

March 26, 1940.

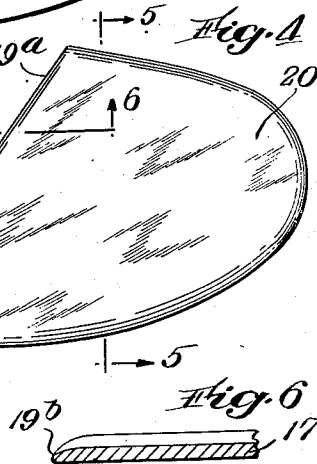
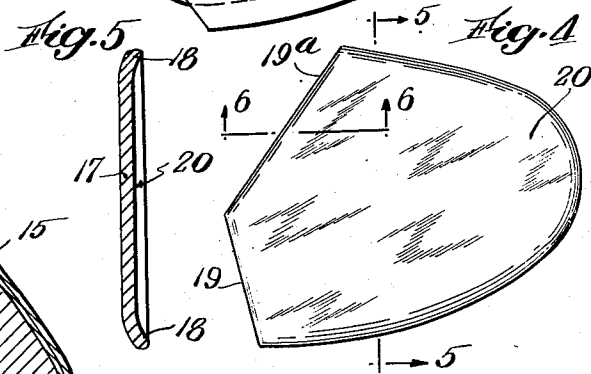
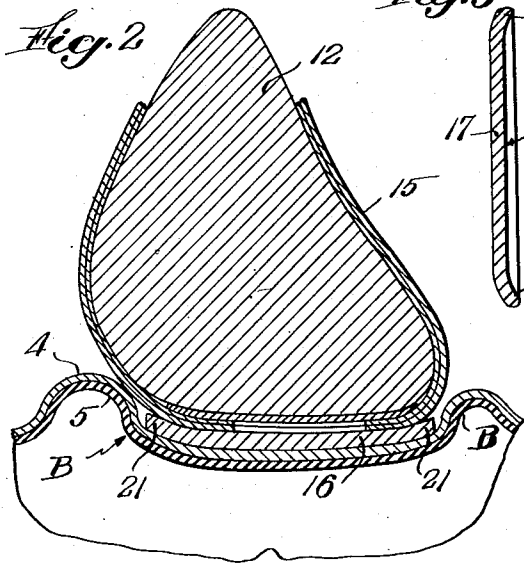
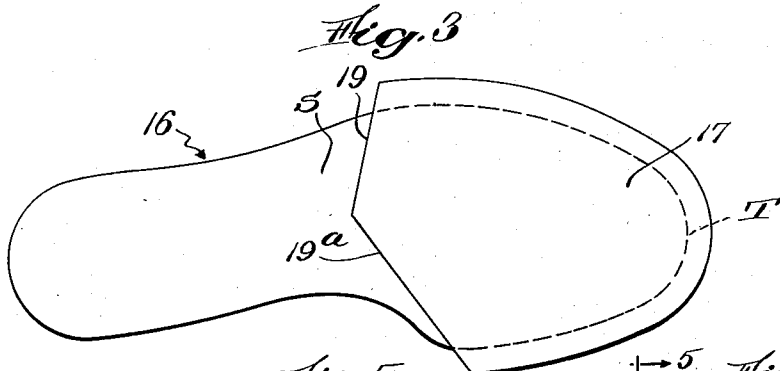
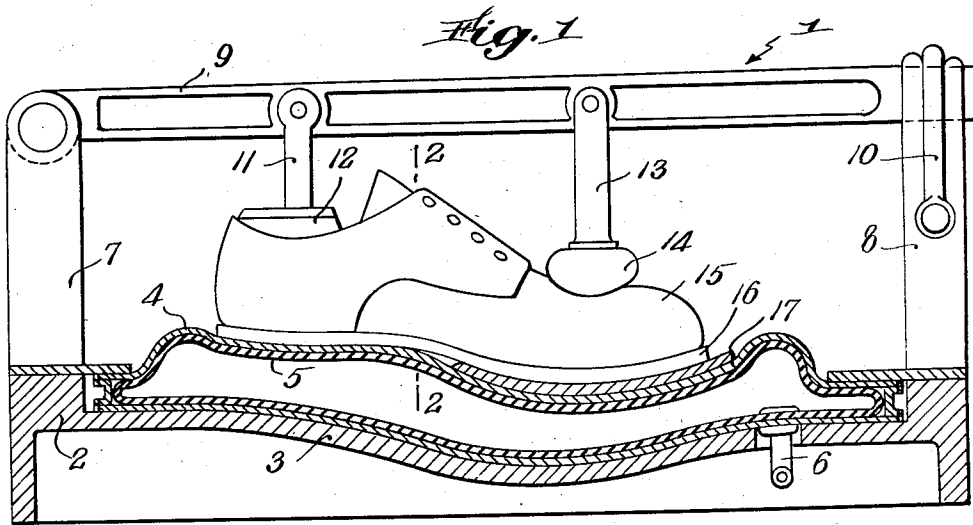
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2,195,107

METHOD OF AND APPARATUS FOR USE IN MAKING SHOES

Filed March 5, 1938

2 Sheets-Sheet 1



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Fig. 7

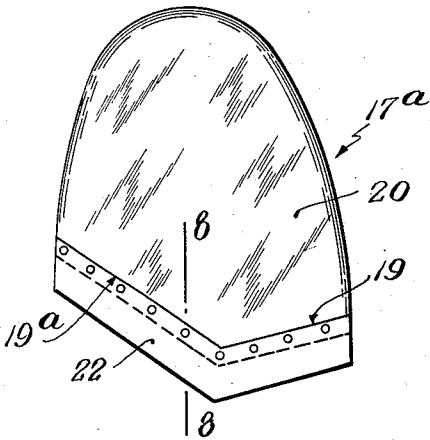


Fig. 9

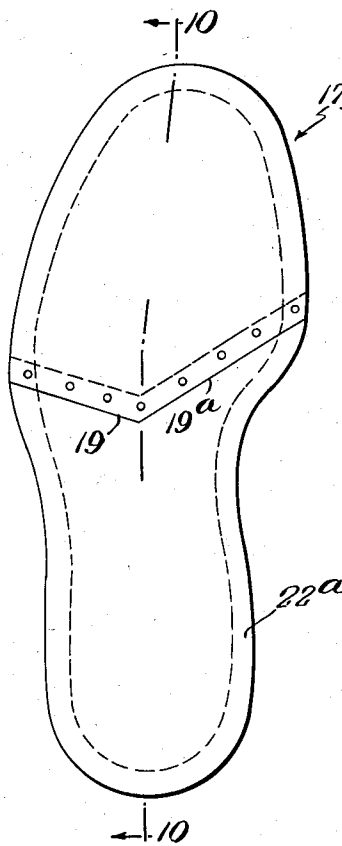


Fig. 10

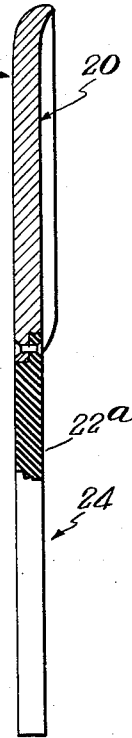


Fig. 11

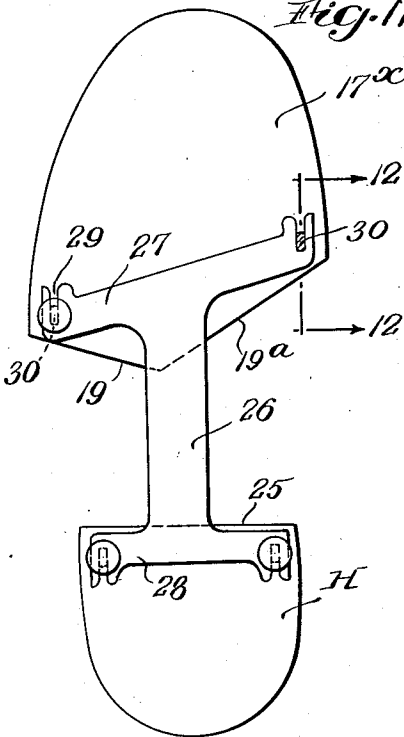
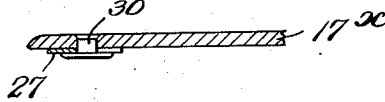


Fig. 12



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# UNITED STATES PATENT OFFICE

2,195,107

## METHOD OF AND APPARATUS FOR USE IN MAKING SHOES

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Application March 5, 1938, Serial No. 194,027

2 Claims. (Cl. 12-142)

This invention relates to the manufacture of footwear and is more particularly concerned with an improved method of and apparatus useful in applying and/or contouring the outer soles of shoes or the like, the present invention constituting an improvement upon that disclosed in my copending application for Letters Patent Serial No. 183,937, filed January 8, 1938.

In the application just referred to there is disclosed a method of laying and/or contouring outer soles, preferably performed by the use of a substantially rigid contouring form of a length and width somewhat exceeding the length and width respectively of the sole to be treated and having a sole-contacting surface which is substantially a replica of the desired contour of the sole after completion. The method there disclosed and the suggested apparatus are highly effective for the intended purpose and represent a very distinct forward step in the art of shoe making. As disclosed in the aforesaid application, the sole is subjected to the contouring process throughout its entire length, and for shoes of many kinds this procedure seems to be all that could be desired, but in making other classes of shoe, for example women's shoes of the high-heeled type, it is not necessary to contour anything but the forepart of the outer sole, since the trade does not demand that the shank and heel portions be so accurately finished as the forepart. Furthermore, yielding pressure such as that applied, for example, by the pressure bag of a sole-cementing machine, is very effective for producing the close edge at the shank which is requisite in some kinds of shoe, and in fact accomplishes the desired result more simply than by the use of rigid contouring forms designed to shape the sole of a shoe having an angular or high arched shank portion.

The principal object of the present invention is to provide a method of and apparatus useful in laying and/or contouring outer soles whereby the forepart at least of the sole will be as accurately contoured as by the method and apparatus of the aforesaid application, while at the shank portion the laying and/or shaping of the sole is accomplished by means of a yieldable fluid pressure inflated bag or its equivalent capable of conforming the shank of the sole, the shank of the last and the underlying shoe bottom structure.

A further object of the invention is to provide for accurate contouring of the forward part of the outer sole, as by the use of a rigid contouring form and shaping the shank portion by other

means, while at the same time avoiding any indentation of or other injury to the sole at the region at which one mode of procedure ends and the other commences.

As described in the aforesaid application, it is sometimes desirable to contour the heel seat portion of the outer sole, for example, to conform its outer surface to the shape of a heel which is later to be attached, or to impart roughness to the sole surface as an anchorage for heel attaching cement; and a further object of the present invention is to provide for accurate contouring of both the forepart and heel portions of the outer sole, as by means of rigid contouring members, while concomitantly shaping the shank portion of the sole by the use of yieldable means.

Other objects and advantages of the present invention will be made manifest in the following more detailed description and by reference to the accompanying drawings, wherein

Fig. 1 is a diagrammatic side elevation, partly in vertical section, illustrating a simple form of apparatus useful in the practice of the improved method in accordance with the present invention and showing a shoe in process of having the forepart of its outer sole accurately contoured by means of a rigid contouring form while the shank portion is being shaped by yielding means;

Fig. 2 is a fragmentary diagrammatic vertical section, to larger scale, on the line 2-2 of Fig. 1, showing how the shank portion of the outer sole is shaped;

Fig. 3 is a diagrammatic bottom view of an outer sole showing the relative positions of a sole and a contouring form, in accordance with the present invention;

Fig. 4 is a plan view of the contouring form of Fig. 3, showing that side of the form which engages the sole;

Fig. 5 is a section substantially on the line 5-5 of Fig. 4;

Fig. 6 is a fragmentary section on the line 6-6 of Fig. 4;

Fig. 7 is a view similar to Fig. 4, but showing the contouring form as comprising a flexible extension designed to prevent indentation of the outer sole by the rear edge of the form;

Fig. 8 is a fragmentary section on the line 8-8 of Fig. 7;

Fig. 9 is a plan view of a modified contouring form having a rigid forward portion and yieldable shank and heel portions;

Fig. 10 is a section on the line 10-10 of Fig. 9;

Fig. 11 is a plan view illustrating a further modification wherein the contouring form com-

prises substantially rigid forepart and heel portions flexibly united but separated to permit shaping of the shank portion of the shoe by fluid pressure; and

5 Fig. 12 is a fragmentary section on the line 12—12 of Fig. 11.

For convenience in description the invention is here illustrated by reference to a press of the general kind commonly used in permanently securing an outer sole by means of adhesive to the bottom of a lasted shoe, for example as practiced in the manufacture of compo shoes. However, it is to be understood that the press here illustrated is by way of example only and that the successful practice of the present invention is not dependent upon the precise details of the press which may be used.

Referring to the drawings, and in particular to Figs. 1 and 2, the press 1 comprises a frame or base 2 which may be an independent unit, designed to accommodate a single shoe and to keep the shoe parts under pressure for the desired period of time, or it may, if preferred, form an element of a sole-attaching machine comprising a plurality of similar press units. Since the particular mode of supporting the press frame constitutes no essential part of this invention, it is not herein illustrated and needs no further description. As shown, the press frame comprises the horizontal web 3 which forms a support for a flexible pressure-applying bag 4, usually of leather and which encloses an impervious bag 5 of rubber or the like having a nipple 6 by means of which pressure fluid may be introduced. As shown, the frame of the press also comprises rigid uprights or posts 7 and 8, the post 7 providing a pivotal support for a swinging jack arm 9 whose free end may be locked to the top of the post 8 by means of a yoke 10. The jack arm 9 is provided with the jack pin 11 designed to enter the spindle socket in the last 12, and is also furnished with a pivoted bracket 13 having a pad 14 which is designed to rest upon the forepart of the upper 15 of a lasted shoe having an outer sole 16. Ordinarily, in securing the outer sole to the bottom of the lasted shoe in accordance with the compo process, the entire sole 16 would rest directly upon the upper exposed surface of the bag 4. However, in accordance with the present method, whether the press be used for permanently attaching a compo sole; for laying a welt sole; or for imparting the final contour to a sole of any type, there is interposed between the forepart of the sole 16 and the bag 4 a contouring form, for instance the form 17 (Figs. 3 to 6), which constitutes an essential feature of the present invention. As illustrated in Figs. 1 to 6, the contouring form 17 is a simple, substantially rigid plate-like member of a length sufficient to extend from the toe T (Fig. 3) of the sole 16 to the forward end of the shank portion S of the sole. The form is also of such dimensions as to permit it to overlap the edges of the forepart of the sole at the sides and forward end. The rear edge of this contouring form 17 may be of any desired configuration, for example it may extend straight across from one curved edge to the other of the form, or it may, as here illustrated, form a broken line comprising the parts 19 and 19<sup>a</sup> more or less following the contour of the forward end of the shank portion of the shoe sole. In this connection it may be noted that it is quite common in certain types of shoe, for example shoes of the so-called arch-supporting type, to form the shank

portion with a distinct longitudinal ridge and to cause the shank to join the forepart or ball portion of the sole along distinct lines which intersect at this ridge at an angle similar to that made by the lines 19 and 19<sup>a</sup>, as indicated in Fig. 3. However, as noted, the rear edge of the contour form may have any desired configuration in accordance with the type of shoe being made.

While as here illustrated the contouring form is a simple plate-like element of unitary construction, it is contemplated that this form may be of built-up construction comprising two or more layers of the same or different materials, like the form more fully described in the pending application above referred to. In any event the lateral margins of the form are preferably smoothly curved, as indicated at 18 (Fig. 5) to provide a rim-like finish for the edge of the form and to give the margin of the sole the desired convexity. That surface 20 of the form which is designed to contact the shoe sole is preferably smooth and desirably polished. This sole-contacting surface is given a contour which is as nearly as practical the exact complement of the contour of the forepart of a finished outer sole having a theoretically perfect configuration relative to the particular last on which the shoe was lasted. The member 17 is preferably of a mouldable or ductile material which is normally substantially rigid and which normally has a hard surface but which may be obtained in a mouldable or plastic condition or reduced to such condition by proper treatment. Thus for example, the member 17 may be a metal which may be moulded while fluid; a material such, for example, as Celluloid which may be made plastic by suitable treatment with a solvent or by the use of heat and moisture; it may be a material such as a ductile metal which may be shaped in a die press or the like, or it may be one of the synthetic resins capable of being moulded but which, after moulding becomes hard and irreversible in phase.

Whatever the material of the member 17 its sole-contacting surface 20 is designed, as above stated, to be as nearly as possible the exact complement of the surface of the forepart of the outer sole of a theoretically perfect shoe made upon a given last. One suggested mode of obtaining such a contour would be to make a shoe upon the selected last in accordance with usual methods, and following the best shoe-making practice, and then to finish the exposed surface of the forepart of the outer sole with the most meticulous care, thereby to obtain a shoe having a sole whose forepart is as nearly perfect in contour and finish as it is practically possible to obtain. This finished surface of the forepart of the sole is then used, in accordance with any desired and practical mode of procedure, as a primary matrix for moulding the surface 20 of the member 17.

Having prepared the contouring form 17, and assuming that it is to be employed for imparting the final finished contour to the forepart of an outer sole already attached in one way or another to the bottom of a lasted shoe, it is preferred, as shown in Figs. 1 and 2, to mount the contouring form 17 upon the upper surface of the bag 4 of the press 1 and then having properly tempered the outer sole 16 to dispose the sole so that its forepart rests upon the exposed upper surface 20 of the member 17, while the remainder of the sole rests directly upon the bag 4. The lasted shoe is then clamped in posi-

tion by means of the parts 9, 10, 11, 13 and 14, and pressure fluid is admitted through the nipple 6 into the bag 5, thereby applying very substantial pressure against the under surface of the form 17, thus forcing the latter up against the forepart of the outer sole. At the same time the pressure-applying bag, where it engages the shank portion of the sole, is caused to bulge upwardly as indicated at B (Fig. 2) about the lateral edges of the sole 16, thereby causing the edges 21 of the sole 16 to curl upwardly into close contact with the lasted upper at the shank portion of the shoe. The heel portion of the sole is also at the same time forced firmly against the heel portion of the lasted shoe bottom. By reason of the application of pressure by means of a fluid, the pressure is exerted substantially uniformly upward at all points of the rigid form 17, the force being directed substantially normally to the exposed surface of the shoe sole at the forepart of the latter. Since the sole is in temper and the fluid pressure is of substantial amount, for instance from 65 to 90 pounds per square inch, the material of the forepart is moulded to substantially the exact surface configuration of the part 17, while at the same time at the shank portion and the heel the sole is directly pressed against the shoe bottom by means of the bag, and caused to conform very closely to the shape of the underlying parts of the shoe bottom structure and last. During the moulding or squeezing operation exerted by the form 17, the moisture in the tempered sole is caused to flow outwardly toward the margins of the sole which places these margins in the best condition for such subsequent operations as rough rounding or stitching. If the shoe be left in the press for a sufficient period of time, for example from six to ten minutes, it is found that when the shoe is ultimately removed from the press the forepart of the sole will have taken a substantially permanent set with its outer surface of a contour which is substantially the exact complement of the surface 20 of the form 17, while at the same time the shank portion will have been closely conformed to the shape of the shank portion of the shoe bottom. The result is that the contour of the forepart of the sole very nearly approaches the theoretically perfect finished contour, and since each successive shoe of a lot which is being made will be caused to engage the same or a like contouring form, it is obvious that all of the resulting shoes will have the forepart of their soles of substantially the same exact contour, something which has not been capable of performance by any ordinary commercial mode of making and finishing shoes.

As above noted, shoe-making practice in general only requires this excessive exactness of surface finish at the forepart of the outer sole, the shank portion usually having a pronounced curvature or angularity or surface configuration, and in accordance with usual practice no attempt has been made to reduce this surface to an exact contour or finish. Thus since no such exactness of finish is required at this part of the sole, but since on the other hand it is quite often requisite that at this portion the edges of the sole fit very close against the upper, it is regarded as desirable, in accordance with the present invention, to confine the contouring action to the forepart, and to exert the desired pressure at the shank portion by a flexible element such as the pressure bag which, without expectation of producing ex-

actitude of contour, furnishes the necessary pressure to produce a snug fit of the outer sole at the shank portion and a close edge at this part of the shoe.

As pointed out in the aforesaid application, this mode of contouring the forepart of the outer sole has no tendency to flow the sole material in its own plane such as might distort sewing stitches or open the grain, but on the other hand tends to compact the sole and to produce a hard and firm surface well adapted to receive such finishing operations as may be required.

To prevent indentation of the surface of the sole at the location of the rear edge 19, 19<sup>a</sup> of the contouring form, such edge is preferably rounded smoothly, as indicated at 19<sup>b</sup> (Fig. 6). However, in order even better to distribute the pressure at this point, the form may be provided at its rear edge with a flexible extension. Thus as shown in Figs. 7 and 8, the form 17<sup>a</sup>, having the sole-contacting surface 20 and the rear edge 19, 19<sup>a</sup>, is furnished with the flexible extension member 22, the free margin 23 of which is preferably curved away from the surface of the sole. This extension member 22 is set into the material of the form proper so that its sole-contacting surface forms an unbroken continuation of the surface 20. When this form 17<sup>a</sup> is pressed forcibly against the outer sole, the extension 22 yields resiliently and thus distributes the pressure at the rear edge of the form so that there is no danger of indenting the sole at the rear terminus of the form.

A further arrangement is illustrated in Figs. 9 and 10 in which the form comprises the rigid forward part 17<sup>b</sup> having the sole-contacting surface 20 and the rear edge 19, 19<sup>a</sup>, but in this instance the flexible extension 22<sup>a</sup> consists of a length of flexible material, for example rubber, preferably of substantially the same thickness as the rigid body portion 17<sup>b</sup> of the contouring form and which extends to the rear end of the sole. The sole-engaging surface 24 of this extension forms a smooth continuation of the sole-contacting surface 20. While this form permits the production of a close edge in the shank portion, since the member 22<sup>a</sup> is flexible and readily conformable to the narrow shank, it supports the entire sole of the shoe at substantially the same distance from the upper surface of the pressure-applying bag; avoids any break whatever between the forepart and the shank; and serves to distribute the pressure uniformly throughout the entire length of the shoe bottom.

In the aforementioned application mention is made of the fact that certain advantages are obtained by treating the heel seat portion of the sole by the use of a contouring form of plate. In Figs. 11 and 12 an arrangement is disclosed wherein the rigid contouring plate may be applied both to the forepart and to the heel seat portion of the sole, while at the same time leaving the shank portion free for direct shaping by the use of the pressure bag. Thus in these figures the rigid forepart contouring form 17<sup>c</sup>, similar in all substantial respects, if desired, to the form 17 above described, and having the rear edge 19<sup>a</sup>, is associated with a heel-contouring form H having the forward edge 25 by means of a bridge device 26. This bridge device may preferably be made of some resilient material such as spring steel and comprises the transverse forward portion 27 and the transverse rear portion 28. These transverse portions are designed to be connected to the contouring forms 17<sup>c</sup> and H

respectively, and in a preferred construction are so arranged as to be separably connected to the forms so that one or both of the forms may be removed for replacement by another if desired.

5 For this purpose, as illustrated in Figs. 11 and 12, the transverse parts 27 and 28 are furnished with elongate slots 27 for the reception of pins 30 fixed in and projecting from the forms 17<sup>a</sup> and H, respectively.

10 By this arrangement the forepart form 17<sup>a</sup> is permitted some freedom of movement relatively to the heel-contouring form H by reason of the resiliency of the bridge piece, which is of considerable importance when treating soles in which the forepart and the heel portion do not lie in the same plane. Moreover, as suggested in the  
15 aforementioned application, the heel-contouring plate may, if desired, be provided with a sole-roughening surface, or on the other hand it may be smooth, or plates of different degrees of concavity may be provided, and the arrangement whereby the forepart form and the heel part form may readily be separated allows the substitution of one type of form for another to take  
20 care of various conditions.

While certain desirable embodiments of the invention have been described and illustrated by way of example, it is to be understood that the invention is not necessarily limited to the precise  
30 details herein disclosed but is to be regarded as broadly inclusive of all equivalent constructions, and in so far as the method is concerned it is to be understood that the several steps enumerated may be performed in any desired or convenient  
35 order and that equivalent method steps may be substituted for those specifically named, all within the scope of the invention as set forth in the appended claims.

I claim:

1. A contouring form for use in moulding the exposed surface of the outer sole of a lasted shoe, said form being of a length such as to reach but part way from the toe of the sole toward the heel end of the sole, and a thin resilient extension projecting from the rear edge of the form, the free margin of said extension being smoothly curved away from the sole, the extension being operative to prevent indentation of the sole by the rear edge of the form when the form is forcibly pressed against the sole, the form proper having a substantially rigid sole-contacting surface which is the exact complement of the desired finished configuration of the exposed surface of that portion of the sole member with which it contacts.

2. That method of making shoes which comprises as steps laying an outer sole against the bottom of a lasted shoe previously made ready for reception of the outer sole, providing a contouring form of such rigidity as to preserve its initial configuration regardless of the shape of the sole against which it is pressed, said form having a glossy surface which is substantially the exact complement of the desired surface contour of that portion only of the outer sole which extends from the toe to the forward end of the shank, disposing said glossy surface against the exposed face of the forepart portion of the outer sole, providing a flexible pressure-applying bag, disposing said bag against the shank portion of the sole, and concomitantly supplying pressure fluid to the bag and applying force to the form, thereby accurately to contour the forepart of the sole and closely to conform the shank portion of the sole to the shank portion of the bottom of the lasted shoe.

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