

998,682.

K. ENGEL.  
MACHINE FOR FORMING UPPERS OF BOOTS AND SHOES.  
APPLICATION FILED AUG. 5, 1907.

Patented July 25, 1911.

3 SHEETS-SHEET 1.

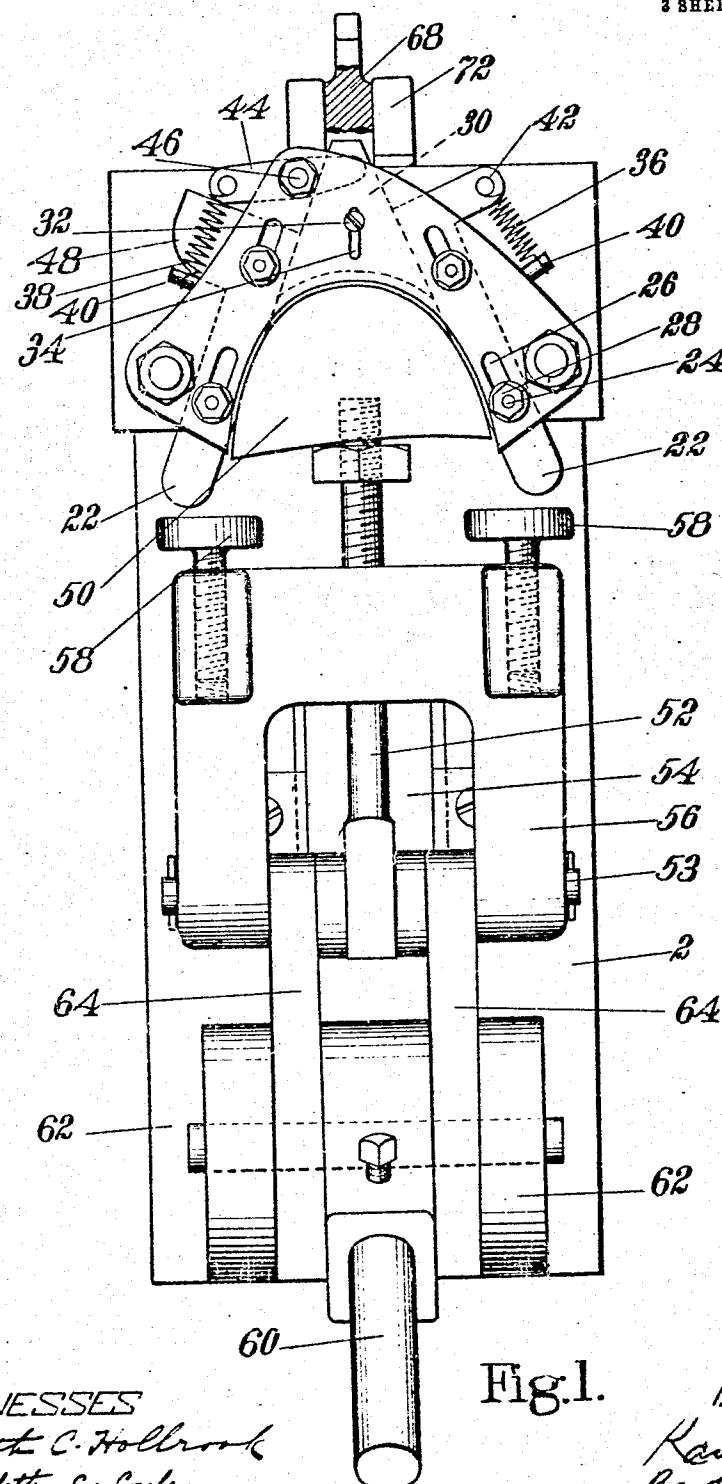


Fig. 1.

WITNESSES

Edith C. Hollbrook  
Elizabeth C. Cope

INVENTOR

Karl Engel  
By his attorney  
Nelson W. Howard

K. ENGEL.

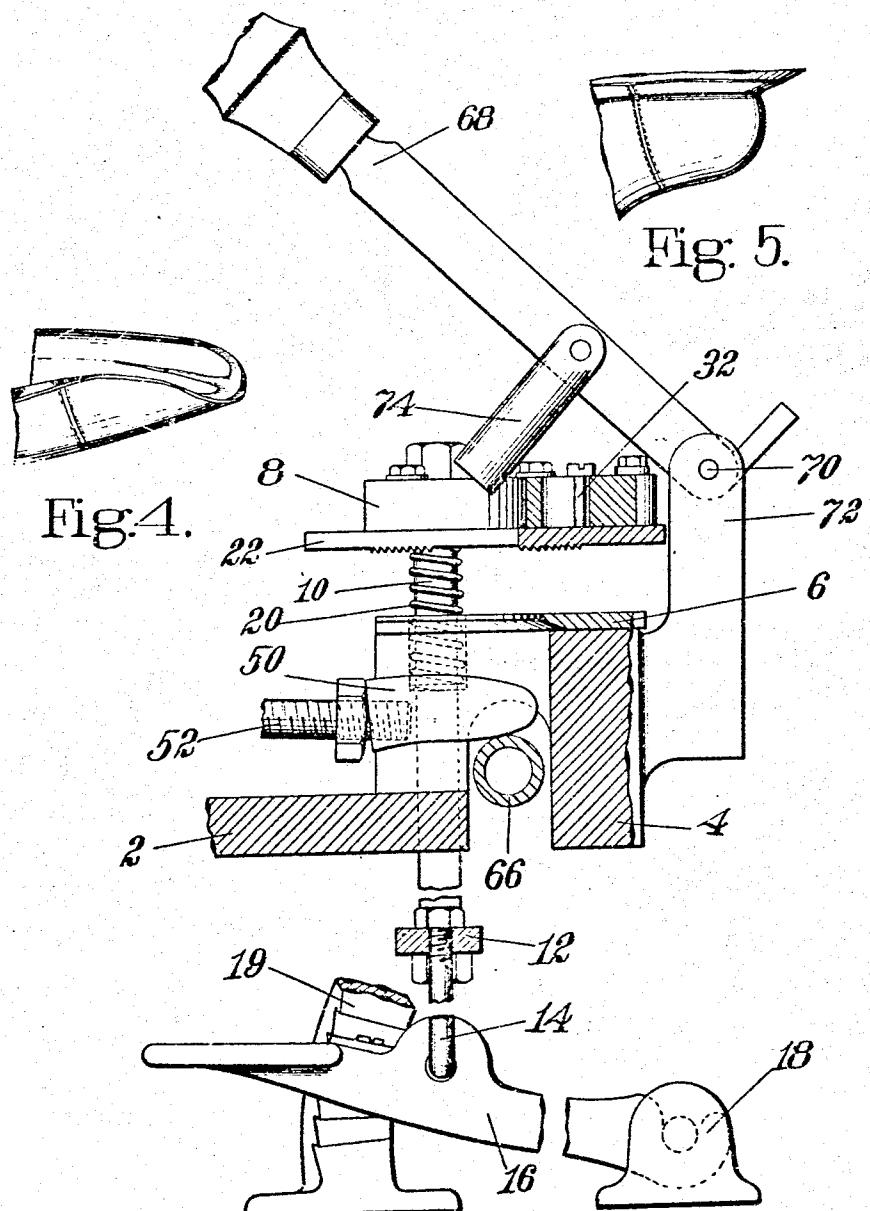
MACHINE FOR FORMING UPPERS OF BOOTS AND SHOES.

APPLICATION FILED AUG. 5, 1907.

998,682.

Patented July 25, 1911.

3 SHEETS-SHEET 2.



WITNESSES.

Edith C. Hollbrook

Elizabeth C. Coyle

Fig. 2.

INVENTOR.  
Karl Engel  
By his Attorney,  
Malvina R. Howard

K. ENGEL.

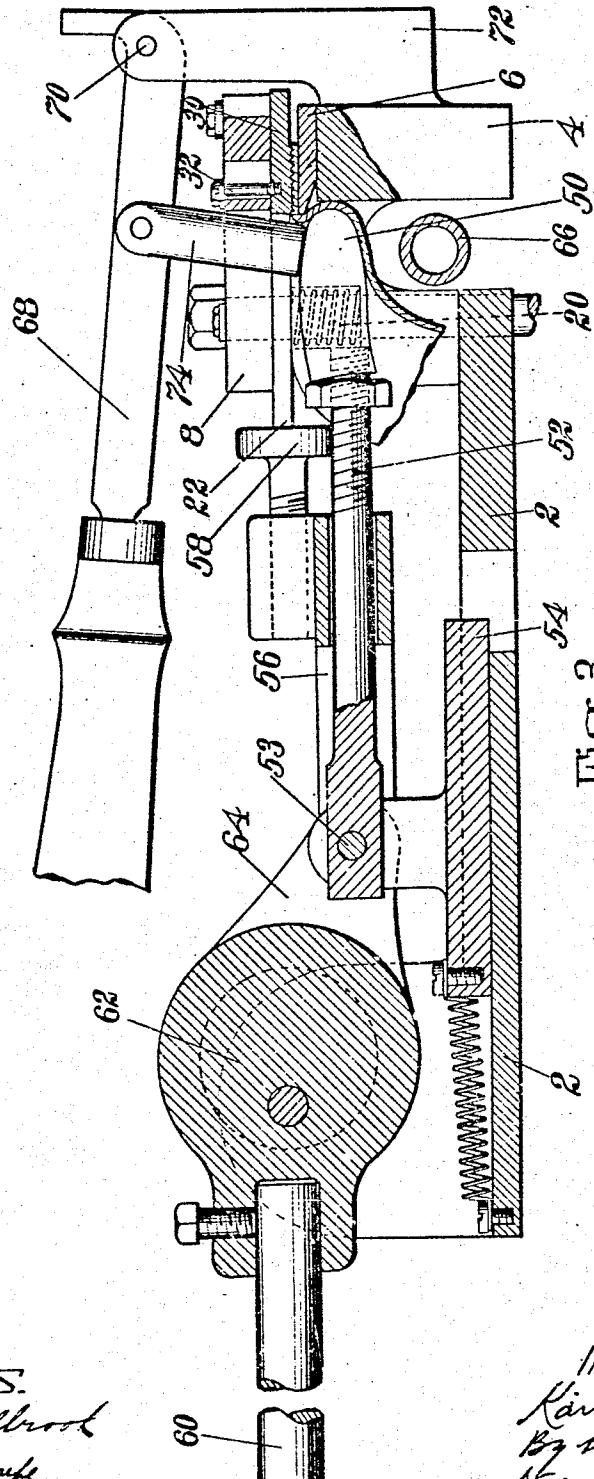
## MACHINE FOR FORMING UPPERS OF BOOTS AND SHOES.

APPLICATION FILED AUG. 5, 1907.

998,682.

Patented July 25, 1911.

3 SHEETS—SHEET 3.



၁၁၁

WITNESSES.

Edith C. Holbrook

Elizabeth C. Coupe

## INVENTOR.

Karl Engel  
By his Attorney,  
Klemens K. Howard

# UNITED STATES PATENT OFFICE.

KARL ENGEL, OF REVERE, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## MACHINE FOR FORMING UPPERS OF BOOTS AND SHOES.

998,682.

Specification of Letters Patent. Patented July 25, 1911.

Application filed August 5, 1907. Serial No. 337,163.

*To all whom it may concern:*

Be it known that I, KARL ENGEL, a subject of the Emperor of Germany, residing at Revere, in the county of Suffolk, and 5 Commonwealth of Massachusetts, have invented certain Improvements in Machines for Forming Uppers of Boots and Shoes, of which the following description, in connection with the accompanying drawings, is a 10 specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for use in the manufacture of shoes having out-turned uppers. Shoes of this type are commonly known to the trade as "stitch-downs", the upper of a shoe of this type being attached to the sole by stitches, or other fastenings, which are passed through the out-turned portion of the upper and through the sole.

Although the stitch down shoe is one of the older types of shoes, the manufacture and commercial exploitation of this shoe, 25 particularly in the better grades, has not been undertaken upon a large scale up to the present time. This has been due largely to the fact that the advantages to be gained in manufacture of this shoe by reason of 30 the simplicity of the sole-attaching operation have been more than counterbalanced by the difficulties attending the preparation of the upper for this operation. Many methods have been devised for preparing the uppers of such shoes for the sole-attaching 35 operation. The greater number of such methods involve shaping the upper over the last in approximately the usual way, the chief difference being that in the case of 40 the stitch-down shoe upper the upper is turned out around the bottom edge of the last instead of being turned in. These methods in practical application have been found as a rule unsatisfactory, their em- 45 ployment resulting either in a poorly-shaped upper or in a poorly-formed flange for the attachment of the sole. They are also waste- 50 ful of material.

One of the chief difficulties attending the preparation of the stitch-down upper for the sole-attaching operation by the simple lasting method is that of forming a smooth and properly curved out-turned flange, there being nothing upon the last which will aid

in the formation of this flange or to which 55 the flange may be attached after it has been formed. Another difficulty to be overcome is that of properly gathering in the leather about the toe portion of the upper to form the bulge over the flange at the toe, which 60 is desirable both for appearance and comfort, and at the same time leaving this part of the upper smooth. This difficulty is increased in the case of the formation of a 65 stitch-down upper by the necessity of forming at the same time about the toe a smooth flange, or at least a flange lying in one plane.

The purpose of the present invention is to provide a mechanism which will obviate the difficulties hereinbefore pointed out and 70 which will form from a flat toe blank of leather or other flexible material a properly shaped toe having an out-turned flange for sole-attaching purposes. The invention has also for its aim the accomplishment of 75 this purpose by a comparatively simple mechanism which in its operation utilizes a novel method of forming the toe for a shoe upper, this method being described and claimed in U. S. Letters Patent No. 80 947,895, dated Feb. 1, 1910.

The invention aims further to provide a mechanism for use in the manufacture of stitch-down shoes which combines efficient means for shaping the toe portion of a 85 stitch-down shoe upper, together with likewise efficient means for forming upon the upper an out-turned flange, said two means operating in such manner that neither can injuriously affect the work of the other. 90

Another object of the invention is to provide a mechanism of the kind just described in which the two means co-operate, in such manner that each aids in the performance 95 of the work of the other.

A further object of the invention is to provide a mechanism of the kind described which in operation will have no tendency to tear or unduly strain the upper and which will include means for moving any excess of material from the region or regions where it may occur to the region or regions where it is needed in the operation of shaping the toe and forming the out-turned flange. 100

In the illustrated embodiment of the invention it will be noted that lasts have been dispensed with in the toe shaping operation, the place of the last being taken in the con-

struction shown by a former, preferably of metal, so that it may be readily heated, which former is removed from the shaped toe as soon as the material is set in its proper form.

It will be evident, therefore, that a further object of the invention is the provision of means for shaping the toe of a stitch-down upper which will avoid the necessity for 10 lasting the upper in the usual way. An obvious advantage of such a mechanism is the saving effected in both lasts and lasting tacks.

All methods of lasting in the usual way with 15 wooden lasts and tacks involve considerable waste of upper material which it is necessary to trim off after the upper has been lasted. This is especially true of some methods of lasting stitch-down uppers in 20 which the upper is first drawn inward over the edge of the last and tacked and then turned outward.

An important feature of the present invention, therefore, is the provision of 25 mechanism for shaping the upper and forming an out-turned flange thereon which will require for its successful operation only so much material as is actually necessary to form the upper and its flange. In the construction illustrated, this inventive idea is carried out by providing means which gages the flange upon the upper, in combination with means which properly shapes the upper while it is held by the gaging means. 30 35 It is obvious that if it were attempted to shape an upper in this way by gaging the flange upon a flat blank and then rigidly confining the flange while the upper shaping means operated upon the unconfined portion of the blank, there would be great liability of tearing the material, especially if it were comparatively non-extensible material like patent leather. It is further obvious that this liability to tear would be increased if, in such a combination, it were attempted to bulge out the toe portion over the flange in order to form a crease around the bottom of the toe.

A further important feature of the invention, therefore, is the provision of means 50 for clamping the gaged flange portion of the blank to be formed or molded in such manner that portions of the flange, which, in the upper as finally shaped or molded, 55 would have an excess of material, may be moved toward other portions, which, owing to the shape of the upper, would have a deficiency in the amount of material necessary for the proper operation of the shaping means. It is obvious that such movement of the flange portions of the blank to be formed or molded will also have a tendency to gather in the material of the blank along the flange line and thus cause a fullness of material upon each side of this line,

which fullness upon the toe side of the flange line is especially useful in shaping the toe.

The invention embraces also a novel construction of clamping means whereby a toe blank of finished material may be clamped in such manner that clamped portions of the blank may be moved relatively to the clamping means in defined directions without scratching or tearing the finished side of the blank. In the preferred construction this feature is embodied in a clamping means having a smooth clamping surface adapted to engage the finished side of the toe blank and having a roughened clamping surface adapted to engage the unfinished side of the toe blank, the roughened surface being formed upon a part movable in the plane of the clamped portion of the blank whereby the said clamped portion may be moved with the movable part of the clamping means over the smooth clamping surface.

In the accompanying drawings.—Figure 1 is a plan view of a machine embodying this invention; the depressing lever at the forward end of the machine being shown in section; Fig. 2 is a vertical section, a little to the right of the middle of Fig. 1 through the forward end of the machine, the parts being in inoperative position; Fig. 3 is a section similar to Fig. 2 through the entire machine, the parts being in operative position. Fig. 4 shows a toe blank before it is operated upon by this machine; Fig. 5 shows a completed toe.

At the forward end of a base or frame 2 which is adapted to be mounted upon a bench or other suitable support is an enlargement 4 having, in the construction shown, an approximately U-shaped recess 105 and constituting an elevated support for a plate 6 which forms the stationary member of a clamping device for clamping a toe blank. The plate 6 is smooth on its clamping face and is provided with a recess overlying that in the support 4 but somewhat smaller, so that its inner beveled edge projects over the recess in the support 4. The recess in the plate 6 has the contour desired for the bottom edge of the toe to be 110 formed.

A movable clamp member 8, adapted to coöperate with the clamp member 6, is mounted upon rods 10 passing through openings in the member 6 and in the support 4 and connected at their lower ends by a cross piece 12, from the center of which extends a rod 14 to a treadle 16 pivoted upon a support 18 which may be mounted upon the floor. By depressing the treadle 16 the clamp member 8 may be brought down into engagement with the clamp member 6, or with the blank lying upon the member 6. A toothed plate 19 adjacent to the path of the treadle is adapted to lock the treadle and 130

with it the clamp member 8 in depressed position. The clamp member 8 is provided with teeth or corrugations on its under side in order that it may firmly grip the material of the toe blank, these teeth or corrugations in the illustrated embodiment of the invention being carried by plates mounted upon the member 8 with provision for movement relative thereto. Of these plates, those 10 adapted to grip the side portions of the toe blank, or the portions of the blank which are to form the flange along the sides of the toe, are indicated at 22, 22 upon the drawings, and are each provided with threaded pins 24 adapted to travel in slots 26 in the clamp member 8 and confined in said slots by nuts 28. A third toothed plate 30 is mounted upon the clamp member 8 in position to grip the forward part of the toe blank, this plate 30 being connected to the member 8 by a headed screw 32 traveling in a slot 34 in said member. It will be noted that these plates have movement only in the plane of the clamping means, the side 25 plates being so guided in their slots that they move in converging paths toward the front of the toe blank, and the front plate being guided in its slot and by its contact with the side plates so that it moves rearwardly with a clamped portion of the blank.

The side plates are preferably kept normally in their rearmost positions by springs 36 and 38, the spring 36 being attached at its respective ends to a pin 40 on the clamp member 8 and a lug 42 on the right-hand plate 22. The spring 38 is attached to a similar pin 40 upon the clamp member 8 at its rear end but at its forward end it is attached to one arm of a lever 44 pivoted at 46 upon the clamp member 8 and having its other arm pivotally connected with the plate 30. An offset portion 48 upon the left-hand side plate 22 is adapted, as the side plate 22 moves forward, to engage the outer 45 arm of the lever 44 and cause it to rotate about its pivot 46, thereby moving in a rearward direction the front plate 30.

The toe blank clamped between the clamp members 6 and 8 is adapted to be operated 50 upon by a toe former 50. The toe former 50, of a contour in plan like that of the recess in the plate 6, is adjustably carried upon the forward end of an arm 52 pivoted at 53 between ears rising from a carriage 54 slidably mounted upon the base 2. A frame 56, through which the arm 52 passes, is also mounted upon the pivot 53 to swing with the arm 52. Adjustably mounted in the forward end of the frame 56 are pushers 58 55 adapted to coöperate with the side plates 22 respectively.

Movement longitudinally of the clamping mechanism may be imparted to the carriage 54 and the former 50 by means of the lever 60 pivotally mounted in ears 62 rising from

the base 2. The lever 60 has an enlargement about its pivot, said enlargement being provided with circular shoulders eccentric to the pivot of the lever, and links 64 connected at one end to the pivot 53 have openings 70 at their other end into which the shoulders upon the lever 60 fit. Rotation of the lever 60 about its pivot therefore imparts longitudinal movement to the carriage 54, forward movement being imparted to the carriage when the lever is depressed and rearward movement when it is raised.

The toe former 50, when not in use, is adapted to rest upon a steam pipe 66, shown in section in Fig. 3, which steam pipe passes 80 through the support 4 below the clamp member 6 and is adapted to heat the support and its attached clamp members. A depressing lever 68 pivoted at 70 in a forked post 72, integral with the support 4 at its forward end, carries an engaging block 74 adapted to engage and depress the toe former 50 as it rests upon the toe blank clamped between the clamp members 6 and 8. The action of the depressing lever is only temporary, the toe former 50 after it has been depressed sufficiently by the depressing lever being moved forward by the lever 60 until its forward end lies under the overhanging part of the clamp plate 6 by which it is kept in its depressed position.

The shape of the recess in the clamp plate 6 is determined not only by the style of the shoe for which it molds the toe, but also by the differing characteristics of the right and left shoes of a pair. If, therefore, a toe is to be molded which is not symmetrical, two molding devices are preferably employed, one for the toe of a right shoe and the other for the toe of a left shoe of a pair. Furthermore, it is advantageous to provide several of these molding devices for each operator, in order that the former may be allowed to remain in the toe after it has shaped it until the material of the toe has adapted itself to, or set, to its new form.

The operation of the mechanism hereinbefore described is as follows:—A suitable toe blank, such, for example, as that shown in Fig. 4, having in position its lining and stiff material to form a box toe, is clamped along its outer edge between the clamp members 6 and 8, the material of the blank when clamped lying approximately all in one plane. As the blank is placed upon the lower clamp member 6 in position to be clamped, the width of the flange to be formed is gaged from the inner edge of the member 6 in any suitable way, as, for example, by extending the edge of the blank to the outer edge of the toothed portion of the plates 22, 22 and 30, and the clamp member 8 is then moved down to engage the inner side of the blank, the outer or finished side lying against the smooth surface of the

plate 6. The toe former 50 and frame 56 have previously been raised above the clamping mechanism. The blank having been clamped, the toe former 50 is now brought 5 down upon the upper surface of the blank and the depressing lever 68 is swung about the pivot 70 to bring its block 74 into engagement with the toe former 50 and depress the toe former until its upper surface 10 lies just beneath the overhanging edge of the clamp plate 6. The toe former 50 is then moved forward by means of the lever 60 and as it moves forward the pull on the portions of the clamped material along the 15 sides of the toe blank will cause the plates 22, 22 to move forward with the toe former. This movement of the plates 22, 22 will effect or permit the forward movement of the portions of the flange along the sides of 20 the toe which are held by said plates, these portions moving freely over the smooth plate 6. As the left-hand plate 22 moved forward with the toe former, the engagement of its offset part 48 with the lever 44 will cause 25 the front plate 30 to move rearwardly carrying with it the portion of the toe blank clamped between it and the plate 6. Should the side plates 22, 22 for any reason fail to move forward under the pull of the material, due to the action of the toe former 50, the pushers 58 upon the front of the frame 56 will engage their rear ends and 30 push them positively forward.

It will be noted by an inspection of Figs. 35 2 and 3 that the rearward movement of the front toothed plate 30 will cause some of the material clamped by it to be moved so that it can be pulled over the edge of the plate 6 by the forward movement of the former 50 and thus be used in forming the bulge at the 40 front of the toe over the flange. It will be further noted by an inspection of Fig. 1 that the forward movement of the slide plates 22, 22 and the rearward movement of the front plate 30 will cause a gathering in or 45 puckering of the material in the region of the sharply rounded corners of the toe. This gathering in or puckering of the material in this region and the moving of the 50 material held by the front plate 30 into a position where it may be utilized in forming the bulge facilitates the proper shaping of the toe, and tends to equalize the strain on the different parts of the blank in the toe forming operation and particularly assists 55 in preventing undue strains upon any part of the clamped margin of the blank. The position of the eccentric shoulders upon the lever 60 is such with respect to the pivots 60 of the lever that when the lever is depressed to push forward the former 50, the lever holds the former in its forward position until it is again actuated to withdraw the former. The former is thus held locked in 65 its depressed position through the action of

the lever 60 and through its engagement with the under side of the plate 6.

The material of the blank is preferably tempered before it is operated upon by the mechanism hereinbefore described, although this is not essential to the successful operation of the mechanism. It will be noted that the heating means is so arranged that it heats the clamping means, and that it also imparts heat to the material of the toe while the toe former is locked in its depressed position during the toe forming operation. The inside of the toe blank and the adjacent sides of the toe stiffener and toe lining are preferably provided with cement, so that they are both pressed into shape and cemented together in the toe forming operation.

After the toe has been allowed to set to its new form while the former is locked in its depressed position and while the flange is held between the clamp members by the engagement of the treadle 16 with the plate 19, the former is withdrawn, the treadle is released, and an innersole, provided with cement along the edge of its inner face, is laid upon the flange of the toe lying upon the plate 6, the innersole being of such size that its edge lies flush with the outer edge of the flange. The clamp member 8 is then depressed sufficiently to press the innersole firmly into engagement with the out-turned flange. The formed toe with its attached innersole is then removed and the innersole and flange and further fastened together by 100 stitches.

It is obvious that with material which may be stretched considerably, a toe shaped like that shown in Fig. 5 may be formed with mechanism of this type in which no part of the clamping surface is movable in its own plane. It is also obvious that the relative movement of the clamp and the toe former which causes the bulge of the toe over the flange may be effected in other ways, as, for example, by providing a movable clamping means. The invention is not limited to the number of movable clamping plates, shown nor to the particular directions of movement illustrated, nor is it limited to a construction in which the outer edge of the blank is engaged by movable plates. It is obvious that some of the advantages of the construction shown might be gained in a construction in which only the front plate was movable and in which the side plates were stationary or vice versa.

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

1. In apparatus for forming a toe having an out-turned flange the combination with means for gaging and confining a portion of a toe blank to form a sole attaching flange,

of means for forming the toe from the unconfined portion of said blank while the blank is held by the gaging means said forming means being constructed and arranged for forming movement in two directions at substantially right angles to each other.

2. In apparatus of the class described, the combination with means for forming a toe from a toe blank having provision for forming movement in two directions at substantially right angles to each other, of means for forming an out-turned sole attaching flange upon said toe, said flange forming means being constructed and arranged to hold the toe blank for the operation of the toe forming means.

3. In apparatus of the class described, the combination with means for forming a toe from a toe blank, of means for forming an out-turned sole attaching flange upon said toe, said last-named means being constructed and arranged to gather in the material along the flange line during the toe forming operation.

4. In apparatus of the class described, the combination with a movable toe former, of means for clamping a toe blank along its outer edge in position to be operated upon by said toe former, said clamping means comprising portions movable while in clamping position, in the plane of said means.

5. In apparatus of the class described, the combination with a toe former, of means for clamping a toe blank along its outer edge in position to be operated upon by said toe former, said clamping means comprising means adapted to travel with the toe former to gather in the clamped leather in the regions of the abruptly curved portions of the toe.

6. In apparatus of the class described, the combination with a movable toe former, of means for clamping a toe blank along its outer edge in position to be operated upon by said toe former, said clamping means comprising portions along the sides of the toe movable in the plane of said means in approximately the same direction as the toe former and a portion at the front of the toe movable in a direction approximately opposite to that of the toe former.

7. In apparatus of the class described, the combination with means for gaging and confining a portion of a toe blank to form an outturned sole attaching flange, said means having provisions for movement relative to each other of parts of the flange in the plane of the flange, of means for forming from the unconfined portion of said blank, while it is held by the gaging means, a toe having a portion bulged out over said flange portion.

8. In apparatus of the class described,

the combination with means for forming a toe from a toe blank, of means for simultaneously forming an out-turned sole attaching flange upon said toe having provision for movement relative to each other of parts of the flange in the plane of the flange, said two means coöperating in such manner that a crease is formed between the toe and the flange.

9. In apparatus of the class described, the combination with means for clamping a toe blank along its outer edge to form a sole attaching flange, of a toe former and means for effecting relative movements of said clamping means and said toe former while the blank is held by the clamping means, comprising a movement transverse to the plane of said clamping means, followed by a movement approximately parallel to the plane of said clamping means.

10. In apparatus of the class described, the combination with means for clamping a toe blank along its outer edge, of a toe former, means to move said toe former transversely of the clamping means and means to move said toe former longitudinally of the clamping means.

11. In apparatus of the class described, the combination with means for clamping a toe blank along its outer edge to form a sole attaching flange, of a toe former, means to cause a relative movement of said toe former and said clamping means in a direction transverse to the plane of said clamping means, and means to cause a subsequent relative movement of said parts in a direction approximately parallel to the plane of said clamping means.

12. In apparatus of the class described, the combination with means for clamping a toe blank along its outer edge, of means for pressing the portion of said blank lying within said clamped portion out of the plane of said clamped portion to form the toe, and means for moving said toe-forming means forwardly to cause a crease to be formed between said toe and said clamped portion of the toe blank.

13. In apparatus of the class described, the combination with means for gaging and clamping a portion of a toe blank to form an out-turned flange, of means for forming a toe from the unclamped portion of said toe blank, means for causing a crease to be formed between the flange and toe and means for effecting a movement in its own plane of portions of the clamped flange.

14. In apparatus of the class described, the combination with a movable toe former and means for clamping a toe blank in position to be operated upon by said toe former, of means for causing portions of the clamped blank to be moved in the direction of the movement of, and simultaneously with, the toe former.

15. In apparatus of the class described, the combination with a movable toe former and means for clamping a toe blank in position to be operated upon by said toe former, 5 of means for causing portions of the clamped blank to be moved in the direction of the movement of and simultaneously with the toe former, and for causing other portions of the clamped blank to be moved in 10 a direction different from the direction of the movement of the toe former.

16. In apparatus of the class described, the combination with a toe former, of means 15 for clamping a toe blank to be operated upon by said former, said former being arranged to be moved transversely of the plane of the clamped portion of the blank and then in a direction parallel with the plane of said clamped portion and said 20 clamping means being constructed and arranged to hold the blank against movement with the toe former as it moves transversely of the plane of the clamped portion of the blank and to permit the blank to move with 25 the toe former as it moves in a direction parallel with the plane of said clamped portion.

17. In apparatus of the class described, the combination with means for clamping 30 a toe blank along its outer edge, of a toe former movable both transversely and longitudinally of said clamping means, said clamping means being so constructed and arranged as to hold said blank positively 35 against movement with the toe former as it moves transversely of said clamping means and yieldingly against movement in the plane of said clamping means as the toe former moves longitudinally of said 40 means.

18. In apparatus of the class described, the combination with a toe former, of means 45 for clamping a toe blank in position to be operated upon by said former, means for moving said former transversely of said clamping means, and means for locking said former in the position to which it is moved.

19. In apparatus of the class described, the combination with a toe former and 50 means for clamping a toe blank in position to be operated upon by said former, of means for depressing said former and with it a portion of the blank lying within the clamped portion, and means for bringing 55 said former into locking relation with said clamping means whereby it is kept in its depressed position.

20. In apparatus of the class described, the combination with a toe former, and 60 means for clamping a toe blank in position to be operated upon by said former, of means for moving said former transversely of said clamping means, and means for moving said former longitudinally of said 65 clamping means, said clamping means being

so constructed that the last named movement of said former effects a locking engagement of said former and clamping means to hold said former in the position to which it has been moved in its transverse movement. 70

21. In apparatus of the class described, the combination with a toe former, of means for clamping a toe blank in position to be operated upon by said toe former, comprising parts movable in the plane of the 75 clamped portion of said blank, and means for heating said clamping means to cause heat to be imparted to the blank to facilitate the shaping of the blank in forming a toe.

22. In apparatus of the class described, 80 the combination with a toe former, of a recessed clamping means adapted to clamp a toe blank along its outer edge in position to be operated upon by said toe former having provision for relative movement of the 85 clamped parts in the plane of the clamping surfaces, and means for heating said clamping means to cause heat to be imparted to said blank to facilitate the aforesaid relative movement of the parts of said blank, said 90 heating means passing through the recess in said clamping means.

23. In apparatus of the class described, the combination with a toe former, and 95 means for clamping a toe blank in position to be operated upon by said former, of means for imparting heat to the clamp and to the material held by it, said heating means being so located that the toe former may rest upon it when not in use. 100

24. In apparatus of the class described, the combination with means for forming a toe, of means for forming an outturned flange upon said toe, and means for heating said toe former to cause heat to be imparted 105 to the toe during the toe forming operation to facilitate the shaping and setting to shape of the toe.

25. In apparatus of the class described, the combination with a toe former, and 110 means for clamping a toe blank in position to be operated upon by said former, said means having provision for relative movement of the clamped parts in one plane, of means for heating said former to facilitate the forming operation, said heating means being located in proximity to said clamping means whereby said clamping means is heated to facilitate the aforesaid relative movement. 115

26. In apparatus of the class described, margin engaging means, toe forming means and means for effecting relative toe forming movements of the margin engaging means and the toe forming means, including a movement whereby the margin is gathered in, and means for heating the margin engaging means to cause heat to be imparted to said margin to facilitate the shaping and 125 the setting to shape of the toe. 130

27. In apparatus of the class described, the combination with means for shaping the toe end of a shoe upper, comprising margin engaging means, of means for heating the 5 margin engaging means to cause heat to be imparted to the upper material to facilitate the shaping operation.

28. In apparatus of the class described, the combination with means for shaping the 10 toe end of a shoe upper, comprising margin engaging means which embrace said toe end and mold those portions of the upper which form the rear and upper walls of the 15 crease between the margin and upper, of means for heating said engaging means to cause heat to be imparted to the upper material, and operating means constructed and arranged to permit the heated margin 20 engaging means to remain in molding contact with the upper.

29. In apparatus of the class described, the combination with means for forming a toe from a toe blank, of means for clamping the toe blank along its outer edge, said means 25 comprising a smooth clamp member engaging the finished surface of the toe blank and a roughened or toothed clamp member engaging the unfinished surface of the blank, said roughened clamp-member being constructed to permit movement of the clamped 30 portion of the blank in its own plane in defined directions only.

30. In apparatus of the class described, the combination with means for forming a 35 toe from a toe blank, of means for clamping the toe blank along its outer edge, said means comprising a smooth clamp member engaging the finished surface of the toe blank and a roughened or toothed clamp member engaging 40 the unfinished surface of the blank, said roughened clamp member comprising portions movable in its own plane.

31. In apparatus of the class described, means for clamping a toe blank along its 45 outer edge, said means comprising portions having only clamping movement and other portions movable while in clamping position in the plane of said means.

32. In apparatus of the class described, 50 coöperating clamp members shaped to engage and clamp a toe blank along its outer edge to gage and form a sole attaching flange, and means carried by one of said clamp members for preventing movement of 55 said material across the flange line, said means having provision for relative movement of parts of the clamped flange along the flange line, whereby the length of said flange is reduced while its width is maintained.

33. In apparatus of the class described, the combination with a smooth clamp member, of a roughened clamp member, the roughened portions of said latter member

being carried by plates mounted upon said 65 member for movement relative thereto.

34. In apparatus of the class described, the combination with a clamp member having a smooth clamping surface, of a coöperating clamp member having a roughened 70 clamping surface, the roughened surface of said latter member being formed upon plates mounted upon said member for movement relative thereto in the plane of the clamping surface, and means for moving said plates. 75

35. In apparatus of the class described, the combination with two relatively movable clamp members, the clamping surface of one of which is formed upon plates mounted upon said member for movement relative 80 thereto in the plane of the surface, of means for moving said plates in defined directions, and means for restoring said plates to initial position.

36. In apparatus of the class described, 85 the combination with two clamp members movable relatively to each other into clamping position, the clamping surface of one of said members being formed upon plates mounted upon said member for movement 90 relative thereto in the plane of said surface, of means for causing a relative movement to each other of said plates.

37. In apparatus of the class described, 95 the combination with clamp members movable relatively to each other into and out of clamping position, the clamping surface of one of said members being formed upon plates mounted upon said member for movement relative thereto in the plane of said 100 surface, of means for moving one of said plates in one direction relatively to said member and means for moving another plate in a different direction relatively to said member.

38. In apparatus of the class described, the combination with means for gaging and clamping a portion of a toe blank to form an out-turned flange, portions of the clamping surface of the clamping means being formed upon parts movable in the plane of said surface, of means for effecting a relative movement to each other of portions of the clamped flange. 105

39. In apparatus of the class described, 115 the combination with means for forming a toe from a toe blank, of means for forming an out-turned sole attaching flange upon said toe, and means for reducing the length of the flange line while maintaining the 120 width of the flange.

40. In apparatus of the class described, the combination with means for forming a toe from a toe blank, of means for forming an out-turned sole attaching flange upon 125 said toe, and means for automatically reducing the length of the flange line while maintaining the width of the flange.

41. In apparatus of the class described, the combination with means for forming a toe from a toe blank, of means for forming an out-turned sole attaching flange upon 5 said toe, said flange forming means comprising means for automatically reducing the length of the flange line while maintaining the width of the flange.

42. In apparatus of the class described, 10 the combination with means for gaging and confining a portion of a toe blank to form an out-turned sole attaching flange, of means for forming a toe from the unconfined por-

tion of said blank, said gaging means comprising means coöperating with said toe 15 forming means to reduce the length of the flange line while maintaining the width of the flange.

In testimony whereof I have signed my name to this specification in the presence of 20 two subscribing witnesses.

KARL ENGEL.

Witnesses:

H. DORSEY SPENCER,  
ARTHUR L. RUSSELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."