M. BROCK.

METHOD OF SHAPING UPPERS.

APPLICATION FILED NOV. 17, 1915.

1,197,440.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 1.

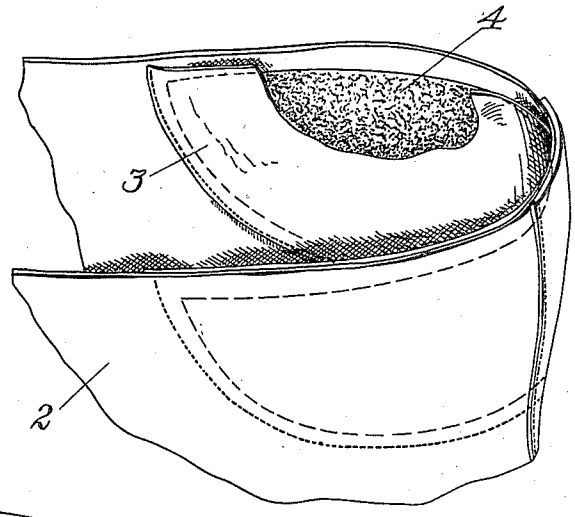



Fig. 1.

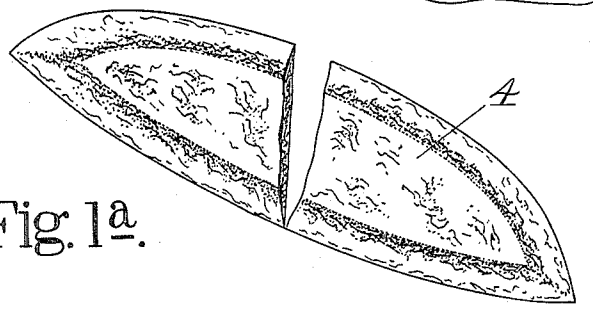



Fig. 1a.

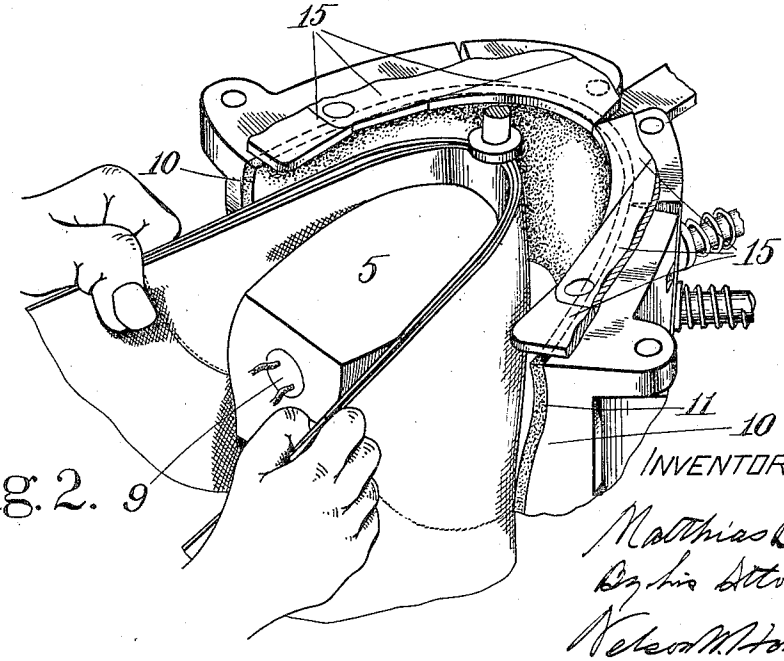



Fig. 2.

INVENTOR.

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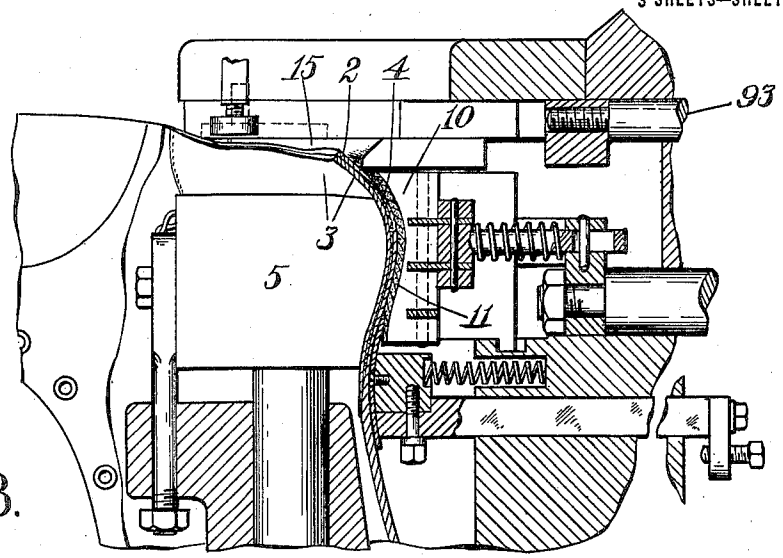



Fig. 3.

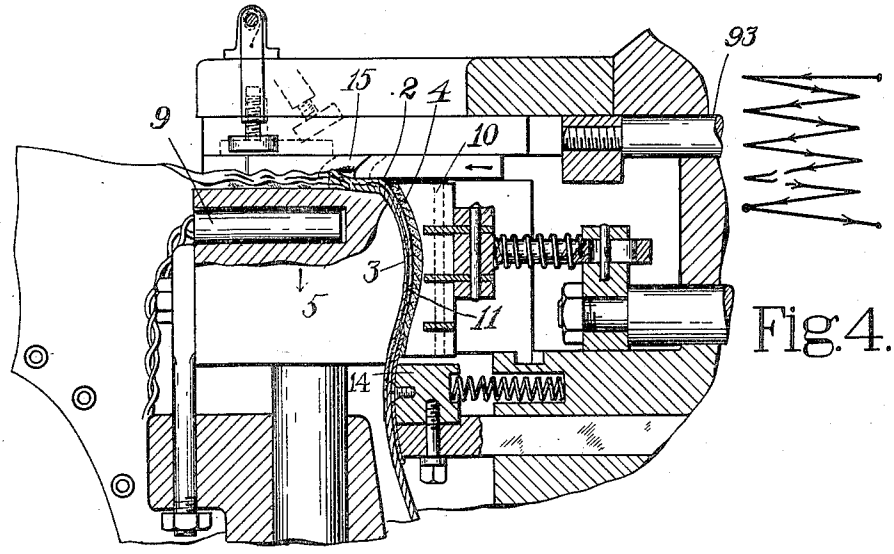



Fig. 4.

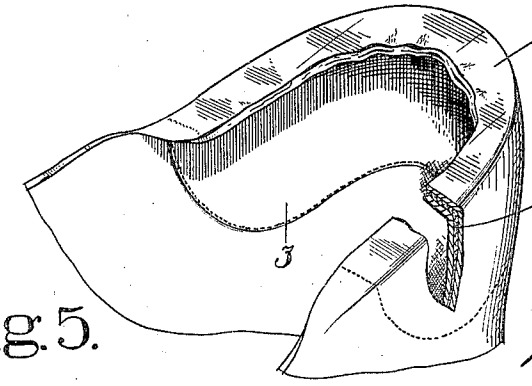



Fig. 5.

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3 SHEETS—SHEET 3.

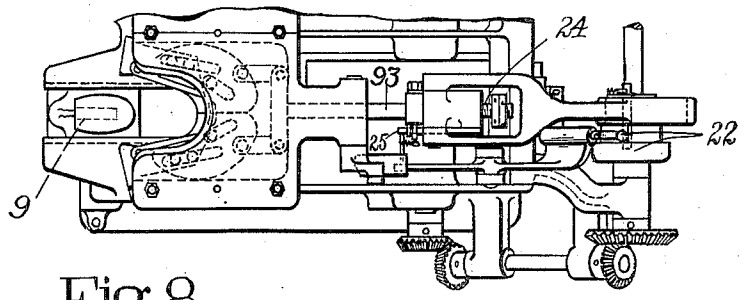



Fig. 8.

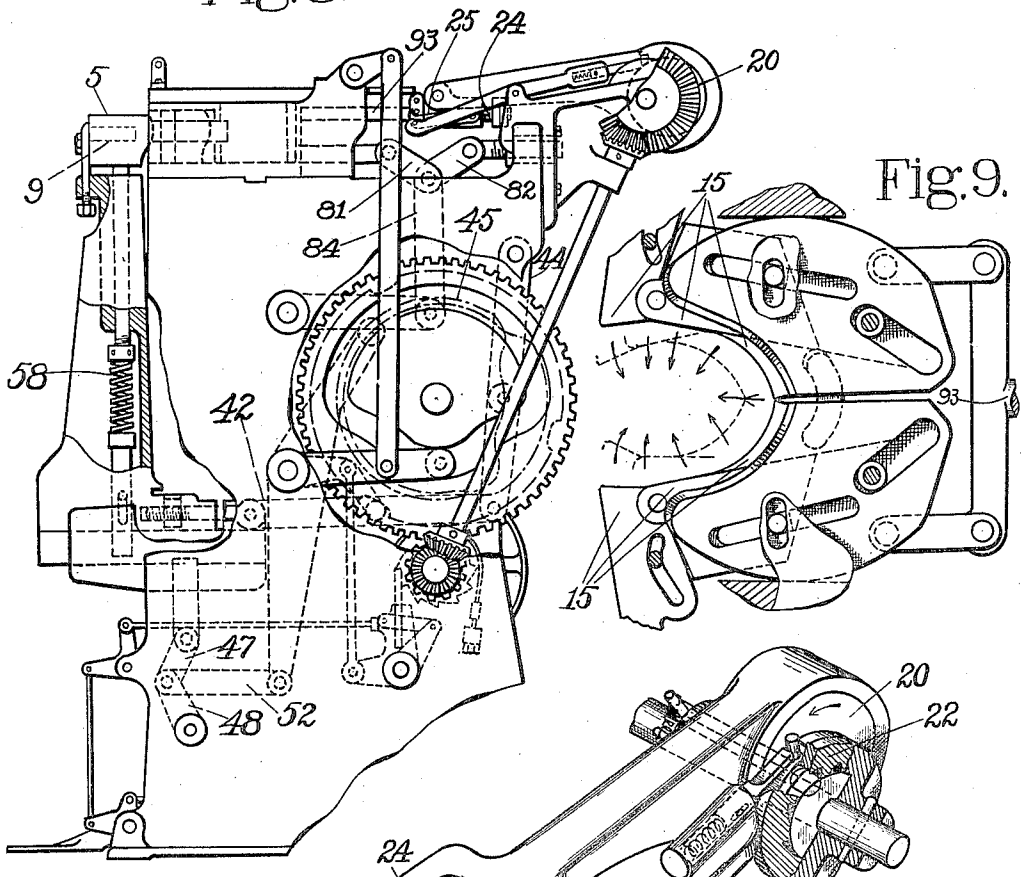



Fig. 6.




Fig. 9.

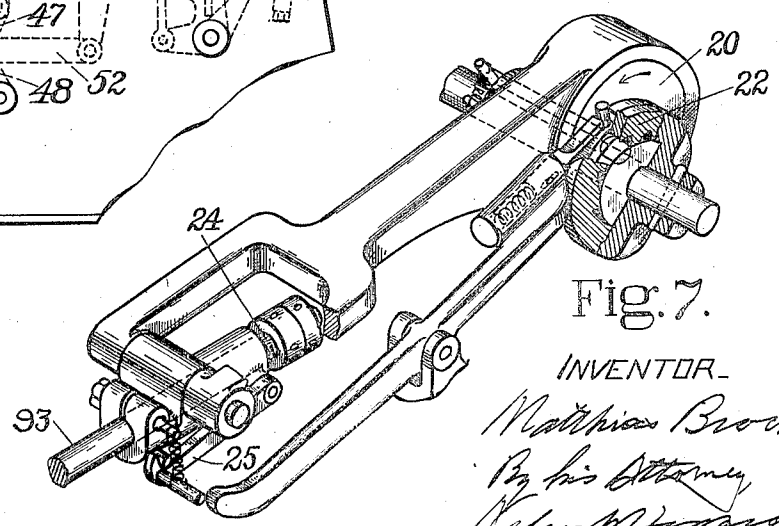



Fig. 7.

INVENTOR.

Matthias Brock

By his Attorney

Nelson M. Howard

# UNITED STATES PATENT OFFICE.

MATTHIAS BROCK, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## METHOD OF SHAPING UPPERS.

1,197,440. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed November 17, 1915. Serial No. 62,041.

*To all whom it may concern:*

Be it known that I, MATTHIAS BROCK, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Methods of Shaping Uppers, 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 the manufacture of shoes and more particularly to the shaping of the upper materials, usually including the heel stiffener, at the rear end of the shoe.

The invention has for its object to provide a method by which the shaping of upper materials shall be performed more effectively than it has heretofore been accomplished. One step toward securing this result consists in subjecting a sole attaching flange to molding compression in a novel manner. Heretofore the flange has been wiped over under frictional pressure which had to be more or less yielding in order to wipe materials of varying thicknesses safely over the edge of the former without scarring them. As herein contemplated the shaping of the flange is perfected by subjecting the flange to compression produced by moving the body of the upper, together with inner and outer molds between which the body is held, and the flange forming means relatively. This relative movement, which is advantageously effected with great force, of the body of the upper and the flange toward one another, crushes the flange down at the line of bend so as to square the edge. Another way in which it is contemplated to perfect the shaping of a flange as, for example, an inturned flange, is to turn it inwardly and to press it down upon the heel seat face of the inner mold by a multitude of rubbing movements directed alternately inwardly and then outwardly over the flange. This operation of rubbing the flange alternately inwardly and outwardly under pressure appears not only to condense and compact the stock of the flange but also to set the fibers so as to assist in producing a permanently flat heel seat flange. The alternate inward and outward rubbing movements do not need to be long ones and I find that the best results in shaping the edge line of the heel seat are obtained by stopping the outward rubbing movements with the rubbing means inside the edge line of the heel seat. I turn in the flange and then rub it alternately outwardly and inwardly a multitude of times, preferably without retracting the rubbing means far enough to uncover the edge line and make the necessity of coming in over it again. In this way I reduce to a minimum the action tending to round the edge and contribute as much as possible to squaring the edge. The portion of the invention which involves repeated rubbing of the flange to perfect its shape and set it is equally applicable to the process of forming an outturned flange, as is required in stitch-down work. Under many conditions the practice of this invention can best be carried out on a metallic inner mold preparatory to assembling the upper upon its last, but under other conditions this invention may be advantageously practised on a mold which is an end portion of a last over which the shoe is to be made. Disposition of the stock to reduce the bunch on the heel seat which is caused by gathering the margin of the upper materials inwardly around the convex edge of the heel is facilitated by augmenting the normal tension produced on the flange by the inward wiping or rubbing action. This I do by moving the rubbing means or wipers inwardly in a plane intersecting the plane of the flange at a small angle so that the wipers bite the stock as they close. The inside mold is mounted so that it can be forced downwardly against a yielding resistance to avoid injury to the work as the wipers advance. As the wipers retract the mold is raised again to press the thinnest part of the flange stock, which is adjacent to the heel seat edge, hard against the wipers so that that portion of the upper receives appropriate rubbing treatment. One result of this movement of the mold is to rub the inside of the heel portion of the upper up and down enough to smooth it.

In some classes of work the upper materials of the rear part of the shoe have a tendency to spread wide across the shank into a flaring or V shape after the molding operation, instead of remaining in a U shape

with the two sides of the shank in substantially their normal relation to each other. I have succeeded in reducing this objectionable tendency to a large extent by drawing the margin of the upper materials, including the stiffener wings, from each side of the rear portion of the shank and the forward portion of the heel in a direction inclined inwardly and rearwardly and maintaining the materials in that position while the heel seat flange is being formed. I accomplish this by wiping these portions of the margin rearwardly and inwardly while wiping the margin from around the rear portion of the heel forwardly and inwardly. I find that by repeatedly rubbing the margin alternately inwardly and outwardly as above suggested, after wiping it over the heel seat face of a mold in the described directions, helps to make the shape permanent. As a result of such rubbing action the fibers of the flange seem to become set in such a way as to prevent or reduce the objectionable spreading of the upper in the shank.

The shaping of the upper is expedited and its effects made more permanent by heating the upper. I have found that advantageous results are obtained by heating the upper frictionally and this I accomplish by rubbing it with such pressure and at such a rate as to develop frictional heat in the flange of the upper. Frictional heat is also developed which assists in smoothing the surface of the inside of the upper where it is rubbed by the inner mold. Substantial permanence of shape of the molded work is obtained in a shorter time under some conditions by using as high a temperature in the mold as can be employed without disadvantageously affecting any of the upper materials and I have obtained good results by electrically heating the inner mold. The shaping of the heel seat flange is made particularly effective by molding the margin of the upper materials, including the heel stiffener, inwardly over the angular edge of a metallic heel-shaped form which is maintained as hot as it may be without disadvantageously affecting any of the upper materials. It is new, as I am advised, to mold the heel seat flange of an upper over the angular edge of a hot metallic form and I find that the heat is particularly effective when thus applied to the inside angle of the work.

It is advantageous to pull the upper snugly or tension it forward around the heel mold before forming the heel seat flange, in order that the flange shall be formed with relation to the position which the upper should occupy when properly incorporated in a shoe. As herein contemplated the upper is maintained by the clamping action of the outer mold in its tensioned relation to the inner mold while it sets or acquires permanently the shape of the inner mold. Advantageous results are obtained in shaping the end portions of shoe uppers by the use of a toe or heel stiffener which is capable of being rendered pliable and adhesive by heat and is hard and resilient when it is cold. This stiffener I heat and insert between the upper and the lining and by the pressure of the molding operation the stiffener is conformed accurately to the mold and caused to adhere to and unite together the upper and the lining to produce a unitary multi-ply structure. The same action occurs in the flange portion of the work under treatment by the flange forming means. Some of the adhesive may be forced from the stiffener toward the edges of the flange portion of the upper by the described inward rubbing of the flange and will cause the edges of the upper and lining to adhere together beyond the stiffener edge. The hardening of this stiffener and the adhesive as it cools assists in rendering the molded shape of the work permanent. While the adhesive qualities of the stiffener are desirable they are not indispensable.

The invention will now be more fully described in connection with drawings which include an illustration of an apparatus by the aid of which the method may be practised, and the invention will then be pointed out in the claims.

In the drawings, Figure 1 shows the rear portion of a shoe before the upper materials are subjected to treatment in accordance with this invention. Fig. 1[a] shows a heel stiffener with which this invention is well adapted to deal. Fig. 2 shows an upper positioned and forwardly tensioned ready to be shaped between a heel form or inner metallic mold and an outer mold. Fig. 3 shows the work under compression between the molds, the flange not yet having been formed. Fig. 4 shows the heel seat flange being turned inwardly by wipers or plates which are advancing in the direction of the arrow. Fig. 5 shows the work after treatment of the upper materials in accordance with this invention. Fig. 6 shows a side elevation of a machine which I have used in practising this invention and the general organization of which is described in my co-pending application Ser. No. 728,183, filed Oct. 28, 1912, of which this application is a continuation as to disclosure of subject-matter which is common to the two applications. Figs. 7, 8 and 9 show details of the machine.

The upper materials illustrated comprise the leather upper 2 with its lining 3 and a heel stiffener 4 which may advantageously be impregnated with a material that renders the stiffener hard and resilient while it is cold and pliable and adhesive when it is heated. These parts having been properly assembled together, with the stiffener in

heated condition between the upper and the lining, are placed around a heel mold 5 which, while it may be any suitable last or other form, is here shown as a metallic member having the general shape of the heel and rear shank part of a last, including the vertical and circumferential curvatures, which are preferably exaggerated for overmolding the upper to an extent which will leave it of approximately the desired shape after the degree of reaction which usually occurs. The upper is preferably tensioned forward snugly about the form or mold 5 and this may be done by the hands of the workman applied at the two sides or at the toe end of the upper or by a gripper as in said application. In the illustrated apparatus the mold 5 is carried by a jack post which is movable rearwardly from the position shown in Fig. 6 to carry the work into the outer mold 10, and during or prior to this movement of the mold 5 the upper is tensioned around the mold and is held under tension until it is clamped by the outer mold.

If the work is to be subjected during the molding operation to the action of more heat than the friction heat which is developed as will shortly be explained, an electrical heating unit 9 may be inserted in the mold 5 and in that case the work will be heated while it is being tensioned around the mold. Good results may also be obtained by heating the upper materials, including the described stiffener, prior to their application to the mold 5 as, for example, by subjecting them to the action of heated vapor.

The upper materials, while held around the mold 5, are carried by the jack post operating mechanism 42, 44, 45 into the outer mold which comprises relatively movable jaws the interior faces of which are formed to correspond with the heel-shaped contour of the inner mold. The joint between the jaws is shown as covered by a lining 11 of hard leather to give continuity to the molding surface. The heel seat flange forming means is shown as comprising wiper plates 15 which, while standing open and retracted, project forwardly over the middle of the outer mold 10 so that as the work is forced back into the mold the flange is turned in over the rear end of the heel by the plates. As the work is moved back into the mold 10 it is engaged at or adjacent to the lower edge of the heel stiffener by a yielding neck presser 14 which forces the stock forwardly and tends to tilt the stiffened ends and the upper stock upwardly in the shank of the shoe.

When the work has been drawn back into the outer mold the upper materials are clamped around the inner mold by the closing of the outer mold by toggle 81, 82, 84. The flange may now be initially turned in over the heel seat face of the inner mold by advancing the wiper plates 15 by means of the plunger 93, the work being raised by the jack post lifting toggle 47, 48, 52. The jaws of the outer mold are so mounted and connected with their operating mechanism that they can rise with the jack post and the inner mold about which they are clamped. The elevation of the jack post after the initial turning in of the flange brings the heel seat face of the mold 5 nearer to the plane of the wiper plates so that in the next advance of the plates a closer wipe is made. Spreading of the molded upper materials after release from the mold, which tends to take place to an undesirable extent with some stocks, is reduced by wiping the marginal portions from the shank and forward portions of the sides of the heel backwardly and inwardly. This is accomplished with the aid of wiper plates which may be organized to operate as claimed in my prior application, Ser. No. 706,655, filed June 29, 1912, to wipe inwardly and backwardly over the front portion of the heel seat while wiping inwardly and forwardly over the rear portion of the heel seat. The wiping action of the heel seat forming plates 15 is made to take place in a plane which intersects the plane of the work at a small angle. The amount of stock concentrated at the inner edge of the flange, because the flange is gathered in over the convex edge of the heel form, makes the flange increase in thickness toward its inner edge and therefore causes its upper surface to incline inwardly and upwardly from its outer to its inner edge, and the heel seat face of the mold may also slant upwardly and inwardly from its rear end. In either or both of these ways the plane of the top face of the work is made such that the wiper plates bite hard and draw inwardly as they are advanced. The mold 5 is permitted by a stiff spring 58 to yield downwardly enough to allow the wiper plates to complete their stroke and the spring raises the mold as the plates are retracted, so that the plates press approximately as hard upon the relatively thin portion of the flange near the outer edge of the heel seat as on the thick part. The upper materials adhere to the outer mold, which does not move as much as the inner mold, and therefore a rubbing of the inside of the shoe upwardly and downwardly by the inner mold is effected. Improved results are obtained by rubbing the flange alternately inwardly and outwardly a multitude of times and I have found it advantageous to reciprocate the flange forming plates about twenty times, as by suitable operating connections between the plunger 93 and an eccentric 20 controlled by a clutch 22. The plunger 93 has a lost motion connection 24 with the eccentric which is operative during the repeated reciprocations to

shorten the back stroke of the plates 15. A hook 25 insures complete retraction of the wipers on the final back stroke, as more fully explained in my co-pending application Ser. No. 75,825, filed Feb. 2, 1916. The alternate inward and outward rubbing of the stock repeatedly under pressure rubs out the wrinkles and the excess thickness of the flange stock to a large extent and appears to set the fibers with the flange in flattened position. The inward and backward rubbing of the flange from the rear part of the shank and the forward portion of the sides of the heel, as above described, repeatedly inwardly and then outwardly, appears so to distribute the stock and mold it in its distributed relation as to resist the tendency of the sides of uppers to spread wide apart in the shank. It is not necessary to make long reciprocations of the wipers to produce effective rubbing, and it is preferable that they be not backed fully off the heel seat, for that avoids the rounding of the edge which would result from the wipers riding up over the edge on their inward strokes. I have found that the described rubbing movements rapidly repeated heat the rubbed surface, particularly of dry leathers, to a material extent. This friction heat, without any other heat applied through the shaping means, softens the stock of the flange and renders it more responsive to the action of the shaping means. The rubbing of the inner face of the shoe in engagement with the side faces of the mold 5 by reason of the downward and upward movements of the mold with each reciprocatory movement of the wipers assists in shaping the inside of the shoe, and this rubbing develops frictional heat which assists in producing a smooth polished surface where the work is pressed hard against the mold 5.

This invention may be advantageously employed in shaping upper materials either together as described or separately, and over a special mold or over the last upon which the shoe is being made, and in many of its aspects the invention is applicable to molding either end of an upper, and the claims are to be construed as limited by terms designating the work only so far as the state of the prior art may require. When the upper has been molded on a heel form as shown, it is removed from the form and is in shape to be easily and accurately assembled with an innersole on the last upon which the shoe is to be made and the flange which was shaped over the tread face of the form stands in position to be quickly tacked to the tread face of the innersole. Novel features of invention embodied in the apparatus herein disclosed are claimed in my co-pending application Ser. No. 75,825, filed Feb. 2, 1916.

Having explained the nature of this invention and how it may be practised, I claim as new and desire to secure by Letters Patent of the United States:—

1. That improvement in methods of shaping shoe uppers which consists in turning a heel seat flange inwardly over a heel seat mold while the body of the heel portion of the upper adjacent to the flange is clamped by an outside mold, and then subjecting the flange to compression for squaring the edge by relatively moving the clamped body portion of the upper and the clamping molds on the one hand and the flange and its forming means on the other hand with great force in a direction substantially perpendicular to the plane of the flange.

2. That improvement in methods of shaping shoe upper materials which consists in turning a heel seat flange inwardly and pressing it down into substantially right angular relation to the body of the heel portion of the upper by a multitude of rubbing movements directed alternately inwardly and then outwardly over the flange.

3. That improvement in methods of shaping shoe upper materials which consists in turning a heel seat flange inwardly and setting fibers of the stock with the flange in its inturned position by a multitude of short rubbing movements applied with pressure and directed alternately inwardly and outwardly over the flange.

4. That improvement in methods of shaping shoe upper materials which consists in turning a heel seat flange inwardly and rendering its inturned position permanent by rubbing the flange with pressure alternately outwardly and inwardly a multitude of times and terminating the outward rubbing movements inside the edge line of the heel seat.

5. That improvement in methods of shaping shoe uppers which consists in turning a heel seat flange inwardly and then rubbing the flange inwardly repeatedly in a plane which intersects the plane of the top face of the flange at a slight angle.

6. That improvement in methods of shaping shoe uppers which consists in turning a heel seat flange inwardly and then rubbing the flange inwardly repeatedly in a plane which intersects the plane of the top face of the flange at a slight angle while supporting the flange yieldingly so that a substantially uniform pressure or bite of the rubbing means against the flange is obtained while rubbing the relatively thin portion of the flange adjacent to the edge of the heel seat and while rubbing the inner portion of the flange which has been made thicker by reason of the stock gathered inwardly around the convex shape of the heel mold.

7. That improvement in methods of shaping shoe upper materials which consists in effecting on the inner side of the heel short

rubbing movements alternately upwardly into the angle at the base of the heel seat flange and then downwardly again.

8. That improvement in methods of shaping shoe upper materials which consists in molding the materials including the stiffener of the rear portion of an upper to the contour of the side and tread faces of a form having a portion the general shape of which corresponds to the rear part of a last from the shank to the heel end but is slightly narrower and has its curvatures exaggerated to an extent to overmold the heel portion of the upper materials relatively to the last with which the upper is to be used, continuing the molding pressure until the new shape of the upper materials becomes established, then removing the work from the form and assembling it with an inner sole on a last and tacking to the tread face of the innersole the flange which was shaped over the tread face of the form.

9. That improvement in methods of shaping shoe upper materials which consists in assembling an upper on a form having a portion shaped similarly to an end portion of a last, wiping inwardly across the edge of the tread face of the form the marginal portions of the upper materials substantially simultaneously from the end and sides of said tread face in directions which are substantially normal to the adjacent portion of the edge of the tread face and shaping said marginal portions by rubbing pressure to form a sole attaching flange.

10. That improvement in methods of shaping shoe upper materials which consists in assembling an upper on a form having a portion shaped similarly to the heel portion of a last, gathering inwardly across the edge of the heel seat face of the form the marginal portions of the upper materials substantially simultaneously in directions extending from the rear end of the heel forwardly and inwardly and from the front of the heel inwardly and rearwardly, and forming the heel seat flange of the upper from said marginal portions by pressure applied while the stock is drawn over the heel seat in the directions specified.

11. That improvement in methods of shaping shoe upper materials which consists in turning the margin of the upper materials including the heel stiffener inwardly over the rear portion of a heel form and gathering the margin of the upper from the rear part of the shank and the forepart of the sides of the heel inwardly and rearwardly and shaping it into a heel seat flange while it is so positioned.

12. That improvement in methods of shaping shoe upper materials which includes the step of drawing the margin of the upper materials from each side of the rear portion of the shank or the forward portion of the heel inwardly and rearwardly over the heel seat of a form and shaping the heel seat flange while maintaining said marginal portion of the upper materials in the specified relation to the form.

13. That improvement in methods of shaping shoe upper materials which consists in gathering a heel seat flange inwardly over a mold in directions which are inclined forwardly from the rear end and corners of the heel and are inclined rearwardly from the sides of the forepart of the heel and the rear part of the shank, and rubbing the flange alternately inwardly and outwardly in said directions a multitude of times, substantially as described.

14. That improvement in methods of preparing upper materials for incorporation into a shoe which consists in turning the margin of the upper materials at substantially right angles to the adjacent portions of the body of the materials entirely around an end of the shoe substantially simultaneously and then subjecting the inwardly turned stock to a multitude of alternate inward and outward rubbing pressures to set it in inturned relation to the adjacent body portion of the upper.

15. That improvement in methods of shaping shoe upper materials which consists in turning a heel seat flange inwardly and then rubbing the flange alternately inwardly and outwardly a multitude of times with a pressure sufficient to create frictional heat in the flange.

16. That improvement in methods of shaping shoe upper materials which consists in turning a heel seat flange inwardly and then rubbing the flange and heating it while rubbing it.

17. That improvement in methods of shaping shoe uppers which consists in conforming the materials of the heel portion of an upper to the contour of the shaping faces of a mold in the presence of heat developed by friction between the work and the shaping means while the work is on the heel mold.

18. That improvement in methods of preparing upper materials for incorporation into a shoe which consists in turning the margin of the upper materials including the heel stiffener at substantially right angles to the adjacent portion of the body of the materials entirely around the heel end of the shoe substantially simultaneously and subjecting the stock at and adjacent to the turning line to molding pressure in the presence of heat.

19. That improvement in methods of preparing upper materials for incorporation into a shoe which consists in molding the margin of the materials including an upper stiffener and lining inwardly over a hot form to produce a sole attaching flange and

maintaining the adjacent portions of the upper materials under pressure against the molding surfaces of said form until the flange has set in substantially permanent relation to the body portion of the upper materials.

20. That improvement in methods of shaping the heel portions of upper materials which consists in tensioning an upper forwardly around a heated heel form and maintaining it tensioned around the form while it acquires the shape of the form.

21. That improvement in methods of preparing upper materials for incorporation into a shoe which consists in heating a stiffener which is impregnated with a material that renders the stiffener hard and resilient when cold and pliable and adhesive when heated, inserting the stiffener between the upper and the lining of the shoe, shaping said materials into a unitary multi-ply structure between devices the inner one of which has the approximate vertical and circumferential curvatures of the corresponding part of the last and the outer one of which has an interior face similarly contoured, and maintaining the work under pressure until the acquired shape and the relation of the portions of the upper materials to each other have become substantially permanent.

22. That improvement in methods of shaping upper materials which consists in heating a stiffener which is impregnated with a material that renders the stiffener hard and resilient when cold and pliable when heated, inserting the stiffener between the upper and the lining of the shoe, shaping said materials around a form having substantially the contour to be imparted to the stiffened portion of the shoe, applying molding pressure to the stiffener, the upper and the lining while the stiffener is pliable, and maintaining the shape of the upper materials until it has become substantially permanent.

23. That improvement in methods of shaping upper materials which consists in assembling a stiffener which is impregnated with a material that renders the stiffener hard and resilient while cold and pliable when heated, shaping said materials while the stiffener is heated around a form having substantially the contour to be imparted to the stiffened portion of the shoe, turning the margin of the upper materials including the stiffener at substantially right angles to the body portion to form a flange, applying pressure to shape the stiffener, the upper and lining while the stiffener is pliable, and maintaining the shape of the upper materials until the shape has become substantially permanent.

24. That improvement in methods of treating upper materials which consists in assembling between an upper and lining a stiffener impregnated with material which renders the stiffener hard and resilient when cold and pliable when hot, shaping said upper materials around a form while the stiffener is pliable, turning the margin over the top of the form to produce a sole attaching flange, and then rubbing the flange repeatedly to effect conformation of the stiffener, upper and lining and render the shape of the flange permanent.

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

MATTHIAS BROCK.