March 26, 1946. E. QUINN ET AL 2,397,369

SHOE MACHINE

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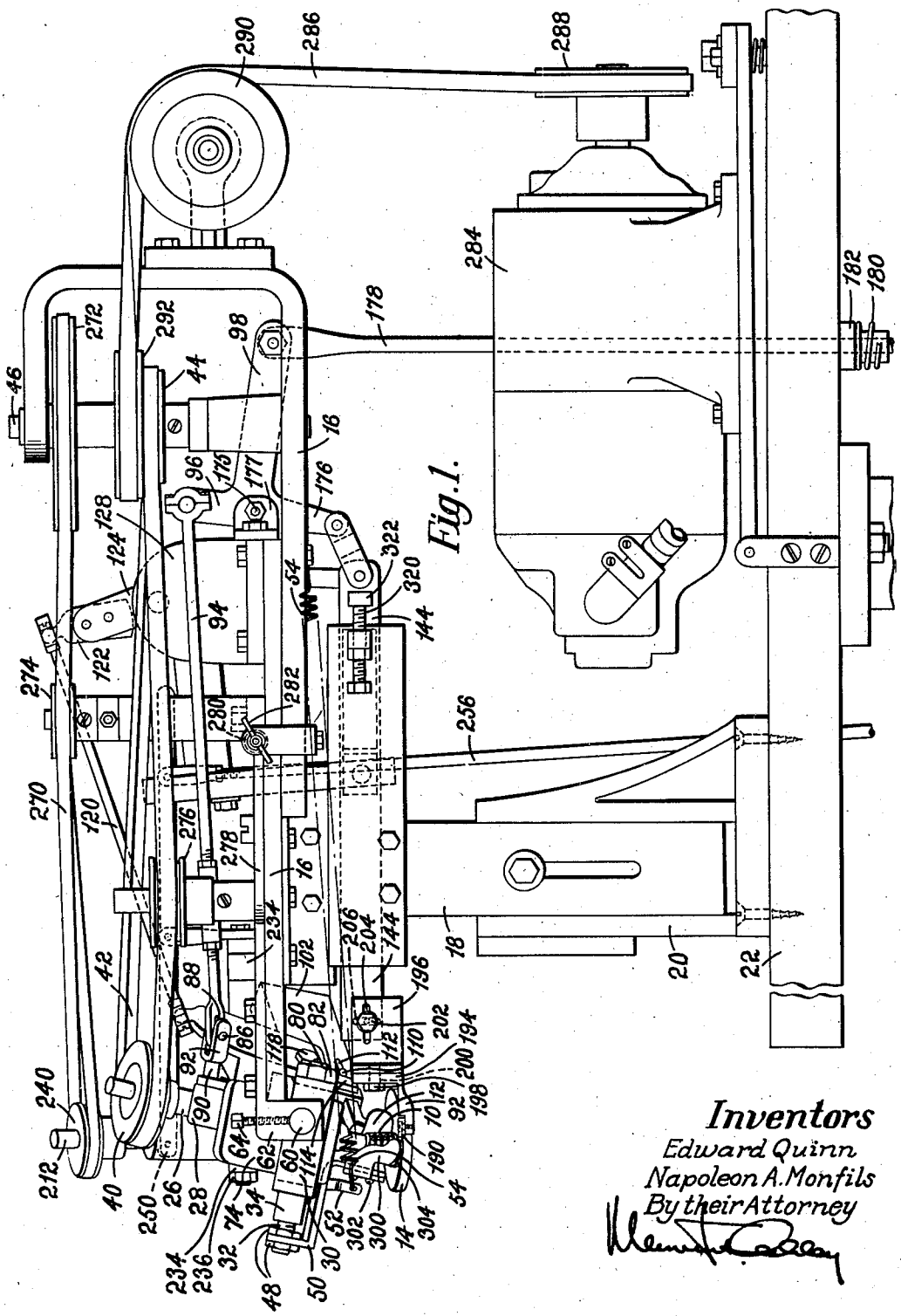


Fig. 1.

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SHOE MACHINE

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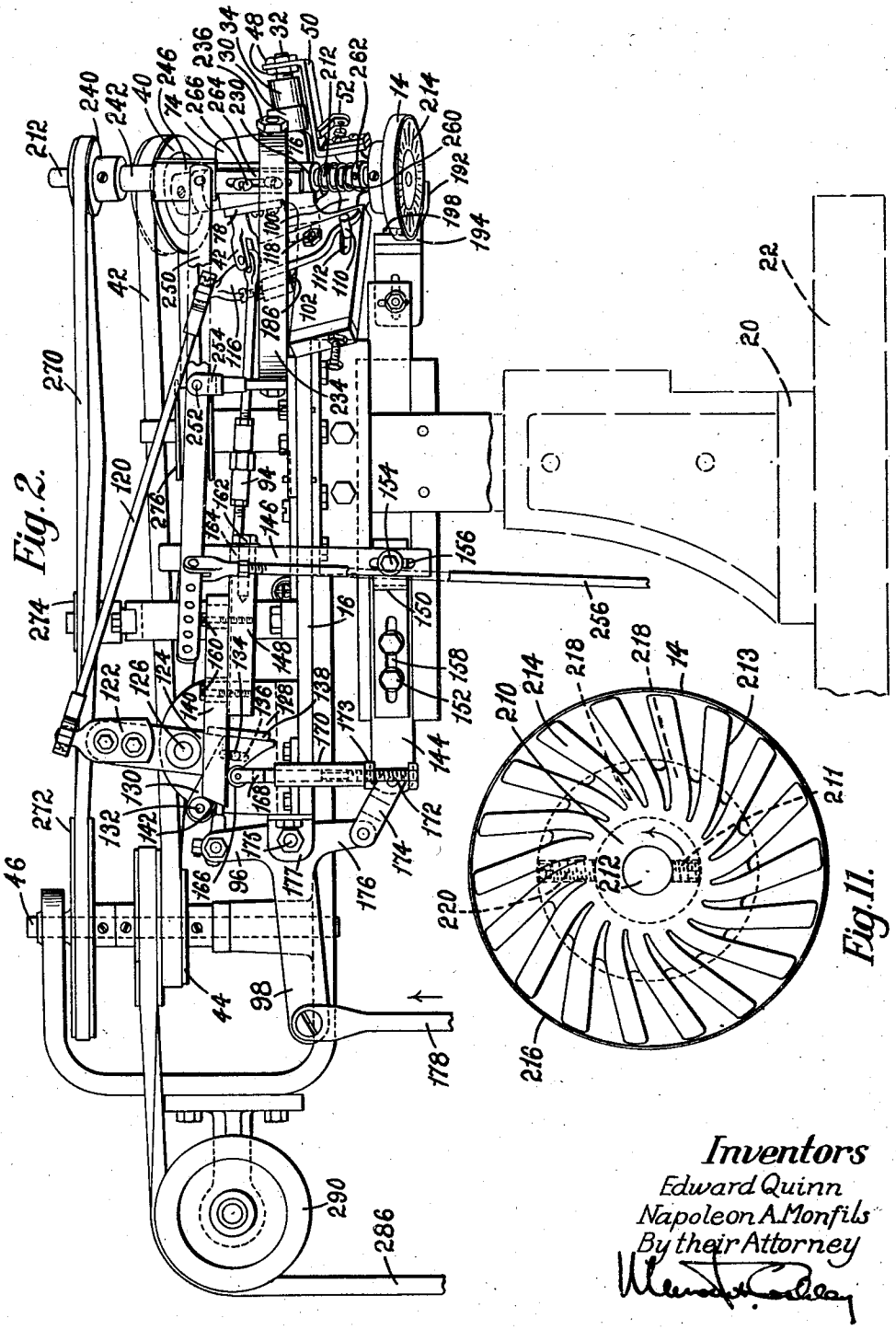


Fig. 2.

Fig. 11.

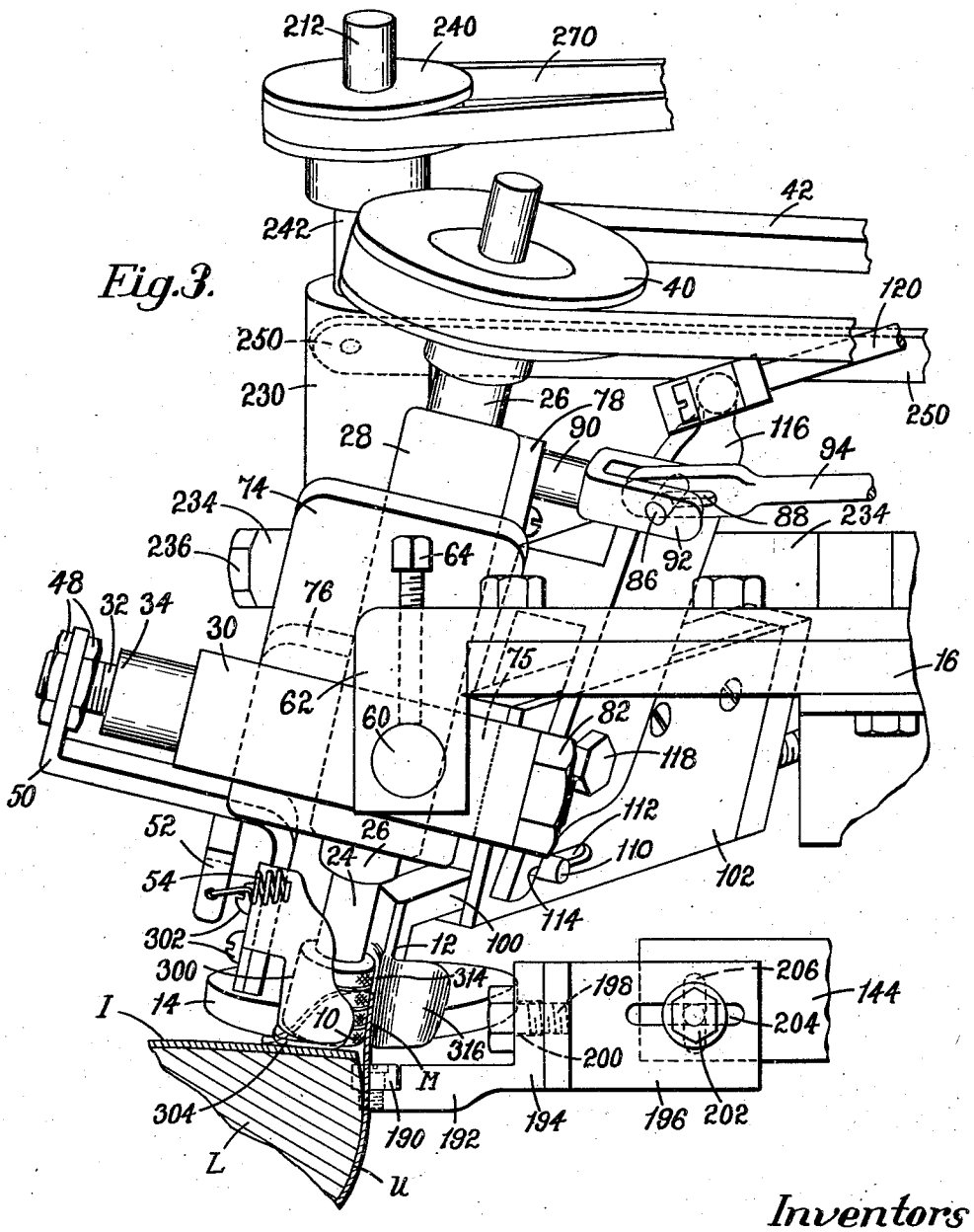
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SHOE MACHINE

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Fig. 3.



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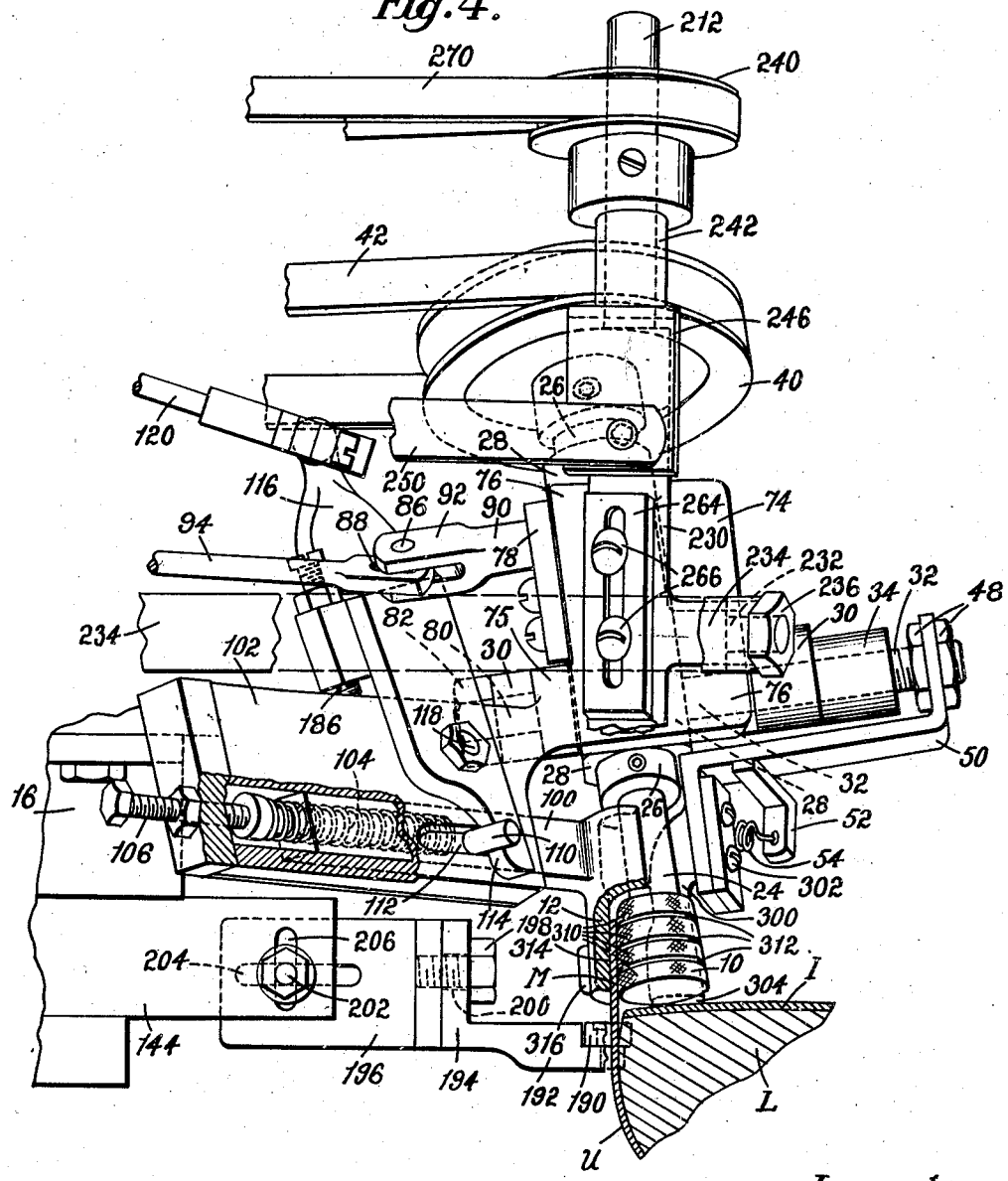
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SHOE MACHINE

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Fig. 4.



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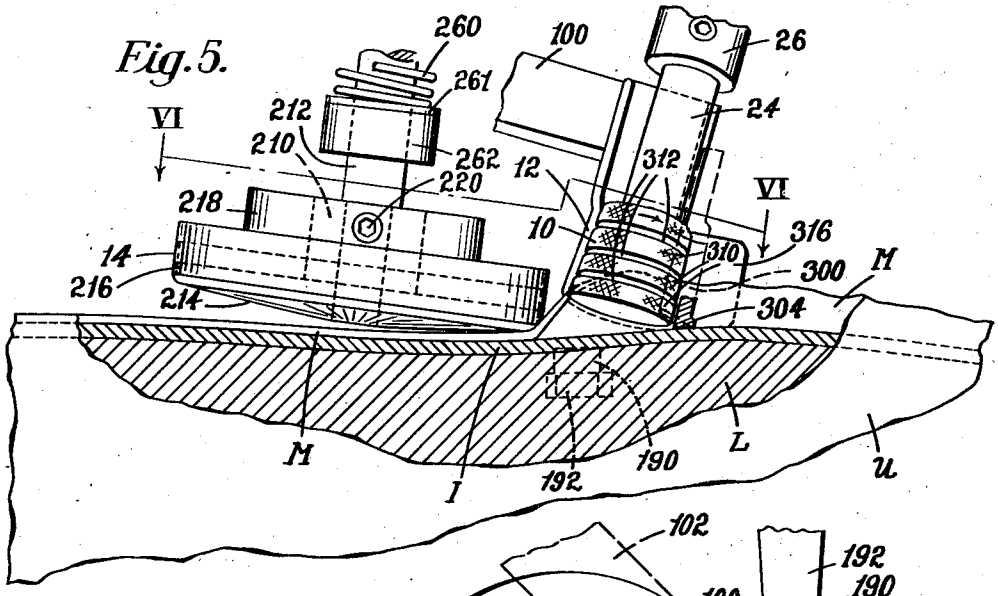
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SHOE MACHINE

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Fig.5.



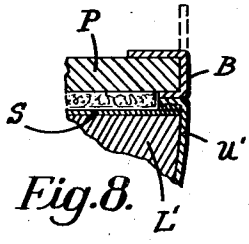


Fig.8.

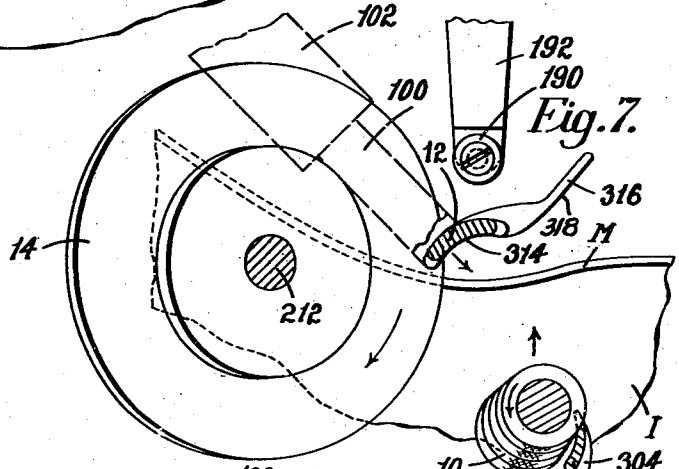


Fig.7.

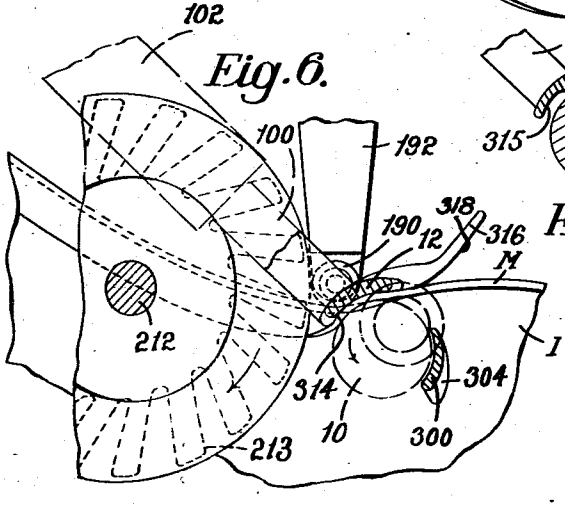


Fig.6.

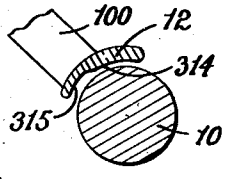


Fig.9.

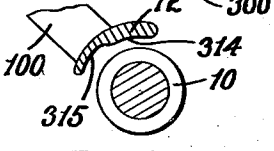


Fig.10.

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SHOE MACHINE

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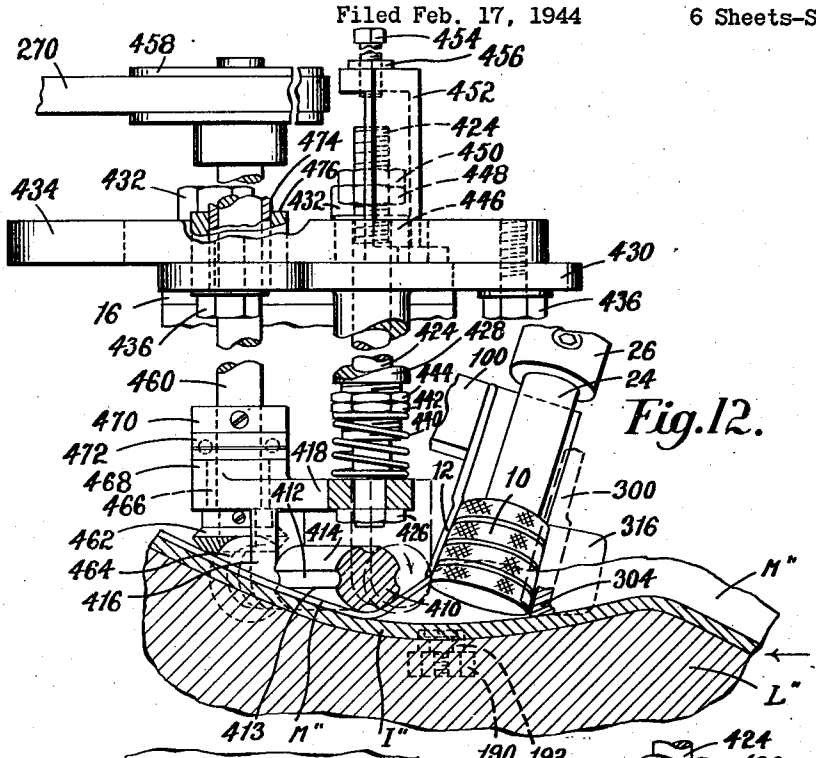


Fig.12.

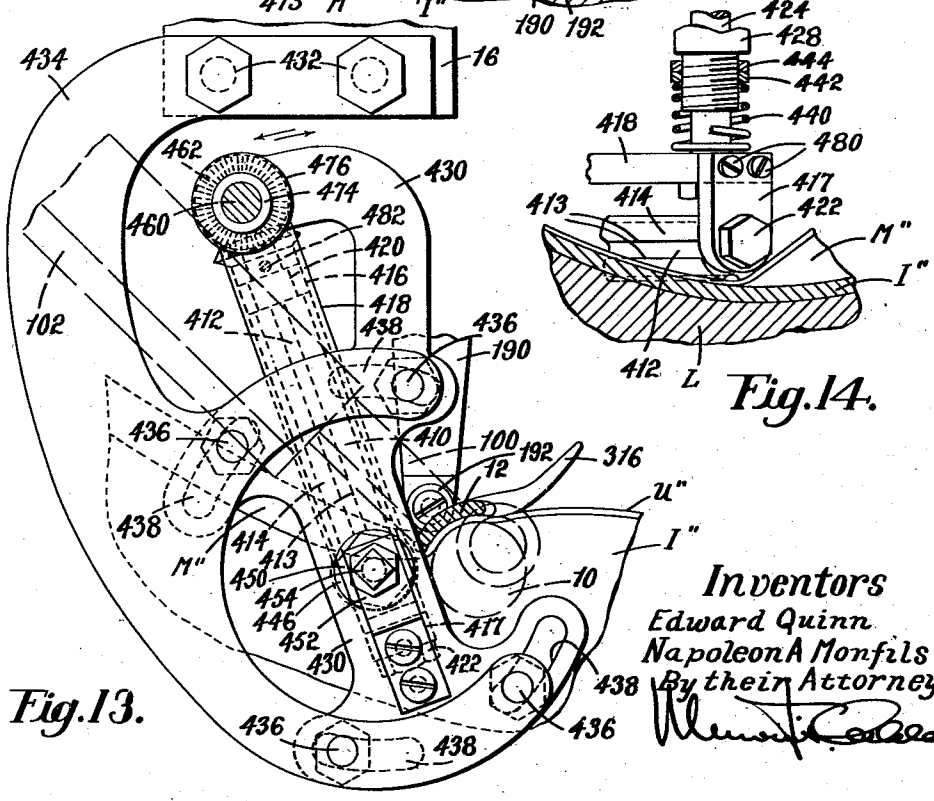


Fig.13.

Fig.14.

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Patented Mar. 26, 1946

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UNITED STATES PATENT OFFICE

2,397,369

SHOE MACHINE

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Application February 17, 1944, Serial No. 522,756

45 Claims. (Cl. 12—7)

This invention relates to shoe machines, and is herein shown embodied in a machine for lasting the upper of a shoe on its last in over the bottom of the shoe and for pressing the lasting margin of the upper smoothly and firmly against the shoe bottom. However, it is to be understood that the machine of the present invention is not limited in use to the lasting of shoes but, instead, is of broader utility and may be employed for performing similar shoemaking operations on other shoe parts.

An object of this invention is to provide a novel and improved machine for lasting shoes, or for performing analogous shoemaking operations, that is capable of tensioning an upper, or other shoe part, drawing its margin in over the bottom of the shoe, and, finally, pressing its overdrawn margin against the shoe bottom, all as a continuous operation, progressing, without interruption, from point to point along the margin of the upper, or other shoe part being acted upon. For the accomplishment of this object, and in accordance with a feature of this invention, the novel machine has means for so exerting a frictional drag on the lasting margin of the upper of a shoe on its last as simultaneously to tension it in a direction heightwise of the last, to draw it in over the bottom of the shoe, and to exert a feeding stress thereon, together with means for wiping and pressing the overdrawn portion firmly and smoothly against the bottom of the shoe.

More particularly, the means herein shown for applying the frictional drag comprises a driven roll and a cooperating pressure member for engaging the opposite face of the lasting margin of the upper, said roll and pressure member being so constructed and arranged that the frictional drag exerted by the roll has a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw its lasting margin in over the bottom of the shoe and also a component of stress tending to pass the lasting margin between the roll and pressure member thus to bring adjacent portions thereof successively into the zone of operation of the roll and to feed the shoe. As the lasting margin leaves the roll and pressure member it is immediately pressed smoothly and firmly against the bottom of the shoe by wiping means which preferably, and in accordance with a further feature of the invention, comprises a driven rotary member that is yieldingly urged toward the shoe bottom and so constructed and arranged as to have a continuous wiping action directed inwardly from, and at an angle to, the edge of the shoe. The lasting margin of the upper, or other shoe part, having been previously coated with a suitable adhesive, this action of the wiper will cause it to be secured, smoothly and effectively, to the bottom of the shoe.

To prevent upward movement of the shoe by the heightwise tensioning action of the frictional drag of the roll, the machine further is provided with a shoe rest against which the bottom of the shoe is held by the operator, and an edge gage is conveniently arranged adjacent to the pressure member for determining the position of the shoe laterally with respect to the roll and the pressure member. Preferably, and as herein shown, the pressure member comprises a sleeve having a surface that partially surrounds the roll and which is yieldingly urged toward the roll so that a part of the lasting margin of the upper is held in frictional engagement with the roll and also wrapped around the roll inwardly over the shoe bottom. The axis of the roll is so inclined to the plane of the shoe bottom that the frictional drag applied directly to the lasting margin of the upper has a feeding component of stress and a component of stress tending to tension the upper in a direction extending heightwise of the shoe. Also, because of the inward wrapping of the upper around the roll by the pressure member, the frictional drag also has a stress component, acting inwardly of the shoe, which tends to draw the lasting margin of the upper in over the shoe bottom. Preferably, and as herein disclosed, means are provided for changing the inclination of the roll to vary the relative intensities of the tensioning and feeding stress components. To facilitate the introduction of the work, as well as the termination of the lasting operation, means are provided for elevating the wiping means and for separating the pressure member and roll. Conveniently, the latter means is arranged to withdraw the edge gage from operative position.

These and other objects and features of the invention will appear in the following detailed description of the embodiment thereof illustrated in the accompanying drawings and will be pointed out in the claims.

In the drawings,

Fig. 1 is a view in side elevation of a machine embodying this invention;

Fig. 2 is a similar view of the opposite side of the machine shown in Fig. 1;

Figs. 3 and 4 are views similar to those of Figs. 1 and 2, respectively, but showing only the front portion of the machine on an enlarged scale;

Fig. 5 is a front view, on an enlarged scale, of

some of the operating parts of the machine and of a shoe being lasted, the latter being partly in section;

Fig. 6 is a plan view of the parts shown in Fig. 5, taken from line VI—VI of that figure;

Fig. 7 is a view similar to Fig. 6 but showing the parts in different positions;

Fig. 8 is a view in section of a shoe after the operation performed by this machine;

Figs. 9 and 10 are sectional views of a modification;

Fig. 11 is a bottom view of one of the operating elements of the machine;

Figs. 12 and 13 are views corresponding to Figs. 5 and 6, respectively, but showing an alternative wiper construction; and

Fig. 14 is a detail view of part of the construction omitted from Fig. 12.

Referring now to the drawings, especially Figs. 1, 2, 3 and 4, the operative elements of the illustrated machine comprise a driven roll 10, a cooperating pressure sleeve 12 and a rotary wiper 14. These elements are all mounted on a frame 16 which is supported on the top of a post 18 that is adjustably secured to a bracket 20 adapted to be mounted, as shown, on a platform 22 or other equivalent supporting structure. The roll 10 has a stem 24 by means of which it is secured to a shaft 26 that is journaled in an elongated block 28, Figs. 3 and 4. This block is slidably supported on a U-shaped member 30 by means of an elongated cylindrical boss 32 that passes through a hollow sleeve 34 formed integrally with the member 30. The shaft 26 is driven, to rotate the roll in the direction shown in Figs. 6 and 7, by means of a pulley 40 and belt 42 which passes over a second pulley 44 mounted on a countershaft 46 that is supported on the frame 16, Figs. 1 and 2. Secured to the outer end of the boss 32 by means of lock nuts 48, 48 is an angled bracket 50 and carried by this bracket is an ear 52 between which and a part of the frame 16 a tension spring 54 is stretched for normally holding the roll 10 in its extreme rearmost position, as shown in Figs. 1, 3, 4 and 6.

The U-shaped member 30 is mounted with the capability of angular adjustment on the frame 16 by means of a trunnion shaft 60 which passes through a hole in a frame member 62 and is locked in adjusted position by means of a set screw 64, see Figs. 1 and 3. The block 28 has flat sides and slides between spaced parallel guide plates 74, 76 which are connected together by means of a cross-web 75, Figs. 3 and 4, extending between the lower ends of their back edges. Formed integrally with this web is a stud 80 that is threaded at its outer end and which projects rearwardly through a bore in the back part of the member 30. This bore is in alinement with the axis of the sleeve 34 and when a locking nut 82 is loosened the plates may be swung around this axis to adjust the angular position of the block and the inclination of the roll, in a direction lengthwise of the shoe and as viewed in Fig. 5. A stud 90, having a bifurcated end 92, is screwed into a plate 78, secured to the upper end of the block 28, and connected to this stud, by means of a pin 86, is one end of an operating link 94 that extends forwardly of the machine from the upper arm 96 of a double bell-crank lever 98. This end of the link 94 is provided with a slot 88 through which the pin 86 extends, so that an appreciable amount of lost motion movement of the link 94, to the left as viewed in Figs. 1 and 3, and to the right in Figs. 2 and 4, is required before the block 28 will be moved in this direction, and forwardly of the machine, against the action of spring 54.

The sleeve 12 is carried on the outer end of a slide 100 which is mounted in a guide block 102 and is yieldingly urged toward the roll 10 by means of a compression spring 104, the force of which may be adjusted by means of a screw 106, Fig. 4. The block 102 is formed integrally with the cross-web 75 and thus moves with it and the plates 74 and 76 when the latter are angularly adjusted on the U-shaped member 30. For moving the sleeve 12 away from the roll 10, the slide 100 is provided with a pin 110 which projects through slots 112 in the opposite sides of the block 102 and the ends of this pin bear against the curved lower ends 114 of a bifurcated lever 116 that is pivotally mounted on the block 102 by means of a bolt 118. Extending rearwardly from the upper end of this lever 116 is a link 120 which is connected to an ear 122 adjustably mounted on the upper end of a lever 124, Fig. 2. This lever is pivoted on a stud 126, carried by a bracket 128 which is bolted to the frame 16, and has, on its lower end, an arm 130 carrying a roll 132. This arm is secured to the lever by means of a bolt 134 which extends through a slot 136 in the arm, so that the vertical position of the roll 132 may be varied, and is guided at one end by an outturned flange 138 on the lever 124. Elevation of this roll, from the position shown in Fig. 2, will swing lever 124 in a clockwise direction and the link 120 will cause the lever 116 to swing in the same direction, thus, through the action of the curved ends 114 of this lever, moving the sleeve 12 away from the roll 10 against the action of spring 104.

For thus elevating the roll 132 a cam bar 140 having an inclined camming surface 142 is provided, Fig. 2. This bar is supported on a slide 144 by means of a post 146 and a supporting arm 148. The post is adjustably connected to the slide by means of a laterally extending bracket 150, bolts 152, 154 and slots 156, 158, while the supporting arm 148, to which the cam bar 140 is secured by screws 160, is adjustably connected to the post by means of a screw 162 and slot 164. Adjacent to its camming surface, the cam bar 140 is also supported on an anti-friction roll 166 carried at the upper end of a vertically adjustable slide 168 mounted in a guide member 170 carried by the frame 16, a screw 172, having a locknut 173, being provided for adjusting the vertical position of the slide 168. The slide 144 is connected, by means of link 174, Fig. 2, to the lower arm 176 of the bell-crank lever 98, which is pivoted to the frame on a bolt 175 extending between two angle brackets 177, so as to be moved rearwardly of the machine, from the position shown in Figs. 1 and 2, when the bell-crank lever 98 is elevated by means of a treadle rod 178, connected to a treadle, not shown. A compression spring 180, Fig. 1, interposed between an abutment sleeve 182, bearing on the bottom of the bench 22, and a collar, not shown, on the treadle rod normally holds the bell-crank lever 98 in the down position shown.

As viewed in Fig. 2, when the treadle is depressed and the treadle rod 178 elevated the slide 144 will be moved to the left, or rearwardly, as will also the cam bar 140, while the link 94 will be pushed to the right, or forwardly. This rearward movement of the cam bar will elevate the roll 132 and cause the lever 124 to be turned in a clockwise direction, thus causing, through link 120, a similar movement of the lever 116

which, in turn, acts on the pin 110 and draws the slide 100 and sleeve 12 back, away from the roll 10, to the position shown in Fig. 7. At first, the forward movement of the link 94 is ineffective, due to the lost motion provided in its connection to stud 90, and the roll 10 remains fixed. However, when this lost motion is taken up, movement of the link 94 is transmitted to the block 28 and the roll is moved forwardly of the machine, against the action of spring 54, to the position shown in Fig. 7. When the treadle is released, the link 94 is moved rearwardly and the slide 144 and cam bar 140 are moved forwardly by spring 180. Spring 54 now keeps the lost motion in the connection of link 94 to stud 90 taken up so that the roll 10 moves rearwardly to its operating position, see Fig. 6, determined by engagement of block 28 with web 75, Fig. 4, before the cam bar 140 has moved forwardly far enough for roll 132 to ride down over the inclined surface 142. Upon the continued forward movement of the slide 144, permitted by the aforementioned lost motion as the treadle is fully released, spring 104 moves the slide 100 and sleeve 12 forwardly to their operating positions, see Fig. 6, the roll 132 now traveling down over the inclined camming surface 142. To prevent actual contact of the sleeve against the roll, the lever 116 is provided with a stop screw 186 which bears against the top side of the block 102.

With this arrangement for separating and bringing together the roll and sleeve, the sleeve moves radially toward the roll while the latter is stationary, and a better engagement of the curved operating surface of the sleeve with the upper, which it presses against the roll, is obtained. If the sleeve were moved to its operative position first, the roll, coming in as it does at an angle instead of radially, might be held away from its proper position by engagement with the upper at the near edge of the sleeve, the action of spring 54 then tending to bind the slide 100. With the roll all the way in, due to the obliquity of the line of its action, spring 104 is not powerful enough to move the roll back.

Mounted on the front end the slide 144 is an antifriction edge gage, illustrated as a roll 190, which is carried by a finger 192 projecting from a bracket 194. This bracket is mounted for lateral adjustment on an angle member 196, by means of a screw 198 and slot 200, and the angle member is mounted on the slide for heightwise and lengthwise adjustment on the slide by means of a bolt 202 and cross-slots 204, 206. When the treadle rod 178 is moved down this edge gage is shifted from the operative position of Fig. 6 to the inoperative position of Fig. 7.

The rotary wiper 14 comprises a hub member 210 secured by setscrew 211, Fig. 11, to a shaft 212, from which extend a circumferential series of inclined teeth 213 the lower faces 214 of which are elements of a very low cone. Above their lower faces these teeth are covered by a cup-shaped guard member 216 having a hub 218 that fits over the wiper hub 210 and is secured thereto by a setscrew 220, Fig. 11. The shaft 212 is journaled in an elongated bearing member 230, Figs. 3 and 4, having a laterally extending boss 232, threaded at its outer end, which passes through a bore in the extreme outer end of a curved supporting member 234, extending from the frame 16, Fig. 4. A nut 236, on the threaded end of the boss 232, serves to draw the member 230 tightly against the member 234 thus to hold it, as well as the shaft 212 and wiper 14, in any desired angular position. Secured to the upper end of the shaft 212 is a pulley 240, and between the lower face of this pulley and the upper end of the bearing member 230 is a sleeve 242 loose on the shaft 212. Formed integrally with this sleeve is a plate 246, and pinned to this plate is one end of a lever 250, fulcrumed at 252 on a bifurcated stud 254 mounted on the member 234, Fig. 2, the other end of which has connected to it a treadle rod 256. A compression spring 260 surrounds the lower end of the shaft 212 and bears on the lower end of the bearing member 230 and also on a thrust washer 261 supported by a collar 262 fast on the shaft 212, Figs. 1 and 5. This spring yieldingly holds the wiper down in its lowermost position with the lower edge of the plate 246 resting on a stop member 264, adjustably secured to the bearing member 230 by screws 266, Fig. 4. This position of the wiper is appreciably lower than that shown in Fig. 5 so that when the machine is operating the wiper is yieldingly forced by the spring 260 against the work and is able to accommodate itself to different operating levels. A treadle, not shown, connected to rod 256, is provided for elevating the wiper when desired.

A belt 270 connects the pulley 240 with a pulley 272 on the countershaft 46, and an adjustable idler pulley 274 is provided for tensioning this belt, Fig. 1. Similarly, an idler pulley 276 is provided for keeping the belt 42, which drives the roll 10, taut. This idler is mounted on one end of an arm 278 that is pivoted on the top of the frame 16, and a spring 280 is stretched between the other end of this arm and a thumbscrew 282 for yieldingly holding the pulley against the belt. The countershaft 46 is driven from a motor 284 by means of a belt 286 passing over pulleys 288, 290 and 292.

For supporting the work against upward movement, the machine is provided with a shoe bottom rest 300 which is secured to a downturned portion of the bracket 50 by means of screws 302, Fig. 1. This rest is shaped to extend part way around the roll 10 and has a lower horizontally extending toe portion 304 that is turned up at its extreme end to facilitate sliding over the bottom of a shoe, see Figs. 3, 4 and 5.

The roll 10 is conical, tapering in slightly from its lower end upwardly, and has a knurled operating surface 310 that is separated into four bands by spaced annular grooves 312, Figs. 4 and 5. The operating surface 314 of the sleeve 12 is substantially complemental to the outer surface of the roll which it surrounds for an angular distance of about 45 degrees, see Figs. 6 and 7. Formed integral with the sleeve member and extending from the side at which the upper enters the space between the sleeve and roll, hereinafter referred to as the entering side, is a deflecting web 316 having a curved surface 318 which merges with the operating surface 314 of the sleeve, see Figs. 6 and 7. The surface 314 extends outwardly around the roll, toward the front of the machine, so that the side at which the upper leaves the space between the sleeve and roll, hereinafter referred to as the leaving side, is positioned some distance inwardly of the edge of the shoe bottom from the entering side, see Fig. 6.

The exact shape of the operating surface 314 of the sleeve 12 may be varied to suit different operating conditions. For example, as shown in Figs. 9 and 10, which are sectional views at the bottom and top, respectively, of the roll 10 and a

modified sleeve, the taper of the surface may be somewhat less than that of the roll, and this surface may even be cylindrical. With this type of sleeve the pressure of the lasting margin against the roll will decrease upwardly from the bottom of the roll, thus allowing some self adjustment of the outer edge of the lasting margin of the upper as it is acted upon by the roll. Also the surface 314 may be relieved, as at 315, so that the upper is freed from the action of the roll quicker but is still confined in the space between the relieved portion 315 and the roll 10. This latter arrangement facilitates the action of the wiper since the upper is permitted to drop down toward the shoe bottom sooner than is the case with the wider operating surface 314, as shown in Figs. 5, 6 and 7.

The operation of this machine to last a shoe is as follows: With motor 284 running, both treadles, which are located side by side, are depressed to separate the roll 10 and sleeve 12, to elevate the wiper 14 and to withdraw the edge gage 190 from operative position. The shoe on its last L is now presented to the machine, bottom up, with the lasting margin M of the upper U inserted between the roll 10 and sleeve 12 and the bottom of the shoe brought up so as to bear against the shoe rest 300, see Fig. 7. The treadle which controls the roll and sleeve and also the edge gage is next released, allowing spring 54 to pull the roll inwardly to the position shown in Fig. 6 and spring 180 to lower the bell-crank lever 98 and move cam bar 140 forwardly so that spring 104 may move the sleeve 12 in against the lasting margin of the upper and press it yieldingly against the rotating roll 10. The downward movement of the bell-crank lever 98 also moves the edge gage 190 forwardly into its operative position, the exact location being determined by the engagement of an adjustable stop screw 320, mounted on the frame, with an abutment 322 carried by the slide 144, see Fig. 1.

The rotating roll 10 now exerts a strong frictional drag on the inside surface of the lasting margin M which is being firmly, but yieldingly, pressed against it by the sleeve 12 under the action of spring 104. As already explained, because of the angle between the direction of movement of the roll and the direction in which this pressure is applied, spring 54 holds the roll fixed against outward movement. As will be apparent from an inspection of Fig. 5, due to the inclination, in a lengthwise direction, of the axis of the roll to the bottom of the shoe, which is maintained in a substantially horizontal plane as the shoe is presented to the machine by the operator, this frictional drag will exert on the upper a component of stress tending to pull the upper in a direction heightwise of the last L and also a component of stress at right angles thereto tending to move the upper in a direction parallel to the bottom of the shoe and hence to feed the shoe in a lengthwise direction. Referring to Fig. 6, it will be seen that since the sleeve extends around the roll, from the entering side to the leaving side, for an appreciable distance inwardly from the edge of the shoe bottom, the frictional drag of the roll will also exert a component of stress tending to draw the lasting margin of the upper in over the bottom of the shoe.

As will be apparent from an inspection of Figs. 4 and 6, the operative position of the edge gage 190 is such that the point of engagement of the lower end of the roll 10 with the upper, as it is pressed against the roll by the sleeve 12, is located a short distance outwardly from the edge of the shoe bottom. The axes of the roll and sleeve are inclined laterally of the shoe, see Figs. 3 and 4, so that as the upper is tensioned in a direction heightwise of the last it is also drawn outwardly and held away from the edge of the insole I thus avoiding any tendency to lift the edge of the insole from the bottom of the shoe. By giving the roll and sleeve this lateral inclination and adjusting the U-shaped member 30 about the axis of the shaft 60, the amount of which may be varied by loosening the setscrew 64, the upper is engaged lower down and very close to the plane of the insole. The conicity of the roll and sleeve permits such lateral inclination while still having the tensioning action on the upper exerted in a direction extending substantially heightwise of the last. The frictional drag on the upper will, of course, be slightly more effective at the lower end of the roll because of its greater peripheral speed. However, since this action is frictional, the top edge of the lasting margin can readily adjust itself to this condition, and this self-adjusting action can be augmented by modifying the shape of the operating surface 314, as already explained.

The action of the roll on the upper being wholly frictional, the operator holds the shoe against feeding for an instant and until the upper has been tightened by the heightwise component of the roll stress and then permits it to be fed along by the lengthwise or feeding component thereof. Just as soon as the shoe starts to move, under the feeding action of the roll drag, the other treadle is released, thus permitting spring 260 to lower the rotating wiper 14 and urge it yieldingly against the lasting margin of the upper as it emerges from the leaving side of the roll and sleeve. The operator now permits the shoe to be fed along by the roll drag while holding it against the edge gage 190 and swinging it so as to maintain substantially the same relationship of the edge of the shoe bottom to the operating parts as is shown in Fig. 6, i. e., with the entering side of the roll and sleeve just about at the edge of the shoe bottom and the leaving side well in over the shoe bottom.

With the modified sleeve construction, mentioned above and shown in Figs. 9 and 10, the action of the roll on the work is essentially the same, as just described. However, because of the decrease in the pressure applied to the lasting margin near the upper part of the roll, the major part of the frictional drag is applied low down on the lasting margin of the upper. This arrangement, as already explained, permits self adjustment of the outer edge of the lasting margin and prevents wrinkling. By providing a relieved portion at 315, the tensioned lasting margin is freed sooner for the action of the wiper while still being guided, and held, inwardly over the shoe bottom by the surface 315 and roll 10. As the shoe thus moves along, successive portions of the upper pass between the roll and sleeve where they are tensioned and drawn in over the bottom of the shoe. As the upper leaves the roll and sleeve it is pressed firmly against the shoe bottom and wiped inwardly by the wiper 14. The lasting margin of the upper having been previously coated with a suitable adhesive, the action of the wiper results in the upper being secured in lasted position on the insole I on the bottom of the shoe.

Referring to Fig. 6, it will be seen that the operating surfaces 214 of the wiper teeth 213 have a continuous in-wiping action, from the edge of the shoe bottom inwardly. Also, their inclined lead-

ing edges extend at an angle to their line of movement. Accordingly, the upper, as it leaves the roll 10 and sleeve 12, is smoothed down nicely and with a wiping action which has a component operating in the direction of feed. The edge gage roll is so located that it bears against the upper up close to the insole and just about below the point where the influence of the roll ceases. Thus the pressure of the edge gage roll 190 does not interfere with the tensioning of the upper but instead is applied at the proper point to hold the tensioned upper against loosening before it is engaged by the wiper. Also, with the edge gage roll contacting the edge of the shoe near the insole, it will hold the shoe properly positioned at all times as the lasting operation proceeds around the shoe.

The illustrated shoe is to be lasted all the way around its edge and when this lasting operation has been nearly completed the operator depresses the roll and sleeve-controlling treadle, just before the previously lasted portion of the upper is reached, thus separating the roll and sleeve, and continues the movement of the shoe past the wiper by hand to finish the lasting operation, after which the wiper is raised by depressing the other treadle. In using this machine to last a part of an upper between two portions that have been previously lasted, as, for example, to side-last a shoe that has been lasted at the toe and heel, the operator would start the lasting operation just as close to one of the previously lasted portions as possible and would finish when the other previously lasted portion was reached. The action of the wiper extends beyond both the starting and finishing points so that a smooth junction is obtained at each place. Also, the heightwise stress that is exerted by the roll on the lasting margin of the upper will be transmitted to adjacent portions of the upper on either side of the point at which the roll is at any instant operating. Accordingly, in operating all the way around the shoe, although the roll and sleeve are separated just before the lasting operation is completed by the wiper, as above explained, all parts of the upper will be tensioned and the same is true where the lasting operation is started and finished adjacent to previously lasted portions of a shoe.

As has been previously mentioned, the action of the roll 10 on the upper is wholly frictional so that the feeding movement of the shoe is entirely under the control of the operator. That is to say, he can hold the shoe fixed and let the roll slip over the upper, and he does so at the beginning of the lasting operation. Also, if during the progress of the lasting operation it is desired to slow down the lengthwise feeding movement of the shoe, as, for example, to prolong the heightwise pulling action of the roll at any particular point or to facilitate the passing of any irregularity on the shoe bottom by the shoe rest 300, the operator, by overcoming the feeding component of the frictional drag, can cause the roll to slip until the desired length of pull has been obtained or the irregularity on the shoe bottom passed. It will be understood that while the roll is thus slipping and the feeding of the shoe arrested, the heightwise component of frictional drag is still being exerted on the upper. The relative intensities of the tensioning stress component and the feeding stress component of the frictional drag on the upper may be varied to suit different operating conditions by loosening the nut 82 and changing the lengthwise inclination of the roll 10 and sleeve 12, as viewed in Fig. 5.

Fig. 8 shows a section of a shoe after it has been operated upon by this machine, but instead of the shoe shown in Figs. 5, 6 and 7 a different type of shoe is here illustrated. In this shoe the upper U' is sewed to a sock lining S and to a binding B previous to its being assembled on a last L'. After the last L' has been inserted into the upper U', a platform sole P is cemented in place with the binding in the dotted-line position shown. The inside face of the outstanding binding is now coated with a suitable cement and the shoe presented to the machine of this invention, in which the binding B is tensioned so as to bring it snugly in against the edge of the platform sole P and drawn in over the shoe bottom and pressed firmly into the full-line position shown. While, strictly speaking, the operation of this machine on a shoe of this type is not a lasting operation, no tensioning of the upper U' being involved, it is clear that the action of the roll 10 and sleeve 12 and also the wiper 14 on the binding B is in all respects analogous to lasting as this term is understood in the trade. Accordingly, in the appended claims, where the terms lasting and/or upper are used, it is intended that they be given a broad interpretation so as to apply to the tensioning, drawing-in, and wiping down on the shoe bottom of any shoe part, such as, for example, the binding of a platform sole.

When used for lasting the uppers, or platform bindings, of shoes the bottoms of which are not substantially flat but, instead, have curved portions, such as, for example, steep shanks, scoop heels, etc., the alternative rotary wiper construction shown in Figs. 12, 13 and 14 may be preferred. Referring to these figures, the wiper 410 comprises an elongated cylindrical member or roll provided with axially directed grooves 412 which interrupt and separate its peripheral surface into a plurality of sections 414 terminating in edges 413. This roll is journaled in ears 416, 417 extending downwardly from a bracket 418, at one end on a reduced portion 420 and at the other end by means of a stud 422. This bracket is secured by means of a nut 426, to a post 424, which is slidably mounted in an elongated boss 428 that projects downwardly from a mounting plate 430. The mounting plate is secured to a supporting arm 434, that corresponds to the wiper-supporting member 234, Figs. 2 and 4, and which is attached to the machine frame 16 by bolts 432, in such a way as to be angularly adjustable about the axis of the post 424 by means of screws 436 that are threaded into curved extensions on the arm 434 and which pass through arcuate slots 438 in the plate 430.

The bracket 418 is urged downwardly, yieldingly to hold the wiper against the shoe bottom, by means of a compression spring 440 which is interposed between the top of the bracket and an adjustable abutment nut 442 which is threaded onto the lower part of the boss 428 and provided with a lock nut 444. The post 424 extends some distance above a second boss 446 on the plate 430 and its upper end is threaded to receive a stop nut 448, and its companion lock nut 450, for limiting the downward movement of the bracket and wiper by the spring 440. The mounting plate 430 also carries a support 452 for a stop screw 454, provided with a locknut 456, for limiting upward movement of the wiper 410 and its supporting bracket 418.

The wiper is rotated, in the direction of the

arrow, Fig. 12, by means of the belt 270 which, through a pulley 458, drives a vertical shaft 460 that is connected to the wiper by means of bevel gears 462, 464. This shaft is journaled at its lower end in a bushing 466 in a bearing boss 468 formed on the bracket 418, a thrust collar 470 and anti-friction bearing 472 being provided to support the weight of the shaft and its pulley, and at its upper end in a bushing 474 which is mounted in a boss 476 that extends upwardly from one end of the plate 430.

In Fig. 12 the wiper 410 and its bracket 418 are shown in section on a plane passing through the axis of post 424 with the parts in front of the section shown in broken lines. These parts are, however, illustrated in full lines in Fig. 14, from which it will be seen that the ear 417 is removably secured to the bracket 418 by means of screws 480. This arrangement makes it possible to remove the wiper 410 by unscrewing the stud 422, taking off the ear 417, and loosening a setscrew 482 which holds the bevel gear 464 on the inner reduced end of the wiper.

In Fig. 12 shafts 424 and 460 are broken to permit this view to be foreshortened in its vertical dimensions. Also for the sake of clarity the slide 100 is shown only in part, and its guide block 102, together with other associated parts, are entirely omitted from Fig. 12. The position of the guide block is indicated by broken lines in Fig. 13 and it will be understood that the arm 434 is located above the block 102 and that this arm, as well as the rearwardly extending portion of the plate 430, which carries the bearing boss 476, are suitably shaped to provide adequate clearances for the sleeve-operating lever 116.

With this alternative wiper construction it has been found unnecessary to provide for elevating the wiper at the beginning of each lasting operation and, accordingly, no operating connections from the wiper elevating lever 250, Fig. 4, have been shown. It will, of course, be understood that, if desired, such a connection could be readily provided by simply extending a link between the bracket 418 and the end of the lever 250. Under some operating conditions it may be desirable greatly to limit, or even prevent, up and down movement of the wiper, and this may be done by appropriately setting the stop nut 448 and stop screw 454, and the pressure of the wiper against the work may, of course, be regulated by varying the force applied by the spring 440 through adjustment of the nut 442.

Referring to Fig. 12, the machine with this alternative wiper construction operates to tension, overdraw and feed the lasting margin M'' of the upper of a shoe on its last L'' in exactly the same manner as described above, and the wiper operates to lay the tensioned upper down on, and to press it against, the bottom of the insole I'', in substantially the same manner as the disc-like wiper 14, i. e., with a continuous wiping action directed inwardly from, and at an angle to, the edge of the shoe bottom. As can be seen in Fig. 13, the surfaces 414 with their leading edges 413 correspond in action to the surfaces 214 and leading edges of the disc wiper, that is to say, the leading edges, in each case, wipe the lasting margin inwardly and with a component of movement extending lengthwise of the shoe, so that the upper is smoothed down nicely. However, with the cylindrical roll-type wiper the component of movement lengthwise of the shoe is somewhat greater than that obtained from the edges of the inclined teeth of the disc wiper. On the other hand, the inward component of wipe of the cylindrical wiper is somewhat less than that of the disc wiper. By loosening the screws 436 the angularity of the wiper 410 can be changed so as to vary the relationship between its inward and lengthwise wiping components, as will be readily understood. For example, if the axis of the wiper is swung in a clockwise direction, as viewed in Fig. 13, the inward component will be diminished and the lengthwise component increased and an opposite effect will be produced if the axis of the roll is swung in a counterclockwise direction. Also, the grooves 412 may be cut at an angle to the axis of the wiper in such a way as either to increase or decrease the inward wiping component.

Aside from this flexibility of action inherent in the cylindrical roll-type of wiper there is another and equally important advantage obtained. As mentioned above, this type of wiper is especially adapted for operating on shoes having curved bottoms, and such a shoe is illustrated in Fig. 12. Reference to this figure will show how readily the small diameter cylindrical wiper fits onto a curved working surface without interfering at all with portions of the lasting margin that have been previously wiped down. It will also be apparent that in following a curved shoe bottom the shoe may be held to maintain its bottom, at the point of operation of the lasting roll 10, nearly horizontal, without disturbing the action of the wiper which can assume different vertical positions and thus accommodate itself to different operating levels.

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

1. A machine for lasting shoes comprising means constructed and arranged so to apply a frictional drag on the lasting margin of the upper of a shoe on a last as first to tension the upper heightwise of the last, then to draw the tensioned upper in over the bottom of the shoe and also to exert a stress on the upper tending to feed the shoe, and means for laying the tensioned upper down on the shoe bottom.

2. A machine for lasting shoes comprising means constructed and arranged continuously so to apply a frictional drag on the lasting margin of the upper of a shoe on a last as first to tension the upper heightwise of the last, then to draw the tensioned upper in over the bottom of the shoe and also to exert a stress on the upper tending to feed the shoe, and means for continuously laying the tensioned upper down on the shoe bottom.

3. A machine for lasting shoes comprising cooperating, relatively fixed and movable members for engaging between them opposite sides of the lasting margin of an upper of a shoe on a last, means for effecting movement of the movable one of said members relative to the other fixed member so as to exert a frictional drag on the lasting margin of the upper, said members being so constructed and arranged that such frictional drag has a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said members, and means for laying the lasting margin of the tensioned upper down on the shoe bottom.

4. A machine for lasting shoes comprising cooperating, relatively fixed and movable members

for engaging between them opposite sides of the lasting margin of an upper of a shoe on a last, means for effecting movement of the movable one of said members relative to the other fixed member so as to exert a frictional drag on the lasting margin of the upper, said members being so constructed and arranged that such frictional drag has a component of stress tending to tension the upper heightwise of the last and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said members, and means for laying the lasting margin of the tensioned upper down on the shoe bottom.

5. A machine for lasting shoes comprising a pair of complementally shaped arcuate, relatively fixed and movable members for engaging between them the opposite sides of the lasting margin of the upper of a shoe on a last, means for effecting movement of the movable one of said members relative to the other fixed member so as to exert a frictional drag on the lasting margin of the upper, said members being so constructed and arranged that such frictional drag has a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said members, and means for laying the lasting margin of the upper down on the shoe bottom as it leaves said members.

6. A machine for lasting shoes comprising a roll and a cooperating, relatively fixed pressure member for engaging between them the opposite sides of a lasting margin of the upper of a shoe on a last, means for rotating the roll relative to the pressure member to exert on the lasting margin of the upper a frictional drag, said roll and pressure member being so constructed and arranged that the frictional drag imposes upon the upper a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said roll and said member, and means for laying the lasting margin of the upper down on the shoe bottom.

7. A machine for lasting shoes comprising a driven roll for engaging the inside face of the lasting margin of the upper of a shoe on a last, a cooperating pressure member, shaped partially to surround the roll, for yieldingly holding the upper in engagement with said roll so that a frictional drag is exerted on the lasting margin of the upper by the roll, said roll and pressure member being so constructed and arranged that the frictional drag imposes on the upper a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said roll and said member, and means for laying the lasting margin of the upper down on the shoe bottom.

8. A lasting machine comprising a driven tapered roll for engaging the inside face of the lasting margin of the upper of a shoe on a last, a cooperating pressure member having a concave arcuately shaped operating surface for yieldingly holding the upper in engagement with said roll so that a frictional drag is exerted on the lasting margin of the upper by the roll, said roll and pressure member being so constructed and arranged that the frictional drag imposes on the upper a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between said roll and said member, and means for laying the lasting margin of the upper down on the shoe bottom.

9. A lasting machine comprising a driven tapered roll for engaging the inside face of the lasting margin of the upper of a shoe on its last, a cooperating pressure member having a cylindrical surface for yieldingly holding the upper in engagement with said roll to cause a frictional drag to be exerted on the lasting margin of the upper by the roll, said cylindrical surface being concentric with the axis of said roll so that the pressure of the upper on the roll decreases upwardly of the lasting margin of the upper and said roll and pressure member being so arranged that the frictional drag imposes on the upper a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper through said roll and member, and means for laying the lasting margin of the upper down on the shoe bottom.

10. A lasting machine comprising a driven tapered roll for engaging the inside face of the lasting margin of the upper of a shoe on a last, a cooperating pressure member having a concave arcuately shaped operating surface for yieldingly holding the upper in engagement with said roll so that a frictional drag is exerted on the lasting margin of the upper by the roll and another adjacent surface between which and the roll the lasting margin of the upper is confined, said roll and said pressure member being so arranged that the frictional drag imposes on the upper a component of stress tending to tension the upper heightwise of the last, a component of stress tending to draw the tensioned upper in over the bottom of the shoe and a component of stress tending to feed the shoe thereby to pass successive portions of the upper between the roll and member, and means for laying the lasting margin of the upper down on the shoe bottom.

11. In a lasting machine, the combination of a driven roll, and relatively fixed means for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the shoe bottom, in a direction generally lengthwise of the shoe, as the shoe is presented to the machine by an operator, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and a component of stress tending to feed the shoe.

12. In a lasting machine, the combination of a driven roll and means for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the shoe bottom, in a direction generally lengthwise of the shoe as the shoe is pre-

sented to the machine by an operator, and also laterally of the shoe bottom, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and outwardly from the edge of the shoe bottom, and a component of stress tending to feed the shoe.

13. In a lasting machine, the combination of a driven roll and a cooperating pressure member for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said pressure member having a curved operating surface extending partly around the roll and inwardly from the edge of the shoe bottom whereby the frictional drag exerted by the roll has a component of stress tending to draw the upper in over the shoe bottom.

14. In a lasting machine, the combination of a driven roll and a cooperating pressure member for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the bottom of the shoe, in a direction generally lengthwise of the shoe as the shoe is presented to the machine by an operator, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and a component of stress tending to feed the shoe, and said pressure member having a curved operating surface extending partly around the roll and inwardly from the edge of the shoe bottom whereby the frictional drag also has a component of stress tending to draw the tensioned upper in over the shoe bottom.

15. In a lasting machine, the combination of a driven roll and a cooperating pressure member for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the bottom of the shoe in a direction generally lengthwise of the shoe as the shoe is presented to the machine by an operator, and also laterally of the shoe bottom, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and outwardly from the edge of the shoe bottom, and a component of stress tending to feed the shoe, and said pressure member having a curved operating surface extending partly around the roll and inwardly from the edge of the shoe botom whereby the said frictional drag also has a component of stress tending to draw the tensioned upper in over the shoe bottom.

16. In a lasting machine having a driven tapered roll, and means for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the shoe bottom, in a direction generally lengthwise of the shoe as the shoe is presented to the machine by an operator, and also laterally of the shoe bottom, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and outwardly from the edge of the shoe bottom, and a component of stress tending to feed the shoe.

17. In a lasting machine, the combination of a driven tapered roll and a cooperating pressure member for holding the lasting margin of the upper of a shoe against the roll to cause the roll to exert a frictional drag on the upper, said roll being mounted with its axis inclined to the bottom of the shoe, in a direction generally lengthwise of the shoe as the shoe is presented to the machine by the operator, and also laterally of the shoe bottom, whereby the frictional drag exerted by the roll has a component of stress tending to tension the upper in a direction heightwise of the shoe and outwardly from the edge of the shoe bottom, and a component of stress tending to feed the shoe, and said pressure member having a curved operating surface extending partly around the roll and inwardly from the edge of the shoe bottom whereby the said frictional drag also has a component of stress tending to draw the tensioned upper in over the shoe bottom.

18. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a rotary wiper for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

19. A lasting machine comprising means for progressively and continuously tensioning the upper of a shoe heightwise of its last and for then drawing the lasting margin of the upper inwardly over the bottom of the shoe, and a disc-like rotary wiper for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

20. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a disc-like rotary wiper for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

21. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a substantially cylindrical rotary wiper for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

22. A lasting machine comprising means for progressively and continuously tensioning the upper of a shoe on its last and for drawing the lasting margin of the upper inwardly over the bottom of the shoe, and a disc-like rotary wiper having a radially ribbed operating surface for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

23. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a disc-like rotary wiper having a radially ribbed operating surface for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom.

24. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the

bottom of the shoe, and a substantially cylindrical rotary wiper having an axially grooved peripheral surface for laying the tensioned and overdrawn lasting margin of the upper down on the bottom of the shoe.

25. A lasting machine comprising means for tensioning the upper of a shoe on its last, and a substantially cylindrical rotary wiper having an axially grooved peripheral surface for laying the tensioned and overdrawn lasting margin of the upper down on the bottom of the shoe, said wiper being arranged with its axis at an angle to the edge of the shoe.

26. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, a rotary wiper adjacent to said tensioning and overdrawing means for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom, and means for yieldingly urging the wiper toward the shoe bottom.

27. A lasting machine comprising means for progressively and continuously tensioning the upper of a shoe on its last and for drawing the lasting margin of the upper inwardly over the bottom of the shoe, a rotary disc-like wiper adjacent to said tensioning and overdrawing means for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom, and means for yieldingly urging said wiper toward the shoe bottom.

28. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, a rotary disc-like wiper adjacent to said tensioning and overdrawing means for laying the tensioned and overdrawn lasting margin of the upper down on the shoe bottom, and means for yieldingly urging said wiper toward the shoe bottom.

29. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, a rotary substantially cylindrical wiper adjacent to said tensioning and overdrawing means for laying the tensioned and overdrawn lasting margin of the wiper down on the shoe bottom, and means for yieldingly urging said wiper toward the shoe bottom.

30. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a rotary wiper for laying the tensioned upper down on the bottom of the shoe, said wiper comprising a substantially cylindrical member mounted for rotation about an axis that is parallel to the plane of the shoe bottom.

31. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a substantially cylindrical member mounted for rotation about an axis that is parallel to the plane of the shoe bottom and inclined to the edge of the shoe.

32. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a substantially cylindrical member mounted for rotation about an axis that is parallel to the plane of the shoe bottom and inclined to the edge of the shoe, and means for varying the inclination of the axis of the wiper with respect to the edge of the shoe.

33. A lasting machine comprising means for tensioning the upper of a shoe on its last, a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a substantially cylindrical member mounted for rotation about an axis that is parallel to the plane of the shoe bottom and inclined to the edge of the shoe, and means permitting variation of the inclination of the axis of the wiper with respect to the edge of the shoe.

34. A lasting machine comprising a driven roll, a cooperating member for wrapping the lasting margin of the upper of a shoe on its last partly around the roll to cause the roll progressively and continuously to tension the upper on its last and to draw its lasting margin inwardly over the bottom of the shoe, and a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a member mounted for rotation about an axis that extends over and is parallel to the edge of the shoe bottom and constructed and arranged so as continuously to wipe the upper inwardly from the edge of the shoe with a component of movement extending lengthwise of the shoe.

35. A lasting machine comprising means for tensioning the upper of a shoe heightwise of its last, and a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a disc-like member mounted for rotation about an axis inclined to the plane of the shoe bottom and having a conical operating surface.

36. A lasting machine comprising means for tensioning the upper of a shoe heightwise of its last, and a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a disc-like member mounted for rotation about an axis inclined to the plane of the shoe bottom and having a ribbed conical operating surface.

37. A lasting machine comprising means for tensioning the upper of a shoe heightwise of its last, and a rotary wiper for laying the lasting margin of the tensioned upper down on the bottom of the shoe, said wiper comprising a disc-like member mounted for rotation about an axis inclined to the plane of the shoe bottom and having a conical operating surface formed by a plurality of inclined teeth.

38. A machine for lasting shoes comprising

means constructed and arranged so to apply a frictional drag on the upper of a shoe on a last as first to tension the upper heightwise of the last, then to draw the tensioned upper in over the bottom of the shoe and also to exert a stress on the upper tending to feed the shoe, means for laying the tensioned upper down on the shoe bottom, a shoe rest for engaging the bottom of the shoe to prevent heightwise movement thereof, and an edge gage for engaging the side of the shoe to determine its position widthwise with respect to said tensioning, overdrawing and feeding means.

39. A machine for lasting shoes comprising means constructed and arranged so to apply a frictional drag on the upper of a shoe on its last as first to tension the upper heightwise of the last, then to draw the tensioned upper in over the bottom of the shoe and also to exert a feeding stress on the upper, means for laying the tensioned upper down on the shoe bottom, and means for engaging the side of the shoe to determine the position of the shoe widthwise with respect to said tensioning, overdrawing and feeding means.

40. A machine for lasting shoes comprising means constructed and arranged so to apply a frictional drag on the upper of a shoe on its last as first to tension the upper heightwise of the last, then to draw the tensioned upper in over the bottom of the shoe and also to exert a feeding stress on the upper, and means for engaging the bottom of the shoe to prevent heightwise movement thereof under the action of said tensioning means.

41. A machine for lasting shoes comprising a roll and a cooperating, relatively fixed pressure member for engaging the opposite sides of the lasting margin of the upper of a shoe on a last, means for rotating the roll to exert on the upper a frictional drag for tensioning the upper heightwise of the last, an edge gage for engaging the side of the shoe to determine the position of the shoe widthwise with respect to said roll and said pressure member, and means for separating said roll and said pressure member.

42. A machine for lasting shoes comprising a roll and a cooperating pressure member for engaging the opposite sides of the lasting margin of the upper of a shoe on a last, means for rotating the roll to exert on the upper a frictional drag for tensioning the upper heightwise of the last, an edge gage for engaging the side of the shoe to determine the position of the shoe widthwise with respect to said roll and said pressure member, and means for separating said roll and said pressure member and for withdrawing said edge gage.

43. A machine for lasting shoes comprising cooperating members for engaging the opposite sides of the lasting margin of an upper of a shoe on a last and operable to tension the upper heightwise of the last, an edge gage movable from an inoperative position to an operative position for engaging the side of the shoe to determine the position of the shoe widthwise with respect to said cooperating members, and means for separating said members to permit the introduction therebetween of the upper, said separating means being arranged to move said edge gage to its inoperative position when said members are separated and to return it to operative position when the cooperating members are closed on the upper.

44. A machine for lasting shoes comprising cooperating, relatively fixed and movable members for engaging the opposite sides of the lasting margin of an upper of a shoe on a last, means for effecting movement of the movable one of said members relative to the other fixed member so as to exert a frictional drag on the lasting margin on the upper, said members being so constructed and arranged that such drag has a component of stress tending to tension the upper heightwise of the last and a component of stress tending to feed the shoe in a lengthwise direction, and means for changing the angular position of said cooperating members, with respect to the bottom of the shoe, as it is presented to the machine, to vary the relative intensities of said stress components.

45. A machine for lasting shoes comprising a roll and a cooperating, relatively fixed pressure member for engaging the opposite sides of the lasting margin of the upper of a shoe on a last, means for rotating the roll to exert a frictional drag on the lasting margin of the upper, said roll and pressure member being so constructed and arranged that such drag has a component of stress tending to tension the upper heightwise of the last and a component of stress tending to feed the shoe in a lengthwise direction, and means for changing the angular position of said roll and pressure member, with respect to the bottom of a shoe, as it is presented to the machine, to vary the relative intensities of said stress components.

EDWARD QUINN.
NAPOLEON A. MONFILS.