July 23, 1929. B. JORGENSEN 1,721,736

MACHINE FOR SHAPING UPPERS

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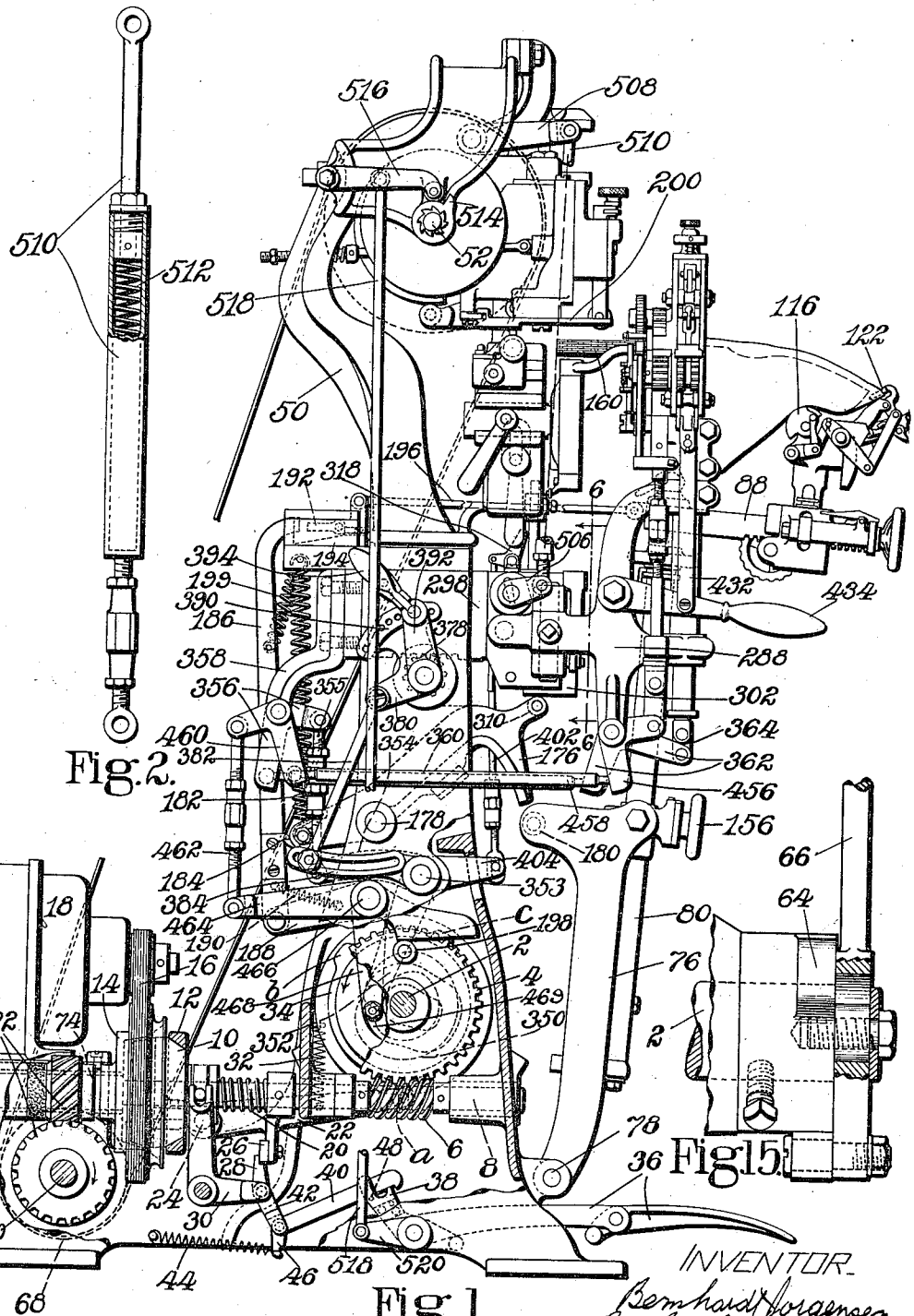


Fig. 2.

Fig. 1.

Fig. 15.

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MACHINE FOR SHAPING UPPERS

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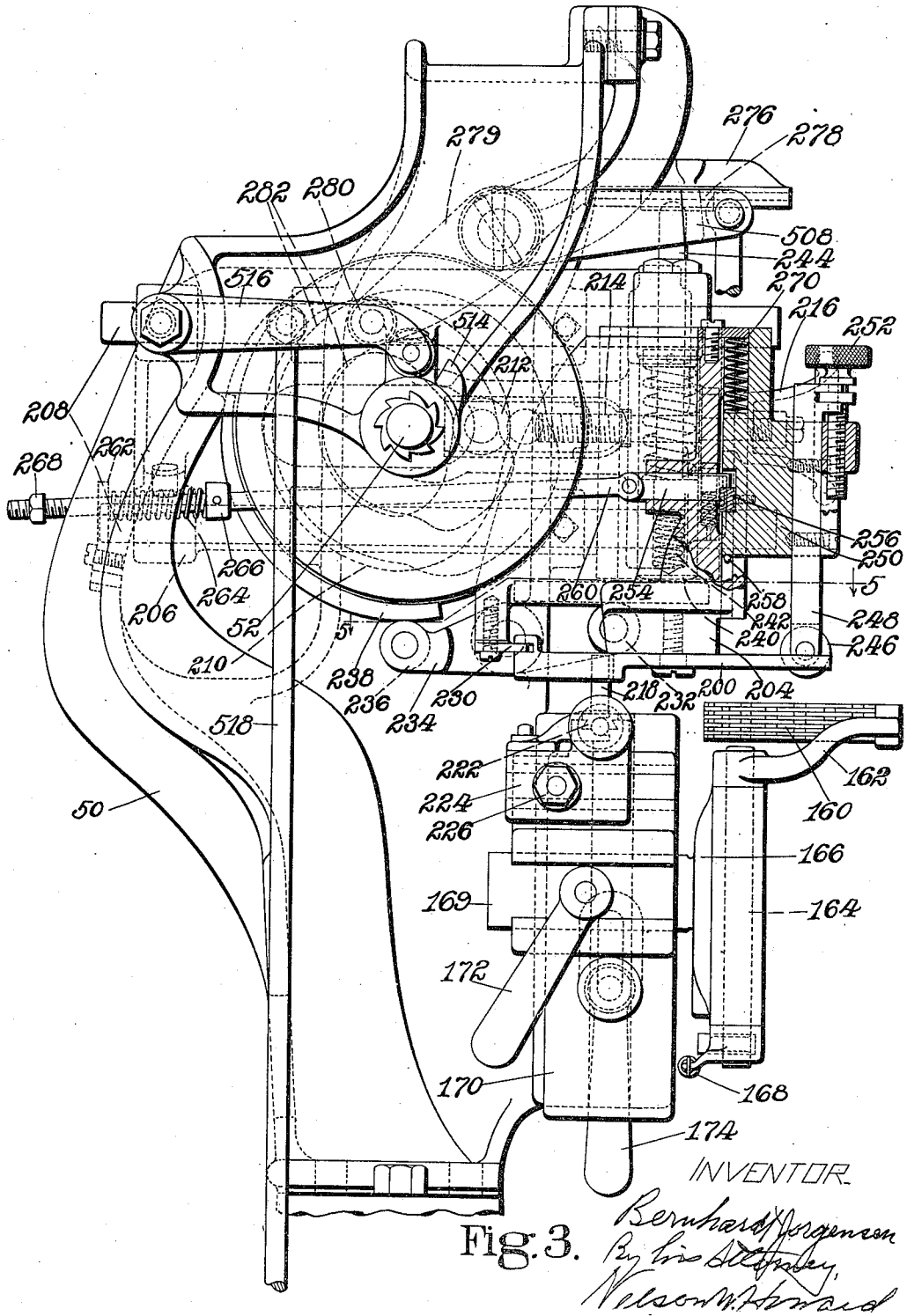


Fig. 3.

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MACHINE FOR SHAPING UPPERS

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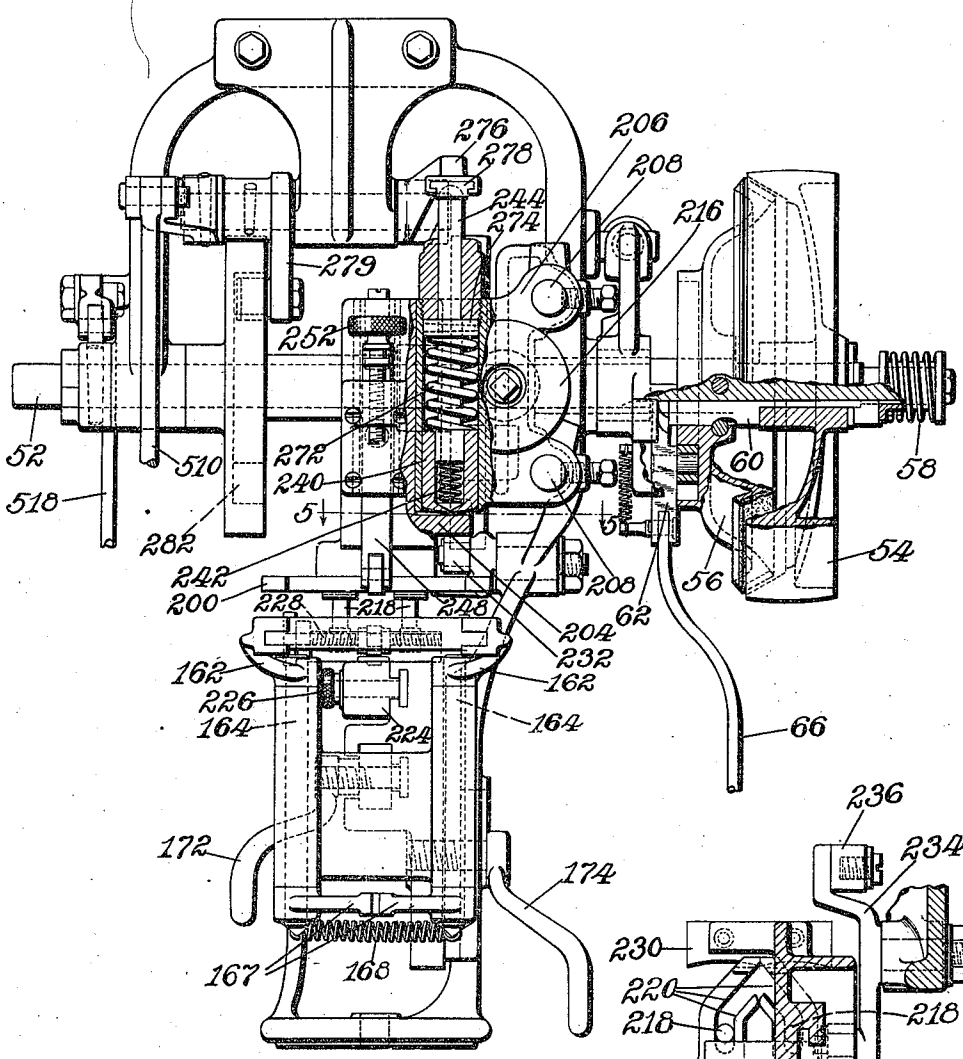


Fig. 4.

Fig. 5.

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MACHINE FOR SHAPING UPPERS

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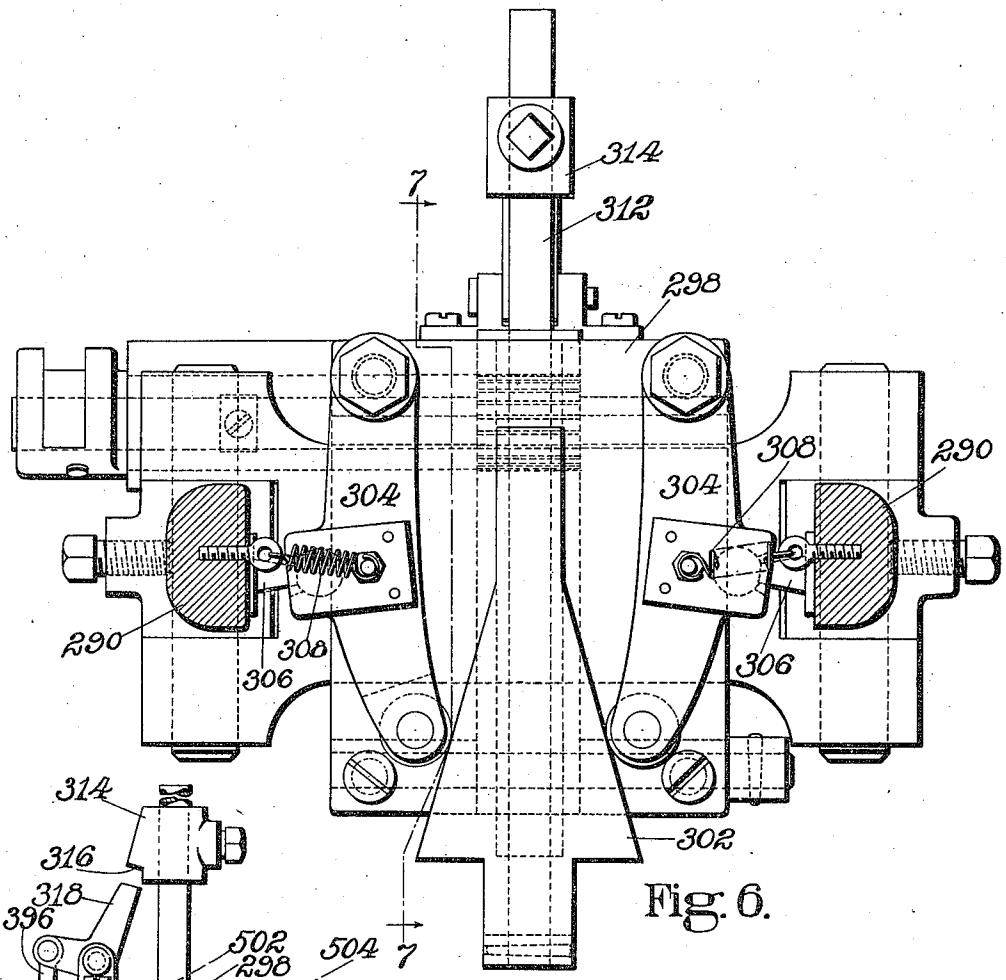


Fig. 6.

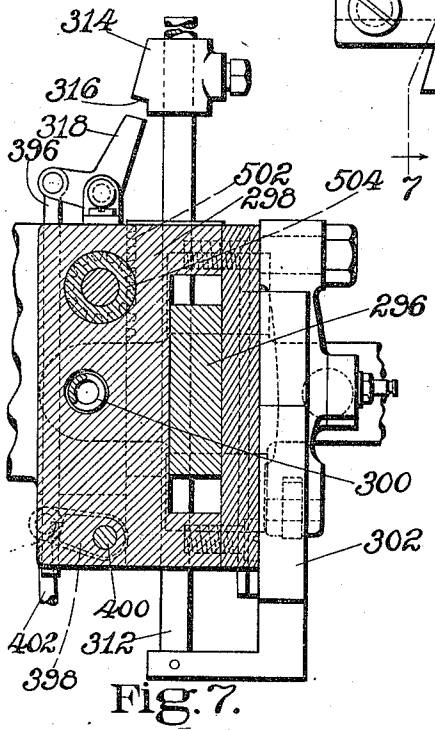


Fig. 7.

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MACHINE FOR SHAPING UPPERS

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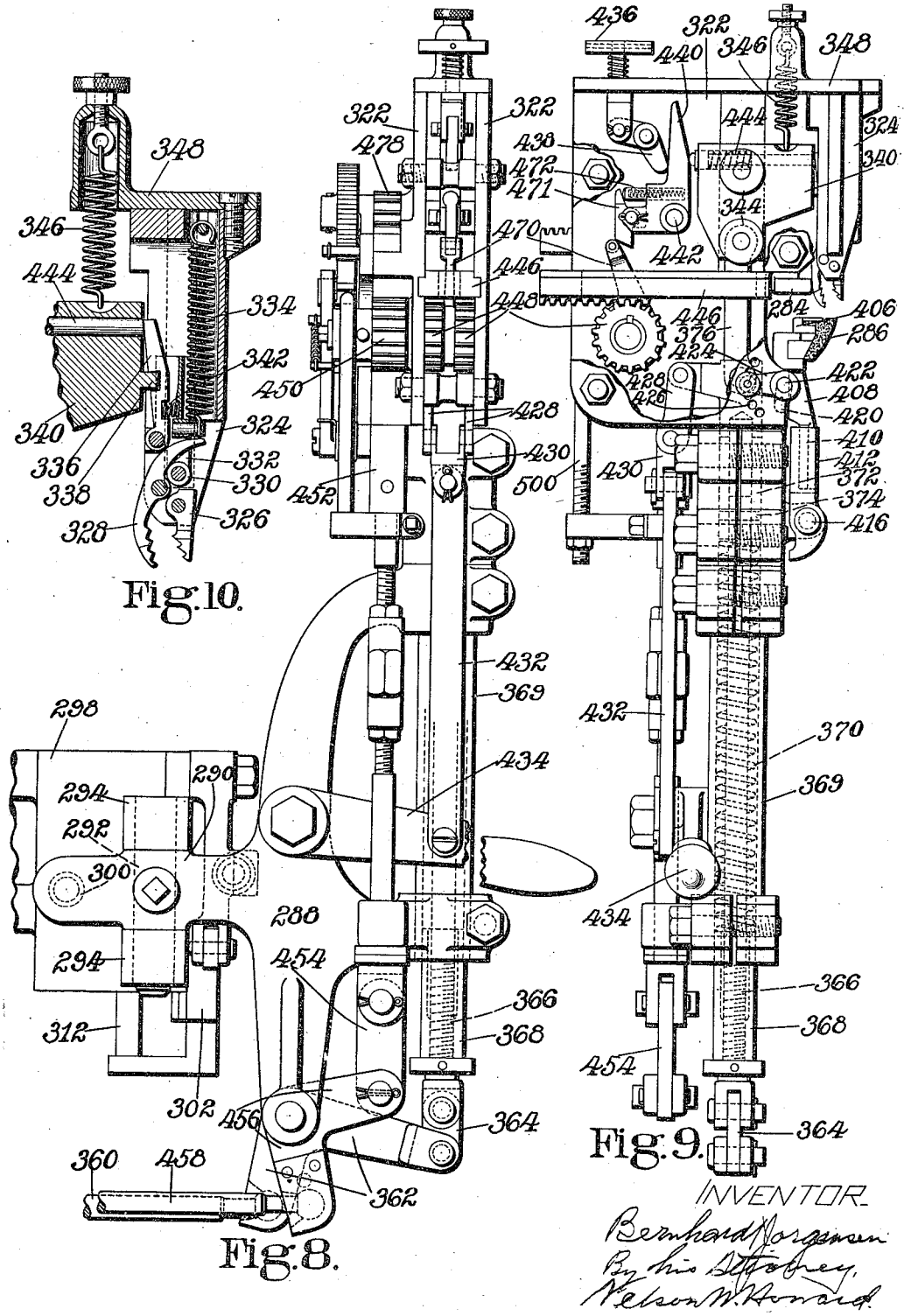


Fig. 10.

Fig. 8.

Fig. 9.

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MACHINE FOR SHAPING UPPERS

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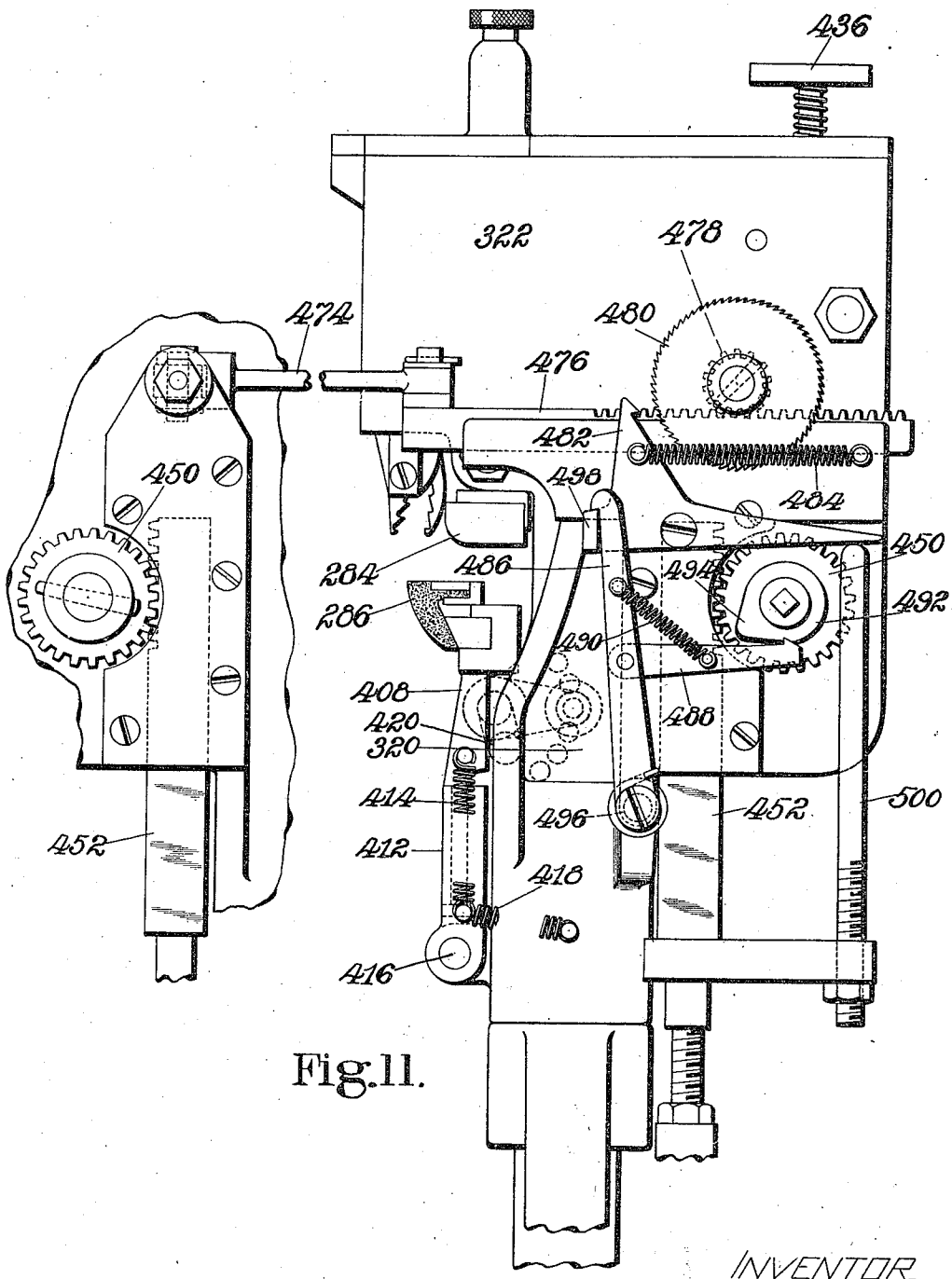


Fig.11.

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MACHINE FOR SHAPING UPPERS

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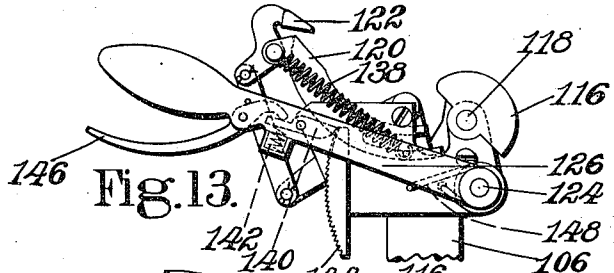


Fig.13.

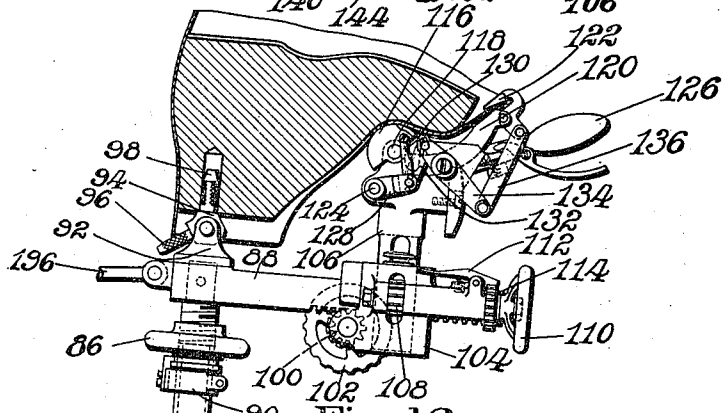
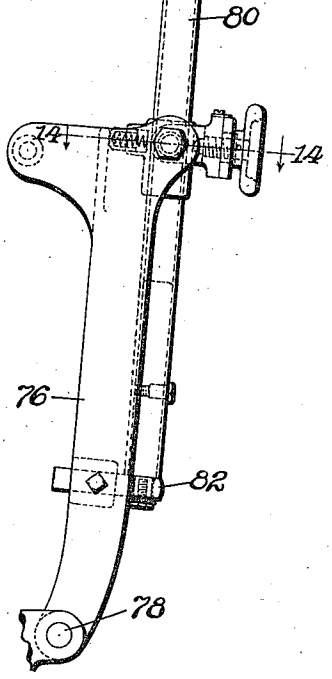


Fig.12.



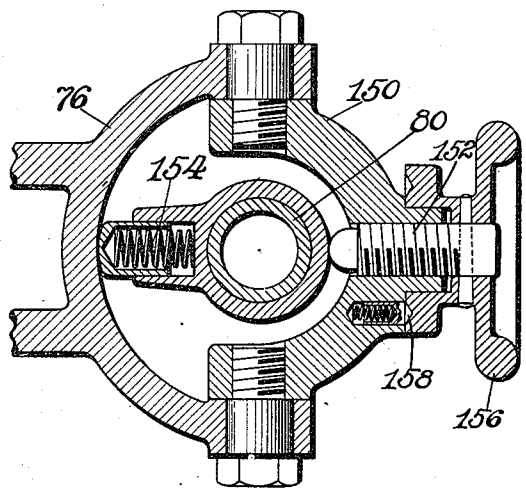


Fig.14.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR SHAPING UPPERS.

Application filed July 19, 1922. Serial No. 576,091.

This invention relates to machines for use in the manufacture of boots and shoes and more particularly, in many of its important aspects, to machines for shaping the upper materials over a form or last. The invention is herein shown as embodied in a machine having means for lasting the heel and shank portions of shoes, and adapted more particularly for operation upon tennis shoes or other shoes, including arctics, in which the upper in the lasting operation is fastened to the insole by adhesion, but it will be recognized that in many of its novel features the invention is not limited to the manufacture of that type of shoe nor to a combination of means for operating at both the heel and the shank, and that in various novel aspects, moreover, the invention is not limited in respect to the portion of the shoe upon which the operation is performed.

Important features of the invention are to be recognized in a novel combination of means for performing upper shaping operations at the heel end and at the shank of the shoe. In one important aspect, the invention provides for shaping the upper at the shank before laying it inwardly over the insole about the heel end of the shoe, the machine herein shown having shank and heel lasting mechanisms which are timed to operate in sequence to conform the upper to the pronounced curvatures of the shank portion of the last and to lay its margin inwardly over the insole at the opposite sides of the shank and thereafter to gather and lay the margin of the upper inwardly about the heel end. This contributes to uniformity in the lasting operation without danger of wrinkling the upper at the junction of the heel end and the shank, and in the manufacture of shoes that are provided with heel end stiffeners or counters has the further advantage that in the lasting of the heel end of the shoe the wings of the counter are held frictionally from undesirable displacement by the previously shaped shank portions of the upper materials. In a further aspect, the invention provides for pressing the margin of the upper upon the insole at the heel end and at the shank after the different portions of the margin have thus been laid inwardly in sequence, the machine illustrated having means for moving the heel and shank overlaying mechanisms heightwise of the shoe substantially simultaneously to apply such pressure. In operating upon shoes in which the margin of the upper is fastened to the insole by adhesion, for example by the use of cement applied to the upper, the application of such pressure serves to effect the adhesion and thus to secure the upper in lasted position.

In accordance with a further feature, the invention provides a novel organization of operating and controlling means for different mechanisms, the machine herein shown having separately controlled power means for imparting operative movements respectively to the heel lasting mechanism and to the shank lasting mechanism, with means for starting the different operating means at different respective times. More particularly, the construction shown comprises different clutches for controlling the different mechanisms, with automatic means for actuating the clutch for the heel lasting mechanism to start that mechanism after the shank lasting mechanism has performed a portion of its cycle of operations, whereupon the operating means for the shank lasting mechanism comes automatically to rest, and with further means for actuating the clutch of the shank lasting mechanism to start that mechanism again in operation in time relation to the operation of the heel lasting mechanism. This affords convenient means for controlling the different mechanisms to perform their operations in sequence as hereinbefore explained.

A further feature of the invention consists in novel means for conforming an upper to the contour of its last in the shank portion of the shoe. Included in the novel organization herein shown are opposite shank grippers which pull the upper heightwise of the last, forwardly toward the toe, and inwardly over the insole, together with overlaying members or wipers which act to lay the margin of the upper at the opposite sides of the shank inwardly over the insole and to press it into adhering relation to the insole. In accordance with the manner of operation of the illustrative machine, the shank grippers are operated to pull the upper as above described and the machine then comes to a stop to enable the operator to move the grippers relatively for adjusting the upper transversely of the last, and when the machine is again started the overlaying operations are performed,

first at the shank and then at the heel end of the shoe. An important novel and useful feature is to be recognized also in the combination of the shank pulling means with the heel lasting means, since the shank grippers, by their foredrawing and overdrawing movements, serve to draw the upper closely about the last in front of the heel seat and to tighten it about the heel end of the last preparatory to the heel end lasting operation.

Further to assist in conforming the upper closely and tightly to the contour of the last, the invention provides means for drawing the upper forwardly at the forepart of the last, such means in the machine herein shown being adapted for manual operation to tighten the upper about the heel end of the last and along the shank and also to conform the upper to the curvature of the last at the top of the forepart, preparatory to the operations performed as above described in the shank and at the heel end. Novel and useful features are to be recognized not only in the combination of such means with other means for operating on the shoe, but also in the structure provided for drawing the upper forwardly at the forepart, including novel details of a toe gripper and its operating means, a novel device for engaging the upper frictionally at the top of the forepart with a forwardly directed pull, and a novel combination of such device and gripper.

A further feature of the invention, as applied to a machine having devices for operating upon the opposite sides of the shoe, comprises novel means for effecting positioning movement of said devices relatively to the shoe prior to their operation upon the shoe. The construction shown comprises an organization wherein the opposite shank lasting mechanisms, provided with grippers for gripping the margin of the upper at the sides of the shank, are moved inwardly toward the sides of the shoe into position for the grippers to engage the upper by means which is rendered operative by movement of the shoe support to carry the shoe into position between said lasting mechanisms. This construction affords ample room for moving the shoe into position to be operated upon by the lasting means, and serves also to move the grippers into convenient position to receive the margin of the upper as soon as the shoe arrives in operative position.

Various features of novelty are also to be recognized in the construction of the opposite shank lasting mechanisms, these features including a novel gripper construction, novel gripper operating and controlling means, and a novel gripper and wiper unit, as well as a novel combination of such units with their operating and controlling means. Included also among these various features of the invention is novel means for insuring against ineffectiveness in the operation of an overlaying member on a shoe, the construction shown comprising means for locking the support on which the overlaying member and its operating means are mounted, to prevent the support from being forced outwardly from the shoe by the resistance of the shoe to the inward movement of the overlaying member. As applied to a construction comprising opposite side overlaying or lasting mechanisms, this feature of the invention in the machine herein shown is embodied in means for locking the opposite mechanisms together automatically to prevent them from being forced apart by the resistance of the shoe in the overlaying operation.

Still another feature consists in novel means for determining by engagement with the shoe the relation between the plane of the shoe bottom and means for laying the margin of the upper inwardly over the insole. In its embodiment of this feature the invention provides on the wiper carrier whereby the heel embracing wipers are moved lengthwise of the shoe a gaging device which is moved initially heightwise of the shoe with the wipers into engagement with the insole and moves forwardly with the wipers to position them relatively to the insole substantially throughout their advancing movement. In order to permit the subsequent pressing action of the wipers upon the margin of the upper the machine is also provided with automatic means for releasing the wipers from the gaging device after they have substantially completed their inward movement.

The above and other features of the invention, including various details of construction and combinations of parts, will now be more particularly set forth in connection with the accompanying drawings and pointed out in the claims.

In the drawings:

Fig. 1 is a view in side elevation of a machine embodying the features of the invention with parts broken away;

Fig. 2 shows an operating connection which is broken away on Fig. 1,

Fig. 3 is a view similar to Fig. 1, on an enlarged scale, of the head portion of the machine which carries the heel end lasting mechanism, with a part of the structure in vertical section;

Fig. 4 is a front elevation of the structure shown in Fig. 3, with portions broken away;

Fig. 5 is a section on the line 5—5 of Figs. 3 and 4;

Fig. 6 is a section on the line 6—6 of Fig. 1;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 1, on an enlarged scale, of one of the shank lasting mechanisms;

Fig. 9 is a front elevation of the mechanism shown in Fig. 8, with one of the side cover plates broken away;

Fig. 10 is a vertical section illustrating more fully the gripper and its controlling mechanism;

Fig. 11 is a view in rear elevation of portions of the opposite shank lasting mechanisms;

Fig. 12 is a view in side elevation of the shoe support or jack;

Fig. 13 shows a portion of the shoe support as viewed from the opposite side of Fig. 12;

Fig. 14 is a section on the line 14—14 of Fig. 12, and

Fig. 15 is a detail view showing a portion of the clutch controlling mechanism.

The machine herein shown as an embodiment of the features of the invention comprises, as stated, mechanism for lasting the heel end portion of the shoe and mechanism for lasting the shank portion of the shoe. The shank lasting mechanism, hereinafter more particularly described, is operated and controlled by cams on a cam shaft 2 which carries a spiral gear 4 driven by a worm 6 on a shaft 8, the latter having slidingly mounted on its rear end a friction clutch member 10 arranged to engage a brake member 12 on one side and a driving member 14 on the other side. The member 14 is driven continuously through a belt 16 by an electric motor 18. The clutch member 10 is forced into clutching engagement with the member 14 by a spring 20, but when the machine is at rest is held against the pressure of the spring in engagement with the brake member 12 by the action of a controlling lever 22 which is pivoted at 24 on the frame of the machine and carries a block 26 which engages one end of a finger 28 pivotally mounted on one of the arms of a bell-crank 30, the other arm of which is operatively connected to the sliding clutch member 10. To stop the machine the lever 22 is depressed against the tension of a spring 32 by one or another of three stop cams *a*, *b* and *c* carried by a cam disk 34 on the cam shaft 2. To start the machine the finger 28 is swung rearwardly from under the block 26 by depression of a treadle 36. The connection between the treadle and the finger 28 comprises a member 38 which is swung by the treadle and operates in engagement with a projection on the end of a link 40 to pull forwardly on an arm 42 which is rigidly connected to the finger 28. A spring 44 connected to a finger 46 which is rigidly connected to the link 40 acts both to hold the link down in engagement with the member 38 and to swing the finger 28 under the block 26. When the link 40 is pulled forwardly by the treadle and swings the finger 28 from under the block 26, the spring 20 is rendered effective to move the clutch member 10 into engagement with the member 14, the finger 28 being moved up by the bell-crank 30 at the rear of the block 26. In the continued depression of the treadle a pin 48 on the member 38 lifts the link 40 far enough to disengage its projecting end from the member 38, thus permiting the spring 44 to swing the finger 28 against the rear face of the block 26 in order that the machine may be stopped automatically even if the operator continues to hold the treadle depressed. It will be understood that as the cam disk 34 is turned from the position illustrated in Fig. 1 the stop cam *a* permits the spring 32 to swing the lever 22 upward until the finger 28 is permitted to snap back under the block 26. When this occurs the parts are in condition for the clutch to be released and the brake applied when the next succeeding stop cam *b* arrives in position to depress the lever 22.

While the starting and stopping mechanism above described is convenient and effective for the purposes in view, it will be understood that it is merely an example of various mechanisms which may be utilized for controlling the action of the machine. In the construction shown there are three stop cams which for purposes to be more particularly explained hereinafter determine two periods of rest for the cam shaft 2 before the machine arrives at the end of its cycle, but it will be understood that in many of its aspects the invention is not limited to this particular manner of control.

The heel end lasting mechanism is mounted upon the upper or head portion 50 of the frame of the machine (Figs. 1, 3 and 4), and in the construction shown is operated and controlled by cams on a separate cam shaft 52 which is controlled by another clutch. For controlling this shaft any suitable form of clutch may be utilized, the construction shown comprising a one revolution clutch including a pulley 54 constructed to serve as the driving member of the clutch and a member 56 which is fast on the shaft 52 and is engaged by the pulley. In the position illustrated in Fig. 4 the pulley 54 is held out of engagement with the member 56, against the resistance of a spring 58, by means of a member 60 which slides lengthwise of the shaft 52 in a groove in the shaft and is recessed to receive the hub of the pulley for moving the pulley endwise. A vertically movable slide 62 has a wedge shaped upper end for engagement with the inner end face of the member 60 to force this member and the pulley outwardly for releasing the clutch at the end of each revolution. For further disclosure of this clutch mechanism reference may be made to U. S. Patent No. 1,026,067 granted on May 14, 1912 upon an application of Orrell Ashton. When the slide 62 is moved downward it re-

leases the member 60 and permits the spring 58 to set the clutch. Such downward movement of the slide is effected automatically in the construction shown at a predetermined time in the cycle of the cam shaft 2, as hereinafter more fully explained, by the action of a cam 64 (Fig. 15) on the end of this cam shaft upon a rod 66 which extends upwardly and is connected to the slide. The pulley 54 is connected by a belt to a pulley 68 mounted on the end of a shaft 70 which is connected by spiral gearing 72 to a shaft 74 on which the clutch member 14 is secured, the pulley 54 thus being driven continuously.

For the lasting operation the shoe is mounted on a shoe support or jack comprising a jack standard 76 pivoted at 78 on the base of the machine, and on this standard is mounted a tubular member 80 supported at its lower end on an eye-bar 82. Extending downwardly within the upper end of the member 80 is a rod 84 adjustable upwardly or downwardly by means of a hand wheel 86 and having fast on its upper end a forwardly projecting bar 88. The member 80 is split at its upper end and is embraced by a clamp 90 which may be tightened to hold the rod 84 in adjusted position. Above the bar 88 is a member 92 on which is pivoted a heel pin holder 94 provided with heel pins 96 and 98 of different sizes either one of which, by turning the holder 94, may be positioned for engagement in the heel pin socket of a last.

Mounted for adjustment along the bar 88 by means of a pinion 100, which engages rack teeth on the bar and is operated by a hand wheel 102, is a holder 104 provided with a slideway for an upwardly extending toe rest standard or support 106, the latter being adjustable vertically by rack teeth which are engaged by a pinion 108 carried by a shaft which is journaled in the holder 104 and has a hand wheel 110 for effecting the adjustment. A latch 112 engaging the teeth of a wheel 114 locks the member 106 in the position to which it is adjusted by the pinion 108. Similar means not shown in detail is provided for locking the pinion 100 to hold the member 106 in its adjusted position lengthwise of the bar 88.

Mounted on the support 106 is a member 116 which may be conveniently termed a toe rest, although it engages the upper at the top of the forepart somewhat back of the toe end, this member being pivoted at 118 on the support 106 so that it may turn or swing in directions lengthwise of the shoe. The member 116 has an arcuate shoe engaging surface which may be faced with rubber or other material suitable for engaging the upper frictionally. Mounted in an arc shaped guideway below the toe in the member 106 is a curved slide 120 the front end of which is shaped to serve as one of the jaws of a gripper and has pivoted thereon a co-operating jaw 122 for gripping the toe end of the upper materials. Fast on a rock shaft 124 in the support 106 is a hand lever 126, and secured also to the shaft 124 is an arm 128 connected by a link 130 to the toe rest member 116 and also connected by a link 132 to an intermediate lever 134, the latter being pivoted between its ends on the support 106 and connected at one end by a link 136 to the pivoted jaw 122. A spring 138, connected at its opposite ends respectively to the support 106 and to the curved slide 120, serves to hold the slide normally at its inner limit of movement.

When the operator mounts a last and its upper upon the heel pin, the forepart of the upper is positioned on the toe rest member 116 and the toe end of the upper is inserted between the toe gripper jaws. The operator then depresses the hand lever 126. As a result of such depression of the lever the arm 128 acts through the link 132 to swing the lever 134, and the latter acts through the link 136 to swing the jaw 122 into position to grip the upper. Further action of the link 136 upon the gripper jaw 122 serves to move the slide 120 forwardly and upwardly in its guideway while the gripper jaws maintain a firm grip upon the upper, thereby pulling the upper at the toe. Simultaneously with the gripping of the upper and the movement of the gripper jaws to pull the upper the toe rest member 116 is operated by the link 130 to draw or wipe the upper at the top of the forepart forwardly toward the toe end of the last. The combined action of the gripper and the moving toe rest member is to strain the upper forwardly on the last and thus to draw it tight about the heel end of the last while conforming it to the curvature of the top of the forepart of the last. This conforming action, combined with the forward pull or strain on the upper, is particularly advantageous in operating on tennis or artic shoe uppers which are usually not cut and assembled with as nice a regard to the contour lines of the last as most other kinds of shoes. When the lever 126 has been depressed far enough to subject the upper to the required tension, the operator releases it, and a pawl 140 controlled by a spring 142 then acts by engagement with ratchet teeth 144 to hold the lever from return movement. After the operations upon the shoe have been completed the operator releases the lever 126 by means of a pawl releasing handle 146, and a spring 148 then acts to swing the lever upwardly and to return the parts to the positions illustrated in Fig. 13.

The tubular supporting member 80 extends downwardly through a yoke-shaped member 150, which is secured to the standard 76 and carries an adjusting screw 152 bearing on a collar on the member 80 for imparting to said member a rearward swinging movement relatively to the standard 76 against the re-

sistance of a spring 154 or for permitting a forward swinging movement of the member 80 by the action of the spring. A hand wheel 156 is provided for turning the screw 152, and a detent 158 retains the screw yieldingly in adjusted position. Such adjustment is sometimes required for different sizes of shoes.

After the shoe has been mounted on the jack and the upper subjected to a forward pull as above explained, the jack is swung rearwardly about its pivotal axis 78 to carry the shoe into position to be operated upon by the heel and shank lasting mechanisms. By such movement of the jack the heel end of the shoe is carried into engagement with a heel embracing band 160, comprising a band chain and a strip of leather or other suitable facing material, connected at its opposite ends to arms 162 which are fast on vertical rock shafts 164 mounted in bearings in a heel band carrier 166 and connected together by gear sectors 167. A spring 168 connected to arms on the lower ends of the rock shafts tends to swing the arms 162 apart and thus to open the band 160, and when the shoe is carried rearwardly into the band the arms 162 are pulled toward each other and the band is thus wrapped about the heel end of the shoe to clamp the upper about the end face and against the sides of the heel end portion of the last. The carrier 166 has a rearwardly extending portion 169 which is mounted in a slideway in a holder 170, so that the heel band may be adjusted forwardly or backwardly, the band being held in such adjusted position by a suitable clamping device 172. The holder 170 is vertically adjustable on the frame of the machine and is held in adjusted position by a clamping device 174. Such vertical adjustment of the band is utilized to position it in the correct relation to the plane of the heel seat, and may be necessary, for example, in changing from one size of shoe to another or by reason of vertical adjustment of the shoe support as hereinbefore explained. Forward or backward adjustment of the heel band may be utilized to determine the pressure of the band against the shoe, a result which is further served by adjustment of the member 80 in the manner explained.

The rearward swinging movement of the jack is utilized to actuate mechanism whereby the jack is locked in its rearmost position with the shoe embraced and clamped by the heel band. The locking mechanism comprises a lever 176 (Fig. 1) pivoted at 178 on the frame of the machine and having a downturned front end which hooks over a pin or roll 180 on the jack standard 76. The lever is swung into locking position by a spring 182. Normally the lever is held in idle position, as illustrated in Fig. 1, by means of a latch 184 which is fast on an upright arm 186 pivotally mounted at its lower end on a lever 188 and held forwardly in latching position by a spring 190. At its upper end the arm 186 is curved forwardly into position to be engaged by the end of a spring controlled finger 192 which is pivoted on a sliding block 194, the latter being connected by a link 196 to the rear end of the shoe supporting bar 88 of the jack. Through this connection the block 194 is moved rearwardly by the rearward movement of the jack and causes the finger 192 to engage and swing the arm 186 into position to release the locking lever 176. The lever 188 has a forwardly projecting end which rests upon a roll 198 on the gear wheel 4. When the cam shaft 2 is turned in the direction of the arrow, the lever 188 is released by the roll 198, and a spring 199 then acts to impart upward movement to the arm 186 into position for the latch 184 to effect operative engagement again with the locking lever 176. In the final period of the cycle of the machine the roll 198 arrives in position to uplift the front end of the lever 188 and thus to move the arm 186 downwardly, whereby the lever 176 is operated to release the jack. In this movement the upper curved end of the arm 186 may engage and press down the pivoted spring controlled finger 192, and when the jack receives its forward movement to carry the shoe out of the machine this finger slips past the end of the arm and springs back into the position illustrated in Fig. 1.

The heel lasting mechanism comprises end embracing wipers 200 pivotally mounted at 202 (Fig. 5) on the lower end of a wiper holder 204 which is mounted for vertical movement in guideways formed in a carrier 206, the latter having ears whereby it is guided for horizontal movement on fixed rods 208. Movement is imparted to the carrier 206 to carry the wipers forwardly, and subsequently to retract them, by a path cam 210 on the cam shaft 52, this cam engaging a roll 212 which is adjustable horizontally by means of a screw 214 threaded in the carrier 206 to vary the limit of forward movement of the carrier and the wipers. A hand wheel 216 on the end of the screw 214 serves as convenient means for effecting this adjustment.

The closing of the wipers for wiping the upper over the sides of the heel end of the insole is effected in response to their forward movement by fixed pins 218 which engage in slots 220 formed in rearward extensions of the wipers. These pins are mounted on holders 222 which are adjustable laterally of the shoe in guideways formed in a block 224, the latter being adjustable lengthwise of the shoe in a guideway formed in the holder 170 and held in position by a clamping nut 226. A screw 228 having right and left hand threaded portions is provided for simultaneous adjustment of the holders 222 and pins 218 toward or from each other. Such adjustment

serves to vary the distance between the wipers 200, and in consequence to vary the limit of their closing movement laterally of the shoe, as may be required in order that the wipers may wipe the upper inwardly to the required extent on shoes of different sizes. Adjustment of the block 224 with the pins 218 lengthwise of the shoe determines the time in the advance of the wipers when they begin to close over the heel seat, and may be necessary as a compensating adjustment when the roll 212 is adjusted as hereinbefore explained, in order that the beginning of the closing movement of the wipers may take place in proper relation to their lengthwise movement, or may be necessary or desirable for other reasons. In their rearward extensions the wipers 200 are provided with slots to receive a plate 230 which is fast on the wiper holder 204 and assists in resisting strains on the wipers when they are moved downward to press the upper against the insole as hereinafter explained.

The wiper holder 204 is normally upheld by a roll 232 which engages a plane lower face of the holder and is mounted on one end of a lever 234, the other end of which carries a roll 236 engaging a cam 238 on the cam shaft 52. The wiper holder 204 is pressed downwardly upon the roll 232 by a plunger 240 which engages an upper surface of the holder and is pressed downward by a spring 242, the latter being mounted in a recess in the plunger and engaging at its upper end a vertically movable rod 244. It will be seen that immediately upon the starting of the cam shaft 52 the cam 238 releases the lever 234 and permits the spring 242 to force the wiper holder downwardly. The machine has means for limiting such downward movement under control of the shoe itself to determine the plane of the overwiping movement of the wipers. This means comprises a roll 246 which is positioned for engagement with the heel seat face of the insole and is mounted on a bar 248 carried by a block 250 on the wiper holder 204. By engagement with the bottom of the shoe the roll 246 thus limits the downward movement of the wipers preparatory to their advancing and closing movements. It will be evident by reference to Fig. 3 that for the overwiping operation the wipers are thus positioned somewhat above the plane of the heel seat, as is desirable on this type of shoe to insure against displacement of the insole or against premature adherence of the margin of the upper to the insole. The height of the wipers relatively to the plane of the heel seat may be varied by vertical adjustment of the bar 248 in the block 250 through the turning of an adjusting screw 252.

In order that the wipers may be moved farther downwardly for pressing the margin of the upper firmly into adhering relation to the insole, the machine has means for disconnecting the limiting roll 246 from the wiper holder at a predetermined time in the cycle so as to render the roll ineffective to limit or prevent downward movement of the wipers. For this purpose the block 250 is mounted for vertical movement in guideways formed in the wiper holder 204 and is controlled by a latch 254 slidingly mounted in the wiper holder and having a projecting end for engagement with the top face of a hardened block 256 secured to the block 250. The latch 254 normally locks the block 250 to the wiper holder with the lower face of the block in engagement with a pin 258 on the holder. The release of the block 250 from the latch 254 is effected in response to forward movement of the carrier 206 with its wiper holder and wipers. For this purpose a rod 260 is pivotally connected to the latch and extends rearwardly through an opening in a plate 262 fast on the frame of the machine. In the position illustrated in Fig. 3 a spring 264 compressed between the plate 262 and a collar 266 on the rod 260 holds the latch forwardly in locking position. Substantially at the end of the forward movement of the wiper carrier for advancing and closing the wipers a nut 268 on the rod 260 comes into engagement with the plate 262 and stops the forward movement of the rod and the latch. Continued movement of the wiper carrier then serves to withdraw the block 256 from engagement with the latch, thereby breaking the fixed connection between the roll 246 and the wiper holder. The block 250 is then controlled only by a light spring 270 which is provided for subsequently insuring return of the block into latching position and opposes no substantial resistance to downward movement of the wipers.

Substantially at the time when the wipers are thus released for further downward movement increased downward pressure is applied to the wiper holder 204 to insure that the margin of the upper will be pressed smoothly and firmly into adhering relation to the insole. Such increased pressure is applied through a spring 272 the lower end of which rests upon the plunger 240. This comparatively heavy spring is under substantially no compression when the parts are in their initial positions, the light spring 242 in addition to the weight of the parts being depended upon to move the wipers down to their overwiping plane as hereinbefore described. For compressing the spring 272 to apply the increased pressure to the wipers the rod 244 carries a collar 274. Downward movement is imparted to the rod 244 by an arm 276, the front end portion of which is provided with a guideway for a sliding block 278 in which the upper end of the rod 244 is seated in all positions of the wipers, the spring 242 holding the rod up against the block. The arm

276 is fast on a rock shaft on which is also secured an arm 279 provided with a roll 280 which rides in a cam path 282.

Briefly described, therefore, the operation of the heel seat lasting mechanism is as follows. Upon the starting of the cam shaft 52 the lever 234 is released by its cam 238 and the spring 242 forces the wiper holder 204 downwardly until the roll 246 engages the insole on the heel seat. The cam 210 then moves the carrier 206 with the wiper holder forwardly to advance the wipers over the heel seat, and in response to such movement of the wipers they are closed inwardly over the sides of the heel seat by the pins 218, thus gathering the margin of the upper and laying it inwardly over the insole. Substantially at the end of this advancing and closing movement of the wipers the latch 254 releases the block 250, and the arm 276 is then operated to compress the spring 272 and thus to apply increased downward pressure to the wipers. Thereafter the arm 276 is reversely moved to relax the pressure and the wiper holder and the wipers are raised by the cam 238, the support 206 being moved rearwardly by its cam, and the latch 254 snaps back into position to lock the block 250 again to the wiper holder ready for operation on the next shoe.

The different shank lasting mechanisms at the opposite sides of the shoe are substantially identical in construction and operation, and each comprises a gripper for gripping and pulling the upper over the last, a wiper 284, (Fig. 9) for laying the margin of the upper inwardly over the bottom of the last and for pressing it into adhering relation to the insole, and a side clamp 286 for clamping the upper against the side of the last. Each of these sets of instrumentalities is supported on a bracket or carrier 288 which has a rearwardly extending arm 290 secured to a rock shaft 292 and mounted between ears 294 which afford bearings for the rock shaft and are fast on a vertically movable slide 296 (Fig. 7). The slide 296 is mounted for vertical movement in a support 298 provided with a rearwardly extending portion which is guided for horizontal movement in the frame of the machine. Between the rear ends of the arms 290, in the support 298, is a spring 300 which acts on spring plungers to force these ends of the arms apart and thus tends to swing the two opposite shank lasting mechanisms inwardly toward the shoe. Such inward movement is under control of a wedge block 302 (Fig. 6) which has bearing engagement with rolls on the lower ends of arms 304 pivotally mounted on the support 298, the arms 304 being connected by ball joints to bearing members 306 which have sliding engagement with the inner sides of the arms 290. Springs 308 connecting the arms 304 to the arms 290 hold the latter in sliding engagement with the members 306. Initially the wedge block 302 is upraised to hold the shank lasting mechanisms well away from the sides of the shoe in order that the shoe may be moved rearwardly into the heel band without the interference of these mechanisms. By reference to Fig. 1 it will be seen that the lever 176 which locks the jack in its rearmost position carries a roll 310 which bears upwardly under the lower end of the wedge block 302, and when this lever is moved downwardly to lock the jack in response to the movement of the jack the roll 310 releases the wedge block and permits it to slide downwardly in its guideway, thus causing the spring 300 to swing the lasting mechanisms inwardly toward the sides of the shoe. The machine is provided, however, with means for stopping such downward movement of the wedge block at a point where the grippers of the shank lasting mechanisms are over the edges of the upper in position for the upper to be conveniently inserted between the gripper jaws and before the clamp members 286 have been carried into engagement with the shoe. For this purpose the wedge block has secured thereto a rod 312 which extends upwardly through a recess in the slide 296 and has fast on its upper end a block 314 which is notched at 316 for engagement with the upper end of a pawl or latch 318 pivotally mounted on the support 298. When the roll 310 releases the wedge block it drops only to the limit determined by the block 314 and the pawl 318. By adjustment of the block 314 on the rod 312 the limit of this preliminary inward movement of the lasting mechanisms may be varied, as may be necessary for different sizes of shoes.

Secured to the upper end of each of the carriers 288 is a frame or casing which serves to support the different shank lasting instrumentalities at that side of the machine, this casing including opposite cover plates 322 one of which is broken away on Fig. 9. Mounted for vertical movement in guideways in these cover plates is a gripper casing 324 to the lower end of which is secured a fixed gripper jaw 326. A co-operating jaw 328 is pivotally mounted on the casing 324 and has a curved shank portion engaged by a roll 330 which is carried by a closing slide 332 mounted for vertical movement relatively to the gripper casing. A spring 334 connected at one end to the gripper casing and at its other end to the closing slide tends to move the slide upwardly and thus to impart closing movement to the jaw 328. For maintaining the closing slide at its lower limit of movement with the jaws open to receive the upper a latch 336 is pivoted on the slide, this latch having a recess to receive a projection 338 on an operating member or block 340 movable vertically at the outer side of the gripper. A spring 342 normally holds the latch 336 in the position shown in Fig. 10 in which the block 340

is holding the closing slide downward against the tension of the spring 334. The block 340 has rolls 344 which run in vertical guideways in the cover plates 322 and is under control of a spring 346 the upper end of which is connected to a short cover plate 348 on the top of the casing 324, the spring tending to pull the block upwardly.

Each of the grippers is under control of a cam 350 on the cam shaft 2 which serves to operate a lever 352 fast on a rock shaft 353. Fast on this rock shaft are two levers 354, one for each gripper, and each connected by a link 355 to a bell-crank 356 mounted on a support 358 which is fast on the rear end of the support 298. Each bell-crank 356 is connected by a link 360 to a bell-crank 362 pivoted on the lower end of the carrier 288, each bell-crank 362 being connected by a link 364 to the lower end of a gripper operating rod 366 (Fig. 8). Threaded on the lower end of this rod is a sleeve 368 which slides vertically in a fixed sleeve 369 clamped in the carrier 288 and provides a bearing for the lower end of a spring 370. The upper end of this spring seats against the lower end of a sleeve member 372 provided at its opposite sides with vertical slots to receive a pin 374 which is fast in the upper end of the rod 366. The head of the sleeve member 372 is connected by a link 376 to the block 340 above described. Initially, by the action of the springs 346 and 370, the sleeve 372 and the block 340 are upheld as far as permitted by the pin 374, but with the gripper jaws open as shown in Fig. 10. When the rod 366 receives its upward movement from the cam 350, the member 372 and the block 340 are forced yieldingly upward by the springs and the closing slide 332 is thereby moved upward in the gripper casing to close the jaws on the upper. Further upward movement of the block 340 then lifts the gripper casing to cause the jaws to pull the upper, the spring 370 being compressed more or less in accordance with the resistance of the upper materials. It will be evident that the spring 370 through which each of the opposite side grippers is operated is thus yieldable independently in response to resistance of the upper to the pull of that gripper.

Simultaneously with the upward movement of the grippers for pulling the upper acros the instep of the last they receive a forward movement to foredraw the upper. For this purpose both the shank lasting mechanisms are moved forwardly by the support 298 which receives its forward movement from a pinion 378 (Fig. 1) engaging rack teeth on the lower face of the rearward extension of the support. This pinion is operated by a crank arm 380 connected by a link 382 to a lever 384 also fast on the rock shaft 353. The extent of such forward movement of the lasting mechanisms may be varied by adjusting the link 382 along a curved slot in the lever 384, as shown in Fig. 1. For positioning the lasting mechanisms initially lengthwise of the shoe in accordance with the size of the shoe the pinion 378, which may be turned relatively to the arm 380, has secured thereto a segment arm 390 provided with a plurality of holes to receive a pin which is carried by an arm 392 fixed to the arm 380. A handle 394 is provided for withdrawing the pin from engagement with the arm 390. When the pin is thus withdrawn the arm 390 with its pinion may be turned relatively to the arm 392 to move the support forwardly or backwardly and thus to adjust the lasting mechanisms lengthwise of the shoe.

Substantially at the end of the updrawing and foredrawing movement of the grippers the pawl or latch 318 is operated to release the block 314, permitting the wedge block 302 to move farther downwardly and thus rendering the spring 300 effective to swing the opposite shank lasting mechanisms still farther inwardly toward the shoe, thereby causing the grippers to draw the margin of the upper inwardly over the bottom of the last and forcing the side clamps 286 into holding engagement with the upper at the sides of the shoe in the shank. For this purpose the pawl has a link 396 depending from it through an opening in the support 298 (Fig. 7), this link having at its lower end a notch to receive a tooth formed on a crank arm 398 which is fast on a rock shaft 400 journaled in the support 298, this rock shaft having on one end another crank arm connected by a link 402 to an arm 404 also fast on the rock shaft 353. Between the link 402 and the arm 404 there is a pin and slot connection, permitting lost motion, so that the pawl 318 is not operated until substantially the end of the forward movement of the grippers. In response to such release of the block 314 the wedge block 302 may move downwardly until it again meets the roll 310, and in the return of the parts to starting position the wedge block is raised to its upper limit of movement by the action of this roll, thus swinging the opposite shank lasting mechanisms outwardly away from the shoe.

Each of the side clamps 286 comprises a pad of yieldable material, for example rubber, mounted on a holder 406 which is swiveled on the upper end of a supporting arm 408 so that the clamp member may turn in a horizontal plane to adjust itself to the contour of the shoe. The arm 408 has a depending shank 410 which is mounted in a socket in another arm 412 for a purpose to be hereinafter described, and a spring 414 (Fig. 11) holds the arm 408 normally from upward movement. The arm 412 is pivoted at 416 on a portion of the frame of the lasting mechanism so that it may be swung toward or from the shoe. A spring 418 con-

nected to the arm 412 tends to swing the clamping device away from the shoe, and co-operating with this spring to determine the position of the device is a pin 420 (Fig. 9) which is fast on a crank arm secured to a rock shaft 422 in the frame of the lasting mechanism, this rock shaft being provided with an adjusting arm 424 having a spring controlled pin to enter any one of a plurality of holes 426 formed in the frame. It will be evident that this construction permits adjustment of each side clamping device independently toward or from the shoe and that such adjustment determines at each side of the shoe the extent of overdrawing movement of the gripper since the clamp limits the inward movement of the gripper. It may be desired, for example, to adjust the clamping device at the inner side of the shoe so that the gripper at that side will pull the upper farther inwardly on the last than the gripper at the other side of the shoe.

At the end of the overdrawing movement of the grippers the second rise *b* on the cam 34 arrives in position to stop the machine, as hereinbefore described. The operator is then permitted to inspect the work and to determine whether any adjustment of the upper on the last is necessary. If for example the gripper at one side should have pulled the upper too high relatively to the extent of pull at the other side, so that the upper will not overlap the insole for a substantially uniform distance at both sides of the shank, the operator is enabled to adjust the upper by relative movement of the grippers. For this purpose each of the sleeve members 372, which is positively connected to the corresponding gripper operating block 340, as explained, is connected by links 428, 430 and 432 to a hand lever 434 pivoted on the carrier 288. By moving one hand lever upwardly and the other downwardly corresponding movements may be imparted to the opposite side grippers in such manner as to shift the upper transversely of the last. Likewise by use of the hand levers the force of the pull on the upper may be either increased or relaxed.

If for any reason it should be desired at this point to release the shoe from the grippers, each of the grippers independently may be disconnected from its operating block 340 by pressing down on a spring plunger 436 (Fig. 9) thereby operating a pivoted finger 438 which presses against a tripping member 440 pivoted at 442 on the side plates 322. One arm of the member 440 bears on the end of a spring plunger 444, and when the latter is pressed inwardly by downward movement of the plunger 436 it swings the latch 336 (Fig. 10) out of engagement with the projection 338 on the block 340. This releases the closing slide 332 from control of the spring 370, and the gripper casing 324 is permitted to move downwardly in response to the pull of the upper. Since the closing slide is then controlled only by the light spring 334, the upper may be readily slipped out of the gripper jaws. The same means may be used initially for closing the grippers on the upper before the machine is started, in which case the release of the closing slide from the block 340 results in upward movement of the slide in response to the pull of the spring 334, whereby the jaw 328 is operated to grip the upper. The operator may thus, if desired, insert the margin of the upper at one side of the shoe in the corresponding gripper and close that gripper on the upper, and may thereafter do the same at the other side of the shoe. When the machine is operated under these conditions the blocks 340 will be moved upward until their projections 338 again enter the notches in the latches 336, and thereafter the upper will be pulled in the same manner as if the closing of the jaws had been effected automatically.

When the operator again starts the machine by the depression of the treadle 36 the wipers 284 are moved inwardly to lay the margin of the upper at the shank over the insole, these wipers operating in a plane sufficiently above the plane on the insole to avoid displacement of the latter and to prevent presing the margin of the upper prematurely into position to adhere to the insole. Each wiper is carried by a slide 446 movable in guideways in the plates 322 and is operated by a pair of pinions 448 which engage rack teeth on the lower face of the slide. Fast on the same shaft with the pinions 448 is a pinion 450 which is engaged by a vertically movable rack bar 452 (Figs. 8 and 11), the latter being connected at its lower end by means of a link 454 to a bell-crank 456. The link 458 connects each bell-crank 456 to a bell-crank 460 mounted on the member 358, and each of these bell-cranks is connected by a link 462 to a lever 464 fast on a rock shaft 466 provided with an arm 468 operated by a cam 469 on the cam shaft 2. Downward movement is thus imparted to the racks 452 for moving the wipers inwardly. Between the pinions 448 is secured an arm 470 on the upper end of which is a roll engaging a block 471 pivoted on one arm of the member 440 and controlled by a spring plunger 472. As the pinions are operated to force the wiper inwardly the arm 470 swings the member 440 about its axis and thus presses the plunger 444 inwardly to release the latch 336 from the block 340, thus disconnecting the gripper from its operating mechanism and permitting the upper to slip out from between the jaws as the wiper moves inwardly. The upper is thus released from the grippers at the opposite sides of the shoe in time relation to the inward movement of the wipers, if it has not already been thus released manually as hereinbefore explained. In the return of the arms 470 to

starting position the blocks 471 are swung about their pivots against the pressure of the spring plungers 472 to permit the arms to pass.

In order to prevent the opposite side lasting mechanisms from being swung outwardly from the shoe by the resistance of the shoe in such manner as to relax the pressure of the side clamps on the upper, the machine is provided with mechanism for automatically locking together the two opposite shank lasting mechanisms, as shown most clearly in Fig. 11. This means comprises a link 474 connected at one end to one of the shank lasting mechanisms and connected at its other end to a slide 476 on the other shank lasting mechanism, this slide having rack teeth engaging a pinion 478. When the lasting mechanisms are swung inwardly toward the shoe as hereinbefore explained this pinion is turned idly by the slide 476. Fast on the same shaft with the pinion 478 is a ratchet wheel 480, and pivoted on the casing of the same lasting mechanism is a pawl 482 which is pulled toward the ratchet wheel by a spring 484. This pawl, however, is held normally out of engagement with the ratchet wheel by a latch 486, pivoted on which is a releasing dog 488 having a projection held by a spring 490 in a notch formed in a cam member 492 fast on the same shaft as the pinion 450. When this pinion is operated by the rack bar 452 to force the wiper inwardly, the dog 488 is immediately pulled toward the right (Fig. 11) releasing the latch 486 from the pawl 482 and causing the latter to swing into engagement with the ratchet wheel 480, thus locking the two opposite lasting mechanisms together so that they cannot be forced apart away from the shoe. Immediately thereafter a rise 494 on the cam 492 forces the dog 488 downwardly out of the notch in the cam, and a spring 496 then swings the latch 486 back against a projection 498 on the pawl 482. At a later time in the cycle, in the return of the parts to starting position, a rod 500 carried by the rack bar 452 engages and lifts up one end of the pawl member 482, thereby disconnecting the pawl from the ratchet wheel and swinging it back into position for the latch 486 to hook over the top of the projection 498.

Immediately after the wipers have arrived at their limits of inward movement the cam 64 on the cam shaft 2 acts on the rod 66 to actuate the clutch on the cam shaft 52 of the heel lasting mechanism, and the cam shaft 2 is then stopped by the action of the third rise *c* on the cam 34 and remains at rest substantially throughout the cycle of operations of the heel seat lasting mechanism hereinbefore described. The machine is so organized, however, that downward pressure is applied by the shank wipers 284 to the margin of the upper at the same time that downward pressure is applied by the heel wipers 200 on the heel seat and under control of the same mechanism. For this purpose the slide 296, hereinbefore described as mounted in a guideway in the carrier 298 and as supporting the opposite shank lasting mechanisms, is provided on its rear side (Fig. 7) with an upward extension having rack teeth 502 engaged by a pinion 504 which is fast on a shaft provided on its outer end with an arm 506 (Fig. 1), the latter being connected to an arm 508 fast on the same rock shaft as the arm 276 for imparting downward movement to the heel wipers, the connections comprising a rod 510 (Fig. 2) having two telescoping parts between which is a compression spring 512. The shank lasting mechanisms with their wipers are thus forced downward yieldingly through the spring 512 at the same time as the heel wipers, so that pressure is applied simultaneously to all portions of the margin of the upper in the shank and on the heel seat for cementing the margin firmly to the insole. In this operation the side clamps 286 remain stationary by reason of the manner in which their depending shanks 410 are mounted in the holders 412, thus avoiding displacement of the upper by the friction of the clamps. It will be understood that the shank wipers are moved upwardly again with the heel wipers before they are retracted from over the shoe in order to avoid outward drag on the margin of the upper.

Just before the clutch for the heel lasting mechanism is actuated to stop the rotation of the shaft 52 the clutch at the base of the machine is actuated automatically by the turning of the shaft 52 to start the cam shaft 2 for the final period of its cycle. For this purpose the cam shaft 52 carries a cam 514 which engages a roll on a lever 516 connected by a link 518 to an arm 520 fast on the same rock shaft as the treadle 36, whereby the treadle is operated automatically to trip the clutch. It will be understood, of course, that the link 518 is moved upwardly also at the time when the treadle is depressed by the operator, but that this is merely an idle movement without effect upon the machine. In the completion of the cycle of the cam shaft 2 the parts of the shank lasting mechanism are returned to starting position and the jack is released to permit the removal of the shoe.

While the operations of the different mechanisms and the cycle of the machine as a whole have been set forth in the foregoing description, they may be summarized briefly as follows:

While the jack is in its forwardly swung position the operator mounts thereon a last and assembled upper materials, the margin of the upper, in the case of a tennis shoe, being coated with cement, and after inserting the toe end of the upper materials be-

tween the gripper jaws 120, 122, depresses the lever 126 to grip the toe end of the upper and to draw the upper forwardly to tighten it about the heel end of the last, the member 116 operating simultaneously to wipe the upper forwardly at the top of the forepart and to press and hold it against the last. The operator then swings the jack rearwardly to carry the shoe into the heel band and to cause the heel band to close about the heel end of the shoe, this rearward movement of the jack serving to release the locking lever 176 which is thereupon swung into position to hold the jack and the shoe securely against return forward movement. As the lever 176 is swung to operative position it releases the wedge block 302, which drops as far as permitted by the pawl 318 and thus renders the spring 300 effective to swing the opposite shank lasting mechanisms inwardly until the grippers are in convenient position to receive the margin of the upper, but without carrying the side clamps 286 into engagement with the shoe. If the insole has not already been mounted on the bottom of the last it may then be placed in the proper lengthwise position determined by engagement with the upstanding margin of the upper held tightly about the heel end of the last. The operator then positions the margin of the upper at the opposite sides of the shank within the grippers, with or without tripping the grippers manually to close them on the upper as hereinbefore described.

Immediately upon the starting of the machine the grippers are closed on the upper, if they have not already been tripped manually, and in either case are moved upwardly to pull the upper, with a simultaneous forward movement by the action of the pinion 378 to draw the upper still more tightly about the heel end of the last. Substantially at the end of this updrawing and foredrawing movement of the grippers the wedge block 302 is released by the pawl 318 to cause the grippers to be swung inwardly to draw the upper over the margin of the insole and to cause the side clamps 286 to be forced into position to clamp the upper against the sides of the last. The machine then comes automatically to a stop, and the operator is permitted, if necessary, to manipulate the levers 434 for adjusting the upper transversely of the last.

In the second stage of the cycle of the machine, following another depression of the starting treadle, the gripper operating cam 350 maintains the gripper operating connections in the positions to which they have been previously moved, the wiper operating cam 469 becomes effective to impart inward movement to the wipers 284, and the opposite shank lasting mechanisms are locked together as described to prevent them from being forced outwardly by the resistance of the work. Shortly after the wipers begin their inward movement the grippers are tripped to release the upper. The wipers, as hereinbefore explained, act in their inward movement to lay the margin of the upper over the insole without such pressure as might tend to displace the insole. Substantially at the end of the inward movement of the shank wipers the clutch which controls the operation of the heel seat lasting mechanism is tripped automatically by the cam 64, and the heel seat wipers 200 are then positioned automatically at the proper height above the heel seat by engagement of the roll 246 with the insole and are advanced and closed to gather the margin of the upper and lay it inwardly over the heel end of the insole. Immediately after the clutch which controls the heel seat lasting mechanism is tripped, the main cam shaft 2 is brought automatically to a stop by the action of the cam *c* upon the controlling lever 22. After the heel wipers have been advanced and closed they are forced downwardly, as described, and at the same time downward movement is imparted to the shank lasting mechanisms by the action of the arm 508 and its operating connections to cause the shank wipers to press the margin of the upper into adhering relation to the insole at the same time as the heel wipers, and both sets of wipers are then moved upward by the same mechanism to release the pressure. The cam shaft 52 continues its movement to return the parts of the heel lasting mechanism to starting position, and immediately before this shaft completes its movement the lower clutch is tripped automatically by the action of the cam 514, whereupon the cam shaft 2 turns through the remainder of its cycle and restores the parts of the shank lasting mechanisms to starting position and releases the jack. The operator then releases the toe gripper from the upper and removes the shoe from the jack.

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

1. In a machine of the class described, the combination with shoe positioning means, of mechanism for conforming the upper to the contour of its last and for laying its margin inwardly over the insole in the shank portion of the shoe, mechanism for lasting the heel end of the shoe, and power-driven operating means for imparting in automatically determined sequence operative movement to said shank conforming mechanism and thereafter to said heel lasting mechanism.

2. In a machine of the class described, the combination with shoe positioning means, of means for conforming the upper to the contour of its last and for laying its margin inwardly over the insole in the shank portion of the shoe, means for thereafter laying the margin of the upper inwardly over the insole about the heel end of the shoe, and means for

effecting relative movement between said overlaying means and the shoe to press the margin of the upper into adhering relation to the insole about the heel end and in the shank.

3. In a machine of the class described, the combination with shoe positioning means, of mechanism for lasting the heel end of the shoe, mechanism for lasting the shank portion of the shoe, and clutch-controlled power driven operating means automatically timed to impart first to the shank lasting mechanism and then to the heel lasting mechanism movement to lay the upper inwardly over the insole.

4. In a machine of the class described, the combination with shoe positioning means, of mechanism for lasting the heel end of the shoe, mechanism for lasting the shank portion of the shoe, and operating means for imparting first to the shank lasting mechanism and then to the heel lasting mechanism movement to lay the upper inwardly over the insole and for thereafter effecting relative movement between said different mechanisms and the shoe to press the margin of the upper upon the insole at the heel and shank substantially simultaneously.

5. In a machine of the class described, the combination with shoe positioning means, of heel and shank lasting mechanisms, each including wipers for laying the margin of the upper inwardly over the insole, means for imparting overlaying movements first to the shank wipers and then to the heel wipers in automatically determined time relation, and means for thereafter moving said shank wipers and heel wipers heightwise of the shoe substantially simultaneously to press the margin of the upper into adhering relation to the insole.

6. In a machine of the class described, the combination with shoe positioning means, of heel and shank lasting mechanisms, each including wipers for laying the margin of the upper inwardly over the insole, and operating means for moving said shank wipers and heel wipers inwardly at different respective times and for thereafter operating said wipers in automatically determined time relation to their inward movements to press the margin of the upper upon the insole.

7. In a machine of the class described, the combination with shoe positioning means, of mechanism for laying the upper inwardly over the insole at opposite sides of the shank of the shoe, mechanism for laying the upper inwardly over the insole about the heel end of the shoe, and operating means for moving first the shank overlaying mechanism and then the heel overlaying mechanism inwardly over the shoe and for thereafter effecting relative movement between the shoe and said different mechanisms to press the upper upon the bottom of the insole.

8. In a machine of the class described, the combination with shoe positioning means, of mechanism for laying the upper inwardly over the insole at opposite sides of the shank of the shoe, mechanism for laying the upper inwardly over the insole about the heel end of the shoe, and power driven operating means for imparting overlaying movement first to said shank overlaying mechanism and then to said heel overlaying mechanism in a continuous operation of the machine.

9. In a machine of the class described, the combination with shoe positioning means, of different mechanisms for lasting different portions of the shoe, separately controlled power driving means for the different respective mechanisms, and starting means for one of said mechanisms arranged to be operated automatically by the driving means for the other mechanism.

10. In a machine of the class described, the combination with shoe positioning means, of different mechanisms for lasting different portions of the shoe, a controlling clutch for each of said mechanisms, manual means for actuating one of said clutches, and automatic means for actuating the other clutch.

11. In a machine of the class described, the combination with shoe positioning means, of power operated heel lasting mechanism, power operated shank lasting mechanism, manual means for starting said shank lasting mechanism, and automatic means for thereafter starting the heel lasting mechanism in predetermined time relation to the operation of the shank lasting mechanism.

12. In a machine of the class described, the combination with shoe positioning means, of power operated shank lasting means organized to lay the margin of the upper at the shank inwardly over the insole and then to come automatically to rest, and power operated heel lasting means automatically controlled to follow said shank lasting means in operation on the shoe and to start said shank lasting means again in operation to complete its cycle of movements.

13. In a machine of the class described, the combination with shoe positioning means, of different mechanisms for lasting respectively different portions of the shoe, a controlling clutch for each of said lasting mechanisms, and a device associated with each of said mechanisms for automatically actuating the clutch for the other mechanism.

14. In a machine of the class described, the combination with shoe positioning means, of different mechanisms for lasting respectively different portions of the shoe, a controlling clutch for each of said mechanisms, manual means for actuating one of said clutches to start its lasting mechanism, automatic means for controlling said clutch to stop said lasting mechanism at an intermediate point in the cycle, and automatic means for actuating the

clutch for the other lasting mechanism and for thereafter actuating the clutch for said first lasting mechanism to complete the cycle.

15. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanism, heel lasting mechanism, manual means for starting the shank lasting mechanism, automatic means for bringing the shank lasting mechanism to a stop at an intermediate point in the cycle of the machine, automatic means for starting the heel lasting mechanism in time relation to the operation of the shank lasting mechanism, and automatic means for again starting the shank lasting mechanism in operation in time relation to the operation of the heel lasting mechanism.

16. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanism, heel lasting mechanism, operating means for said shank lasting mechanism arranged to come automatically to a stop at an intermediate point in the cycle of the machine, and operating means for said heel lasting mechanism arranged to perform the lasting operation at the heel while said first named operating means is at rest and then again to start said first named operating means for completing the cycle of movements of the shank lasting mechanism.

17. In a machine of the class described, the combination with shoe positioning means, of different mechanisms for laying the upper inwardly over the insole respectively in different locations, separately controlled power-driven operating means for imparting overlaying movement to each of said mechanisms, and connections for rendering the operating means for one of said mechanisms effective to impart to both the mechanisms movement heightwise of the shoe to press the margin of the upper upon the insole.

18. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanism, heel lasting mechanism, separately controlled operating means for each of said lasting mechanisms, and connections for rendering the operating means for the heel lasting mechanism effective to impart an operative movement to the shank lasting mechanism.

19. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanism, heel lasting mechanism, power-driven operating means for imparting to the shank lasting mechanism movement to lay the margin of the upper inwardly over the insole, separately controlled power-driven operating means for the heel lasting mechanism, and connections for rendering said last named operating means effective to impart to the shank lasting mechanism movement to press the margin of the upper upon the insole.

20. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanism comprising wipers for laying the margin of the upper inwardly over the insole, power driven means automatically operative to move said wipers inwardly and to come to a stop with the wipers in overlaying position, heel embracing wipers, separately controlled power-driven means for operating said heel embracing wipers to lay the margin of the upper inwardly and then to press it upon the insole, and mechanism operated by said last named power-driven means for imparting to the shank wipers movement to press the margin of the upper upon the insole.

21. In a machine of the class described, the combination with shoe positioning means, of shank and heel lasting mechanisms each comprising wipers for laying the upper inwardly over the insole, separately controlled operating means for the different respective lasting mechanisms, and compressing mechanism controlled by one of said operating means and including a member common to both the shank wipers and the heel wipers for imparting to said wipers movement to press the margin of the upper upon the insole.

22. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, different mechanisms arranged respectively to last the opposite sides of the shank portion of the shoe, and a shoe support movable to carry the shoe lengthwise into position for the operation of said heel and shank lasting mechanisms.

23. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, mechanism for lasting the opposite sides of the shank of the shoe, a shoe support movable to carry the shoe into position to be operated upon by said heel and shank lasting mechanisms, and power means arranged to be started in operation after the shoe is thus positioned for imparting operative movements to said heel and shank lasting mechanisms.

24. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, mechanism for lasting the shank portion of the shoe, a shoe support movable to carry the shoe rearwardly into position to be operated upon by said heel and shank lasting mechanisms, locking means automatically operative in response to such movement of the shoe support to lock said support in shoe presenting position, and power means arranged to be started in operation when the shoe is thus positioned for imparting operative movements to said lasting mechanisms.

25. A machine of the class described having, in combination, lasting means constructed to lay the margin of an upper over an insole and to press it into position to adhere to the insole at the heel and shank por-

tions of a shoe including mechanism for lasting the entire heel end of the shoe at one operation, and means for pulling the upper lengthwise and for holding it under lengthwise strain throughout the operation of said heel and shank lasting means upon the shoe.

26. A machine of the class described having, in combination, lasting means constructed to lay the margin of an upper over an insole and to press it into position to adhere to the insole at the heel and shank portions of a shoe, a support for holding the shoe substantially stationary during the heel and shank lasting operations, a toe gripper, means for operating said toe gripper to pull the upper forwardly on the last, and means for maintaining said gripper in upper pulling position with the upper under lengthwise strain throughout the operation of said heel and shank lasting means upon the shoe.

27. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, mechanism for lasting the opposite sides of the shank of the shoe, a shoe support movable relatively to said heel and shank lasting mechanisms to carry the shoe rearwardly into position to be operated upon by said mechanisms, and means on said shoe support for engaging the forepart of the upper and for pulling the upper forwardly on the last preparatory to the operation of said heel and shank lasting mechanisms.

28. A machine of the class described having, in combination, means for pulling an upper and for holding it under lengthwise strain and in conformity to the contour of the top of the forepart of its last at the rear of the toe end, and means for lasting the heel and shank portions of the shoe while the upper is thus held.

29. A machine of the class described having, in combination, a toe gripper, a member for engaging the upper frictionally at the top of the forepart, means for operating said gripper and member to draw the upper forwardly on its last, and means for laying portions of the upper at the rear of the toe inwardly over the bottom of the last while the upper is subjected to such forward strain.

30. A machine of the class described having, in combination, means for pulling an upper lengthwise of its last, and means for laying the margin of the upper at the opposite sides of the shank inwardly over the insole and for pressing it into adhering relation to the insole while the upper is held under lengthwise strain by said pulling means.

31. A machine of the class described having, in combination, means for lasting the opposite sides of the shank of a shoe, a shoe support movable to carry a shoe into position to be operated upon by said shank lasting means, and a toe gripper on said shoe support manually movable to pull the upper forwardly on its last preparatory to the operation of said shank lasting means.

32. A machine of the class described having, in combination, means for gripping an upper at the toe end of its last and for pulling the upper lengthwise of the last, means for thereafter pulling the upper at the opposite sides of the last, and means for laying the margin of the upper inwardly over the insole at the opposite sides of the shank of the shoe after it has been thus pulled at the toe and the sides.

33. A machine of the class described having, in combination, a toe gripper and manual means for operating it to pull an upper lengthwise of its last, opposite side grippers, power means for imparting upper pulling movements to said side gripers, and means for laying the margin of the upper at the shank inwardly over the insole after it has been thus pulled at the toe and the sides.

34. A machine of the class described having, in combination, lasting devices for the opposite sides of the shank of a shoe comprising grippers for gripping and pulling the upper at the shank, a shoe support movable to carry a shoe into position for the operation of said lasting devices, and a toe gripper movable with said shoe support and manually operable to pull the upper forwardly on its last preparatory to the operation of said lasting devices.

35. A machine of the class described having, in combination, grippers for gripping an upper at opposite sides of the shank of a last, means for effecting relative movement of said grippers and the last to pull the upper heightwise of the last and forwardly toward the toe end of the last, means for gripping and pulling the upper at the toe end of the last, and means for laying the margin of the upper inwardly over the insole at opposite sides of the shank after the upper has been thus pulled.

36. A machine of the class described having, in combination, a toe gripper and means for operating it to pull an upper lengthwise of its last, grippers for gripping the upper at opposite sides of the shank of the shoe, means for imparting to said shank grippers updrawing, foredrawing and overdrawing movements, and means for laying the margin of the upper inwardly over the insole at opposite sides of the shank.

37. A machine of the class described having, in combination, means for lasting the heel and shank portions of a shoe including grippers for gripping and pulling the upper at opposite sides of the shank, and means for pulling the upper at the toe end of the last preparatory to the operation of said heel and shank lasting means.

38. A machine of the class described hav-

ing, in combination, a toe gripper and means for operating it to pull an upper lengthwise of its last, grippers for gripping the upper at opposite sides of the shank of the shoe, means for operating said shank grippers with a component of movement forwardly toward the toe end of the last, and means for laying the upper inwardly over the insole about the heel end and at opposite sides of the shank of the shoe.

39. A machine of the class described having, in combination, a toe gripper and means for operating it to pull an upper at the toe end of its last, grippers for gripping the upper at opposite sides of the shank of the shoe, means for imparting updrawing, foredrawing and overdrawing movements to said shank grippers, and means for laying the upper inwardly over the insole about the heel end and in the shank of the shoe after the upper has been thus pulled.

40. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, and means for gripping and pulling the upper forwardly on its last at the toe end and at opposite sides of the shank of the shoe to tighten the heel end portion of the upper about the last.

41. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, a toe gripper and means for operating it to pull the upper forwardly on its last, grippers for gripping the upper at opposite sides of the shank of the shoe, and operating means for imparting to said shank grippers forward movement to tighten the upper about the heel end of the last.

42. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, a toe gripper and manual means for operating it to pull the upper forwardly on its last, grippers for gripping the upper at opposite sides of the shoe, and power means for imparting to said opposite side grippers forward movement to tighten the upper about the heel end of the last.

43. A machine of the class described having, in combination, means for supporting a making last having an upper and an insole thereon, mechanism for lasting the upper at the heel end of the shoe over the insole, grippers for gripping the upper at opposite sides of the shank of the shoe, and operating means for imparting to said grippers movement toward the toe end of the shoe to tighten the upper about the heel end of the last.

44. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, grippers for gripping the upper at opposite sides of the shank of the shoe, and operating means for imparting to said grippers upper pulling movements heightwise of the shoe and forwardly toward the toe end of the shoe.

45. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, grippers for gripping the upper at opposite sides of the shank of the shoe, and power-driven operating means timed to impart to said grippers upper pulling movements heightwise of the shoe and forwardly toward the toe end of the shoe prior to the operation of said heel lasting mechanism on the shoe.

46. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, grippers for gripping the upper at opposite sides of the shoe, and operating means for imparting to said grippers updrawing, foredrawing and overdrawing movements prior to the operation of the heel lasting mechanism upon the shoe.

47. A machine of the class described having, in combination, grippers for gripping the upper at opposite sides of the shank of a shoe, power means automatically operative to impart upper pulling movement to said grippers and to come to a stop with the upper held under tension, and mechanism automatically operative upon a subsequent starting of the machine to last the heel end of the shoe.

48. A machine of the class described having, in combination, grippers for gripping the upper at opposite sides of the shank of a shoe, power means automatically operative to impart upper pulling movement to said grippers and to come to a stop with the upper held under tension, means enabling the operator to move said grippers relatively to adjust the upper on the last while the upper is thus held, and means automatically operative upon a subsequent starting of the machine to last the heel end portion of the shoe.

49. A machine of the class described having, in combination, grippers for gripping the upper at opposite sides of the shank of a last, means for effecting relative movement of said grippers and the last to pull the upper heightwise of the last and forwardly toward the toe end of the last, and means for laying the margin of the upper inwardly over the insole in the shank and about the heel end of the shoe.

50. A machine of the class described having, in combination, grippers for gripping the upper at opposite sides of the shank of a shoe, means for imparting to said grippers updrawing, foredrawing and overdrawing movements, and means for laying the margin of the upper inwardly over the insole in the shank and about the heel end of the shoe.

51. A machine of the class described having, in combination, grippers for gripping the upper at opposite sides of the shank of a last, power means automatically operative to effect relative movement of said grippers and the last to pull the upper and to come to

a stop with the upper held under tension, and means automatically operative upon a subsequest starting of the machine to lay the upper inwardly over the insole in the shank and about the heel end of the shoe.

52. In a machine of the class described, the combination with shoe positioning means, of heel embracing wipers, wipers for the opposite sides of the shank of the shoe, grippers for gripping the opposite side portions of the upper in the shank, and operating means for imparting upper pulling movement to said grippers to pull the upper heightwise of the last and forwardly toward the toe end of the last and for thereafter imparting operative movement to said shank wipers and heel wipers to lay the margin of the upper inwardly over the insole.

53. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shank of a shoe, wipers for the opposite sides of the shank, wipers for embracing the heel end of the shoe, and operating means for imparting upper pulling movement to said grippers and for thereafter operating first the shank wipers and then the heel wipers to lay the margin of the upper inwardly over the insole.

54. In a machine of the class described, the combination with shoe positioning means, of means for laying the upper inwardly over the insole about the heel end of the shoe, and power operated means for pulling the upper and for laying it inwardly over the insole at opposite sides of the shank of the shoe before it is laid inwardly about the heel end.

55. In a machine of the class described, the combination with a shoe support, of means for gripping and pulling the upper at opposite sides of the shoe, means for laying the margin of the upper inwardly over the insole first in the shank and then about the heel end of the shoe, and means for effecting relative movement of said overlaying means and the shoe support to press the upper upon the insole.

56. A machine of the class described having, in combination, opposite shank grippers, means for effecting relative movement of said grippers and a last to pull the upper over the last, opposite shank wipers, wipers for embracing the heel end of the shoe, and operating means for imparting inward movement first to said shank wipers and then to said heel wipers and for effecting relative movement of the last and said shank and heel wipers heightwise of the last to press the upper upon the insole.

57. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shank of the shoe, and operating means for moving said grippers heightwise, lengthwise and laterally of the shoe for updrawing, foredrawing and overdrawing the upper.

58. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shank of the shoe, means for imparting to said grippers upper pulling movements heightwise and lengthwise of the shoe substantially simultaneously, and means for thereafter imparting to the grippers overdrawing movements inwardly over the bottom of the shoe.

59. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shank of the shoe, and operating means for imparting to said grippers in a continuous operation of the machine upper pulling movements heightwise and lengthwise of the shoe and inwardly over the bottom of the shoe.

60. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shank of the shoe, operating means for effecting relative movement of said grippers and the shoe to pull the upper heightwise and lengthwise of the shoe, and means for laying the margin of the upper at the opposite sides of the shank inwardly over the insole.

61. In a machine of the class described, the combination with shoe positioning means, of opposite shank grippers, means automatically operative to impart upper pulling movements to said grippers and then to come to a stop with the upper held under tension, and means automatically operative upon a subsequent starting of the machine to lay the margin of the upper at the shank inwardly over the insole.

62. In a machine of the class described, the combination with shoe positioning means, of opposite shank grippers, means automatically operative to impart updrawing, foredrawing and overdrawing movements to said grippers and then to come to a stop with the upper held under tension, and means for thereafter laying the margin of the upper at the opposite sides of the shank inwardly over the insole.

63. In a machine of the class described, the combination with shoe positioning means, of opposite shank grippers, opposite shank wipers, operating means for imparting to said grippers upper pulling movements with a component of movement forwardly toward the toe end of the shoe, and means for thereafter imparting to said wipers inward movements to lay the margin of the upper at the shank inwardly over the insole.

64. In a machine of the class described, the combination with shoe positioning means, of power-operated lasting devices for the opposite sides of the shoe, and means responsive

to the presentation of a shoe to said lasting devices for imparting preliminary movement toward the sides of the shoe to said devices before the machine is started.

65. A machine of the class described having, in combination, lasting devices for the opposite sides of a shoe, a shoe support movable to carry a shoe into position between said lasting devices, and mechanism automatically operative in response to such movement of the shoe support to impart a preliminary positioning movement to said lasting devices.

66. A machine of the class described having, in combination, lasting devices for the opposite sides of a shoe, a shoe support movable to carry a shoe into position between said lasting devices, and spring controlled means arranged to be tripped by such movement of the shoe support to impart to said lasting devices a preliminary movement toward the sides of the shoe.

67. A machine of the class described having, in combination, upper pulling mechanisms for the opposite sides of a shoe comprising grippers for gripping the opposite side portions of the upper, means for positioning a shoe between said upper pulling mechanisms, and means for imparting to said mechanisms after the shoe is thus positioned preliminary inward movement to carry the grippers into position to receive the margin of the upper.

68. A machine of the class described having, in combination, upper pulling mechanisms for the opposite sides of a shoe comprising grippers for gripping the opposite side portions of the margin of the upper, a shoe support movable to carry a shoe into position between said upper pulling mechanisms, and means automatically operative in response to such movement of the shoe support to impart to said upper pulling mechanisms movement toward the sides of the shoe to carry the grippers into position to receive the margin of the upper.

69. In a machine of the class described, the combination with shoe positioning means, of opposite side grippers, a shoe support movable to carry a shoe into position between said grippers, means automatically operative in response to such movement of the shoe support to impart to the grippers preliminary positioning movements inwardly toward the sides of the shoe, and means for thereafter imparting to the grippers further inward movements to draw the upper over the bottom of the shoe.

70. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, mechanism for lasting the opposite sides of the shank of the shoe including grippers for gripping the margin of the upper, a shoe support movable rearwardly to carry a shoe into position to be operated upon by said heel and shank lasting mechanisms, and means automatically operative in response to such movement of the shoe support to move said shank lasting mechanisms inwardly toward the sides of the shoe to carry the grippers into position to receive the margin of the upper.

71. A machine of the class described having, in combination, mechanism for lasting the heel end of a shoe, mechanisms for lasting the opposite sides of the shank of the shoe including grippers for gripping the margin of the upper, a shoe support movable rearwardly to carry a shoe into position to be operated upon by said heel and shank lasting mechanisms, a device automatically operative in response to such movement of the shoe support to lock the support in operative position, and means controlled by said locking device for imparting to said shank lasting mechanisms preliminary movement toward the sides of the shoe.

72. In a machine of the class described, the combination with shoe positioning means and means for lasting the heel end of the shoe, of grippers for gripping the upper at opposite sides of the shank of the shoe, and a support for said grippers movable to carry them bodily lengthwise of the shoe to tighten the upper about the heel end of the last.

73. In a machine of the class described, the combination with shoe positioning means and means for lasting the heel end of the shoe, of grippers for gripping the upper at opposite sides of the shank of the shoe, a support for said grippers movable to carry them bodily forward lengthwise of the shoe to tighten the upper about the heel end of the last, and operating means for said support including connections adjustable to vary the extent of the foredrawing movement of the grippers.

74. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shoe, and a support for said grippers movable to carry them bodily lengthwise of the shoe, the grippers being mounted for swinging movements relatively to said support about axes extending heightwise of the shoe.

75. In a machine of the class described, the combination with means for supporting a shoe bottom upward, of grippers for gripping the upper at opposite sides of the shoe, a gripper support mounted below the shoe for movements lengthwise of the shoe, and gripper carriers mounted on said support for swinging movements laterally of the shoe.

76. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of gripers for gripping the upper at opposite sides of the shoe, gripper carriers mounted below the shoe for movements laterally of the shoe, and means for imparting to said gripper carriers pre-

liminary inward movements to carry the grippers into position to receive the margin of the upper and for thereafter imparting to said gripper carriers further inward movements to cause the grippers to draw the upper inwardly over the bottom of the last.

77. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of grippers for gripping the upper at opposite sides of the shoe, operating means for said grippers comprising members extending upwardly from below the shoe for imparting upper pulling movements to the grippers, and handles connected to said operating members to enable the operator to effect relative movement of the grippers to adjust the upper on the last.

78. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of grippers for gripping the upper at opposite sides of the shoe, operating means for said grippers comprising members extending upwardly from below the shoe for imparting upper pulling movements to the grippers, and carriers supporting said grippers and operating members for bodily swinging movements laterally of the shoe.

79. In a machine of the class described, the combination with shoe positioning means, of a gripper for gripping the margin of the upper, and a member movably mounted at one side of the gripper for controlling the gripper and for operating it to pull the upper.

80. In a machine of the class described, the combination with shoe positioning means, of a gripper for gripping the margin of the upper, said gripper comprising relatively movable gripping jaws and a jaw closing member, and an operating member mounted for movement at one side of the gripper for controlling said jaw closing member and for operating the gripper to pull the upper.

81. In a machine of the class described, the combination with shoe positioning means, of a gripper for pulling the upper, said gripper comprising relatively movable gripping jaws and a spring-controlled jaw closing member, an operating member mounted for movement at one side of the gripper, and a latch for connecting said operating member to the jaw closing member.

82. In a machine of the class described, the combination with shoe positioning means, of a gripper for gripping the margin of the upper, said gripper comprising relatively movable gripping jaws and a spring-controlled jaw closing member, an operating member mounted for movement at one side of the gripper, a latch for connecting said operating member to the jaw closing member to render the operating member effective to close the jaws and to move them to pull the upper, and a device for operating said latch to release the closing member from the operating member.

83. In a machine of the class described, the combination with shoe positioning means, of a gripper for gripping the margin of the upper, said gripper comprising relatively movable gripping jaws and a spring-controlled jaw closing member, an operating member mounted for movement at one side of the gripper, a latch for connecting said operating member to the jaw closing member, and a manually operative device for operating said latch to release the closing member to cause the jaws to close upon the upper.

84. In a machine of the class described, the combination with shoe positioning means, of upper pulling means comprising a casing, a gripper guided for movement in said casing and including relatively movable gripper jaws and a jaw closing member, an operating member guided for movement in said casing at one side of the gripper, and a latch for connecting said operating member to the jaw closing member.

85. In a machine of the class described, the combination with shoe positioning means, of upper pulling means comprising a casing, a gripper guided for movement in said casing and including relatively movable gripper jaws and a jaw closing member, an operating member guided for movement in said casing at one side of the gripper, a latch for connecting said operating member to the jaw closing member, automatic means for operating said latch to break the connection between the operating member and the jaw closing member, and a device on said casing adapted for use manually to break said connection.

86. In a machine of the class described, the combination with shoe positioning means, of upper pulling means comprising a casing, a gripper movably mounted in said casing and including relatively movable gripper jaws and a spring-controlled jaw closing member, an operating member movable in said casing, a latch for connecting said operating member to the jaw closing member, and a device mounted on the casing to enable the operator to break the connection between the jaw closing member and the operating member.

87. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of a gripper for gripping the margin of the upper, and upwardly movable operating mechanism extending upwardly from below the shoe and including a spring through which upper pulling movement is imparted yieldingly to the gripper.

88. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of a gripper for pulling the upper, an operating member for said gripper movable upwardly at one side of the gripper, and mechanism extending upwardly from below the shoe to impart upward movement to said operating member.

89. In a machine of the class described, the

combination with shoe positioning means, of grippers for pulling the upper at opposite sides of the shoe at the rear of the forepart, said grippers being mounted for swinging movements laterally of the shoe each about an axis extending heightwise of the shoe and also for movements heightwise of the shoe to pull the upper.

90. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units comprising grippers for pulling the upper at opposite sides of the shoe and wipers for wiping it inwardly over the insole, said gripper and wiper units being mounted to swing laterally of the shoe each about an axis extending heightwise of the shoe at the rear of the gripper.

91. In a machine of the class described, the combination with shoe positioning means, of grippers for gripping the upper at opposite sides of the shoe, gripper carriers mounted for swinging movements laterally of the shoe each about an axis extending heightwise of the shoe, spring means for swinging said carriers inwardly, and wedging means between said carriers for controlling their inward movements.

92. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units movable laterally of the shoe at the rear of the toe and each comprising a support having a gripper and a wiper mounted thereon, and means for moving the wiper of each unit relatively to its gripper to lay the margin of the upper inwardly over the insole.

93. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit movable laterally of the shoe and comprising a support having a gripper and a wiper mounted thereon, and a rack and pinion mechanism on said support for moving the wiper relatively to the gripper to lay the margin of the upper inwardly over the insole.

94. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units movable laterally of the shoe at the rear of the toe and each comprising a support having a gripper and a wiper mounted thereon, means for moving said supports toward the shoe to cause the grippers to draw the upper inwardly over the insole, and means for imparting to the wiper of each unit a movement relatively to its gripper to lay the margin of the upper over the insole.

95. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit comprising a support having a gripper and a wiper mounted thereon, means for moving said support toward the shoe to cause the gripper to draw the upper inwardly over the insole, means on said support for engaging the shoe to limit the overdrawing movement of the gripper, and means for moving the wiper relatively to the gripper to lay the margin of the upper over the insole.

96. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units movable laterally of the shoe at the rear of the toe and each comprising a gripper, a wiper and a clamp member, means for moving said units laterally of the shoe to positions determined by the engagement of said clamp members with the shoe to cause the grippers to draw the upper inwardly over the insole, and means for moving the wiper of each unit relatively to its gripper to lay the margin of the upper over the insole.

97. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit comprising a support mounted for movement relatively to the shoe and having a gripper and a wiper mounted thereon, means for moving said wiper relatively to the gripper to lay the margin of the upper inwardly over the insole, and automatic means to cause the gripper to release the upper in time relation to the inward movement of the wiper.

98. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit comprising a support movable relatively to the shoe and having a gripper and a wiper mounted thereon, wiper operating mechanism for moving the wiper relatively to the gripper to lay the margin of the upper inwardly over the insole, and means controlled by said wiper operating mechanism for tripping the gripper to cause it to release the upper.

99. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit comprising a support having a gripper and a wiper mounted thereon, power operated means for moving said support toward the shoe to cause the gripper to draw the upper inwardly over the insole, controlling means for bringing the machine to a stop with the gripper in overdrawing position, and wiper operating means automatically operative upon a subsequent starting of the machine to impart to the wiper a movement relatively to the gripper to lay the margin of the upper over the insole.

100. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units for the opposite sides of the shoe each comprising a support with a gripper and a wiper thereon, said supports being mounted for swinging movements laterally of the shoe each about an axis extending heightwise of the shoe at the rear of the gripper and the wiper.

101. In a machine of the class described, the combination with shoe positioning means, of a member for laying the margin of the up-

per inwardly over the insole, a support for said member movable heightwise of the shoe to cause the member to press the margin of the upper upon the insole, and a clamp member carried by said support for engaging the shoe and so mounted as to permit movement of the support heightwise of the shoe without moving said clamp member.

102. In a machine of the class described, the combination with shoe positioning means, of wiper supports at opposite sides of the shoe mounted for movement toward and from the sides of the shoe, wipers on said supports for laying the margin of the upper inwardly over the insole, means for moving said supports heightwise of the shoe to cause the wipers to press the upper upon the insole, and clamp members carried by said supports for engaging the sides of the shoe, said clamp members being movably mounted on the supports to permit the supports to move heightwise of the shoe without moving said members.

103. In a machine of the class described, the combination with shoe positioning means, of wiper supports at the opposite sides of the shoe having wipers movably mounted thereon for laying the margin of the upper at the shank inwardly over the insole, means for effecting relative movement of said wiper supports and the shoe heightwise of the shoe to press the margin of the upper upon the insole, and clamp members carried by said supports for engaging the sides of the shoe and movably mounted to permit such relative pressing movement of the supports and the shoe without moving said members.

104. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units at opposite sides of the shoe each comprising a support having a gripper and a wiper mounted thereon, and means for moving said units heightwise of the shoe to cause the wipers to press the margin of the upper upon the insole.

105. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units at opposite sides of the shoe each comprising a support having a gripper and a wiper mounted thereon, means for moving said supports laterally of the shoe to cause the grippers to draw the upper inwardly over the insole, means for moving the wipers relatively to the grippers to lay the upper over the insole, and means for moving said supports heightwise of the shoe to cause the wipers to press the upper upon the insole.

106. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units at opposite sides of the shoe each comprising a support having a gripper and a wiper mounted thereon, means for moving the grippers relatively to said supports to pull the upper, means for moving said supports inwardly to cause the grippers to overdraw the upper, and means for moving the wipers relatively to the grippers to lay the margin of the upper over the insole.

107. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units at opposite sides of the shoe each comprising a support having a gripper and a wiper mounted thereon, means for moving said supports lengthwise and laterally of the shoe to cause the grippers to draw the upper forwardly and inwardly over the insole, and means for moving the wipers relatively to the grippers to lay the upper over the insole.

108. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanisms at opposite sides of the shoe each comprising a gripper and a wiper, means for imparting to said grippers foredrawing and overdrawing movements, and means for effecting relative movements of the shoe and the wipers to lay the margin of the upper over the insole and to press it into adhering relation to the insole.

109. In a machine of the class described, the combination with shoe positioning means, of shank lasting mechanisms at the opposite sides of the shoe each comprising a gripper and a wiper, means for imparting updrawing, foredrawing and overdrawing movements to the grippers, and means for imparting overlaying and compressing movements to the wipers after the upper has been pulled by the grippers.

110. In a machine of the class described, the combination with shoe positioning means, of a support movable laterally of the shoe toward and from the shoe, a member movably mounted on said support for laying the margin of the upper at the side of the shoe inwardly over the insole, means on said support for imparting inward movement to said member, and means for locking said support to prevent it from being forced outwardly from the shoe by resistance of the shoe to the inward movement of said member.

111. In a machine of the class described, the combination with shoe positioning means, of a wiper support movable toward and from the shoe, a wiper movably mounted on said support, operating means on said support for moving the wiper relatively to the support to lay the margin of the upper inwardly over the insole, and automatic means for locking said support in time relation to the movement of the wiper to prevent it from being forced outwardly from the shoe by resistance of the shoe to the inward movement of the wiper.

112. In a machine of the class described, the combination with shoe positioning means, of a wiper support movable toward and from the shoe, a wiper movably mounted on said support for laying the margin of the upper inwardly over the insole, operating means on said support for moving the wiper inwardly,

and mechanism controlled by said wiper operating means for locking the support to prevent it from being forced outwardly from the shoe by resistance of the shoe to the inward movement of the wiper.

113. In a machine of the class described, the combination with shoe positioning means, of a support movable toward and from the shoe, a member movably mounted on said support for laying the margin of the upper inwardly over the insole, means on said support for moving said member inwardly, a clamp member on the support for applying clamping pressure to the shoe, and means for locking said support against outward movement from the shoe in response to resistance of the shoe to the movement of the overlaying member to prevent relaxing the clamping pressure of the clamp member upon the shoe.

114. In a machine of the class described, the combination with shoe positioning means, of a gripper and wiper unit comprising a support movable toward and from the shoe and having a gripper, a wiper and a clamp member mounted thereon, means on said support for imparting to the wiper an inward movement relatively to the support to lay the margin of the upper over the insole, and automatic means for locking said support to prevent it from being forced outwardly from the shoe by resistance of the shoe to the inward movement of the wiper.

115. In a machine of the class described, the combination with shoe positioning means, of wiper supports mounted for movement toward and from the opposite sides of the shoe, wipers movably mounted on said supports, operating means for moving said wipers inwardly over the shoe, and means for locking said supports together to prevent them from being forced apart by resistance of the shoe to the inward movements of the wipers.

116. In a machine of the class described, the combination with shoe positioning means, of wiper supports mounted for movement toward and from the opposite sides of the shoe, wipers movably mounted on said supports, operating means for moving said wipers inwardly over the shoe, and mechanism controlled by said wiper operating means for locking said supports together to prevent them from being forced apart by resistance of the shoe to the inward movements of the wipers.

117. In a machine of the class described, the combination with shoe positioning means, of wiper supports movable toward and from the opposite sides of the shoe, wipers mounted on said supports for laying the margin of the upper inwardly over the insole, and automatic means for locking said supports together to prevent them from being forced apart by resistance of the shoe to the inward movements of the wipers and for subsequently unlocking them to permit them to withdraw from the shoe.

118. In a machine of the class described, the combination with shoe positioning means, of gripper and wiper units movable toward and from the opposite sides of the shoe and each comprising a support having a gripper, a wiper and a clamp member mounted thereon, operating means for moving the wipers inwardly relatively to said supports to lay the margin of the upper over the insole, and automatic means for locking said supports from outward movement in response to resistance of the shoe to the inward movements of the wipers and for thereafter unlocking them to permit them to withdraw from the shoe.

119. In a machine of the class described, the combination with shoe positioning means, of overlaying means movable inwardly over the bottom of the shoe to lay the margin of the upper over the insole, and a gaging member movable inwardly with said overlaying means and arranged to determine by engagement with the bottom of the shoe the position of said overlaying means relatively to the plane of the insole throughout the inward movement of said means.

120. In a machine of the class described, the combination with shoe positioning means, of overlaying means movable inwardly over the bottom of the shoe to lay the margin of the upper over the insole and mounted also for positioning movement heightwise of the shoe, a gaging member mounted for movement heightwise of the shoe and inwardly with said overlaying means and arranged to engage the bottom of the shoe substantially throughout such inward movement to position the overlaying means relatively to the shoe, and controlling mechanism to cause said gaging member and overlaying means to move together heightwise of the shoe to positions determined by the engagement of said member with the shoe prior to the inward movement of said means over the shoe.

121. In a machine of the class described, the combination with shoe positioning means, of end embracing wipers movable lengthwise and heightwise of the shoe, and a gaging member movable with said wipers both lengthwise and heightwise of the shoe and arranged to determine by engagement with the bottom of the shoe the position of the wipers relatively to the plane of the insole substantially throughout such lengthwise movement of the wipers.

122. In a machine of the class described, the combination with shoe positioning means, of end embracing wipers, a wiper support movable lengthwise and heightwise of the shoe, a gaging member carried by said wiper support and arranged to determine by engagement with the bottom of the shoe the relation of the wipers to the plane of the in-

sole substantially throughout their operative movement, and means for moving said wiper support heightwise of the shoe to the position determined by said gaging member and for thereafter moving said support lengthwise of the shoe.

123. In a machine of the class described, the combination with shoe positioning means, of overlaying means movable inwardly over the bottom of the shoe to lay the margin of the upper over the insole, a gaging device movable inwardly with said overlaying means and arranged to determine by engagement with the bottom of the shoe the distance between the overlaying means and the plane of the shoe bottom, means for effecting relative movement of the shoe positioning means and the overlaying means to press the margin of the upper upon the insole, and mechanism for releasing the overlaying means from said gaging device to render said device inoperative to prevent such relative movement.

124. In a machine of the class described, the combination with shoe positioning means, of overlaying means movable inwardly over the bottom of the shoe to lay the margin of the upper over the insole and mounted also for positioning movement heightwise of the shoe, a gaging device movable with said overlaying means both inwardly and heightwise of the shoe and arranged to determine by engagement with the bottom of the shoe the plane of operation of said overlaying means, mechanism for moving said overlaying means heightwise of the shoe to press the margin of the upper upon the insole, and means for releasing the overlaying means from said gaging device to render said device inoperative to prevent such pressing movement.

125. In a machine of the class described, the combination with shoe positioning means, of end embracing wipers, a wiper support movable both lengthwise and heightwise of the shoe, a gaging device carried by said wiper support and arranged to engage the bottom of the shoe to determine the position of the wipers relatively to the plane of the insole, means for effecting relative movement of the shoe positioning means and the wiper support heightwise of the shoe to press the margin of the upper upon the insole, and controlling mechanism automatically operative to release the wiper support from said gaging device to render said device inoperative to prevent such relative movement.

126. In a machine of the class described, the combination with shoe positioning means, of end embracing wipers, a wiper support movable both lengthwise and heightwise of the shoe, a gaging device carried by said wiper support and arranged to engage the bottom of the shoe to determine the position of the wipers relatively to the plane of the insole, and mechanism automatically operative in response to advancing movement of said wiper support to disconnect the support from said gaging device.

127. In a machine of the class described, the combination with shoe positioning means, of end embracing wipers, a wiper support movable both lengthwise and heightwise of the shoe, a gaging device carried by said wiper support and arranged to engage the bottom of the shoe to determine the position of the wipers relatively to the plane of the insole, means for imparting to the wiper support a positioning movement heightwise of the shoe to the limit determined by engagement of said gaging device with the bottom of the shoe, and mechanism automatically operative when the wipers have substantially completed their inward movement over the shoe to disconnect the wiper support from said gaging device to permit further movement of the wipers toward the plane of the insole.

128. In a machine of the class described, the combination with means for positioning a shoe bottom upward, of a support adjacent to the toe end of a shoe positioned by said means, a toe gripper comprising a curved member guided on said support below the toe for upper pulling movement forwardly and upwardly about the axis of its curvature, and means for imparting upper pulling movement to said member.

129. In a machine of the class described, the combination with shoe positioning means, of a gripper support, a toe gripper comprising a curved slide guided in said support for movement about the axis of its curvature in a direction lengthwise and heightwise of the toe, an upper gripping jaw mounted on said slide for movement to grip the toe of the upper, and operating means mounted on said support and connected to said gripper jaw to close said jaw on the upper and by continued movement to operate said slide to pull the upper.

130. In a machine of the class described, the combination with shoe positioning means, of a support adjacent to the toe end of a shoe positioned by said means, said support having a curved guideway, a toe gripper mounted in said guideway for movement lengthwise and heightwise of the toe, and manually operable means mounted on said support for imparting upper pulling movement to said gripper.

131. In a machine of the class described, the combination with shoe positioning means, of a toe gripper, an operating member, an intermediate lever, and links connecting said lever respectively to said operating member and to the gripper for imparting upper pulling movement to the gripper by the movement of said member.

132. In a machine of the class described, the combination with shoe positioning means, of a toe gripper comprising a member mounted for upper pulling movement and having a

gripper jaw pivoted thereon, an operating member, an intermediate lever, a link connecting said operating member and lever, and another link connecting the lever to said gripper jaw for closing said jaw on the upper and for moving the gripper to pull the upper.

133. In a machine of the class described, the combination with shoe positioning means, of a gripper for pulling the upper at the toe end of the shoe, and means for engaging the upper frictionally at the top of the forepart and for working it forwardly toward the toe by such frictional engagement to assist the action of the toe gripper.

134. In a machine of the class described, the combination with shoe positioning means, of a toe gripper and manual means for operating it to pull the upper at the toe, a member for engaging the upper frictionally at the top of the forepart, and manual means for operating said member to work the upper forwardly toward the toe.

135. In a machine of the class described, the combination with shoe positioning means, of a toe gripper, a member for engaging the upper frictionally at the top of the forepart, and an operating member connected both to the toe gripper and to said upper engaging member for operating them to pull the upper and to work it forwardly toward the end of the toe.

136. In a machine of the class described, the combination with shoe positioning means, of a toe gripper, an operating member for imparting upper pulling movement to said gripper, a shoe rest member arranged to engage the upper frictionally at the top of the forepart and movably mounted for wiping the upper toward the end of the toe, and a connection for operating said shoe rest member by the movement of said operating member.

137. In a machine of the class described, the combination with shoe positioning means, of a toe gripper mounted for upper pulling movement, an operating member for imparting such movement to the toe gripper, a shoe rest member arranged to engage the upper frictionally at the top of the forepart and mounted for swinging movement lengthwise of the shoe, and a connection between said operating member and shoe rest member for imparting operative movement to the latter simultaneously with the operation of the gripper.

138. In a machine of the class described, the combination with shoe positioning means, of a support adjacent to the toe of the shoe, a toe gripper mounted on said support, a shoe rest member also mounted on said support and arranged to engage the upper frictionally at the top of the forepart, and an operating member mounted on said support and connected to said gripper and shoe rest member for operating them in unison to pull the upper and to work it forwardly toward the end of the toe.

139. In a machine of the class described, the combination with means for laying portions of an upper at the rear of the toe inwardly over the bottom of its last, of a shoe support movable to carry a shoe into position for the operation of said means, and mechanism carried by said shoe support for pulling the upper at the toe and for engaging it frictionally at the top of the forepart to work it forwardly toward the toe prior to the operation of said means.

140. In a machine of the class described, the combination with means for laying portions of an upper at the rear of the toe inwardly over the bottom of its last, of a shoe support movable to carry a shoe into position for the operation of said means, and a member on said shoe support arranged to engage the upper frictionally at the top of the forepart and manually movable to work the upper forwardly toward the toe.

141. In a machine of the class described, the combination with means for lasting the heel end of a shoe, of a shoe support movable to carry a shoe into position for the operation of said lasting means, and mechanism on said shoe support for tightening the upper about the heel end of the last preparatory to the operation of said heel lasting means comprising a member arranged to engage the upper frictionally at the top of the forepart and means for imparting operative movement to said member to work the upper forwardly toward the toe.

142. In a machine of the class described, the combination with shoe positioning means, of means for lasting the heel end of a shoe, and automatic means for clamping the upper to the last at the opposite sides of the shank of the shoe prior to the lasting of the heel end of the shoe and for holding it thus clamped in the heel end lasting operation.

143. In a machine of the class described, the combination with shoe positioning means, of means for lasting the heel end of a shoe, and automatic means for pulling the upper inwardly over the insole at the opposite sides of the shank portion of the shoe to conform it tightly to the sides of the last prior to the lasting of the heel end of the shoe and for holding it thus tightly conformed to the sides of the last at the shank in the heel end lasting operation.

144. In a machine of the class described, a gripper for pulling an upper over a last, said gripper being movable to draw the upper inwardly over the bottom of the last, a spring for imparting to the gripper its overdraw movement, a latch for holding the gripper in retracted position against the resistance of said spring, and means for operating said latch to release the gripper.

145. In a machine of the class described,

a plurality of grippers for pulling an upper respectively in different locations about a last, and a plurality of operating devices positioned at the sides of the respective grippers for imparting to the grippers their upper-pulling movements, each of said devices including a spring independently yieldable in response to resistance of the upper to the pull of the gripper.

146. In a machine of the class described, grippers for pulling an upper respectively at the opposite sides of a last, devices positioned at the sides of said grippers for operating the grippers to pull the upper, and manually operated members connected to said gripper-operating devices for imparting respectively to the opposite side grippers movement either in a direction to increase the force of the pull or in a direction to relax the force of the pull

In testimony whereof I have signed my name to this specification.

BERNHARDT JORGENSEN.