

K. ENGEL.
METHOD OF FORMING THE UPPERS OF BOOTS AND SHOES.
APPLICATION FILED MAR. 20, 1908.

947,895.

Patented Feb. 1, 1910.

4 SHEETS—SHEET 1.

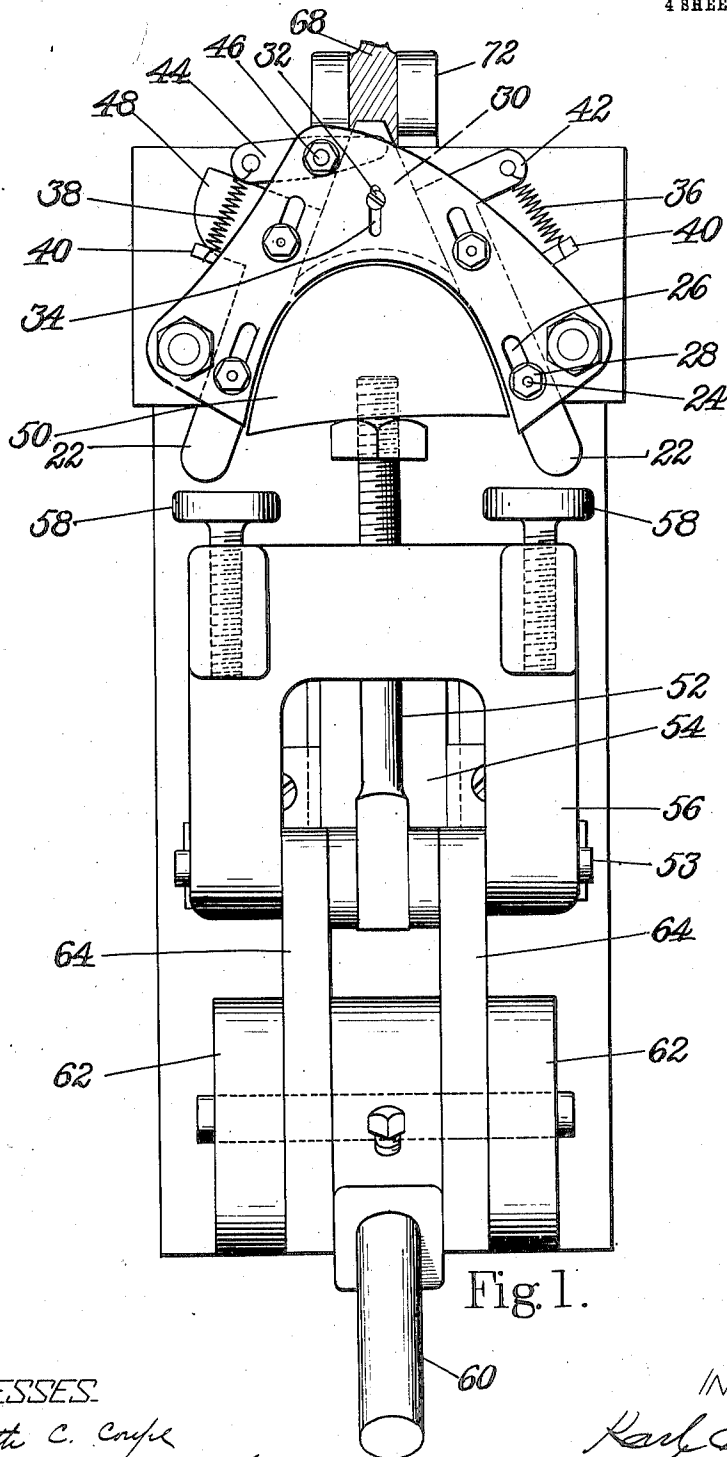


Fig. 1.

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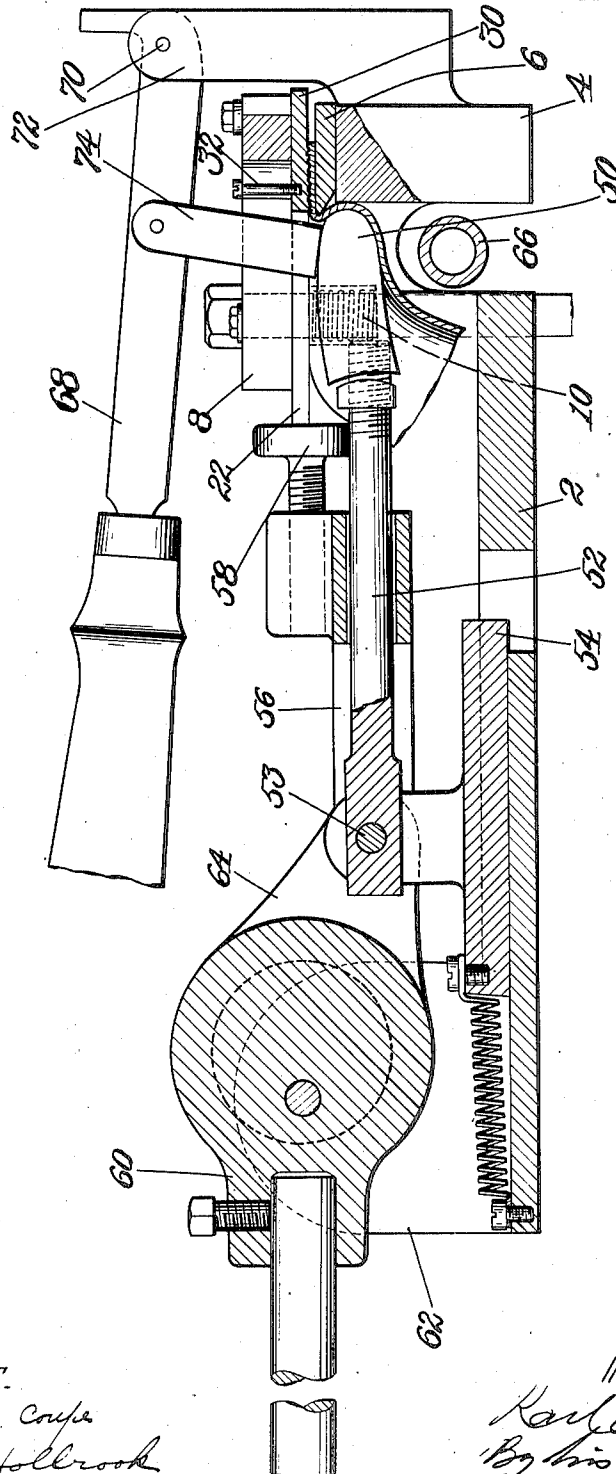


Fig. 2.

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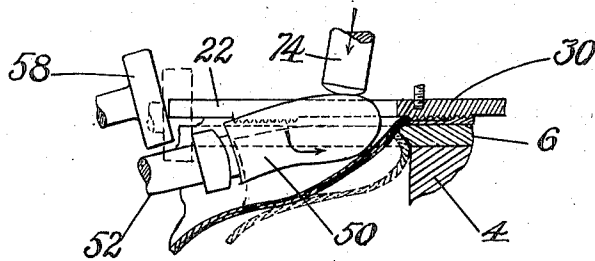


Fig. 4.

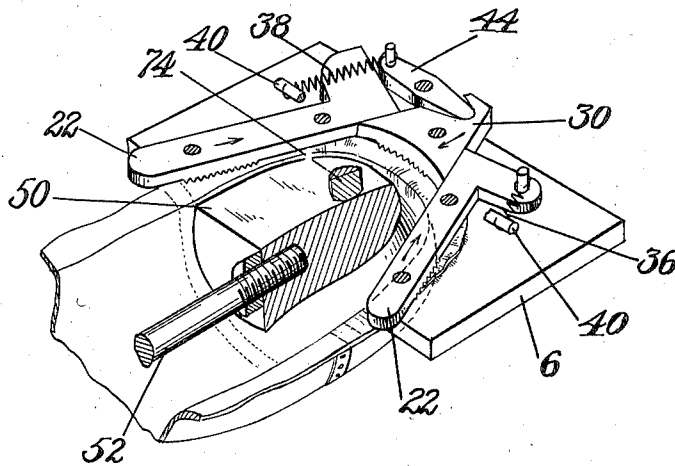


Fig. 3.

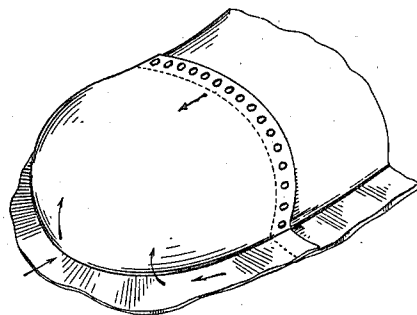


Fig. 6.

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4 SHEETS—SHEET 4.

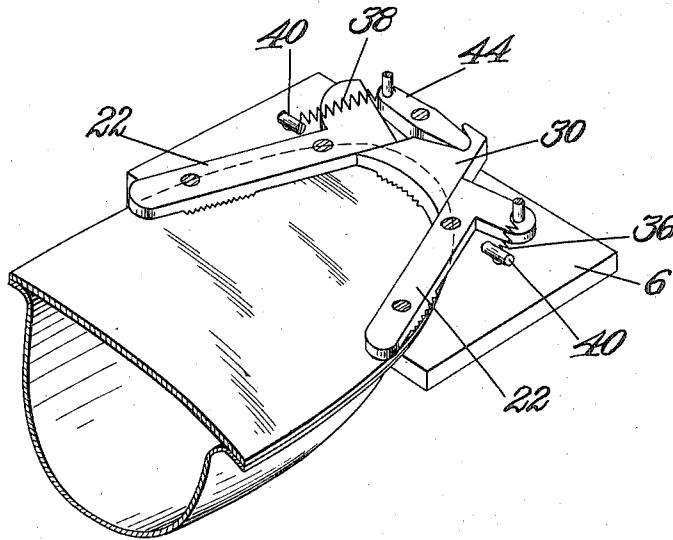


Fig. 7.

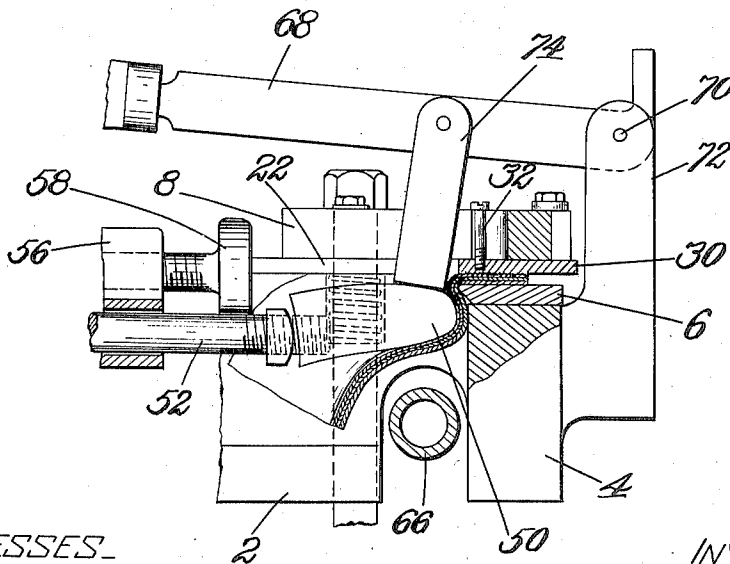


Fig. 5.

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UNITED STATES PATENT OFFICE.

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

METHOD OF FORMING THE UPPERS OF BOOTS AND SHOES.

947,895.

Specification of Letters Patent.

Patented Feb. 1, 1910.

Application filed March 20, 1908. Serial No. 422,293.

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 Commonwealth of Massachusetts, have invented certain Improvements in Methods of Forming the Uppers of Boots and Shoes, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to methods of forming or shaping the uppers of boots and shoes.

Although the invention is herein shown and described in its application to the forming or shaping of the uppers of shoes known to the trade as "stitch downs", that is, shoes having outturned flanges upon the uppers to which the soles are attached, it will be obvious to those skilled in the art that many, if not all, of the principles of this invention may be employed to advantage in the forming or shaping of the uppers of other than "stitch down" shoes.

The type of shoe designated by the term "stitch down" has long been known but has never until recently been manufactured to any great extent owing to the difficulty of producing a well fitting shoe by any method not rendered too costly either by reason of waste of material or by reason of waste of time and labor.

An important object of the present invention, therefore, is to provide a method of forming a well fitting shoe upper, and in particular a method of forming a well fitting shoe upper for a stitch down shoe which will require for its successful employment a minimum of material and a minimum of time and labor.

In the manufacture of the ordinary shoes of commerce, shape is given to the upper by forming it over a wooden last, the upper being drawn over the last and over the edge of a sole placed upon the bottom of the last and being held to the shape of the last by tacks driven through it into the sole, the tacks extending sometimes through the sole and into the last. In the manufacture of some types of shoes the tacks are clenched against an iron bottom on the last and form part of the permanent fastenings which hold the upper to the sole. In the manu-

facture of other types of shoes, the tacks are removed from the fore part, at least, of the sole when the upper and sole are united by stitching. In the manufacture of all of the more common types of shoes in which the sole and upper are united by stitching, the shaping of the upper by drawing it over a last, together with the use of tacks to confine the upper in the lasting operation, necessitates putting into the upper blank more material than would be necessary if the shaping could be performed successfully with only enough excess material in the upper blank to provide a margin of a suitable width for the attachment of the sole.

A further object of the present invention, therefore, is to provide a method of preparing an upper for the attachment of a sole or soles which will dispense with the necessity for initially shaping the upper over a last and confining it with tacks, and will thereby effect a saving both in upper material and in lasts and lasting tacks.

Another object of the invention is to provide a method of forming the upper in which the material from which the upper is to be formed will be so manipulated that it will be brought into the desired shape without excessive strain on any part and also without the necessity for making the material "flow", as in ordinary molding operations, such flowing being objectionable since it renders the parts from which the material flows excessively thin.

The invention contemplates furthermore the provision of a method of forming or shaping shoe uppers in which the upper will not only be brought into proper form for the reception of the sole, but in which it will also be caused to maintain its form until the sole is secured by permanent fastenings.

With the foregoing and other general objects in view, the invention is herein illustrated and described with especial reference to its application to the shaping of the toe parts of stitch down uppers.

One of the great difficulties to be overcome in forming a toe having an outturned flange is to cause the material of the blank to be so distributed during the forming operation that the resultant toe shall present a smooth external appearance, and that the outturned flange shall be of uniform width throughout its extent. If it is desired that the toe

proper shall project or bulge out over its flange, and such bulging is usually desirable both for appearance and for the comfort of the wearer, the difficulty of causing the material of the blank to be distributed in such manner as to produce the desired results is increased.

A particular object of the present invention, therefore, is to provide a method of forming a toe having an outturned flange by which by a simple and quickly and easily effected manipulation of the blank or of various parts of the blank during the toe forming operation the material of the blank will be so distributed and formed as to produce a toe having the desirable characteristics above enumerated.

In carrying out the method of this application, I may utilize the apparatus illustrated and described in my co-pending application, Serial No. 387,168, filed August 5, 1907, for Letters Patent on an improvement in machines for forming uppers of boots and shoes, although it will be obvious that the successful employment of this method is not dependent upon the utilization of the apparatus of the said co-pending application.

In the apparatus above referred to, illustration of which is furnished herewith as of suitable means for carrying out the method of this application, I effect the desired distribution of the material of the toe blank during the toe forming operation by confining a marginal portion of the blank of substantially the desired width of the flange to be formed and then effecting movements of selected portions of the confined margin in defined directions and for the most part in the plane of the said margin, while forming pressure is being applied to the unconfined portion of said blank.

In the apparatus above referred to and also in the method of this application the forming pressure is preferably applied to the blank first in a direction transverse to the plane of the confined portion of the blank and then in a direction longitudinally of, or parallel to, the plane of said confined portion. Although this order of steps is not essential to the carrying out of the method of this application, yet in practical operation there are advantages incident to this order of steps which make it preferable, as will appear from the following detailed description.

In the accompanying drawings,—Figure 1 is a plan view of a machine by which the method of this application may conveniently be carried out, the depressing lever at the forward end of the machine being shown in section. Fig. 2 is a vertical longitudinal section a little to the right of the middle of Fig. 1, the parts being shown in operative position. Fig. 3 is a perspective view, partly

in section, of the elements of this machine utilized in carrying out the method of this application, these elements being shown in operative position. Fig. 4 is a sectional detail, showing the toe former and one of the pushers about to be brought into operative position. Fig. 5 is a view similar to Fig. 2, illustrating the operation of the machine when a toe, a box toe and a toe lining are being formed simultaneously. Fig. 6 is a perspective view of a formed toe with arrows indicating the directions of movement of the material of the toe during the forming operation. Fig. 7 illustrates the method of attaching an insole to keep the toe in its molded shape until the parts can be stitched together.

The machine illustrated comprises a base or frame 2 adapted to be mounted on a bench or other suitable support. At the forward end of the base or frame 2 is an enlargement 4 having, in the construction shown, an approximately U-shaped recess 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 formed, that is it has the contour of the crease between the toe and the sole. A movable clamp member 8, adapted to cooperate with the clamp member 6, is mounted upon rods 10 passing through openings in the member 6 and in the support 4, these rods being connected at their lower ends to suitable treadle-operated mechanism by which they may be pulled down and held in order to cause the blank to be clamped between the members 8 and 6. Suitable mechanism is also preferably provided for locking the rods in their depressed position, so that the operator may leave the blank clamped while he is operating upon a similar blank in another machine.

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 machine being carried by plates mounted upon the member 8 with provision for movement relative thereto. Of these plates those 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 plates being so guided in their slots that they move in converging paths toward the front of the toe blank during the forming operation, and the front plate being guided in a 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 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 operated 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 adapted to cooperate 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, each connected at one end to the pivot 53, have openings at their other ends 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 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. 2. The steam pipe 66 passes 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 the right shoe and the other for the toe of the 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 in carrying out the method of this application is as follows: A suitable toe blank of the material of the upper alone, as shown in Fig. 4, or made up of upper material together with a blank for a box toe and a blank for a lining, as shown in Fig. 5, is clamped along its outer edge between the clamp members 6 and 8, the clamped portions of the blank lying approximately in one plane and the unclamped portions of the blank preferably sagging somewhat below the clamped portions. 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 portions 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 down upon the surface of the blank a short distance back from the front inner edge of plate 6 in order to avoid putting too great strain upon the material 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 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 sides of the toe blank will cause the plates 22, 22 to move forward with the toe formed. This movement of the plates 22, 22 will effect or permit the forward movement of the portions of the flange along the sides of the toe which are held by said plates, these portions moving freely over the smooth plate 6. As the left-hand plate 22 moves forward with the toe former, the engagement of its offset part 48 with the lever 44 will cause 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 plate 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 push them positively forward. A predetermined movement of selected portions of the flange in its own plane is thus insured.

It will be noted by an inspection of Figs. 2, 3 and 5 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 front of the toe over the flange. It will be further noted by an inspection of Fig. 1 that the forward movement of the side plates 22, 22 and the rearward movement of the front plate 30 will cause a gathering in, or 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 moving of the 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.

It will be understood that the invention is not limited to a movement, in the toe forming operation, of the particular selected portions of the margin here illustrated, but that it comprehends broadly the predetermined movement in the plane of the margin of such selected portions in such selected directions as will in any way facilitate the forming of a properly shaped toe having a flange, or the predetermined feeding from one region to another of material which will facilitate the shaping operations in that other region.

The position of the eccentric shoulders

upon the lever 60 is such with respect to the pivots 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 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 such tempering is not essential to the successful employment of this method. 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 when the forming pressure is applied during 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 any suitable means for holding the upper clamp member in depressed position, the former is withdrawn, the upper clamp member released so that it may be restored to its uppermost position by the spring surrounding the rods 10 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, as shown in Fig. 7, the innersole being preferably of such size that its edge lies flush with the outer edge of the flange. The clamp number 8 is then depressed sufficiently to press the innersole firmly into engagement with the outturned flange, the formed toe with its attached innersole is then removed, and the innersole and flange are further fastened together by 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, and the invention should be understood to comprehend, therefore, a method with which such a clamping mechanism could be employed. 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.

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

1. That improvement in the art of pre-

paring a shoe upper for the attachment of the sole which consists in confining a marginal portion of the toe part of the shoe upper, effecting a relative movement of the confined and unconfined portions of said toe part of the upper in a direction transverse to the plane of the confined portion and then effecting a relative movement of said confined and unconfined portions of the toe part of the upper in a direction substantially parallel to the plane of the confined portion.

2. That improvement in the art of preparing a shoe upper for the attachment of the sole which consists in confining throughout its extent the marginal portion of the toe part of the shoe upper, effecting a relative movement of the confined and unconfined portions of said toe part of the upper in a direction transverse to the plane of the confined portion and then effecting a relative movement of said confined and unconfined portions of the toe part of the upper in a direction substantially parallel to the plane of the confined portion.

3. That improvement in the method of preparing a shoe upper for the attachment of the sole which consists in confining the marginal portion of the toe part of an upper, pressing the unconfined portion of said toe part out of the plane of said confined portion and then pressing said unconfined portion forward relatively to said confined portion to form a bulge at the front and sides of the toe.

4. That improvement in the art of preparing a shoe upper for the attachment of the sole which consists in confining a marginal portion of the toe part of the shoe upper, of a width corresponding to the desired width of an outturned flange to be formed upon the said upper, effecting a relative movement of the confined and unconfined portions of said toe part of the upper in a direction transverse to the plane of the confined portion and then effecting a relative movement of said confined and unconfined portions of the toe part of the upper in a direction substantially parallel to the plane of the confined portion whereby a toe is formed having a bulge over the outturned flange.

5. The method of forming shoe uppers which consists in confining a marginal portion of an upper blank, applying forming pressure to an unconfined portion of said blank and moving selected portions of the confined margin in the plane of said margin during the application of the forming pressure.

6. The method of forming shoe uppers which consists in confining a marginal portion of an upper blank, applying forming pressure to an unconfined portion of said blank and moving selected portions of the

confined margin in defined directions in the plane of said margin during the application of the forming pressure.

7. The method of forming shoe uppers which consists in confining the margin of the toe part of an upper blank, applying forming pressure to the unconfined portion of said toe part and feeding selected portions of the margin into the field of operation of the forming pressure during the application of said forming pressure.

8. The method of forming a toe having an outturned flange, which consists in confining a marginal portion of a toe blank of substantially the width of the desired flange, applying forming pressure to the unconfined portion of said blank and reducing the peripheral length of the margin during the application of the forming pressure.

9. The method of forming a toe having an outturned flange, which consists in confining a marginal portion of a toe blank of substantially the desired width of the flange to be formed, applying forming pressure to the unconfined portion of said flange and effecting a relative movement to each other of portions of the confined margin in the plane of said margin during the application of the forming pressure.

10. The method of forming a toe having an outturned flange, which consists in confining a marginal portion of a toe blank of substantially the desired width of the flange to be formed, applying forming pressure to the unconfined portion of said blank and controllably moving the margin while the forming pressure is being applied.

11. The method of forming a toe having a flange which consists in confining the marginal portion of a toe blank to form the flange, bringing forming pressure to bear upon the unconfined portion of said blank and transferring forwardly during the forming operation portions of the margin at the sides of the toe.

12. The method of forming a toe having a flange which consists in confining the marginal portion of a toe blank against movement out of its own plane, effecting a relative movement of the confined and unconfined portions of said blank in a direction transverse to the plane of the margin and then effecting a relative movement of parts of said margin in the plane of said margin.

13. The method of forming a toe having a flange which consists in confining the marginal portion of a toe blank to form the flange, bringing forming pressure to bear upon the unconfined portion of said blank in a direction transverse to the plane of the confined portion while holding said confined portion against movement out of its plane, bringing forming pressure to bear upon the blank in a direction substantially parallel to the plane of the confined portion, moving

portions of the margin in its own plane while the forming pressure is operating parallel to the said plane, and feeding into the field of operation of said forming pressure other portions of said margin.

14. The method of forming a toe having a flange which consists in confining the marginal portion of a toe blank to form said flange, bringing forming pressure to bear upon the unconfined portion of said blank first in a direction transverse to the plane of the confined portion, then in a direction substantially parallel to said plane, and gathering in the material along the flange line during the forming operation.

15. The method of forming a toe having an outturned flange and a crease between the toe and its flange, which consists in so manipulating a toe blank relatively to a fixed crease line that portions of the blank which are to form the flange are moved relatively to each other along said line as the portion which is to form the toe proper is caused to bulge out over said line.

16. That improvement in the art of making shoes which consists in confining a marginal portion of a shoe upper to form an outturned flange, forming the unconfined portions into the desired shape of the finished upper after the confining operation, partially releasing the confined portion and temporarily attaching an insole to the outturned flange to hold the upper to its proper

outline while permanent fastening of the insole and flange is being effected.

17. That improvement in the art of making shoes which consists in confining a marginal portion of a shoe upper to form an outturned flange, forming the unconfined portions into the desired shape of the finished upper after the confining operation, partially releasing the confined portion, placing an insole provided with cement upon the outturned flange, and again confining said flange together with the insole until attachment of the flange and insole is effected.

18. That improvement in the art of making shoes which consists in confining the marginal portion of a shoe upper to form an outturned flange, forming the unconfined portions into the desired shape of the finished upper after the confining operation, permitting the flange and unconfined portions to set in their formed shape, partially releasing the confined portion and temporarily attaching an insole to the outturned flange to hold the upper to its proper outline while permanent fastening of the insole and flange is being effected.

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

KARL ENGEL.

Witnesses:

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FREDERICK L. EDMONDS.