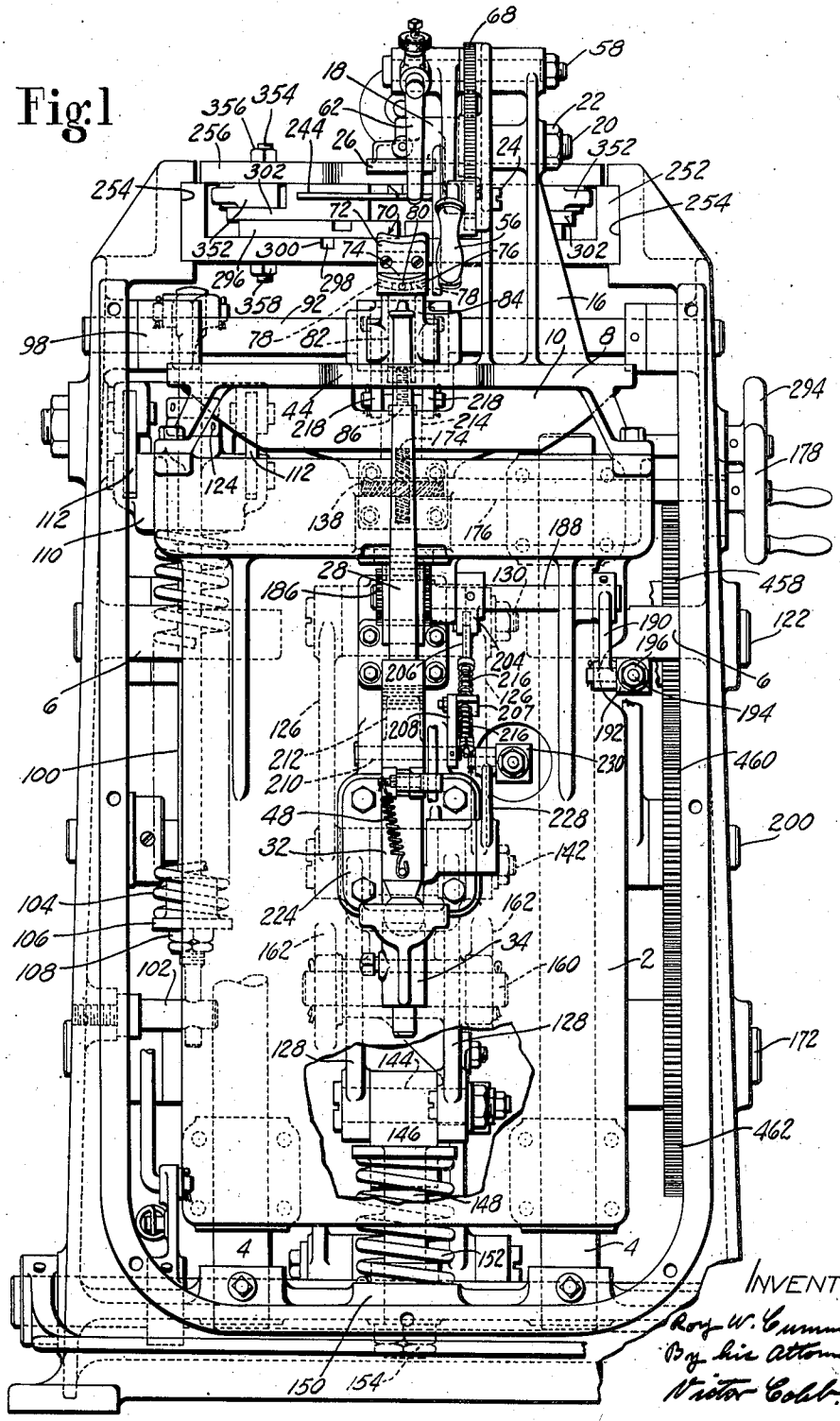
Nov. 19, 1940. R. W. CUMMINGS 2,221,864

LASTING MACHINE

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Fig. 1



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LASTING MACHINE

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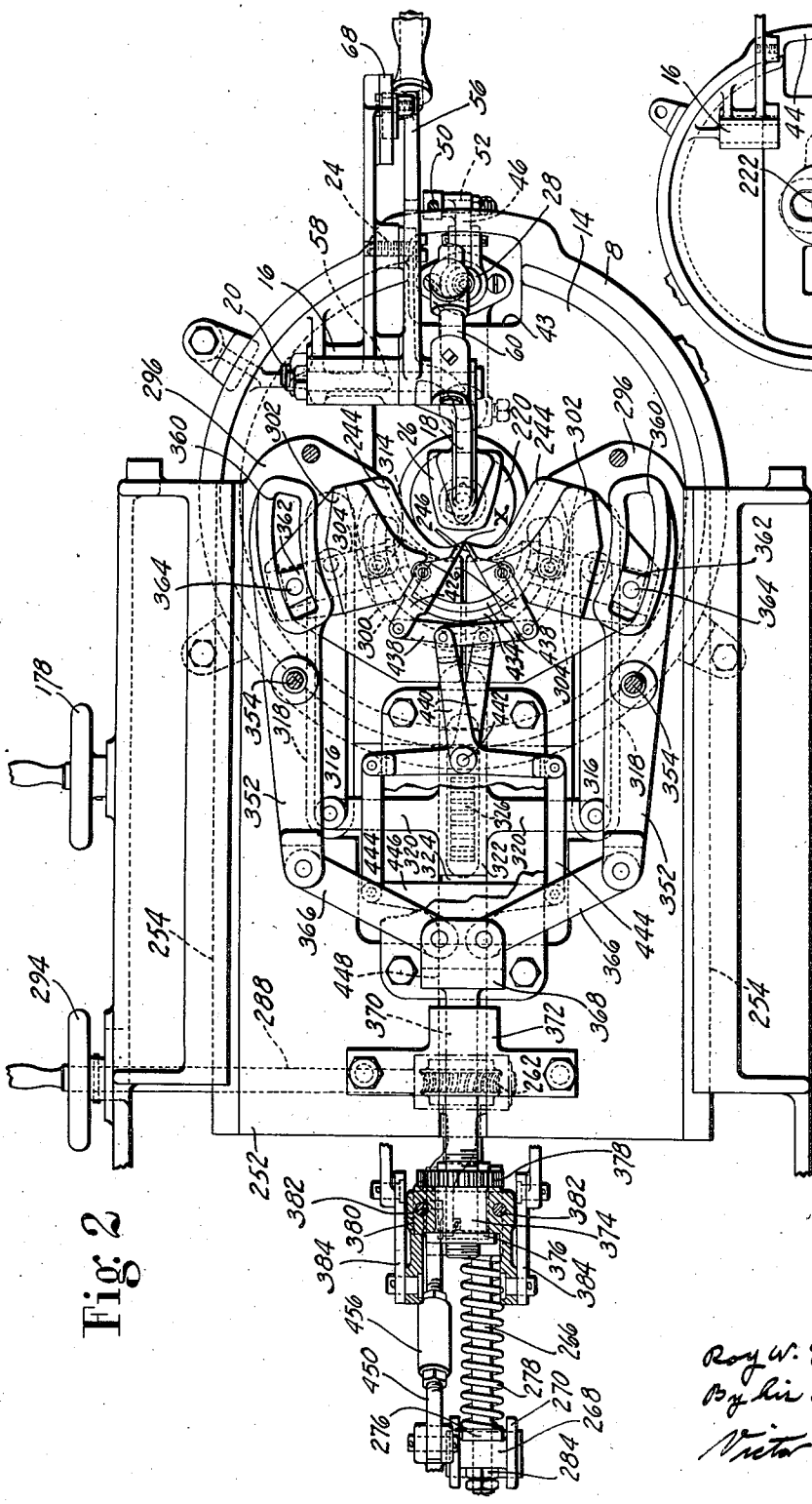


Fig. 2

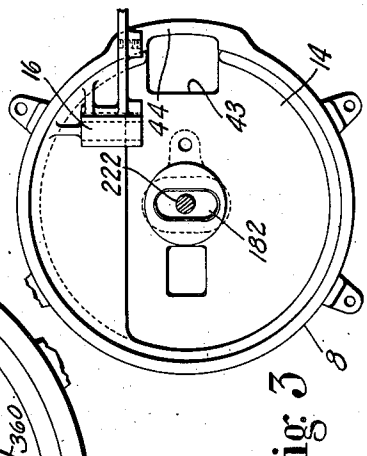


Fig. 3

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LASTING MACHINE

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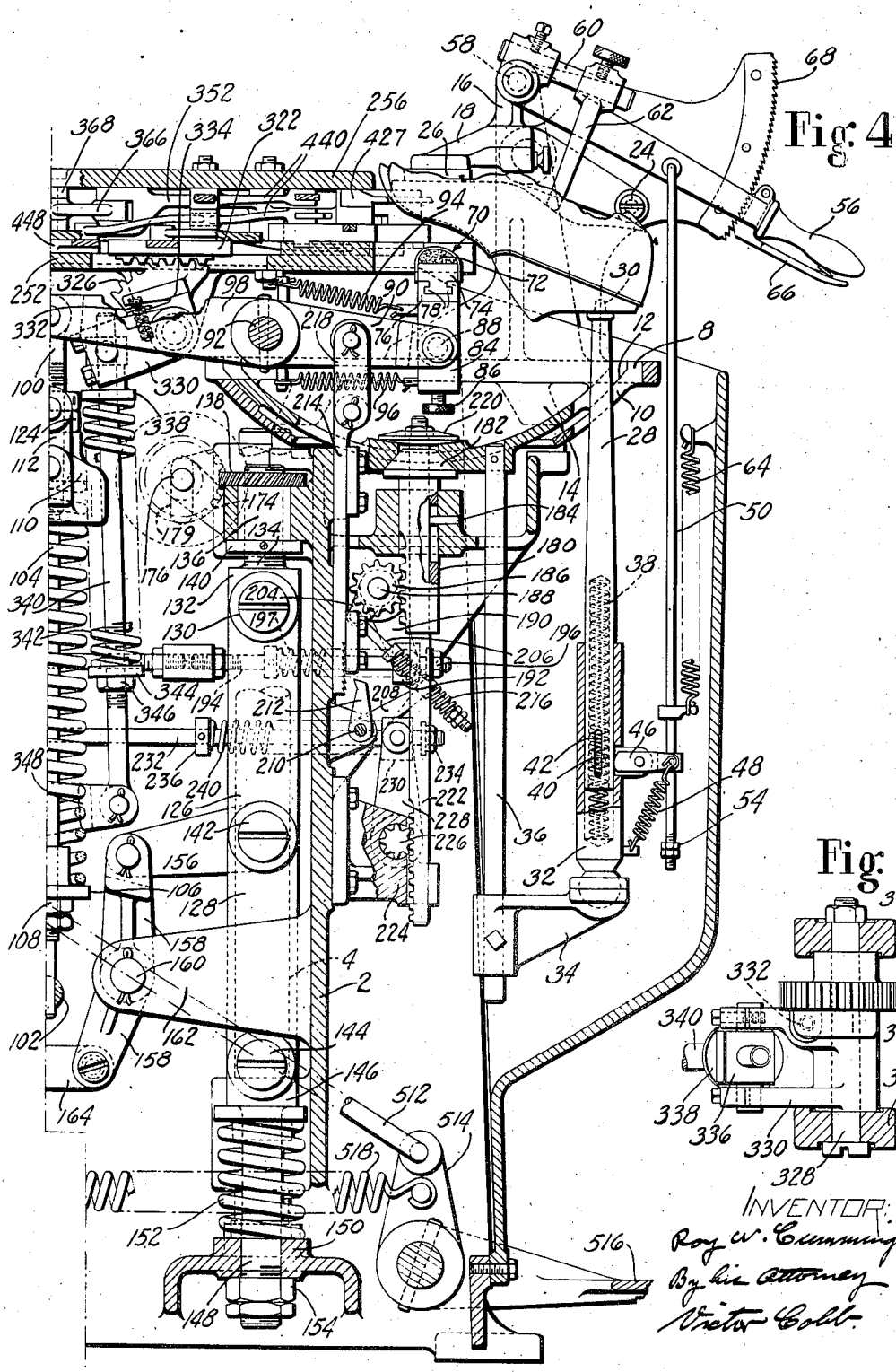


Fig. 4

Fig. 5

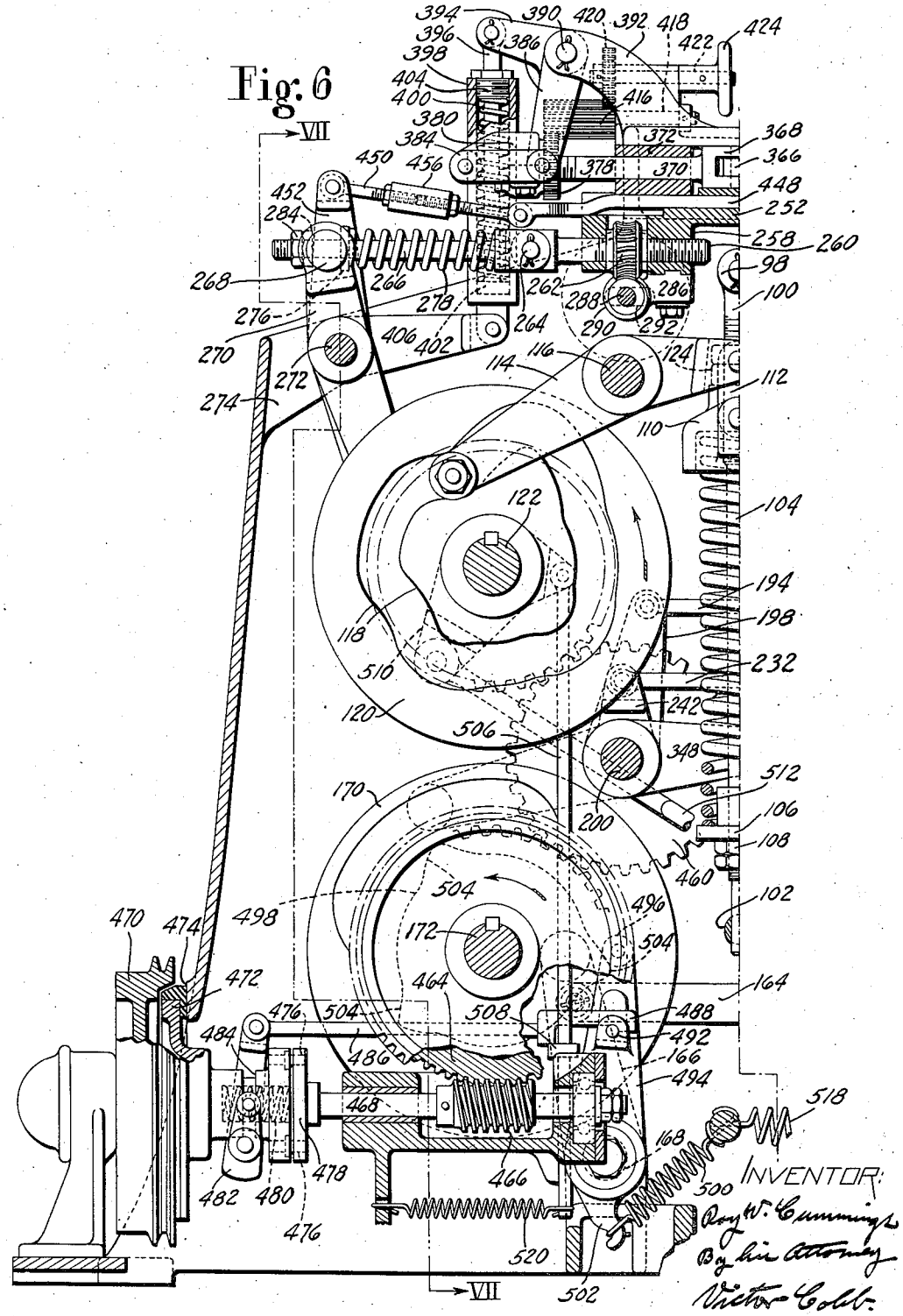
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LASTING MACHINE

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Fig. 6

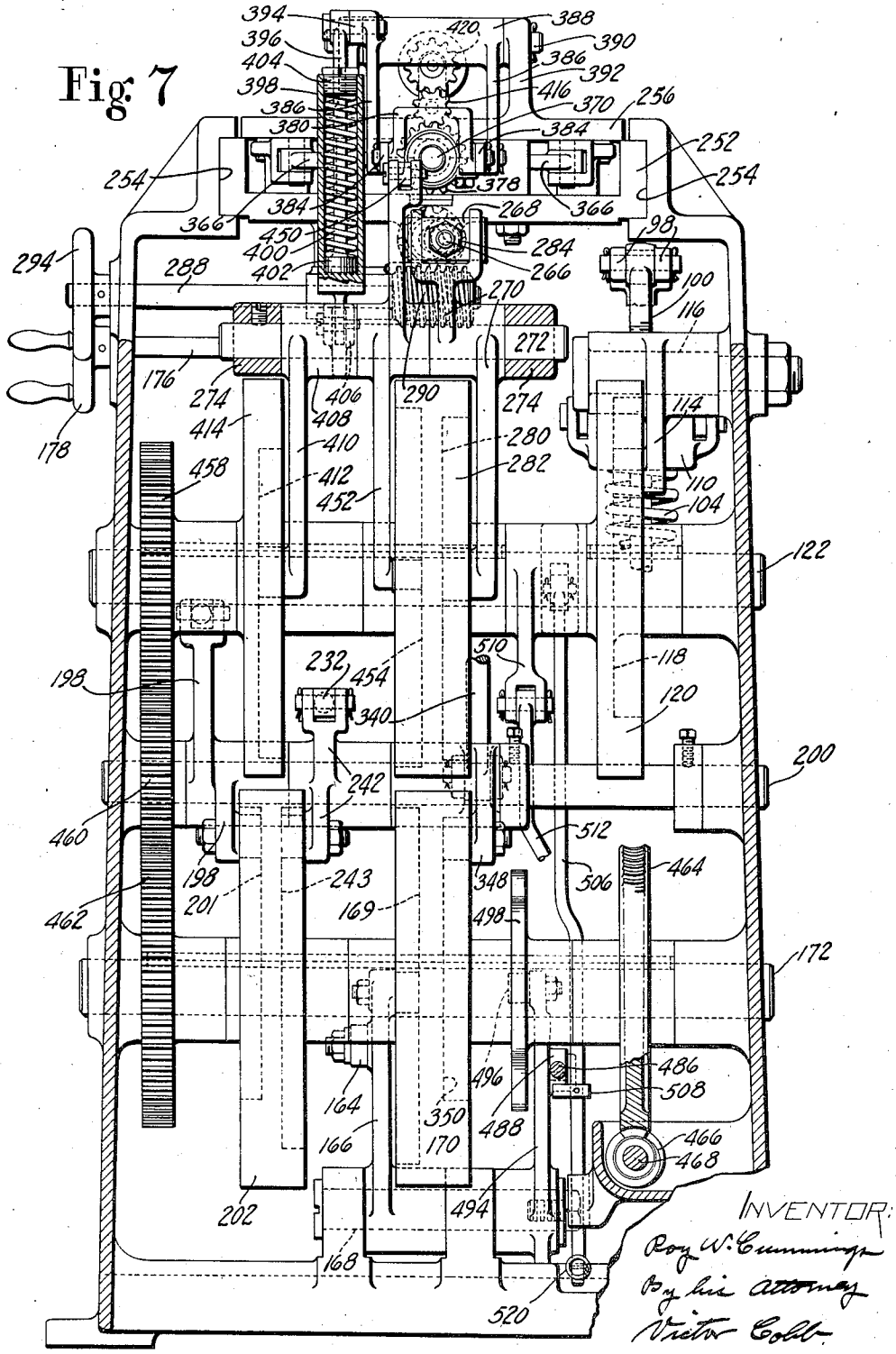


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Fig. 7



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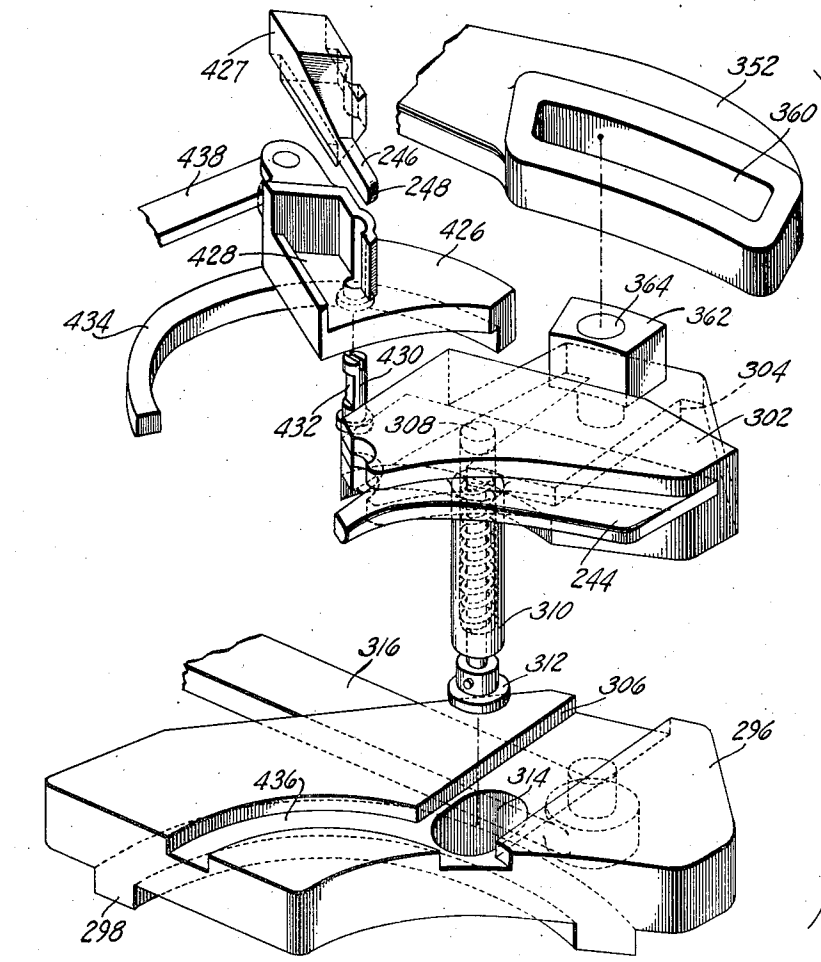


Fig. 8

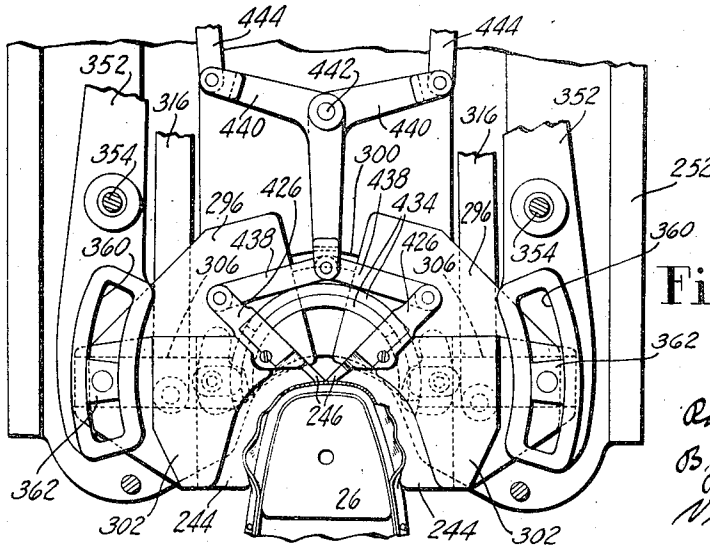


Fig. 9

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LASTING MACHINE

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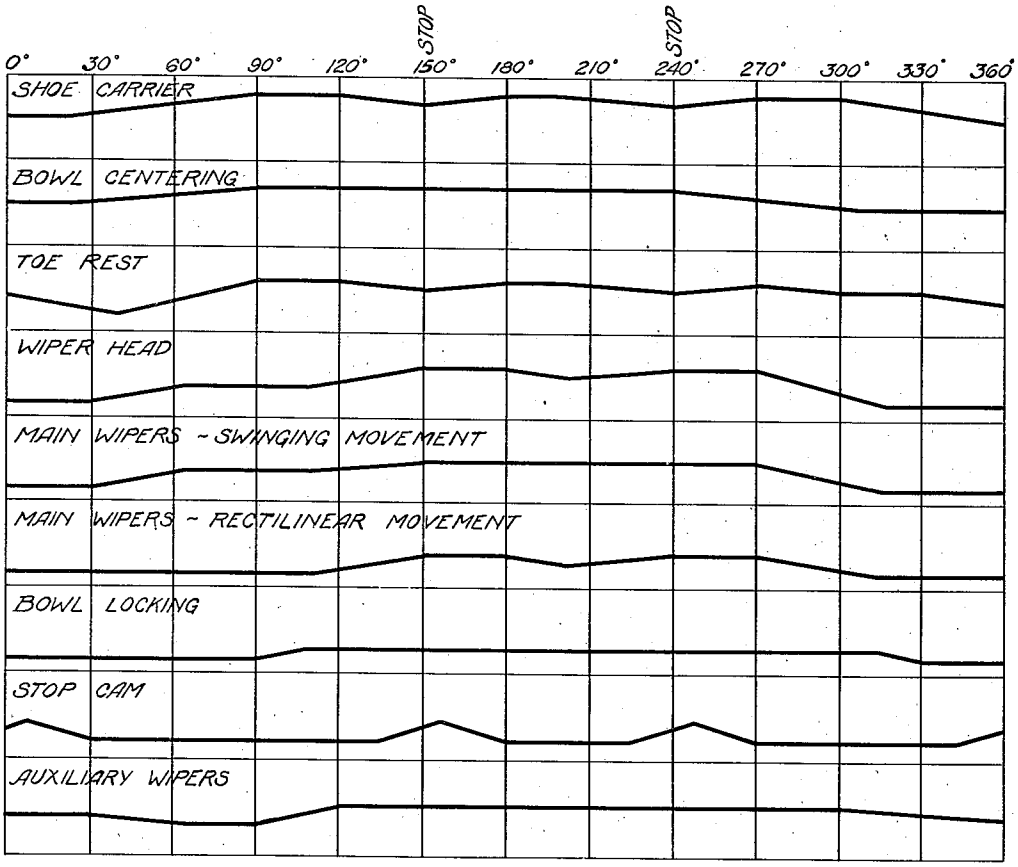


Fig: 11

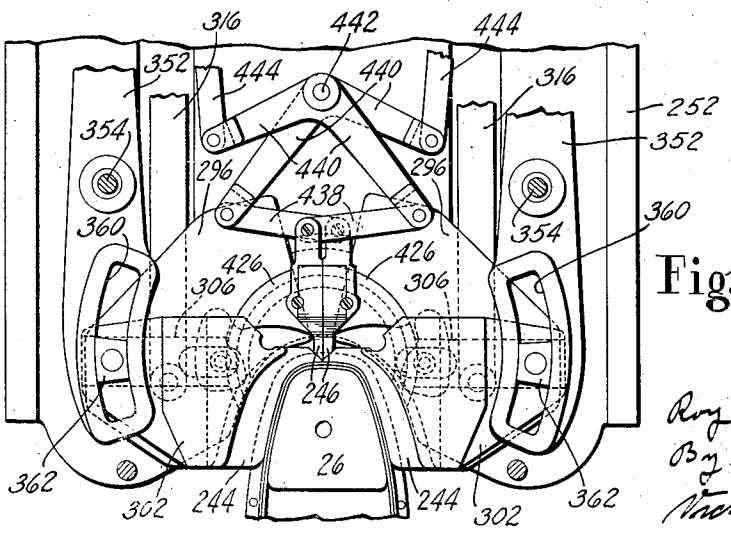


Fig: 10

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Patented Nov. 19, 1940 2,221,864

UNITED STATES PATENT OFFICE

2,221,864

LASTING MACHINE

Roy W. Cummings, Beverly, Mass., assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Application June 17, 1939, Serial No. 279,709

32 Claims. (Cl. 12—14)

This invention relates to lasting machines, and is herein illustrated as embodied in a toe-lasting machine, the invention being further illustrated as applied to the lasting of the toes of welt shoes for which use, in some of its aspects, it has special advantages. It will be recognized, however, that in various aspects it is not limited to the lasting of welt shoes or to the lasting of the toe ends of shoes.

The toes of welt shoes are commonly lasted in lasting machines having toe-embracing wipers which first wipe the upper heightwise of the last and then wipe its marginal portion inwardly over the feather of the insole and press it against a lip or shoulder lying substantially parallel to the extreme edge of the insole. An object of the present invention is to provide a construction such that wipers, preferably formed substantially to fit the contour of the shoe opposite the edge face of the insole for the best results in the wiping of the upper heightwise of the last (commonly known as the upwiping operation), will also thereafter press the marginal portion of the upper closely against the lip or shoulder of the insole all along their wiping edges. To this and other ends, the machine herein shown is provided with wipers which are operated to wipe the upper inwardly over the insole mainly by bodily movements toward each other widthwise of the last, as distinguished from swinging movements about an axis located substantially at the end of the toe, combined with bodily movements lengthwise of the last, so as to maintain a substantially parallel relation between their wiping edges and the lip or shoulder of the insole. To permit these wipers, which may be termed the main wipers, thus to be moved toward each other, they are separated initially from each other at the end of the toe, and between them are located what may be termed auxiliary wipers which wipe the upper heightwise of the last at the extreme end of the toe and are thereafter moved in such manner as to make way for the main wipers to approach each other, as the latter wipe the upper inwardly over the insole, while assisting in the inward wipe at the end of the toe. As illustrated, the auxiliary wipers comprise bars arranged initially in angular relation to each other and having beveled ends to provide upper-engaging faces or edges bridging the space between the main wipers, the bars being swung into parallel relation after the upwiping operation to permit suitably formed portions of the main wipers substantially to meet at the end of the toe. In the construction shown the main wipers are closed about the toe preparatory to the upwiping operation by swinging movements of wiper carriers about an axis located substantially at the end of the toe, and relatively to these carriers they are moved rectilinearly toward each other in wiping the upper inwardly over the insole. For better insurance that under any conditions the upper will be forced inwardly against the lip or shoulder of the insole with adequate pressure in locations comparatively remote from the end of the toe, provision is afforded in the machine herein shown, which is a power-operated machine, for not only moving the main wipers bodily toward each other as above described, but also swinging them inwardly to a small extent by movements of the above-mentioned wiper carriers about their axis at the end of the toe.

The invention further provides novel shoe-positioning means so constructed that the shoe may tip and adjust itself to the wipers to equalize the pressure of the wipers heightwise of the shoe on different portions of the upper over the insole. For the purpose in view, the shoe-positioning means in the construction shown comprises a member for engaging the bottom of the forepart of the shoe presented bottom upward, and means below the shoe providing a bearing relatively to which this member is universally movable with the shoe about a center located substantially on the bottom of the toe end of the shoe and substantially midway lengthwise and widthwise of the shoe of the portion of the shoe on which the wipers operate. Mechanism is further provided for locking this member in a centralized position during the upwiping operation and for thereafter unlocking it to permit the shoe controlled thereby to adjust itself as above described as the wipers wipe the upper inwardly. Included also in the construction shown is a heel-end support for the shoe and last so mounted as to partake of any such tipping movement of the shoe.

The above and other features of the invention, including various novel details of construction and combinations of parts, will now be more particularly described with reference to the accompanying drawings and thereafter pointed out in the claims.

In the drawings:

Fig. 1 is a view in front elevation of a machine in which the invention is embodied, with parts broken away;

Fig. 2 is a plan view of the machine, with parts removed and others broken away;

Fig. 3 is a plan view on a reduced scale of a

portion of the shoe-positioning means shown in Fig. 2;

Fig. 4 shows partly in left-hand side elevation and partly in section the front portion of the machine;

Fig. 5 is mainly a plan view on an enlarged scale of a portion of the structure shown in Fig. 4;

Fig. 6 is a view similar to Fig. 4 of the rear portion of the machine;

Fig. 7 is a view of the machine partly in rear elevation and partly in section on the line VII—VII of Fig. 6;

Fig. 8 is an exploded view of a portion of the wiper mechanism;

Fig. 9 is a plan view of the wipers and parts associated therewith as they appear substantially at the end of the upwiping operation;

Fig. 10 is a view similar to Fig. 9, showing the wipers at the end of the overwiping operation; and

Fig. 11 is a cam chart illustrating the timing of the different operations.

For positioning and controlling the shoe in the toe-lasting operation the machine is provided with a carrier 2 (Figs. 1 and 4) which, by means hereinafter described, is moved downwardly to lower the shoe relatively to the toe-lasting wipers (also hereinafter described) and thus to cause the wipers to wipe the upper heightwise of the last to the edge of the insole, and is also moved upwardly to press the overwiped margin of the upper more firmly against the insole after the wipers have wiped the margin inwardly over the insole. The carrier 2 is guided in its movements by two vertical rods 4 which, for this purpose, extend through lugs formed on the carrier at its upper and lower ends, the rods being fastened at their lower ends to the frame of the machine and extending near their upper ends through lugs 6 formed on the frame. Secured on the upper end of the carrier 2 is a casting 8 provided with a downwardly extending annular flange 10 which is curved to provide an upper face 12 (Fig. 4) of spherical contour to serve as a seat for a correspondingly curved member 14 (Figs. 3 and 4) which, by reason of its shape, may be conveniently referred to as a bowl. Integral with this bowl is an upwardly extending standard 16 on one side of which is mounted an arm 18, the arm having a stem 20 (Fig. 1) extending through the standard and fastened by a nut 22 and being further secured to the standard by a screw 24. Mounted on the arm 18 is a plate 26 (Fig. 2) curved to fit the inner face of the toe-end portion of the lip of a welt shoe insole and also formed to engage the bottom face of the insole adjacent to the lip, so that by its engagement with the insole the plate determines in all respects the position of the shoe relatively to the bowl 14. Preferably the plate is detachably mounted on the arm to permit differently shaped plates to be readily substituted for positioning shoes of different styles and sizes. For this purpose there may be utilized, for example, mechanism substantially as disclosed in United States Letters Patent No. 2,160,846, granted on June 6, 1939 on an application of F. C. Eastman and A. F. Pym. Instead of the plate 26, the arm 18 may be provided, if desired, with means for positioning the work by the use of pins extending through the insole into sockets in the last, substantially in accordance with the disclosure of United States Letters Patent No. 1,674,060, granted on June 19, 1928, upon an application of A. F. Pym. This may be desirable, for example, if the machine is to operate on shoes of a different type than welt shoes.

Also supported on the bowl 14 is a heel-end support for the shoe and last, comprising a bar 28 (Figs. 1 and 4) formed at its upper end to engage the top of the cone of the last and provided with a short pin 30 arranged to extend into the end of the usual spindle hole in the last to position the bar in proper relation to the last. The bar 28 has a tubular portion slidingly movable in a sleeve member 32 which has a lower ball-shaped end mounted in a socket formed in a bracket 34 adjustably secured to a rod 36, this rod at its upper end being secured in fixed relation to the bowl 14. Mounted in the tubular portion of the bar 28 is a spring 38 which tends to move the bar upward relatively to the member 32, the limit of such upward movement of the bar being determined by pins 40 which extend from the member 32 into slots 42 in the tubular portion of the bar. The bar 28 is accordingly movable in a downward direction against the resistance of the spring 38 by pressure of the last thereon as the operator presents the work to the machine, until it assumes a position determined by the last when the shoe is in proper relation to the plate 26. It will also be understood that the bar may swing in any direction to adapt its position to the position of the last, its upper end portion extending for this purpose through comparatively wide slots 43 (Figs. 2 and 3) formed in the casting 8 and the bowl 14. Forward swinging movement of the bar, when there is no shoe in the machine, is limited by its engagement with a portion 44 of the casting 8 which bridges these slots.

After the bar 28 has been depressed as above described to a position determined by the last, it is locked against upward movement by a dog 46 pivotally mounted on a pin supported in ears on the member 32 and having an eccentric end face arranged for frictional engagement with the outer face of the tubular portion of the bar. A spring 48 connected to the dog and to a pin on the member 32 serves, when permitted, to hold the dog in locking position. Accordingly the spring 38, while opposing substantial resistance to any tipping movement of the heel end of the shoe in a downward direction in the lasting operation, has no tendency itself to tip the shoe in the opposite direction. The dog 46 is moved into position to release the bar 28 by upward movement of a rod 50 extending through the enlarged head of a pin 52 (Fig. 2) which is rotatably mounted in the forward end of the dog, this rod carrying a nut 54 (Fig. 4) arranged to engage the head of the pin 52 to swing the dog to its idle position. The rod 50 at its upper end is bent to extend through a hole in a hand lever 56 to connect it to the hand lever, this lever being mounted to swing about a rod 58 supported in the standard 16. Adjustably mounted in a socket in the hub portion of the hand lever 56 is a rod 60 on which is adjustably secured a downwardly extending rod 62 arranged to serve as a holddown in engagement with that portion of the bottom of the shoe which slopes heelwardly from the ball of the shoe. A spring 64 connected to the rod 50 and to a projection on the frame tends to lift the rod and the hand lever and is of sufficient strength to support them at any height permitted by a spring-pressed detent 66 which is carried by the hand lever and arranged to engage ratchet teeth formed on a plate 68 secured to a segmental portion of the standard 16. Initially the hand lever may be

held at such a height that the dog 46 is inoperative when the bar 28 is forced downwardly by the last as the operator presents the work to the machine, or it may be low enough to render the dog operative at this time, since the dog in its operative position does not prevent downward movement of the bar. After adjusting the shoe in proper relation to the plate 26 the operator lowers the hand lever far enough to bring the holddown rod 62 into engagement with the bottom of the shoe. The holddown rod 62 thus assists not only in preventing any tipping movement of the shoe relatively to the plate 26 about an axis extending laterally of the shoe, but also, by reason of its engagement with the sloping bottom face of the shoe, in holding it against any heelward displacement by reason of pressure of the wipers thereon in the lasting operation.

For clamping the toe end of the shoe against the plate 26 after the shoe has been positioned as above described, there is provided a toe rest 70 which is moved upwardly into clamping engagement with the shoe substantially at the beginning of the power operation of the machine. This toe rest comprises a pad 72 mounted on a block 74 which is supported on a holder 76, the block being provided with curved ribs 78 mounted in correspondingly curved guideways in the holder so that the toe rest may tip about an axis extending lengthwise of the shoe and located substantially on the bottom of the toe end of the shoe. A pin 80 (Fig. 1) extending from the holder 76 to a position between the inner ends of the ribs 78 serves by contact with the ribs to limit tipping movements of the toe rest. The holder 76 is provided with a depending stem 82 mounted in a carrier 84 and resting at its lower end on a screw 86 threaded in the carrier, the toe rest accordingly being adjustable upwardly or downwardly in response to the turning of this screw. The carrier 84 is mounted for swinging movements in directions lengthwise of the shoe on a pin 88 supported in the forked front end of an arm 90 fast on a rock shaft 92 mounted in bearings in the frame of the machine. Two springs 94 and 96 connected to pins on the arm 90 and to portions of the carrier 84 located respectively above and below the pin 88 hold the carrier normally in a substantially vertical position while permitting it to swing in one direction or the other about the pin for a purpose hereinafter described. Also fast on the rock shaft 92 is an arm 98 to the rear end of which is pivotally connected a depending rod 100, the reduced lower end of this rod extending through and being guided by a stud 102 mounted on the frame of the machine. The rod 100 is surrounded by a spring 104 which bears at its lower end on a thimble 106 supported by a nut 108 on the rod. In engagement with the upper end of the spring 104 is a cap member 110 movable lengthwise of the rod 100 and connected by links 112 to the forked front end of a lever 114 (Fig. 6) mounted to turn about a rod 116 (Fig. 7) on the frame. The rear end of the lever 114 carries a roll engaged by a path cam 118 formed in one side of a cam wheel 120 fast on a cam shaft 122 mounted in bearings in the frame. When the cam wheel 120 is turned in the direction of the arrow (Fig. 6) downward movement is imparted to the cap member 110 and this member acts through the spring 104, the rod 100 and the arms 98 and 90 to force the toe rest 70 upwardly against the shoe, the spring being compressed more or less after the toe rest engages the shoe. In the return of the parts to starting positions the cap member 110 engages a nut 124 threaded on the rod 100 to lower the toe rest.

By means hereinafter described the bowl 14 is held down on its seat 12 on the casting 8, and accordingly when downward movement is imparted to the carrier 2 the shoe is forced downward by the plate 26 and the holddown rod 62 to cause the wipers to wipe the upper upwardly around the toe end of the last. For thus moving the carrier downwardly, and for also moving it upwardly thereafter to force the shoe firmly against the wipers, there is provided a toggle comprising an upper and a lower pair of toggle links 126 and 128 (Figs. 1 and 4). The upper links 126 are pivotally mounted on a rod 130 which extends through a crosshead 132 formed on the lower end of a stem 134 on which is threaded a spool 136 rotatably mounted in a bore formed in a lug on the rear face of the carrier 2, the spool having on its upper end a skew gear 138 which engages the top face of the lug and having fast on its lower end a collar 140 which engages the lower face of the lug. Accordingly downward and upward movements are imparted to the carrier 2 by corresponding movements of the crosshead 132. At their lower ends the links 126 are pivotally connected to the upper ends of the links 128 by a rod 142, and the links 128 at their lower ends are pivotally mounted on a rod 144 extending through the head 146 of a rod 148 vertically movable in a bearing member 150 on the frame. Between this member and the head 146 is a spring 152 which is compressible by downward movement of the rod 148, the rod carrying a nut 154 which limits upward movement thereof by engagement with the member 150. The rod 142 which connects the two pairs of toggle links together is connected by a link 156 to the upper end of a lever 158 pivotally mounted on a rod 160 carried by a pair of ears 162 which are integral with the carrier 2. At its lower end the lever 158 is connected by a link 164 to a lever 166 pivotally mounted at its lower end on a rod 168 supported in lugs at the base of the machine, the lever 166 being provided with a roll engaged by a path cam 169 (Fig. 7) formed in one side of a cam wheel 170 fast on a cam shaft 172. As shown in Fig. 4 the toggle 126, 128 is straight and the carrier 2 is at the limit of its upward movement prior to the operation of the wipers on the shoe, and in the operation of the machine the toggle is broken toward the left by the above-described cam-operated mechanism to impart the required downward movement to the carrier. As the wipers wipe the margin of the upper inwardly over the insole the toggle is partially straightened to cause the shoe to be pressed more firmly up against the wipers. At this time the spring 152 may yield more or less.

The skew gear 138 above referred to as part of the spool 136 threaded on the stem 134 is engaged by another skew gear 174 fast on a shaft 176 which is rotatably mounted in ears on the carrier 2 and is provided with a hand wheel 178 for turning it. By this means the carrier 2 may be adjusted in upward and downward directions relatively to the toggle which operates it. The shaft 176 extends through a slot 179 (Fig. 4) in the frame which permits the movements of the shaft with the carrier.

It will be evident that when the shoe is moved downwardly by the carrier 2 the toe rest 70 is forced downwardly by pressure of the shoe thereon. The cam 118 which controls the toe rest is

suitably shaped to compensate for such downward movement thereof, so that the amount of compression of the spring 104 remains substantially constant at that time. When the carrier 2 is raised the small amount required to cause the shoe to be pressed more firmly against the wipers by reason of the raising of the plate 26 and the holddown rod 62, it is mainly through the toe rest 70 that the shoe is thus pressed against the wipers. In this operation the toe rest is not only controlled by the spring 104, but also by mechanism hereinafter described through which upwardly directed force is applied thereto by the carrier 2.

The bowl 14 and its seat 12 on the casting 8 are spherically curved about a center located substantially on the bottom of the shoe and substantially midway between the opposite sides of the toe of the shoe as well as midway lengthwise of the shoe of the portion thereof on which the toe wipers operate. Provision is afforded for universal movement of the bowl and the parts supported thereon about this center for the purpose of equalizing the pressure of the wipers on all portions of the margin of the upper on which they operate as they are moved inwardly to wipe the upper over the insole. If they tend, for example, to apply greater pressure to the margin of the upper at one side of the toe than at the other side, or greater pressure at the extreme end of the toe than in locations farther from the end of the toe, such pressure will cause the shoe to tip in a direction to equalize the pressure, the tipping of the shoe being accomplished by tipping movement of the bowl about the above-mentioned center by reason of the action of the shoe on the plate 26 against which it is pressed firmly by the toe rest. It will be understood that in any such movement of the bowl the heel end support, including the bar 28, partakes of the movement of the bowl and the shoe. If the shoe is tipped laterally in this manner the toe rest 70 moves with it about the axis of curvature of the ribs 78 and their guideways, this axis being located substantially at the bottom of the shoe. If the shoe is tipped lengthwise the toe rest and its support may swing about the pin 88 against the resistance of one or the other of the springs 94, 96, so as to avoid any rubbing of the toe rest on the shoe.

Initially, however, the bowl 14 is centralized with respect to tipping movement, and it is maintained in this centralized position during the wiping of the upper heightwise of the last and until the wipers are about to begin their movement to wipe the upper inwardly over the insole. This insures against any objectionable displacement of the shoe in the upwiping operation. The means for thus centralizing the bowl comprises a member 180 (Fig. 4) mounted for vertical movements in a bearing in the carrier 2 and having at its upper end a head 182 arranged to extend into an opening in the bowl and provided with a downwardly and outwardly flaring face which engages a complemental face on the bowl. As shown in Fig. 3, the head 182 is oblong, so that it not only centralizes the bowl with respect to tipping movement, but also determines its initial position with respect to movement about a vertical axis and thus properly orients the shoe lengthwise relatively to the wipers in the upwiping operation. A pin 184 extending from the carrier 2 into a vertical slot in the member 180 prevents the member from turning. For imparting downward movement to the member 180 to withdraw its head 182 from centralizing position, there is provided a pinion 186 (Figs. 1 and 4) supported on the carrier 2 and arranged to engage rack teeth on the member 180, the pinion being fast on a shaft 188 on which is secured an arm 190. This arm is pivotally connected at its lower end to a block 192 which is slidingly mounted on a rearwardly extending rod 194 provided on its front end with a nut 196 through which the arm is operated to impart downward movement to the member 180 when the rod is moved in a rearward direction. Mounted on the rod 194 is a spring 197 which bears at its front end on the block 192 and at its rear end against a collar fast on the road, so that by forward movement of the rod the arm 190 is operated through the spring to move the member 180 upwardly into its operative position. The rod 194 is connected at its rear end to one arm of a bell-crank lever 198 (Figs. 6 and 7) mounted to swing about a rod 200 supported on the frame, the other arm of this bell-crank lever carrying a roll which lies in a path cam 201 formed in one side of a cam wheel 202 fast on the cam shaft 172.

Fast on the previously mentioned shaft 188 which carries the pinion 186 is an arm 204 (Fig. 4) to which is pivotally connected a rod 206 extending through a block 207 (Fig. 1) having a stem swiveled in an arm 208 fast on a shaft 210. This shaft is mounted in ears on the carrier 2 and has fast thereon a pawl 212 arranged to engage ratchet teeth formed on a bar 214 vertically movable in the carrier 2. Confined on the rod 206 at opposite sides of the block 207 are springs 216 through one or the other of which the arm 208 is operated by movement of the rod, as will be readily understood. The bar 214 at its upper end is connected by links 218 to the arm 90 which carries the toe rest 70. As the parts are initially positioned the pawl 212 is held out of engagement with the teeth on the bar 214, as shown in Fig. 4, but when the pinion 186 is operated to impart downward movement to the member 180 the rod 206 acts through one of the springs 216 to swing the pawl into engagement with the ratchet teeth. It will be evident that this pawl then serves to lock the toe rest 70 to the carrier 2 in such manner that the toe rest cannot yield in a downward direction relatively to the carrier in response to pressure of the wipers on the bottom of the shoe. On the other hand, when the carrier 2 is moved upward to cause the shoe to be pressed more firmly against the wipers, this movement of the carrier not only lifts the plate 26 and the holddown rod 62, but also serves to raise the toe rest by reason of the positive action of the pawl 212 on the bar 214. Accordingly the toe rest is not only under the influence of the spring 104, which tends to raise it, but is also forced upwardly by the carrier to press the shoe more firmly against the wipers.

The means hereinbefore referred to for holding the bowl 14 down on its seat 12 as the carrier 2 is moved downwardly to cause the wipers to wipe the upper heightwise of the last comprises a disk 220 the lower face of which is spherically curved for engagement with a spherically curved face on the bowl 14, the disk being fast on a rod 222 which extends downwardly through a bore in the member 180 and is guided at its lower end in a bracket 224 fast on the carrier 2. Near its lower end the rod 222 is provided with rack teeth engaged by a pinion 226 rotatably supported on the bracket 224, and mounted in fixed relation to this pinion is an arm 228 pivotally connected at its upper end to a trunnion block 230 slidingly

mounted on a rod 232 which extends rearwardly through an opening in the carrier 2. A nut 234 on the front end of this rod is arranged to act on the trunnion block to swing the arm 228 in the direction to raise the disk 220 in response to movement of the rod in a rearward direction. Between the rear face of the trunnion block 230 and a collar 236 fast on the rod 232 is a spring 240 through which the arm 228 is operated yieldingly to force the disk 220 down against the bowl 14 in response to movement of the rod 232 in a forward direction. At its rear end the rod 232 is pivotally connected to one arm of a bell-crank lever 242 (Figs. 6 and 7) mounted to swing about the rod 200, the other arm of this bell-crank lever carrying a roll engaged by a path cam 243 formed in one side of the previously mentioned cam wheel 202. The timing of the different operations is such that the disk 220 remains in position to hold the bowl 14 down on its seat 12 and also to lock the bowl frictionally against tipping movement until after the member 180 has been moved downward from its bowl-centralizing position, the disk being raised sufficiently to unlock the bowl and permit it to tip just before the wipers being to wipe the margin of the upper inwardly over the insole.

For wiping the toe end of the upper heightwise of the last and inwardly over the insole the machine is provided with wipers 244 (Figs. 2 and 9), which may be termed the main wipers and have wiping edges curved to conform substantially to the contour of the upper opposite the edge face of the insole, and with auxiliary wipers 246 which cooperate with the main wipers in lasting the upper at the extreme end of the toe. Initially and during the upwiping of the upper the main wipers 244 are spaced bodily apart (Fig. 9) in such manner that they are separated somewhat from each other at the end of the toe, and the auxiliary wipers 246, comprising straight bars, are arranged in angular relation to each other between the main wipers and are beveled to provide end faces or edges 248 (Fig. 8) which serve as continuations of the wiping edges of the main wipers and bridge the space between the latter. Briefly, the operation is such that all the wipers close about the toe prior to the upwiping operation by swinging about an axis x (Fig. 2) located where the auxiliary wipers 246 meet. After the upwiping operation the main wipers 244 are moved bodily toward each other widthwise of the shoe in rectilinear paths to wipe the margin of the upper inwardly over the insole, the auxiliary wipers 246 being swung toward each other about the axis x to provide room, by reason of the angular relation then assumed by their end faces 248, for the main wipers to be thus moved inwardly until their wiping edges substantially meet at the end of the toe, as shown in Fig. 10. In addition to these movements, all the wipers receive bodily movements lengthwise of the shoe to bring them into proper relation to the end face of the upper prior to the upwiping operation and thereafter to cause them to wipe the margin of the upper inwardly at the end of the toe.

All the wipers, and portions of their operating mechanisms, are supported by a casting 252, hereinafter termed a wiper head, which is movable horizontally in directions lengthwise of the shoe along guideways 254 in the frame and carries a cover plate 256, omitted from Fig. 2, which is fastened thereto and holds various parts hereinafter described in their proper positions. Extending through a bore formed in a lug 258 (Fig. 6) on the wiper head 252 is a rod 260 on which is threaded a worm gear 262, this gear being engaged on its opposite sides by shoulders on the lug 258, so that the rod 260 is normally held against lengthwise movement relatively to the wiper head. At its rear end the rod 260 is pivotally connected by a pin 264 to the forked front end of another rod 266 which extends rearwardly through a bore formed in a trunnion block 268 supported on the upper forked end of a lever 270, this lever being mounted to swing about a rod 272 supported by lugs 274 on the frame. Surrounding the rod 266 between a shoulder on the forked front end of the rod and a washer 276 in contact with the trunnion block 268 is a spring 278. At its lower end the lever 270 carries a roll engaged by a path cam 280 (Fig. 7) formed in one side of a cam wheel 282 fast on the previously mentioned shaft 122. It will thus be seen that when the lever 270 is swung in a clockwise direction (Fig. 6) by the cam 280 the wiper head 252 is moved forwardly through the spring 278 to engage the wipers with the toe-end face of the upper preparatory to the upwiping operation and thereafter to cause them to wipe the margin of the upper inwardly over the insole at the extreme end of the toe. Upon reverse movement of the lever 270 after the lasting operation the wiper head is retracted by reason of the action of the trunnion block 268 on nuts 284 threaded on the rod 266. By turning the worm gear 262 the wiper head with its wipers may be adjusted at any time lengthwise of the shoe. For this purpose there is rotatably mounted in a support 286 which is fastened to the lug 258 a rod 288 on which is fastened a worm 290 in engagement with the gear 262. This rod extends through a slot 292 in the frame to permit it to move lengthwise of the shoe with the wiper head, and is provided at its outer end with a hand wheel 294 for turning it.

For imparting to the main wipers 244 their swinging movements about the axis x there are provided wiper carriers 296 (Figs. 2 and 8) having depending ribs 298 curved about this axis and lying in a correspondingly curved groove 300 formed in the wiper head 252. The wipers 244 are not mounted directly on these wiper carriers, but upon wiper holders 302 supported on the carriers, these wiper holders having depending tongues 304 which lie in straight slots 306 formed in the upper faces of the carriers to guide the wiper holders and wipers for rectilinear movements widthwise of the shoe. The wipers 244 lie in slots formed in the wiper holders 302 and are held detachably therein by spring-pressed pins 308 which are slidingly mounted in sleeve members 310 extending downwardly from the holders, these pins being arranged to enter holes in the wipers and having at their lower ends knobs 312 by which they may be moved downwardly to release the wipers. The members 310 extend through slots 314 in the wiper carriers 296 to permit the rectilinear movements of the wiper holders 302. The means whereby these holders are moved relatively to the carriers 296 and are controlled during the movements of the carriers will be hereinafter described.

For swinging the wiper carriers 296 about the axis x these carriers are connected by links 316, which lie in slots 318 (Fig. 2) in the wiper head 252, to arms 320 extending from opposite sides of a slide 322 mounted in a guideway 324 in the wiper head. On its lower face this slide is provided with rack teeth engaged by a gear sector

326 (Figs. 4 and 5) which is mounted to turn on a rod 328 supported by lugs 329 on the wiper head 252. Also mounted for swinging movement on the rod 328 is a two-armed lever 330, and located between one of the arms of this lever and a portion of the gear sector 326 is a comparatively light spring 332 through which the gear sector is operated yieldingly by the lever when the lever is swung in a clockwise direction (Fig. 4). Normally the lever and the gear sector are held by the spring in a relation to each other determined by the enegagement at 334 of shoulders formed respectively on these different parts. The lever 330 carries a trunnion block 336 (Fig. 5) engaged below by a thimble 338 which is mounted on a rod 340 extending through a bore in the trunnion block. A spring 342 surrounding the rod 340 between the thimble 338 and a washer 344 held by a nut 346 on the rod serves as yielding means for operating the lever 330 by upward movement of the rod. The spring 332 is lighter than the spring 342 and may yield as the wipers wipe the upper heightwise of the last, while the spring 342 will normally yield only when the wipers press the upper inwardly against the lip of the insole. At its lower end the rod 340 is pivotally connected to the front end of a lever 348 mounted midway between its opposite ends to swing about the rod 200 (Fig. 6), the rear end of this lever carrying a roll engaged by a path cam 350 (Fig. 7) formed in one side of the cam wheel 170.

For imparting to the wipers 244 their rectilinear movements widthwise of the shoe relatively to the carriers 296 there are provided levers 352 mounted to swing about rods 354 which extend through the wiper head 252 and the cover plate 256 and on which nuts 356 and 358 (Fig. 1) are threaded to assist in holding the wiper head and the cover plate together. Formed in the front arms of these levers are slots 360 in which lie blocks 362 pivotally mounted on pins 364 which extend upwardly from the wiper holders 302. When the levers 352 are in their normal positions the slots 360 are curved about the axis x so as to permit the wiper carriers 296 to be operated as previously described to swing the wipers 244 about this axis without affecting the relation of the holders 302 to the carriers 296, the blocks 362 moving along the slots 360 at this time. By swinging movements of the levers 352 thereafter about the rods 354 the wiper holders 302 are moved along the guideways 306 to carry the wipers 244 inwardly toward each other. For thus operating the levers 352 their rear arms are connected by links 366, arranged in the manner of a toggle, to the head 368 of a rod 370 slidingly movable in a bearing member 372 which is fastened to the wiper head 252. Threaded on this rod is a spool 374 (Fig. 2) having a head 376 at one end and a gear 378 at the other end, and mounted on the spool between this head and gear is a block 380 formed of two parts connected together by bolts 382, the arrangement being such that the spool may turn in the block for a purpose hereinafter described. Rearwardly extending portions of the block 380 are connected by links 384 to two parallel depending arms 386 of a bell-crank lever 388 (Fig. 7) pivotally mounted on a rod 390 which is supported by two upwardly and rearwardly extending bracket arms 392 on the cover plate 256. The bell-crank lever 388 is provided also with a rearwardly extending arm 394 to which is pivotally connected the upper end of a depending rod 396. This rod extends downwardly within a tubular casing 398 (Fig. 6) in which is mounted a spring 400 lying between a head 402 formed on the lower end of the rod and a thimble 404 which is threaded in the upper end of the casing and through which the rod extends. At its lower end the tubular casing 398 is pivotally connected to the forwardly extending arm 406 of a bell-crank lever 408 (Fig. 7) mounted to swing about the rod 272, this bell-crank lever having a downwardly extending arm 410 provided with a roll engaged by a path cam 412 formed in one side of a cam wheel 414 fast on the shaft 122. It will thus be seen that by downward swinging movement of the arm 406 the rod 370 is operated through the spring 400 to swing the levers 352 in the directions to move the wiper holders 302 and their wipers 244 inwardly toward each other. The gear 378 is engaged by a pinion 416 mounted to turn on a rod 418 which is supported on the cover plate 256, and this pinion is engaged by another pinion 420 fast on a shaft 422 which is mounted in a bearing provided in a lug on the cover plate and has also fast thereon a hand wheel 424 for turning it. Accordingly by means of this hand wheel the spool 374 may be turned to impart lengthwise adjusting movement to the rod 370 and thereby to vary the initial positions of the wiper holders 302 and their wipers relatively to the carriers 296. The pinion 416 is elongated so that the gear 378 remains in engagement with it at all times.

The auxiliary wipers 246 are detachably mounted on holders 426, each wiper having an enlarged portion 427 (Fig. 8) formed to slide into a recess 428 in its holder and to be locked therein by the turning of a pin 430 which lies partly in a recess in the side of the portion 427 and partly in a recess in the side of the holder and has a slot 432 to permit the wiper to be moved into its proper position on the holder when the pin is in one position. Each of the holders 426 is provided with a curved tongue 434, and these two tongues are arranged to lie side by side (Fig. 2) in correspondingly curved grooves 436 (Fig. 8) in the two wiper carriers 296, these grooves being curved about the axis x. The holders 426 are connected by links 438 to forwardly extending arms of bell-crank levers 440 which are mounted to swing about a rod 442 fast in the wiper head 252 and its cover plate 256, and these bell-crank levers have laterally extending arms connected by links 444 to a crosshead 446 which is formed on a slide 448 (Figs. 2 and 6) movable in the previously mentioned guideway 324. At its rear end this slide is connected by a link 450 to the upper end of a lever 452 (Fig. 7) fulcrumed between its ends on the rod 272, the lower end of this lever being provided with a roll which is engaged by a path cam 454 formed in one side of the cam wheel 262. It will thus be seen that when the slide 448 is moved by the cam toward the front of the machine the wipers 246 are swung toward each other to provide clearance for the wipers 244 when the latter are moved bodily inward toward each other, and that when the slide is moved in the opposite direction the wipers 246 are swung apart to return them into their initial relation to the wipers 244. In order to provide for adjustment of the wipers 246 toward or from each other the link 450 includes a turnbuckle 456 whereby the slide 448 may be moved relatively to the lever 452.

The cam shaft 122 carries a gear 458 connected by an idle gear 460 on the rod 200 to a gear 462 fast on the cam shaft 172, and also fast on this cam shaft is a worm gear 464 engaged by a worm

466 which is fast on a driving shaft 468 mounted in bearings in the frame. For operating the shaft 468 there is herein shown a belt-driven pulley 470 (Fig. 6) formed to serve as one of the members of a friction clutch and arranged to cooperate with another clutch member 472 which is movable lengthwise of the shaft either into clutching engagement with the member 470 or into braking engagement with a brake surface 474 on the frame. The clutch member 472 has a hub portion provided with pins 476 which extend into holes in a disk 478 fast on the shaft 468 to provide a driving connection between the clutch member and the shaft while permitting the clutch member to move lengthwise of the shaft. A spring 480 serves when permitted to move the member 472 into engagement with the member 470, but the member 472 is held initially out of such engagement by a pivoted yoke 482 provided with shoes (not shown) which lie in a groove 484 in the hub of the clutch member 472. Pivotally connected to this yoke is the rear end of a rod 486 on the front end of which is mounted a bar 488 having a shoulder engaged by a pin 492 which is mounted on an arm 494 arranged to swing about the previously mentioned rod 168. This arm is provided at its upper end with a roll 496 engaged by a stop cam 498 fast on the cam shaft 172, the roll being held at all times in engagement with the cam by a spring 500 connected to a finger 502 which projects from a hub of the arm. The cam 498 has three projections 504 arranged respectively to bring the machine to a stop at the end of the cycle and twice before the end of the cycle, as hereinafter more particularly explained, by swinging the arm 494 in a clockwise direction (Fig. 6), as will be readily understood. To start the machine the bar 488 is disconnected from the pin 492 by swinging the bar and its rod 486 upwardly, thus permitting the spring 480 to move the clutch member 472 into clutching engagement with the pulley 470. For thus operating the bar 488 there is provided a rod 506 having fast thereon a collar 508 which underlies a shoulder on the bar and lifts the bar when the rod is moved upwardly, the rod being pivotally connected at its upper end to one arm of a bell-crank lever 510 which is mounted to turn about the shaft 122 and the other arm of which is connected by a link 512 to an arm 514 (Fig. 4) operated by a treadle 516 against the resistance of a return spring 518. It will thus be seen that when the treadle is depressed the rod 506 is lifted to cause the starting of the machine. As the clutch member 472 is moved into clutching position by the spring 480 the front end portion of the bar 488 is carried rearwardly over the pin 492, and just after the starting of the machine the cam 498 permits the arm 494 to be swung by the spring 500 into such a position that the pin is again engaged by the cooperating shoulder on the bar when the operator releases the treadle. Accordingly, when the next projection 504 of the cam acts to swing the arm 494 forwardly the pin moves the bar 488 forwardly to disconnect the clutch and stop the machine. The rod 506 is held yieldingly against a shoulder on the frame by a spring 520 connected to its lower end to maintain its collar 508 at all times in proper relation to the bar 488.

Prior to the operation of the machine on shoes of a given style and size a plate 26 of proper shape for use in positioning such shoes will have been mounted on the arm 18 and wipers 244 and 246 of the proper shapes will have been mounted on their holders 302 and 426. It is contemplated, however, that the same wipers may be used for shoes of several different sizes. The operator presents the shoe in the position determined by engagement of the plate 26 with the bottom face and the lip of the insole, at the same time mounting the heel end of the last on the pin 30 and depressing the bar 28 to the position determined by the last when the shoe is in proper relation to the plate 26, the bar further accommodating itself to the position of the last by swinging movement. The operator then swings the hand lever 56 downwardly to move the holddown rod 62 into engagement with the shoe as thus positioned. While continuing to hold the shoe against the plate 26 he starts the machine by depressing the treadle 516. Immediately upon the starting of the machine the toe rest 70 is forced upwardly to clamp the toe end of the shoe against the plate 26. Shortly thereafter the wiper head 252 is advanced lengthwise of the shoe to carry the main wipers 244 and the auxiliary wipers 246 into engagement with the upper at the end of the toe and the wiper carriers 296 are swung about the axis x to close the main wipers inwardly against the upper at the sides of the toe, the auxiliary wipers also swinging with the main wipers. In proper time relation to these movements the shoe carrier 2 is moved downwardly with the shoe to cause the wipers to wipe the upper heightwise of the last in the manner illustrated in Fig. 9. At substantially the same time the bowl-centering member 182 is moved downwardly out of its operative position and the pawl 212 is swung into position to connect the carrier 2 to the toe rest, the bowl 14, however, being still locked in its initial position by the member 220. As the shoe is forced downwardly by the carrier the toe rest is depressed by the pressure of the shoe thereon, its controlling cam being shaped as described to compensate for the downward movement thereof so as to avoid any substantial increase of its pressure against the shoe.

At the completion of the upwiping operation the bowl 14 is unlocked by the member 220, and the auxiliary wipers 246 are swung toward each other to make way for the main wipers 244 to be moved bodily inward widthwise of the last. Near the end of these movements of the auxiliary wipers the wiper head 252 is further advanced to force all the wipers inwardly over the insole at the end of the toe, the main wipers 244 are moved bodily toward each other widthwise of the last relatively to their carriers 296 to wipe the upper over the insole at the sides of the toe, and these wiper carriers also are swung to a small extent about the axis x to impart further closing movements about this axis to the wipers 244. When the wipers are at the end of their advancing and closing movements, as illustrated in Fig. 10, the main wipers 244 are in substantially contiguous relation to each other at the end of the toe and they press the margin of the upper materials inwardly against the lip of the insole under the influence of the spring 278 which acts on the wiper head 252, the spring 400 through which the main wipers are forced bodily toward each other, and the spring 342 through which the wiper carriers 296 are swung inwardly. After the beginning of the movements of the wipers to wipe the upper over the insole and the shoe carrier 2 is raised a short distance to elevate the plate 26 and thus permit the shoe to be forced up more firmly against the wipers by the toe rest 70 which is raised by the carrier through the action of the

pawl 212. At this time, by reason of the fact that the bowl 14 has been released by its locking member 220, the shoe may tip to adjust itself to the wipers and thus to equalize the pressure of the wipers on all portions of the margin of the upper which they engage.

At the completion of the inward movements of the wipers in the manner above described the machine comes automatically to a stop to permit the operator to anchor a binder wire to a tack at one side of the toe and to draw the wire about the toe adjacent to the lower faces of the wipers. He then starts the machine again, whereupon the shoe carrier and the toe rest are lowered slightly to relieve somewhat the downward pressure of the wipers on the upper and thus permit the wire to be pulled in over the upper underneath the wipers. Shortly thereafter the wipers are somewhat retracted lengthwise and widthwise of the shoe by movement of the wiper head and of the main wiper holders 302, and they are then advanced and closed again to force the wire firmly against the upstanding margin of the upper, the shoe carrier being raised to increase the downward pressure of the wipers on the upper. The machine then comes again to a stop to permit the operator to fasten the binder wire to a tack at the other side of the shoe and to cut the wire. Thereafter the operator starts the machine again, whereupon all the parts are returned to their starting positions, the shoe carrier and the toe rest being operated to relieve the pressure of the wipers on the shoe prior to the retractive movements of the wipers, so as to avoid any objectionable dragging action of the wipers on the upper. As the shoe is released, the operator removes it from the machine, and he also elevates the hand lever 56 to retract the holddown rod 62 and to unlock the bar 28 so that the bar may be returned to its initial upraised position by the spring 38.

It will be understood from the foregoing description that the main wipers 244, preferably shaped as described to conform substantially to the contour of the upper opposite the edge face of the insole, wipe all portions of the upper which they engage in an effective manner heightwise of the last and thereafter wipe the marginal portion of the upper inwardly over the insole with components of bodily movement both lengthwise and widthwise of the last while maintaining their wiping edges in substantially parallel relation to the corresponding portions of the lip of the insole. Upon the completion of their inward wiping movements, therefore, they press the upstanding margin of the upper effectively against the lip of the insole all along their edges, insurance being afforded that under any conditions their forward ends will apply adequate inward pressure to the upper by reason of such inward swinging movements as are imparted to the wiper carriers 296 through the spring 342.

While the invention is herein illustrated by reference to the lasting of welt shoes, it will be evident that the machine described may be used also effectively to last shoes of other kinds, the construction being such that the marginal portion of the upper is wiped inwardly from the edge of the insole in a direct and uniform manner regardless of the presence of a lip or shoulder on the insole.

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

1. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, said wipers being spaced from each other initially at the extreme end of the last and movable bodily toward each other widthwise of the last in thus wiping the upper inwardly, and auxiliary wiping means interposed between said wipers at the extreme end of the last, said auxiliary wiping means being displaceable to permit thus to approach each other.

2. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, said wipers being spaced from each other initially at the extreme end of the last and being movable lengthwise of the last and also bodily toward each other widthwise of the last in thus wiping the upper inwardly, and auxiliary wipers interposed between said first-named wipers at the extreme end of the last and movable bodily with them lengthwise of the last, said auxiliary wipers being also movable relatively to each other to make way for said first-named wipers to approach each other widthwise of the last in wiping the upper inwardly.

3. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, said wipers being spaced from each other initially at the extreme end of the last and being movable lengthwise of the last and also bodily toward each other widthwise of the last in thus wiping the upper inwardly, and auxiliary wipers interposed between said first-named wipers at the extreme end of the last and movable bodily with them lengthwise of the last, said auxiliary wipers comprising bars arranged normally in an angular relation to each other and having beveled ends to provide edges substantially continuous with the wiping edges of said first-named wipers when the bars are in that relation, the bars being mounted to swing toward each other to present said edges in angular relation and thus to make way for said first-named wipers to approach each other in wiping the upper inwardly.

4. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the feather of a welt shoe insole around an end of a last and for pressing it against a lip or shoulder on the insole, said wipers being spaced from each other initially at the extreme end of the last and being shaped to conform substantially to the contour of the upper opposite the edge face of the insole, means for moving said wipers lengthwise of the last and also bodily toward each other widthwise of the last in thus wiping the upper inwardly, and auxiliary wipers interposed between said first-named wipers at the extreme end of the last and movable with them lengthwise of the last, said auxiliary wipers being movable relatively to each other to make way for said first-named wipers to approach each other widthwise of the last in wiping the upper inwardly.

5. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, said wipers being spaced from each other initially at the extreme end of the last, means for moving said wipers lengthwise of the last and bodily toward each other widthwise of the last and for also swinging them toward each other about an axis located substantially at the end of the last in thus wiping the upper inwardly, and auxiliary

wiping means arranged to act on the upper in the space between said wipers at the end of the last.

6. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, wiper carriers supporting said wipers and mounted to swing with them widthwise of the last each about an axis located substantially at the end of the last, the wipers being bodily movable relatively to said carriers widthwise of the last, and means for thus moving the wipers bodily toward each other relatively to the carriers and for also swinging the carriers and wipers in wiping the upper inwardly.

7. In a lasting machine, wipers for wiping the marginal portion of an upper inwardly over the bottom of a last around an end of the last, wiper carriers mounted to swing widthwise of the last each about an axis located substantially at the end of the last, wiper holders supporting the wipers on said carriers and rectilinearly movable widthwise of the last relatively to the carriers, means for thus moving the wiper holders to move the wipers bodily toward each other in wiping the upper inwardly, and means for also swinging the carriers to impart inward swinging movements to the wipers.

8. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last and being movable bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, and auxiliary wiping means for engaging the upper between said wipers at the end of the toe to wipe it heightwise of the last, said auxiliary wiping means being displaceable to permit the wipers to approach each other in wiping the upper inwardly.

9. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper each part way around the toe with a space between them at the end of the toe in wiping it heightwise of the last, auxiliary wiping means arranged substantially to bridge the space between said wipers at the end of the toe in the wiping of the upper heightwise of the last, and means for moving said wipers bodily toward each other widthwise of the last to wipe the upper over the bottom of the last and for displacing said auxiliary wiping means to permit the wipers thus to approach each other.

10. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper part way only around the toe with a space between them at the end of the toe in wiping it heightwise of the last, auxiliary wipers associated respectively with said first-named wipers and arranged substantially to bridge the space between the latter at the end of the toe in the wiping of the upper heightwise of the last, and means for moving said first-named wipers bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, the auxiliary wipers being movable relatively to said first-named wipers to permit the latter thus to approach each other in wiping the upper inwardly.

11. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last and being movable bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, and auxiliary wipers for engaging the upper between said first-named wipers at the end of the toe to wipe it heightwise of the last, said auxiliary wipers being mounted to swing toward each other to make way for said first-named wipers to approach each other in wiping the upper inwardly.

12. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last and being movable bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, and auxiliary wipers for engaging the upper between said first-named wipers at the end of the toe to wipe it heightwise of the last, said auxiliary wipers comprising bars arranged normally in an angular relation to each other and beveled at their ends to provide upper-engaging edges substantially continuous with the edges of said first-named wipers when the bars are in that relation, the bars being mounted to swing toward each other to present said edges in angular relation and thus to make way for said first-named wipers to approach each other in wiping the upper inwardly.

13. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper each part way around the toe with a space between them at the end of the toe in wiping it heightwise of the last, auxiliary wipers arranged normally in angular relation to each other and having portions for substantially bridging the space between said first-named wipers at the end of the toe in the wiping of the upper heightwise of the last, mechanism for moving said first-named wipers bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, and mechanism for swinging said auxiliary wipers toward each other to make way for said first-named wipers to approach each other in wiping the upper inwardly.

14. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper each part way around the toe with a space between them at the end of the toe in wiping it heightwise of the last and being movable bodily toward each other widthwise of the last to wipe the upper inwardly over the bottom of the last, auxiliary wipers arranged normally in angular relation to each other and having portions for substantially bridging the space between said first-named wipers at the end of the toe in the wiping of the upper heightwise of the last, and means for swinging all said wipers to close them about the toe preparatory to the wiping of the upper heightwise of the last and for thereafter

reversely swinging the auxiliary wipers relatively to said first-named wipers to make way for the latter to approach each other in wiping the upper inwardly.

15. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last, wiper carriers supporting said wipers and movable about a common axis at the end of the toe to close the wipers about the toe preparatory to the wiping of the upper heightwise of the last, the wipers being bodily movable toward each other widthwise of the last relatively to said carriers to wipe the upper inwardly over the bottom of the last, and auxiliary wipers for wiping the upper heightwise of the last at the end of the toe between said first-named wipers, said auxiliary wipers being movable about said axis to withdraw them from the paths of bodily movement of said first-named wipers.

16. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last, wiper carriers supporting said wipers and movable about a common axis at the end of the toe to close the wipers about the toe preparatory to the wiping of the upper heightwise of the last, the wipers being bodily movable toward each other widthwise of the last relatively to said carriers to wipe the upper inwardly over the bottom of the last, auxiliary wipers for wiping the upper heightwise of the last at the end of the toe between said first-named wipers, the auxiliary wipers being also movable about said axis, and means for thus moving the auxiliary wipers with said carriers in the closing of the wipers about the toe and for thereafter reversely moving them relatively to the carriers to withdraw them from the paths of bodily movement of said first-named wipers.

17. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last, wiper carriers supporting said wipers and movable about a common axis at the end of the toe to close the wipers about the toe preparatory to the wiping of the upper heightwise of the last, wiper holders supporting the wipers on said carriers and rectilinearly movable relatively to the carriers to move the wipers bodily toward each other widthwise of the last in the wiping of the upper inwardly over the bottom of the last, auxiliary wipers supported by said carriers for wiping the upper heightwise of the last at the end of the toe between said first-named wipers, and means for moving the auxiliary wipers relatively to said carriers to withdraw them from the paths of bodily movement of said first-named wipers.

18. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and inwardly over the bottom of the last, said wipers being constructed and arranged to engage the upper along the sides of the toe and part way only around the end of the toe in wiping it heightwise of the last, wiper carriers supporting said wipers and movable about a common axis at the end of the toe to close the wipers about the toe preparatory to the wiping of the upper heightwise of the last, wiper holders supporting the wipers on said carriers and rectilinearly movable relatively to the carriers to move the wipers bodily toward each other widthwise of the last in the wiping of the upper inwardly over the bottom of the last, auxiliary wipers for wiping the upper heightwise of the last at the end of the toe between said first-named wipers, and wiper holders supporting the auxiliary wipers on said carriers and movable relatively to the carriers about said axis to withdraw the auxiliary wipers from the paths of bodily movement of said first-named wipers.

19. In a lasting machine, wipers for wiping the toe end of an upper heightwise of the last and for wiping the marginal portion of the upper around the toe inwardly over the feather of a welt shoe insole on the last and for pressing it against a lip or shoulder on the insole, said wipers being spaced from each other initially at the end of the toe and being shaped to conform substantially to the contour of the upper opposite the edge face of the insole, means for moving said wipers bodily toward each other widthwise of the last in thus wiping the upper inwardly over the feather of the insole, and auxiliary wiping means for engaging the upper between said wipers at the end of the toe to wipe it heightwise of the last, said auxiliary wiping means being displaceable to permit the wipers to approach each other widthwise of the last in wiping the upper inwardly over the feather of the insole.

20. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and for wiping the marginal portion of the upper around the toe inwardly over the feather of a welt shoe insole on the last and for pressing it against a lip or shoulder on the insole, said wipers being spaced from each other initially at the end of the toe and being shaped to conform substantially to the contour of the upper opposite the edge face of the insole, means for moving said wipers lengthwise of the last and also bodily toward each other widthwise of the last in thus wiping the upper inwardly, auxiliary wipers for engaging the upper between said first-named wipers at the end of the toe to wipe it heightwise of the last, and means for moving said auxiliary wipers lengthwise of the last with said first-named wipers in wiping the upper inwardly and for also moving them relatively to each other to make way for said first-named wipers to approach each other widthwise of the last.

21. In a lasting machine, wipers for wiping the toe end of an upper heightwise of a last and for wiping the marginal portion of the upper around the toe inwardly over the feather of a welt shoe insole on the last and for pressing it against a lip or shoulder on the insole, said wipers being spaced from each other initially at the end of the toe and being shaped to conform substantially to the contour of the upper opposite the edge face of the insole, means for moving said wipers lengthwise of the last and bodily toward each other widthwise of the last and for also swinging them toward each other about an axis located substantially at the end of the last in thus wiping the upper inwardly, auxiliary wipers arranged to engage the upper between said first-named wipers at the end of the toe to wipe it heightwise of the last, and means for displacing said auxiliary wipers to

make way for said first-named wipers to approach each other widthwise of the last in wiping the upper inwardly.

22. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of means for determining the position of the shoe and last relatively to the wipers by engaging the bottom of the forepart of the shoe, said shoe-positioning means being mounted to tip with the shoe in response to pressure of the wipers on the upper heightwise of the shoe to permit a substantial equalization of the pressure of the wipers on different portions of the upper.

23. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of means for determining the position of the shoe and last relatively to the wipers by engaging the bottom of the forepart of the shoe, said shoe-positioning means being mounted for universal tipping movement with the shoe in the wiping operation about a center located substantially on the bottom of the shoe and substantially midway lengthwise and widthwise of the shoe of the portion thereof on which the wipers operate to permit a substantial equalization of the pressure of the wipers heightwise of the shoe on all portions of the upper which they engage.

24. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of a device for determining the position of the shoe and last relatively to the wipers by engaging the bottom of the forepart of the shoe, said device being mounted to tip with the shoe in response to pressure of the wipers on the upper heightwise of the shoe to permit a substantial equalization of the pressure of the wipers on different portions of the upper, and a heel end support for the last and shoe mounted to tip with said device.

25. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of a device for determining the position of the shoe and last relatively to the wipers by engaging the bottom of the forepart of the shoe, said device being mounted to tip with the shoe in response to pressure of the wipers on the upper heightwise of the shoe to permit a substantial equalization of the pressure of the wipers on different portions of the upper, and a toe rest for engaging the shoe at the top of the forepart, said toe rest being supported independently of said device but mounted to tip with the shoe.

26. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of means for positioning the shoe and last bottom upward relatively to the wipers, and means below the shoe providing a bearing for said shoe-positioning means spherically curved about a center located substantially on the bottom of the forepart of the shoe to permit universal tipping movement of said shoe-positioning means and the shoe in response to pressure of the wipers on the upper heightwise of the shoe and thus to permit a substantial equalization of the pressure of the wipers on different portions of the upper.

27. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of means for positioning the shoe and last bottom upward relatively to the wipers by engaging the bottom of the forepart of the shoe, said shoe-positioning means comprising a member spherically curved below the shoe and universally movable about a center located substantially on the bottom of the shoe and substantially midway lengthwise and widthwise of the shoe of the portion thereof on which the wipers operate to permit universal tipping movement of said device and the shoe in response to pressure of the wipers on the upper heightwise of the shoe and thus to permit a substantial equalization of the pressure of the wipers on all portions of the upper which they engage.

28. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of a device for positioning the shoe and last bottom upward relatively to the wipers by engaging the bottom of the forepart of the shoe, means below the shoe providing a bearing relatively to which said device is universally movable to permit it to tip with the shoe in response to pressure of the wipers on the upper heightwise of the shoe and thus to permit a substantial equalization of the pressure of the wipers on different portions of the upper, and a heel-end support for the last and shoe mounted to partake of the tipping movements of the shoe.

29. In a lasting machine, the combination with wipers for wiping the marginal portion of a shoe upper around the toe end of a last inwardly over an insole on the last, of a device for positioning the shoe and last bottom upward relatively to the wipers by engaging the bottom of the forepart of the shoe, a heel-end support yieldingly depressible by the last relatively to said device to a position determined by the last and shoe, and a hold-down movable heightwise of the shoe into operative position and arranged to engage that portion of the bottom of the shoe which slopes heelwardly from the ball of the shoe.

30. In a lasting machine, the combination wtih wipers for wiping an upper around the toe end of a last heightwise of the last and for wiping its marginal portion inwardly over an insole on the last, of means for positioning the shoe and last relatively to the wipers, said shoe-positioning means being mounted to tip with the shoe in response to pressure of the wipers on the upper heightwise of the shoe to permit a substantial equalization of the pressure of the wipers on different portions of the upper, and mechanism for holding the shoe-positioning means against such tipping movement in the wiping of the upper heightwise of the last and for thereafter releasing it to permit it to tip.

31. In a lasting machine, the combination with wipers for wiping an upper around the toe end of a last heightwise of the last and for wiping its marginal portion inwardly over an insole on the last, of means for positioning the shoe and last relatively to the wipers by engaging the bottom of the forepart of the shoe, said shoe-positioning means being mounted for universal tipping movement with the shoe about a center located substantially on the bottom of the forepart of the shoe in response to pressure of the wipers on the upper heightwise of the shoe to permit a substantial equalization of the pressure of the wipers on different portions of the upper, and mechanism for holding said shoe-positioning

means against such tipping movement in the wiping of the upper heightwise of the last and for thereafter releasing it to permit it to tip.

32. In a lasting machine, the combination with wipers for wiping an upper around the toe end of a last heightwise of the last and for wiping its marginal portion inwardly over an insole on the last, of means for positioning the shoe and last bottom upward relatively to the wipers, said shoe-positioning means comprising a member spherically curved below the shoe and universally movable about a center located substantially on the bottom of the forepart of the shoe to permit it to tip with the shoe and thus to permit a substantial equalization of the pressure of the wipers heightwise of the shoe on all portions of the upper which they engage, and a device for engaging said spherically curved member to lock it against such tipping movement in the wiping of the upper heightwise of the last and for thereafter releasing it to permit it to tip as the wipers wipe the upper inwardly over the insole.

ROY W. CUMMINGS.

CERTIFICATE OF CORRECTION.

Patent No. 2,221,864. November 19, 1940.

ROY W. CUMMINGS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 14, for the word "road " read --rod--; page 8, second column, line 10, claim 1, after "permit" insert --the wipers--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of December, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)