

950,701.

R. F. McFEELY.
PULLING OVER MACHINE.
APPLICATION FILED OCT. 31, 1901.

Patented Mar. 1, 1910.
5 SHEETS—SHEET 1.

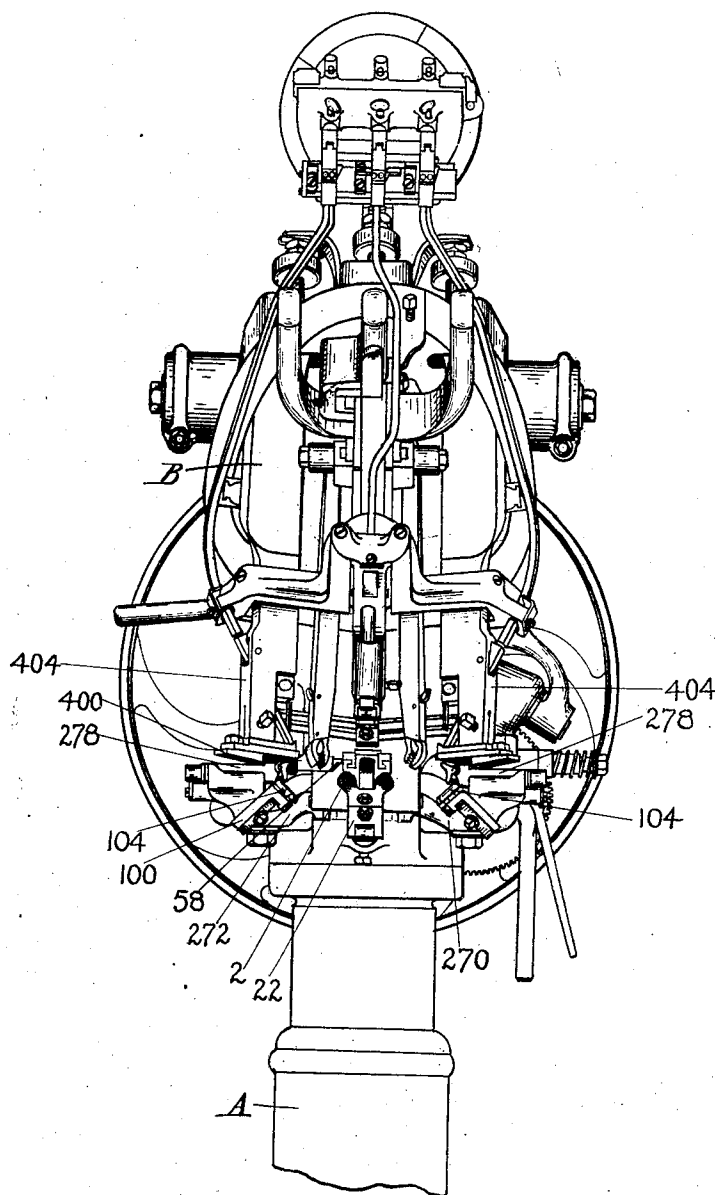


Fig. 1.

WITNESSES.

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6 SHEETS—SHEET 2.

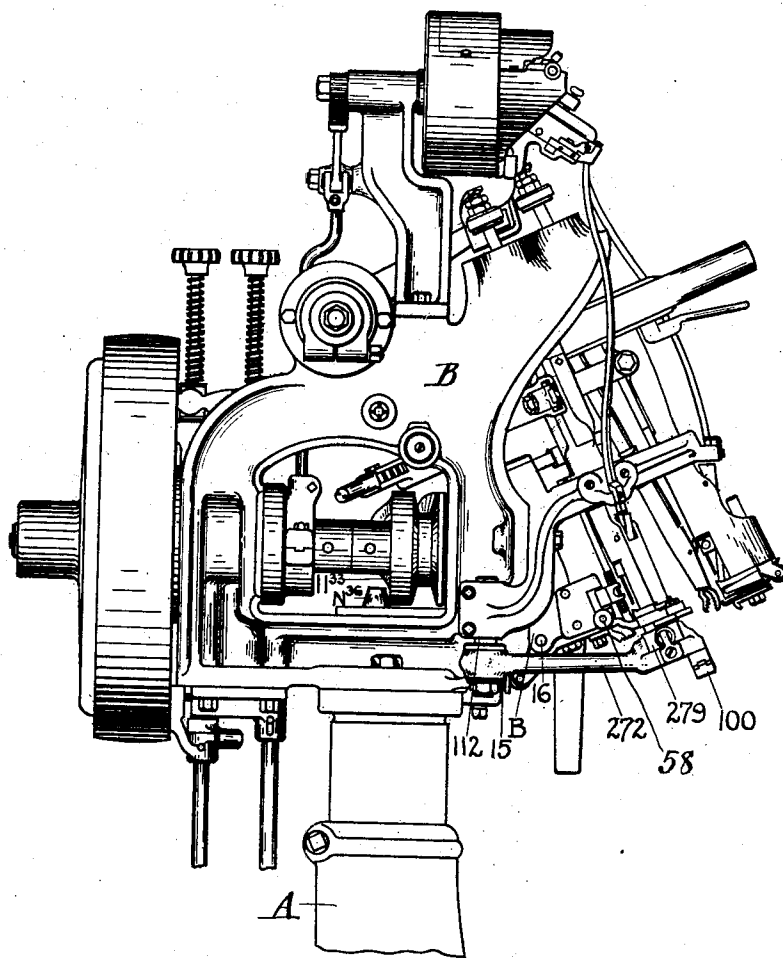


FIG. 2.

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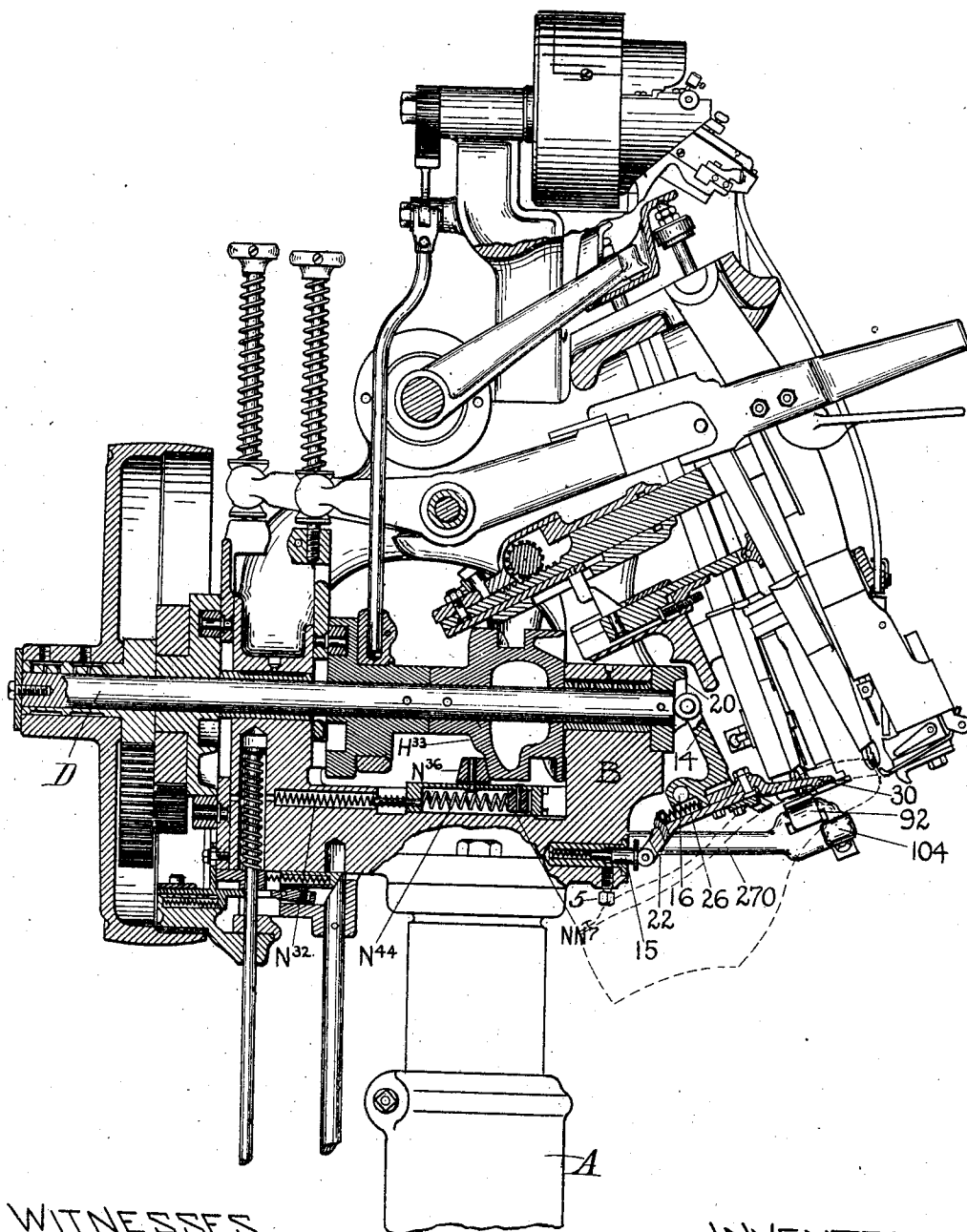
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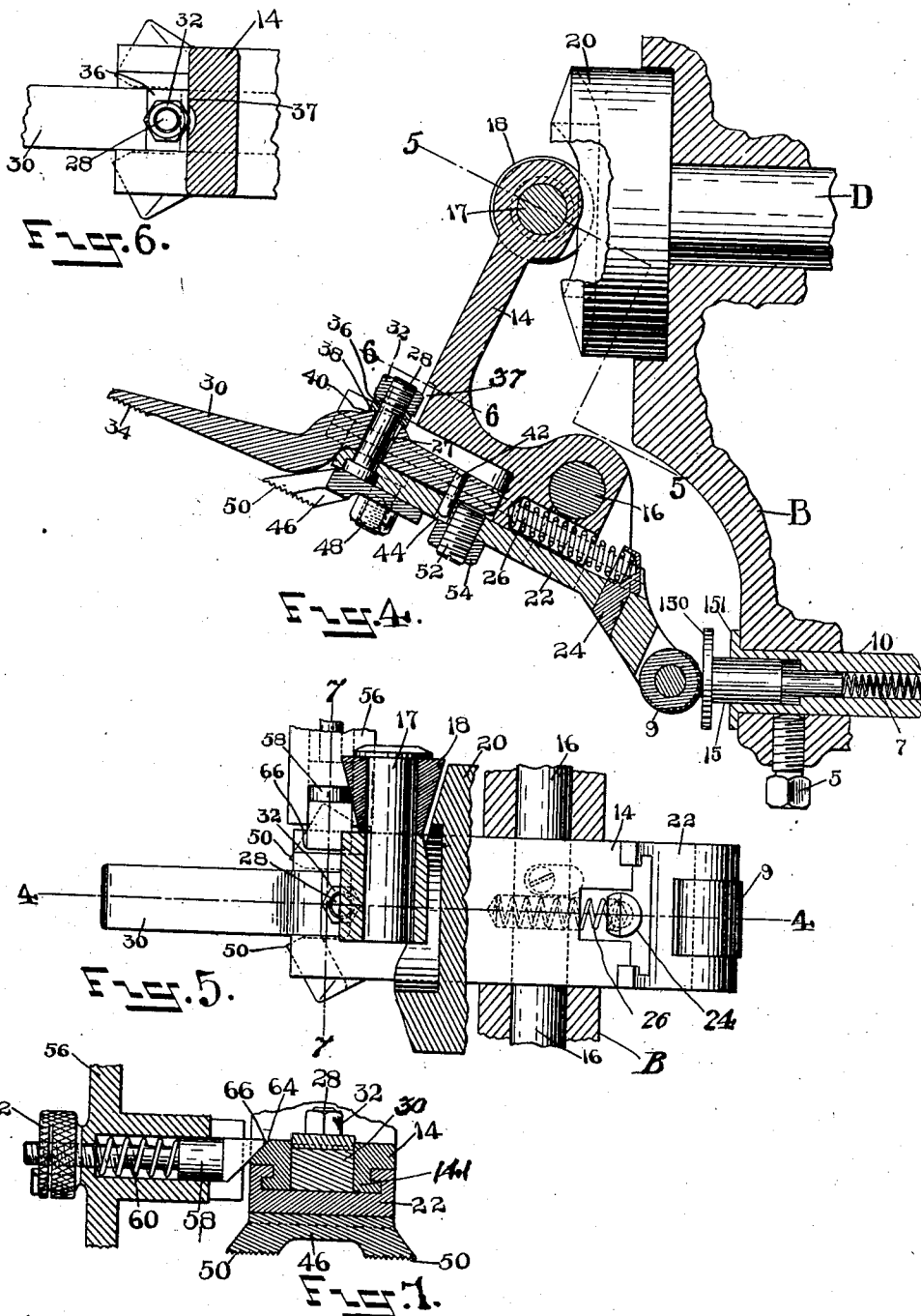
FIG. 3.

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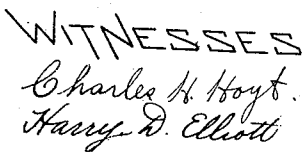


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5 SHEETS--SHEET 5.



INVENTOR
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UNITED STATES PATENT OFFICE.

RONALD F. McFEELY, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF BOSTON, MASSACHUSETTS, AND PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PULLING-OVER MACHINE.

950,701.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed October 31, 1901. Serial No. 80,704.

To all whom it may concern:

Be it known that I, RONALD F. McFEELY, of Beverly, in the county of Essex and Commonwealth of Massachusetts, have invented certain Improvements in Pulling-Over Machines, of which the following, read in connection with the accompanying drawings, is a specification.

This invention is represented as an improvement on the machine described in Letters Patent of the United States, No. 663,777, issued December 11, 1900, whereto reference is to be had for matters pertaining to said machine and not herein described. Many features of the invention are, however, applicable to other kinds of machines and the claims thereon should not, therefore, be limited to a pulling-over machine.

The work is usually prepared for the machine shown in said Letters Patent by applying to the last the upper, lining, heel-stiffener, and toe-stiffener, the upper being sometimes secured to the heel end of the last near the bottom by a tack. The innersole is then placed on the bottom of the last within the upstanding marginal portions of the upper, and in the better grades of work, such as Goodyear welt shoes, the innersole is usually adjusted accurately to the desired position on the last bottom and fastened by one or more tacks. The shoe so assembled is presented by the workman bottom upward with the innersole against the last supporter or "sole-rest," as it is herein designated, and the edges of the upper within the open jaws of the grippers which are located adjacent to the toe and sides of the last. When the machine is started the grippers are closed upon the edge portions of the upper and then are raised to pull the upper about the last, which is thereby pressed against the sole-rest.

A very important feature of this invention consists in providing means for relatively moving the last and the upper longitudinally during the operation of the machine. This movement will preferably be effected either during the last portion of the movement of the grippers for pulling the upper or at the end of such movement and results in straining the upper about the last in a direction at an angle to the direction of the normal upward strain effected by the grippers. This relative movement is ob-

tained in the illustrated embodiment of the invention by a forward movement of the last in the upper. The straining of the upper thus obtained is particularly desirable for the purpose of causing the upper engaged by the side grippers at the ball of the shoe to be pulled backwardly to fit it to the longitudinal curvature of the last along the base of the instep portion. It also increases the effect of the toe grippers in pulling the upper lengthwise over the top of the last. It will thus be seen that by moving the last longitudinally forward the grippers acting at the toe of the upper are caused to strain the upper forwardly while the grippers acting at the sides of the upper pull it backwardly. By this means a forward movement of the last into the pulled upper strains the upper thoroughly over the curved surfaces of the forward portion of the last to cause it to fit these surfaces perfectly.

In the embodiment of the invention herein shown the last is moved longitudinally by the sole-rest. To this end the sole-rest is mounted for movement lengthwise of the last, and, by its engagement with the inner-sole secured to the last, moves the last relatively to the stretched upper and to the grippers. As in the machine of my prior Letters Patent above-mentioned, means is provided for moving the sole-rest or last supporter downwardly, after the grippers have gripped the upper, for settling or sinking the last into the pulled upper. Preferably, and as herein shown, the longitudinal movement of the sole-rest is caused to take place during its downward movement so that the last is simultaneously moved downwardly and thrust endwise into the upper. Provision is made for adjusting the extent of the lengthwise movement of the sole-rest according to the work in hand.

In the event that the innersole is not fastened to the last the longitudinal movement of the sole-rest effects an endwise movement of the innersole upon the last bottom. This is of importance in the cheaper grades of shoes in which the stock is liable to be cut and fitted with less care than in the better grades, for it often happens that the innersoles are slightly shorter than the lasts upon which they are to be used. It is found that the best lasted shoes are obtained by having the innersole flush with the

toe end of the last in order that it shall extend to the toe end of the shoe and no slackness appear in the upper at the edge of the sole when the last is withdrawn. It is, however, the custom of most operators in assembling shoes to place the innersole with its heel end against the convenient abutment or gage presented by the upstanding portion of the heel-stiffener or the upper at the heel of the shoe, and it is advantageous to equip the machine with means for moving the innersole up to the toe end of the last in this class of work. A very important feature of the invention therefore consists in providing a pulling-over machine with means for positioning an innersole on a last. In the present embodiment of the invention the sole-rest is actuated to move the innersole, if it is loose on the last, after the grippers have drawn the upper taut at the toe so that the innersole is moved forward against the upper into position to insure a properly shaped corner when the upper is drawn over the bottom of the last and secured in the subsequent operations of the machine. This movement of the sole-rest is automatically effected and its extent is determined by the adjustment of the sole-rest actuating means.

Another feature of the invention consists in providing means for adjusting the sole-rest to adapt it to engage properly lasts having different longitudinal curvatures. In the construction shown as embodying this feature of the invention the sole-rest comprises members for engaging the innersole on the bottom of the last at the ball portion and a member for engaging it near the toe end, and means is provided for adjusting the rest to change the plane in which the members lie. In the present instance the toe member is mounted for tipping movement with relation to the side members and is arranged to be secured in the positions to which it may be adjusted.

Still another very important feature of the invention consists in providing novel means for holding the over-worked upper while the fastening tacks are being inserted. In the operation of the machine to which the present invention is shown as applied the grippers are moved inwardly over the bottom of the last to carry the marginal portions of the upper over the edge of the innersole after the straining of the upper about the last has been effected. The fastener inserting mechanisms follow the grippers into position for driving tacks into the overdrawn portions of upper for securing them to the innersole, but it is desirable that the grippers release the upper before the tacks are driven so that the upper may lie flat against the face of the innersole. This makes it necessary to provide means for holding the upper to prevent it from slip-

ping back between the time when it is released by the grippers and the time when the fastening tacks are driven. It sometimes happens that the edge portion of the innersole has been lifted in pulling the upper while in contact with it, and in such a case it is important that the innersole be pressed firmly down again upon the bottom of the last before the fastening tacks are driven. I have, therefore, provided means for clamping the upper against the side of the last so that it cannot slip back after it is released by the grippers and also means for pressing the innersole down on the last bottom and clamping the upper firmly to the innersole in position to receive the fastening tacks. In the preferred embodiment of this feature of the invention a single means is provided for engaging the shoe at the side and at the bottom. As herein shown, this is a member mounted for rocking movement and is normally held in position for engaging with the side of the shoe first, the point of contact thereafter moving upward along the side and over the edge of the last until finally the innersole is pressed down and the upper firmly clamped against it. It is of course not essential that the two clamping or pressing means be formed in a single member but this form of presser is of advantage as it constitutes a bell-crank lever, the long arm of which engages the side of the shoe as it is actuated into operative relation to the shoe and causes the short arm to apply considerable force in pressing and clamping the upper and innersole down on the bottom of the last. The presser is swiveled upon a yielding carrier and this mounting permits it to turn about an axis at right angles to that about which it rocks, whereby it is permitted to position itself according to the contour of the side of the last and also to yield under excessive pressure. In the present embodiment of the invention two pressers are employed for acting simultaneously on the opposite sides of the shoe in conjunction with the side grippers. They are arranged to be moved toward and from operative position and to be actuated automatically to clamp the upper as they are moved into bearing against the shoe. This same form of presser may be used at the toe as well as at the side of the shoe, but I prefer to employ at the toe another novel presser which constitutes the subject matter of an application for Letters Patent Serial No. 359,158.

Another feature of the invention consists in combining the presser of the present invention with a support for sustaining the last during the insertion of the fastening tacks. A presser and a last support are carried by an arm at each side of the last, one or both of said members being yieldingly mounted in the arm to permit them to move

relatively for adapting themselves to the contour of different lasts. I have provided improved mechanism for moving the arms carrying the last-supporters and the pressers toward and from the shoe whereby they are enabled to adapt themselves more perfectly to shoes differing in shape, as, for example, to right and left shoes.

Other features of the invention, including certain details of construction and combinations of parts, will be hereinafter described and pointed out in the claims.

Of the drawings,—Figure 1 is a front elevation of a machine embodying the invention in the best form now known to me. Fig. 2 is a left-hand side elevation of the machine. Fig. 3 is an elevation partly in section, showing the machine divided centrally. Fig. 4 is a sectional elevation of the last-engaging means and the member which carries it, the plane of section being the same as that in Fig. 3 and being indicated by the broken line 4—4 in Fig. 5. Fig. 5 is a plan of a section on line 5—5 of Fig. 4. Fig. 6 is a plan of a section on line 6—6 of Fig. 4. Fig. 7 is an elevation of a section on line 7—7 of Fig. 5. Fig. 8 is a plan view of the supports and the pressing and clamping mechanisms, hereinafter referred to, which operate at the sides of the shoe, together with the operating mechanism therefor. Fig. 9 is an elevation of a section on line 9—9 of Fig. 8. Fig. 10 is an elevation of a section on line 10—10 of Fig. 8 showing detail connected with that figure. Fig. 11 is a side elevation of the mechanism shown in Figs. 2 and 8, also showing the actuating cam therefor. Fig. 12 is an elevation of a section on line 12—12 of Fig. 11. Fig. 13 is a plan of a detail connected with Fig. 12. Fig. 14 is an elevation of a longitudinal central section of a modified form of the support for the last shown in Fig. 12.

The working parts of the machine are supported in a head B having a depending stem sustained in a standard A.

The construction and operation of the several mechanisms of the complete machine may be the same, except as hereinafter specified, as in the machine fully shown and described in Letters Patent No. 663,777 before mentioned. The grippers mechanism preferably, however, will be constructed as shown and described in my pending application Serial No. 141,384, filed January 31, 1903, which is a division from this application, and the mechanism for pressing the upper materials and innersole down on the toe of the last preferably will be constructed as shown and described in the before-mentioned application Serial No. 359,158 which is a division from this application. It is not necessary to enter into the construction of these mechanisms or of the machine as a whole for the purpose of understanding the

present invention, but reference may be had to said Letters Patent if a description of a complete machine is desired.

The sole-rest which in the present embodiment of the invention is employed for moving the last or the innersole longitudinally, as well as for settling or sinking the last into the pulled upper, is mounted in a carrier 14 by which it is moved for depressing the last. To this end the carrier is connected by a horizontal pivot rod 16 to the frame B of the machine, as shown in Figs. 2, 3, 4, and 5, and comprises an upwardly extending arm provided on its end with a stud 17 carrying a roll 18 in position to be engaged by a face cam 20 on the main driving shaft D of the machine. The cam operates at the proper time for rocking the carrier 14 about its pivotal connection at 16 with the machine frame to actuate the sole-rest for sinking the last into the pulled upper.

The carrier is held in position for the roll 18 to receive the action of cam 20 by a spring 7 acting through a plunger 15, a roll 9, a part 22, and a spring 26 stiffer than the spring 7. A spring-pressed stop 58 is mounted in a bracket 56 in the machine frame, as shown in Figs. 1, 2, and 7. This stop is arranged to be engaged by the carrier 14, as shown in Fig. 7, and determines the uppermost position to which the spring 7 will move the carrier. In this, the normal position of the carrier, the roll 18 is spaced a short distance from the low part of the cam 20 so that it does not receive the full throw of the cam for sinking the last into the upper. The position of the roll relative to the cam 20 may be varied to increase or diminish the sinking movement by adjusting the stop 58, which has a beveled face 66 for engaging a similar face 64 on the carrier, as shown in Fig. 7. The stop is provided with a check nut 62 for preventing loss of adjustment.

The normal position of the sole-rest when a shoe is to be presented is such that the edge portion of the upper will extend into the open jaws of the grippers when the shoe is pressed against the sole-rest. It sometimes occurs that uppers are cut so small that the edge does not extend far enough into the grippers to be grasped properly by them. The workman may in such cases apply sufficient pressure upwardly against the shoe to force the stop backward against the tension of the spring 60 until the altitude is attained for such an upper to be grasped properly by the grippers.

The carrier 14 is provided on its under side with a guide rib 141 which is undercut at its sides and extends longitudinally of the machine approximately at right angles to the arm 14. This guide rib fits a correspondingly shaped groove in the upper face of a part 22, before mentioned, which forms

the shank of the endwise movable sole-rest. The shank supports on its upper side a forwardly and downwardly extending arm 30 and on its lower side a member 46 having laterally extending arms. The arms have roughened feet or contact surfaces 34, 50, 50 for engaging frictionally with the innersole on the last bottom. The arrangement of the feet of the sole-rest relative to the bottom of the shoe corresponds in a general way to that of the grippers in that they engage the shoe near the toe end and near the sides of the innersole.

For the purpose of adapting the sole-rest to engage properly at the toe and sides of the innersole on last bottoms varying in longitudinal curvature provision is made for adjusting the forwardly extending arm 30 up and down and thus changing the plane in which the feet of the sole-rest lie. The arm 30 is attached to the shank 22 by a bolt 28 extending upward through the shank and through an enlarged opening 27 in the arm. The bolt is provided with a nut 32 and intermediate the nut and the arm is a washer or collar 36 having a concave lower face to engage a convex face 40 on the arm 30. This connection permits the arm 30 to be rocked or tipped for raising or lowering the foot 34 and enables the arm to be clamped to the shank for securing it in adjusted position. The arm is provided near its rear end with a pin 42 extending into a hold 44 to prevent axial movement of the arm about the bolt 28. To assist in adjusting the arm and holding it in adjusted position a stop-screw 52 passes through the shank 22 in position to engage the lower face of the arm at its rear end. A locking nut 54 secures the bolt in adjusted position.

The sole-rest may be moved longitudinally by any suitable means. As herein shown, this is effected by actuating mechanism the essential feature of which consists in means for effecting and controlling movement of the sole-rest in the carrier 14 as the latter is turned about the pivot 16. The means for effecting and controlling this movement includes an adjustable member 10 having a face 151 forming an abutment or stop for the head 150 of the spring-pressed plunger 15 before mentioned. This arrangement insures that when the plunger 15 has been forced back against the member 10 in the first part of the rocking movement of the carrier about its pivot 16, the sole-rest shall be moved longitudinally relative to the carrier during the remainder of the rocking movement. The extent and direction of this longitudinal movement will be governed by the position and the contour of the face of the head 150 which may be suitably formed for imparting any desired extent or direction of movement to the sole-rest. In the present instance the acting face of the

head 150 is plane and it is arranged at an angle to the path of the roll 9 about the pivot 16 such that the sole-rest is advanced when the carrier is rocked downward by the cam 20 for sinking the last into the pulled upper. The member 10 may be adjusted for varying the time when the head 150 shall become effective for moving the sole-rest and thereby varying the extent of such movement. Thus the member may if desired, be positioned with its face 151 against the head 150, in which case the sole-rest will be moved longitudinally during the entire rocking movement of the carrier 14. A binding screw 5 secures the member 10 in adjusted position. The spring 26, before mentioned, is contained in a socket in the carrier 14 and acts against a stud 24 on the shank 22 of the sole-rest to hold the rest normally in its rearmost position in the carrier while permitting it to be advanced as described. The movement of the sole-rest by the spring is limited by the engagement of the collar 36 or the nut 32 with the adjacent face 37 of the carrier, as shown in Fig. 4. It is to be understood that the spring-pressed plunger by which the sole-rest is elevated is associated with the means for longitudinally moving the sole-rest merely as a matter of convenience in construction and that means different from those herein shown and entirely independent of each other may be employed for giving these two movements to the sole-rest.

The mechanism employed at the sides of the shoe for pressing the upper against the sides of the last and pressing and clamping the innersole and upper against the bottom of the last may be carried by any suitable supports, but are herein shown as carried by the arms 270, 272, which also carry the supports for sustaining the shoe while the fastening tacks are being inserted. These arms are similar in construction and operation to those which carry the last-supporting devices in my before-mentioned Letters Patent and they are moved toward and from the last from opposite sides after the grippers have drawn the upper over upon the last bottom and prior to the movement of the fastener and driver carrying arms inward over the last to position for inserting the tacks. The arms 270, 272 are pivotally supported by studs 112, 114 which are vertically adjustable in split bearings 120 in the machine frame, being clamped in position in these bearings by bolts 116, 118, as shown in Fig. 8. The arms may thus be vertically adjusted to adapt them for use with lasts of different sizes or for other purposes. The arms are formed as bell-crank levers having toothed engagement, as shown in Fig. 8, with bars N²⁴, N²⁶. The rear portions of the bars extend through guideways in a slide N²⁸ and are encircled by spiral springs N⁴⁰, N⁴⁴.

The springs bear at their ends against collars N^{33} , N^{35} confined on the screw-threaded ends of the bars by nuts N . The springs abut at their front ends against flanged collars N^{29} , N^{31} , see Figs. 8, 9, and 10. The collars N^{29} , N^{31} receive the forked lateral arms of an equalizing device NN^7 which is fulcrumed on the stud N^{27} in the slide N^{26} , as shown in Figs. 8 and 9. The forked ends of the equalizing device are confined between the flanges of the collars N^{29} , N^{31} and the flanges of other collars N^{29x} , N^{31x} , the collars N^{29x} , N^{31x} abutting at their front ends against shoulders N^{40} on the bars N^{24} , N^{28} , as shown in Fig. 10. The collars N^{29x} , N^{31x} are long enough, as shown in Fig. 10, to provide a clearance space between their flanges and the front end of the slide N^{26} , whereby the equalizing device is permitted to turn for moving one bar N^{24} or N^{28} ahead of the other. The slide N^{26} is movable in a guideway N^{30} in the frame of the machine and is provided on its upper face with a stud N^{34} bearing a roll N^{36} arranged to engage with a face cam H^{33} mounted on the main driving shaft D , see Fig. 3. The slide is acted upon by a spring N^{32} for holding the roll N^{36} in contact with the cam which moves the slide rearwardly at the proper times for swinging the front ends of the arms 270, 272 toward the shoe. The movements of the slide are communicated to the arms through the equalizing device NN^7 , as described, which permits either arm 270 or 272 to come to rest after the pressing device engages the shoe while the slide N^{26} continues to move until the pressing device carried by the other arm has also come into bearing with the shoe, whereupon both arms will be moved together for causing the devices carried by them to act equally on the two sides of the shoe. This provision permits the arms to adapt themselves perfectly to lasts differing in shape, as, for example, to what are known as "crooked" lasts in which the shape of the right one is very different from that of the left one. It will be understood that the movement of the arms toward each other is transmitted by the slide N^{26} and the equalizing device through the springs N^{40} , N^{44} , so that no adjustment is necessary for adapting the arms 270, 272 to operate with shoes of slightly different sizes. For adapting the arms to operate with shoes varying greatly in size the nuts N , N may be adjusted on the bars N^{24} .

The pressing and clamping mechanism carried by the arm 272 is illustrated in detail in Figs. 8, 11, 12, and 13 of the drawings, and this mechanism will be explained in connection with these figures. The end portion of the arm is transversely grooved to receive an endwise movable slide 278 provided near its lower side with laterally extending guide ribs 279, the groove in the

arm being shaped to receive these ribs. The slide is provided with a chamber containing a spring 80 which surrounds a headed guide rod 82. The spring is confined under tension in the slide by a plate 84 extending through the slotted bottom of the slide and secured to the arm 272 by a bolt 87. The spring holds the slide normally pressed inward with its shoulders 280 abutting against the faces 281 on the arm. The slide 278 has a concave inner end face provided with a rib 79 undercut on its upper and lower faces to fit a correspondingly-shaped groove in the face of the segment-shaped block 86. The block 86 is free to slide on the rib about a vertical axis, this movement being limited by stops 91, 93 on the slide, as shown in Fig. 13. The segmental block has connection through a horizontal pivot 90 with the pressing and clamping member 92. This member is shaped as a lever having a depending vertical arm 95 and a relatively short horizontal arm 97. The member 92 is free to rock through a small arc about its pivot 90 and is normally held by a spring 94 in the position shown in Fig. 12 with its depending arm pressed away from the block 86 and its horizontal arm tipped upward. By means of this construction the pressing and clamping member 92 has universal movement with relation to the slide 278. This permits it to position itself about the vertical axis of the segmental block 86 according to the contour of the side of the shoe engaged by it when the arm 272 is moved toward the shoe, and to engage the side of the shoe first with its depending arm 95 and rock about the horizontal pivot 90. This rocking movement causes the point of engagement with the upper at the side of the shoe to move upwardly and the area of pressing contact to spread toward the edge of the last until the lateral arm 97 is brought down to press the innersole on the last bottom and clamp the upper against the innersole. The pressing and clamping mechanism carried by the arm 270 is of the same construction as that carried by the arm 272 and these arms are actuated to bring the two mechanisms into engagement with the opposite sides of the last at the same time, as heretofore explained.

The grippers are timed to release the upper and be withdrawn after the pressing and clamping members have come into bearing with the shoe for securing the upper against slipping back. The fastener and driver carrying arms are moved into operative position as the grippers are withdrawn. For the purpose of determining the distance from the edges of the last at which the tacks will be inserted the fastener carrying arms 404 operating at the sides of the last are provided on their lower faces with adjustable blocks 400 each adapted to engage a

coöperating shoulder 401 on the slide 278, thus stopping the fastener carrying arm in position to have the tacks inserted at the desired distance from the edge of the last.

- 5 The last-supporting devices for sustaining the last against the impact of the tack drivers comprise blocks 100 adjustably secured to the arms 270, 272 by bolts 102, as shown in Fig. 12. Each block is provided
10 with a contact member 104 pivotally connected to it by a pintle 106 for making supporting contact with the underside of the last. This manner of supporting the contact member enables it to rock and adjust
15 itself to the contour of the last. The rocking movement is limited by shoulders 108, 110 on the block 100, as shown in Fig. 8.

- The spring 80 permits the pressing and clamping device to yield backwardly with
20 relation to the last-supporting device. This enables the relative positions of these devices to be changed by contact with the shoe, whereby they may adapt themselves to the contour of the shoe. If desired, the
25 last-supporting device might be yieldingly mounted in the arm 272, as shown in Fig. 14, instead of yieldingly mounting the part 278 which carries the pressing and clamping device; or, if preferred, both these devices may
30 be yieldingly mounted.

- In the construction shown in Fig. 14 the last-supporting device is yieldingly mounted, the stem 122 thereof being arranged to slide freely through a guideway in a bracket 124
35 fixed to the arm 272 by a bolt 126. The last-supporting device is acted upon by a spring 128 contained within the stem 122 and surrounding a guide rod 130 freely movable through an aperture in the lower end
40 of the bracket. The spring abuts at its lower end against the wall of the bracket for normally holding the supporting device pressed upward, but permits said device to be depressed by contact with the last. The
45 amount of movement of said supporting device in the bracket is limited by a stud 132 carried by the bracket and extending into a slot 134 in the stem of the supporting device. The normal position of the supporting
50 device may be adjustably determined in this construction by nuts 136, 138, carried by the screw-threaded lower end of the rod 130 and arranged to engage the lower end of the bracket.

- 55 In the operation of the machine to which the present invention has been applied, the shoe, having the innersole and upper materials assembled on the last as described, is presented by the workman with the inner-
60 sole against the sole-rest, as shown in dotted lines in Fig. 3. If the upper is of usual or normal size the upstanding edge portions of it will extend into the open jaws of the grippers. If the upper should be small so
65 that it does not extend into the grippers far

enough to be grasped properly the workman may, by applying sufficient pressure upward, lift the sole-rest against the action of the spring-pressed stop 58 until the upper extends the desired distance into the grip- 70 pers. The machine is then started, whereupon the grippers close upon the upper and rise to pull it about the last. While the grippers are moving to pull the upper, or at the completion of this movement, the cam 75 20 engages the carrier 14 and actuates it for shifting the relative positions of the sole-rest and grippers for sinking the last into the pulled upper. During the latter part of the movement of the carrier 14 for sink- 80 ing the last the part 150 comes into engagement with the head 151 of the member 10 and causes the sole-rest to be moved longitudinally in its carrier. The time at which this movement of the sole-rest in the carrier 35 takes place is of course dependent on the adjustment of the member 10 and may, if desired, be co-extensive with the time of the sinking movement. If the innersole is fastened to the last, this movement of the sole- 40 rest effects a longitudinal movement of the last for thrusting it forwardly into the upper and causing the upper to be strained for fitting it to the curved surfaces of the last, particularly near the base of the instep. 45 If the innersole is loose on the last the longitudinal movement of the sole-rest forces the innersole forward over the last bottom to position it flush with the toe end of the last and against the upstanding portion of 100 the upper held by the toe grippers. The machine thereafter comes to rest for the purpose described in my before-mentioned Letters Patent.

It will be understood that the cams of the 105 machine are so timed that the toe grippers first pull the upper, straightening it lengthwise and tensioning it lightly; then the side grippers pull the upper transversely, drawing it down upon the top of the last over the 110 ball; then the bottom rest is moved downwardly to depress the last into the upper which is held under tension by all the grippers. Thus far the machine operates as already explained in my prior Letters Patent. 115

In the last part of its downward movement the bottom rest is now given its forward displacement lengthwise of the last by which it will force the last forwardly with 120 relation to the grippers and, while increasing the lengthwise pull of the toe gripper cause a backward pull by the side grippers. This provides a step by step stretching in which the directions of pull are chosen in an order to give the best drafting of the upper 125 to the last and the pause which follows in the machine's operation gives opportunity for the upper to set in its stretched condition before it is overlaid and tacked.

When the machine is restarted the grip- 130

pers are moved inwardly over the bottom of the last to carry the edge portions of the upper into position to be secured to the innersole, and the cam H²³ moves the slide X²⁰ for swinging the arms 270, 272 about their pivots and bringing the devices for pressing and clamping the upper, together with the last-supporting devices, into engagement with the shoe. In this latter movement the lower portions of the arms 95 are the first parts of the pressing and clamping devices to engage the shoe, and as the movement of the arms 270 and 272 toward the shoe continues the devices 92 are rocked about their pivots 90, the points of engagement with the upper moving toward the edge of the last. The arms 97 by this movement are tipped downwardly and press the edges of the innersole down firmly on the last if the innersole has been lifted by the stretching upper, and finally clamp the upper securely against the innersole. The peculiar form of the pressing device 92, similar to a bell-crank, causes the clamping arm 97 to be actuated by the contact of the shoe with the pressing arm 95, and as the pressing arm is materially longer than the clamping arm the latter is actuated with considerable power and securely holds the upper from slipping back. The grippers release the upper as the clamping arms 97 come into holding engagement with it and then are moved out of the way to permit the vertical arms carrying the tacks and drivers to move into position for the tacks to be driven to secure the pulled-over upper to the innersole. The adjustable stops 400 on the lower faces of these arms meet the cooperating shoulders on the slides 278 for insuring that the arms shall be stopped in position to drive the tacks at the desired distance from the edge of the last. After the tacks have been driven the tack and driver carrying arms and also the arms 270, 272 are moved outwardly to their normal positions for permitting the removal of the shoe from the machine, and the cam 20 allows the sole-rest carrier 14 to be raised to its normal position by the spring 7 and the sole-rest to be restored to its retracted position by the spring 26.

Having indicated the nature and scope of the invention and fully described a construction embodying the same, I claim as new and desire to secure by Letters Patent of the United States:—

1. In an automatically operating machine for working an upper over a last, means to engage the last, means to engage the upper at opposite sides of the last, means for shifting the relative positions of said last-engaging means and said upper-engaging means in order to sink the last into the upper, and means to change the relative positions of said last-engaging means and said shifting means in a direction transverse to

the first-mentioned movement during the sinking operation.

2. In an automatically operating machine for working an upper over a last, means to engage the last, means to pull the upper over said last, means for shifting the relative positions of said last-engaging means and said upper pulling means in order to sink the last into the pulled upper, one of said means being also adapted for movement whereby to change position in relation to said shifting means during the sinking operation.

3. Means to engage a last, means to engage an upper at opposite sides of the last, means to shift the relative positions of said last-engaging means and said upper-engaging means for sinking the last into the upper, and separate means to move the last-engaging means in the direction of the length of the last during the sinking operation.

4. Means to engage a last, means to engage an upper, means to actuate said last-engaging means for sinking the last into the upper, and means for supporting said last-engaging means for separate movement while the upper is under strain in a line angular to the line of its movement for the sinking operation.

5. In a machine of the class described, automatic means for sinking a last into a pulled upper, and means for simultaneously changing the relative positions of the last and the sinking means in a line running longitudinally of the last.

6. In a machine of the class described, means for pulling an upper about the sides of a last, means for sinking the last into the pulled upper, and means for changing the relative positions of the last and the pulling means for causing the upper to be strained backwardly along the sides of the last.

7. In a machine of the class described, means for engaging a last, means for engaging an upper to strain it about the last, a carrier for the last-engaging means, and means for actuating the carrier relatively to the upper-engaging means for sinking the last into the pulled upper, said carrier being provided with a guideway in which said last-engaging means is arranged for movement in a line substantially parallel with the plane of the last bottom while the upper is under strain.

8. In a machine of the class described, means for pulling an upper over a last, last-engaging means, a carrier in which the last-engaging means is movably mounted, and means to actuate the carrier for sinking the last into the upper, said machine having provision for moving the last-engaging means in its carrier during the sinking operation.

9. In a machine of the class described, a pivotally mounted carrier, a cam for rock-

ing the carrier, a sole-rest movably mounted in the carrier, and means arranged for engagement with the sole-rest for moving it in the carrier when the carrier is rocked.

5 10. In a machine of the class described, means for engaging an upper, a sole-rest to be engaged by the last bottom, a carrier in which the sole-rest is mounted for movement therewith, and means for rocking the carrier
10 to cause it to shift the relative positions of the last and upper-engaging means, in combination with means arranged to become operative during the rocking of the carrier for moving the sole-rest in the carrier.

15 11. In a machine of the class described, the combination with means constructed and arranged for engaging an upper at the side of a last for pulling the upper over the last, of means for automatically moving the last
20 and the pulling means relatively lengthwise of the last during the pulling operation.

12. In a machine of the class described, means to engage an upper, and means to sink the last into the upper and to actuate
25 the last longitudinally during the sinking movement.

13. Means to pull an upper over a last, means to engage the last, and means for changing the relative positions of said pulling means and last-engaging means to move
30 the last downwardly and for effecting relative movement of the last and upper to advance the last toward the toe of the upper, said last-mentioned means comprising a
35 member arranged for adjustment to vary the extent of said advance movement.

14. In a pulling-over machine, means for engaging a last, means for pulling an upper over the last, means to actuate said engaging
40 means for sinking the last into the pulled upper, said machine having provision for also actuating the engaging means to move the last endwise in the upper.

15. In a pulling-over machine, means for engaging a last, means for pulling an upper over the last, means to actuate said last-engaging means for sinking the last into the
45 pulled upper, and means to actuate it for moving the last endwise in the upper, one of said actuating means being arranged for adjustment to vary the extent of one of said
50 movements of the last-engaging means.

16. In a pulling-over machine, means for engaging an upper at opposite sides of a
55 last having an insole on its tread face, and mechanism for actuating the engaging means to pull the upper over the last, in combination with means for adjusting the innersole with relation to the upper.

60 17. In a pulling-over machine, means for pulling an upper simultaneously at opposite sides of a last, means for engaging an innersole on the tread face of the last, and mechanism for actuating said engaging means to

move the innersole in a plane substantially 65 parallel with its side faces with relation to the upper.

18. In a pulling-over machine, means for pulling an upper simultaneously at opposite
70 sides of a last, a rest for supporting the last against the strain of the pulling means, and means for actuating the rest to move the innersole on the tread face of the last.

19. In a pulling-over machine, means for pulling an upper over a last simultaneously 75 at opposite sides of the last, combined with means for positioning an innersole properly upon the last.

20. Means for pulling an upper over a last at opposite sides of the shoe simultaneously, 80 in combination with automatic means for moving an innersole upon the last.

21. Means for pulling an upper at opposite sides of a shoe over a last having an innersole on its tread face, in combination 85 with automatic means for relatively moving the last and the innersole longitudinally of the last.

22. In a pulling-over machine, means for pulling an upper over a last at opposite sides 90 of the last, and a rest for engaging the innersole of the shoe, in combination with automatic mechanism for actuating said rest to move the innersole with relation to the last.

23. In a pulling-over machine, means for 95 pulling an upper over a last, in combination with means for moving an innersole with relation to the last, said last-mentioned means being adjustable to vary the extent of the movement imparted by it. 100

24. In a pulling-over machine, means for pulling an upper over a last at opposite sides of the last, in combination with a rest for engaging an innersole, means for actuating said rest to move the innersole over the 105 last, and means for restoring said rest to normal position.

25. A pulling-over machine having means for pulling an upper over a last and having provision for sinking the last into the pulled 110 upper, in combination with means for moving an innersole over the last.

26. In a machine of the class described, grippers for engaging an upper on opposite sides of a last, a rest between said grippers 115 for engaging the forward portion of the last bottom at a plurality of points separated by a substantial distance, and means to fix said rest with its acting face in positions of different inclination to vary the plane of the 120 last bottom.

27. In a machine of the class described, means for engaging the last bottom, comprising a member for resting upon the last near its toe end, and a member for engaging 125 the fore part of the last near its opposite side edges, combined with means for relatively adjusting said members to adapt the

engaging means to lasts having differences in the longitudinal curvature of their fore parts.

28. In a machine of the class described, means for engaging the bottom of a last, comprising a member for resting upon the end portion of the last and arms for resting upon the last near its sides, a support upon which said member is mounted for adjustment toward and from the plane of the last bottom, and means for securing said member rigidly in adjusted position, said machine having provision for allowing a limited yielding movement to the support and last engaging means.

29. In a machine of the class described, the combination with grippers for pulling the upper and means for engaging the last bottom, of means, comprising a spring-pressed plunger mounted in a fixed support and having an inclined face engaging a similarly inclined face on the last-engaging means for normally holding the last-engaging means in one relation to the grippers, said holding means being arranged to permit the last-engaging means to be manually moved to a different position.

30. A machine of the class described, comprising means to pull an upper over a last, means to engage the last, and means for changing the relative positions of said pulling means and last-engaging means to move the last downwardly into the upper, said machine having provision for effecting relative movement of the last and upper to advance the last toward the toe of the upper.

31. In a pulling-over machine, mechanism for pulling an upper over a last, combined with means for clamping the pulled-over upper against the innersole, and mechanism for securing the upper to the innersole.

32. In a pulling-over machine, mechanism for pulling an upper over a last, and means for clamping the pulled-over upper against the innersole, combined with means for adjustably supporting the clamping means, and mechanism for fastening the upper to the innersole.

33. In a pulling-over machine, mechanism for pulling an upper over a last, a contact member supported to permit universal movement, means to actuate the contact member for clamping the upper against the innersole, and mechanism for fastening the upper to the innersole.

34. In a pulling-over machine, the combination with means for pulling an upper over a last, of means comprising contact faces set at an angle to one another for pressing the upper against the side and the bottom of the last and holding it against said two faces of the last simultaneously, and actuating mechanism therefor.

35. In a pulling-over machine, a presser mechanism, means to support it, and means

for actuating it whereby said mechanism is caused to engage an upper first at the side of the last and then, while continuing the lateral engagement, press the upper downwardly upon the bottom of the last.

36. In a pulling-over machine, the combination with means for pulling an upper, of a presser, means to support it and means for actuating it whereby it is made to work the pulled upper over the last bottom and then clamp it on the innersole, and mechanism for applying fastening means to secure the upper in overworked position.

37. In a pulling-over machine, mechanism for pulling an upper over a last, combined with means automatically actuated by its engagement with the shoe for pressing the overturned portion of the upper against the innersole.

38. In a pulling-over machine, a support having a rib, a segment piece having a groove to receive said rib, a contact member movable on said segment piece, and means to maintain said contact member in a normal position with relation to the segment piece.

39. In a pulling-over machine, a support, a segment piece movable on said support in the arc of a circle and in a plane parallel with the plane of the shoe bottom, a contact member movable on said segment piece and having its axis of motion intersecting the axis of motion of the segment piece.

40. In a pulling-over machine, means for pressing an upper against the side of a last, and means for clamping the upper against the innersole, said two means being connected together whereby the former is actuated by the latter, combined with automatically actuated mechanism arranged to be positioned by said pressing means for tacking the upper to the innersole.

41. In a pulling-over machine, the combination with means for working an upper over a last, of upper holding mechanism, means to press it against that part of the upper which is upon the innersole, and connected means to support the last against such pressure.

42. In a pulling-over machine, the combination with supports, of devices carried thereby to press the marginal portion of the upper downwardly against the last and also to sustain the last against displacement by such pressure.

43. In a machine of the class described, the combination with means for pulling an upper simultaneously at opposite sides of a last, of means for automatically moving the last and the pulling means relatively lengthwise of the last.

44. In a pulling-over machine, a presser for engaging the side and bottom of the shoe and a carrier with relation to which said presser is movably mounted to engage

first with the side of the shoe and cause the surface of contact to spread upwardly over the side of the shoe and inwardly over the bottom thereof, combined with means for holding the presser normally in position on the carrier to engage first with the side of the shoe.

45. In a pulling-over machine, a presser for engaging the side and bottom of the shoe and a carrier upon which said presser is movably mounted to engage first with the side of the shoe and then to rock and cause the area of contact to spread upwardly over the edge and upon the bottom of the shoe, combined with a spring for holding the presser rocked into position to engage first with the side of the shoe.

46. In a pulling-over machine, a support, a presser member on said support, means to move the support whereby said presser member is made to engage the upper at the side of a last, a fastener inserting mechanism movable over the bottom of the last into position for inserting tacks, and cooperating stops on said support and fastener inserting mechanism for determining the position to which the fastener inserting mechanism shall be moved.

47. In a pulling-over machine, the combination with supports, of devices carried thereby for pressing the marginal portion of the upper downwardly against the last and for sustaining the last against displacement by such pressure, said sustaining devices being adapted to yield in said supports to allow of the pressing devices coming into full bearing with the upper on lasts differing in contour.

48. In a pulling-over machine, means for supporting a last and means for pressing an upper against the side of the last, combined with a carrier upon which said two means are mounted for relative movement.

49. In a machine of the class described, the combination with a device for pressing the upper into position to be fastened, of a device for supporting the shoe while the fasteners are being inserted, and a carrier upon which said devices are mounted for relative movement.

50. In a machine of the class described, the combination with a device for pressing the upper into position to be fastened, of a device for supporting the shoe while the fasteners are being inserted, and a carrier for said devices, one of the devices being yieldingly mounted in the carrier to permit it to move relatively to the other until both devices come into operative relation to the work.

51. In a machine of the class described, the combination with means for pulling an upper over a last, of a plurality of pressers, supporting arms upon which said pressers are yieldingly mounted, actuating mechanism

for forcing the pressers against the upper on opposite sides of the last, and means for insuring uniform pressure on each side of the last.

52. In a machine of the class described, the combination with means for pulling an upper over a last, of a plurality of pressers, actuating mechanism comprising independently yielding means cooperating with each presser for forcing the pressers against the upper on opposite sides of the last and means for insuring uniform pressure on each side of the last.

53. In a machine of the class described, a plurality of pressers, actuating mechanism for moving the pressers into operative positions and forcing them against the work, said actuating mechanism comprising a prime actuator, independent yielding connections between said pressers and the actuator, and an equalizing device arranged to permit the presser first meeting the work to come to rest while the other presser continues to move until it reaches operative position, said mechanism thereafter causing the pressers to be forced equally against the work.

54. In a pulling-over machine, means for pressing an upper against the side and bottom of a last, said means comprising an angle lever having a long arm for engaging the upper at the side of the last and a short arm for engaging the upper on the bottom of the last, and automatically operating mechanism for actuating said pressing means to force said long arm against the upper on the side of the last and thereby rock the short arm into firm engagement with the upper on the last bottom.

55. In a pulling-over machine, an upper clamping mechanism, a carrier therefor, and means to actuate the carrier to press said upper clamping mechanism against the upper on the bottom of the last, combined with a last support also mounted on said carrier.

56. A pulling-over machine, comprising an upper clamping mechanism, a carrier therefor, and means to actuate the carrier to press said clamping mechanism against the upper on the bottom of the last, and a last support also mounted on said carrier, said machine having provision for relative yielding movement of the upper clamping mechanism and the last support.

57. In a pulling-over machine, means for supporting a last and means for pressing an upper against the side of the last, combined with a carrier therefor, said two means being arranged upon the carrier to cause the supporting means to engage the shoe first and to yield until the pressing means comes into engagement with the shoe.

58. In a machine of the class described, automatic means for relatively moving a last and an upper, and automatic means for simultaneously changing the relative posi-

tion of the last and said first-mentioned means in a line running lengthwise of the last.

59. In a machine of the class described, means for sinking a last into a pulled upper and automatic means for simultaneously changing the relative position of the last and sinking means in a line running lengthwise of the last.

60. In a machine of the class described, the combination with means for engaging a last, grippers for engaging an upper applied to the last, and means for shifting the relative positions of the last-engaging means and the grippers to sink the last into the upper, of means, including the abutment 151, for changing the relative position of the last-engaging means and the said shifting means during the sinking of the last into the upper.

61. In a machine of the class described, the combination with means for pulling an upper over a last, of means acting during the pulling operation for automatically moving the last and the pulling means relatively lengthwise of the edge of the last adjacent to the pulling means.

62. A pulling-over machine having, in combination, grippers for the toe end and opposite sides of a shoe, a shoe bottom rest, and actuating mechanisms to cause the toe gripper to pull before the side grippers, then cause the bottom rest to settle the last into the upper held under initial tension by all the grippers and then cause the bottom rest to force the last forwardly into the upper held by the grippers whereby a step by step stretching and drafting of the upper is effected.

63. A pulling-over machine, having, in combination, means to engage a last, means to grip an upper at the two sides of the forward portion of the shoe, means to actuate the last engaging means to sink the last into the upper held at the sides of the shoe by the grippers, and means for effecting relative movement of the last and the grippers in the direction of the length of the last while the grippers hold the upper.

64. A pulling-over machine, having, in combination, the last bottom rest 30, the grippers to engage the upper at opposite sides of the shoe, the rest carrier 14, the cam 20 arranged to actuate the carrier and rest to sink the last into the upper held by the grippers, and additional means to actuate the rest in its carrier in a direction to force the last forwardly into the gripped upper.

65. A machine for working an upper over a last, having, in combination, means for working the upper upwardly and inwardly over the forward portion of the last, means to engage the shoe bottom to resist displacement of the shoe by the overworking means, and means whereby said engaging means may be actuated toward the toe of the last

in a path substantially parallel with the plane of the last bottom to move the shoe innersole forwardly upon the last bottom.

66. A machine for working an upper over a last, having, in combination, means for working the upper upwardly and inwardly over the forward portion of a last, means to engage the shoe bottom to resist displacement of the shoe by the overworking means, said bottom engaging means including a member which is mounted for movement substantially perpendicular to the plane of the last bottom and also substantially in that plane.

67. A machine for working an upper over a last, having, in combination, a shoe bottom rest, a movable carrier therefor relatively to which the rest is movable lengthwise of the last while it is in operative engagement with the shoe bottom, and means for so moving the rest.

68. A machine for working an upper over a last, having, in combination, a carrier mounted for movement from and toward the plane of the shoe bottom, a shoe bottom rest supported by said carrier, and means for effecting movement of the rest lengthwise of the last while it is in operative engagement with the shoe bottom.

69. In a pulling-over machine, a plurality of grippers to engage an upper including a gripper arranged to engage the upper at the toe of the shoe, means to engage the last, and means to actuate said last engaging means to move the last lengthwise in a direction to cause the upper to be strained forwardly on the last by the toe gripper.

70. In a pulling-over machine, a plurality of grippers to engage an upper including a toe gripper arranged to pull perpendicularly to the plane of the last bottom, and means to move the last downwardly and forwardly into the upper to increase the strain effected by the toe grippers.

71. A pulling-over machine, having, in combination, grippers to engage an upper, means pivotally mounted for movement substantially perpendicular to the plane of the last bottom to engage the last and slidably mounted for movement substantially parallel with that plane to move the last, and mechanism for actuating said engaging means to move the last lengthwise during the pulling-over operation.

72. A pulling-over machine, having, in combination, grippers to engage an upper, means to engage a last, and mechanism to actuate the last engaging means to move the last lengthwise in the upper held by the grippers, said machine having provision for withdrawing said engaging means by a movement perpendicular to the plane of the last bottom, and a movement lengthwise of the last.

73. A pulling-over machine, having, in

combination, grippers to engage an upper, means to engage a last, means for relatively actuating said two means to sink the last into the upper, and additional means to
 5 to actuate the last engaging means to move the last lengthwise in the upper while the upper is held by the grippers.

74. A pulling-over machine, having, in combination, upper gripping means, last
 10 engaging means, and operating mechanism for relatively actuating said two means to stretch an upper longitudinally and transversely and to lay it over the last bottom in position to be secured, said mechanism being
 15 constructed and arranged to effect a movement of the last lengthwise in the gripped upper before it is laid into position to be secured.

75. A pulling-over machine, having, in
 20 combination, upper gripping means, last engaging means, and operating mechanism for relatively actuating said two means to stretch an upper longitudinally and transversely and to lay it over the last bottom in
 25 position to be secured, said mechanism being constructed and arranged to effect a movement of the last lengthwise in the gripped upper before it is laid into position to be secured, and means to fasten the upper at a
 30 plurality of points while it is held under lengthwise and transverse tension.

76. A pulling-over machine, having, in combination, last engaging means, upper
 35 gripping means, and upper fastening means located at each side of the shoe; means for actuating the last engaging means and upper gripping means relatively to stretch the upper transversely; means for actuating the
 40 last engaging means to move the last relatively to the gripping means and the fastening means to stretch the upper lengthwise; and means to cause the fastening means to secure the upper while it is under tension.

77. A pulling-over machine, having, in
 45 combination, grippers arranged to engage an upper at opposite sides of a last, automatically operated means for moving the grippers relatively to the last to strain the upper transversely, and means for relatively moving
 50 the last and grippers lengthwise of the last.

78. A pulling-over machine, having, in combination, grippers to engage the upper at
 55 the opposite sides and the toe of a last, means for moving the side grippers relatively to the last to strain the upper transversely, means for moving the last longitudinally in the upper held by the grippers to strain the upper lengthwise.

79. A pulling-over machine, having, in combination, grippers arranged to engage
 60 an upper at opposite sides of a last, means for moving the grippers relatively to the last to strain the upper transversely, means
 65 for relatively moving the last and grippers

to strain the upper lengthwise, and means for securing the upper while it is held under tension resulting from said two movements.

80. A pulling-over machine, having, in combination, grippers arranged to engage an
 70 upper at opposite sides of a last, and means for moving the grippers relatively to the last to strain the upper transversely, said machine having provision for automatically imparting to the side grippers and the last
 75 a relative movement lengthwise of the last.

81. A machine of the class described, having, in combination, means for overworking
 80 an upper, a sole rest, and means for actuating said rest downwardly and forwardly while said overworking means is in engagement with the upper.

82. A machine of the class described, having, in combination, means for overworking
 85 an upper, a sole rest, means for rocking the sole rest downwardly, and means for moving the rest forwardly while said overworking means is in engagement with the upper.

83. A machine of the class described, having, in combination, a sole rest, a carrier in
 90 which the rest is mounted, means for rocking the carrier, and means for sliding the rest lengthwise in its carrier.

84. A machine for working an upper over
 95 a last, having, in combination, means for clamping the upper against the side of the last, and means arranged to clamp the upper flatly down upon the margin of the inner-sole, said two means being operatively connected together to cause the former means by
 100 its contact with the shoe to actuate the latter means.

85. A machine for working an upper over
 105 a last, having, in combination with the overworking mechanism, an upper clamping mechanism mounted for bodily movement in a predetermined path laterally into engagement with the last and comprising an initially contacting member set to engage
 110 the side of the shoe first and a second contacting member operatively connected with the first to be driven thereby into holding engagement with the shoe.

86. A machine for working an upper over
 115 a last, having, in combination with the overworking mechanism, an upper clamping mechanism mounted for bodily movement in a predetermined path laterally into engagement with the last and comprising an initially contacting member set to engage the
 120 side of the shoe first and a second contacting member arranged to engage the upper on the shoe bottom and operatively connected with the first member to be driven downwardly thereby into holding engagement with the
 125 upper.

87. A machine for working an upper over
 130 a last, having, in combination with the overworking mechanism, an upper fastening mechanism, means for supporting the shoe

for the upper fastening operation, means for clamping the upper against the side of the last above the shoe support, and a carrier upon which the support and clamp are relatively movable and are positioned to engage the shoe in a predetermined order.

88. A machine for working an upper over a last, having, in combination, means for pulling an upper over opposite sides of a last, means for fastening the upper, means for clamping the upper against the two sides of the last, and mechanism for yieldingly actuating the side clamps including an equalizing device arranged to insure substantially the same clamping pressure at the two sides of lasts of different contour or occupying slightly different positions in the machine.

89. A machine for working an upper over a last, having, in combination, side clamps 92, 92, carriers 270, 272 therefor, and yielding actuating mechanism for said carriers including separate springs for the two carriers and the equalizer N N' for the purpose stated.

90. A machine for working an upper over a last, having, in combination, a side clamp, a last supporter, a carrier on which the side clamp and supporter are arranged in angular relation to cause the supporter to obtain a bearing under the shoe and the clamp to obtain a bearing against the side of the shoe, and means arranged to permit one of said parts to yield relatively to the other to conform to shoes of different shapes.

91. A pulling-over machine, having, in combination, grippers arranged to pull an upper at opposite sides of a last, oppositely acting upper holding means for the two sides of the shoe each including a carrier, a clamp slidably mounted on the carrier, a spring to resist sliding movement of the clamp, and means also mounted on the carrier to lay the upper upon the last bottom; and means operatively connected with the upper holding means to fasten the upper while it is so clamped and overlaid.

92. A pulling-over machine, having, in combination, a gripper, a swinging arm, an upper clamp slidably mounted on the end of the arm to grip the upper against the side of the last, a device also carried by said arm and having an acting face substantially perpendicular to that of the clamp for laying the upper upon the last bottom, a tacker, and power operated mechanism for actuating in time relation said arm to effect clamping and overlaying of the upper and said tacker to secure the upper.

93. A pulling-over machine, having, in combination, grippers arranged to pull an upper at opposite sides of a last, oppositely acting upper holding means for the two sides of the shoe each including a carrier, means for actuating the two carriers together toward the shoe, a clamp mounted on each carrier, a yielding connection between each clamp and its carrier to permit the clamps to adjust their positions relatively to the carriers to accommodate shoes of different sizes and unsymmetrical formation, means also mounted on the carrier to lay the upper down upon the innersole, and a tacker arranged to insert securing tacks in predetermined relation to the edge of said overlaying means.

94. In a machine for pulling an upper over a last, the combination with grippers arranged to engage the upper at opposite sides of the ball of the last, of means for relatively actuating the last and the grippers to restrain the upper lengthwise of the last on opposite sides simultaneously, and means for securing the upper while it is under lengthwise strain at opposite sides of the last.

Signed by me at Beverly, Massachusetts, this 29th day of October 1901.

RONALD F. McFEELY.

Witnesses:

NELSON W. HOWARD,
JOHN M. LYNCH.