toward the locating means for engaging the heel end of the shoe with the locating means.

4. A machine according to claim 3 in which the jack is also movable heightwise of the shoe to locate the shoe bottom in operable position relative to the wiping means.

5. A machine according to claim 1 in which the wiping means includes at least one frusto-conical roll axially disposed widthwise of the shoe and having helical lands.

6. A machine according to claim 3 in which the locating means includes a generally U-shaped band against the bight of which the heel end of the shoe is located, and the ends of the band are applied with equal movements against opposite sides of the heel end of the shoe

15

for centralizing the shoe on the carrier and with respect to the wiping means and aligning the shoe with the relative movement.

7. A machine according to claim 3 in which the measuring device includes a plate engageable with the toe end of the shoe, the device also carrying a toe pad spaced heelwardly of the plate in a location adapted to support the forepart of the shoe after engagement of said plate.

8. A machine according to claim 3 in which flexible

16

pads are provided to engage opposite sides of the shoe upper to clamp the upper against a shoe last before wiping and to align the shoe with said relative movement.

9. A machine according to claim 8 in which the pads are arranged to engage the upper first adjacent the top line of the upper and then progressively toward the bottom of the shoe to wrap the upper against the last.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,849,817 Dated November 26, 1974

Inventor(s) William H. Berrill; David W. Halford; Arthur A. Bowler

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 14, Claim 3, first line of claim, change claim 1
to --claim 2--

Signed and sealed this 11th day of February 1975.

(SEAL)

Attest:

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