United States Patent [19]

Auberry et al.

[11] **3,742,544**

[45] **July 3, 1973**

[54] **METHOD OF MAKING FOOTWEAR**

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[73] Assignee: **Ro-Search, Incorporated,** Waynesville, N.C.

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[21] Appl. No.: **280,099**

Related U.S. Application Data

[60] Division of Ser. No. 120,078, March 2, 1971, Pat. No. 3,701,273, which is a continuation-in-part of Ser. No. 34,003, May 4, 1970, Pat. No. 3,659,301.

[52] **U.S. Cl.** ..... **12/142 RS**

[51] **Int. Cl.** **A43d 9/00**

[58] **Field of Search** ..... 12/142 R, 142 RS, 12/145

[56] **References Cited**

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[57] **ABSTRACT**

The invention refers to the manufacture of shoes with uppers lasted by pulling a string secured to the lasting margin of the upper. Improvements are presented which reduce costs of manufacture especially if the sole is molded directly to the upper. The method of manufacture includes use of a last deformed to obtain preselected location of the lasting margin and to prevent the formation of undesirable spew.

3 Claims, 6 Drawing Figures

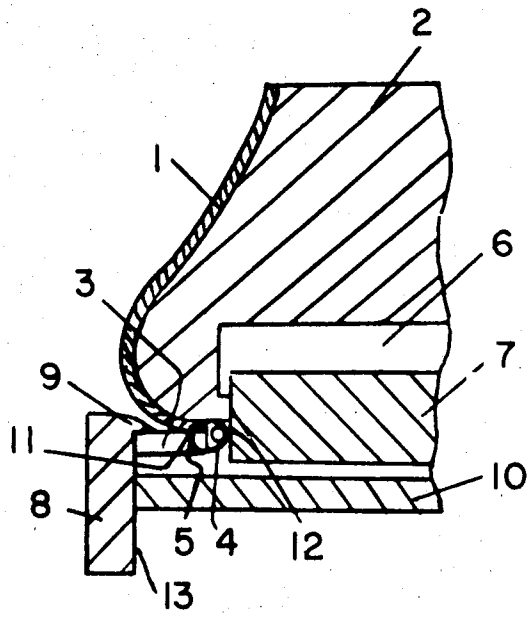


FIG. 1

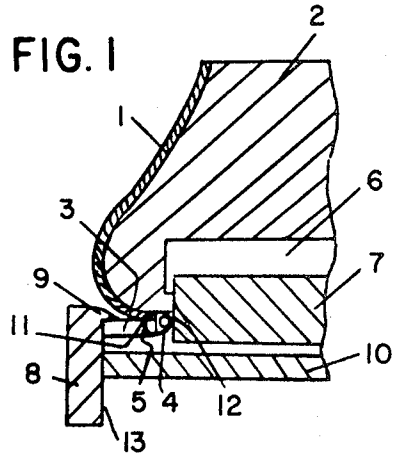


FIG. 2

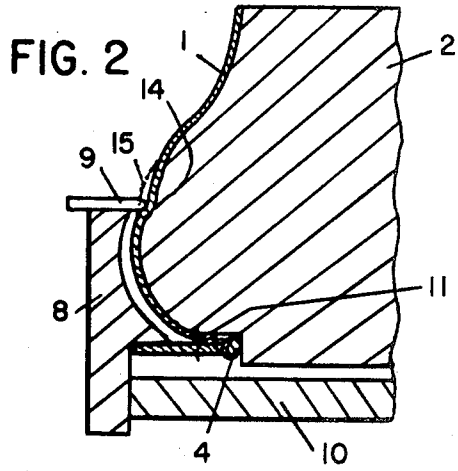


FIG. 3

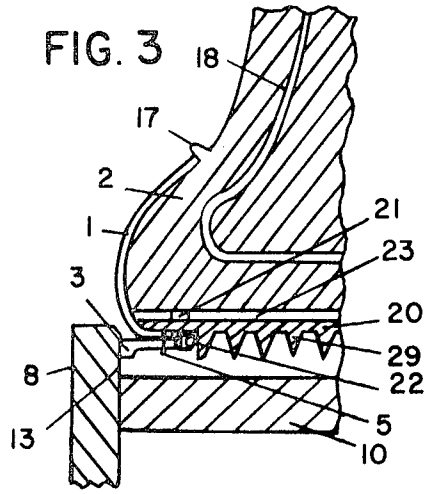
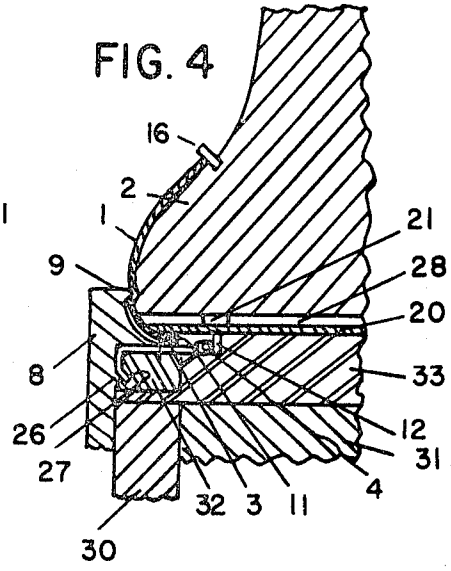


FIG. 4



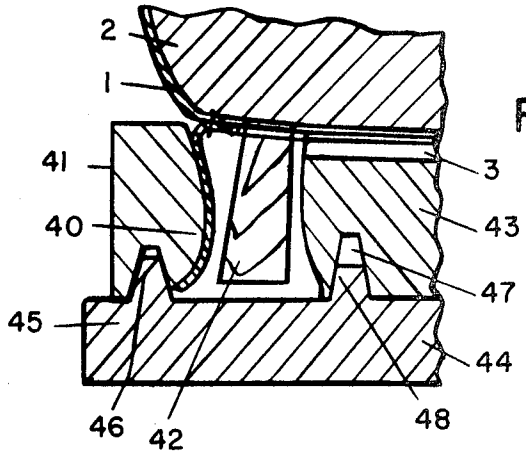


FIG. 6

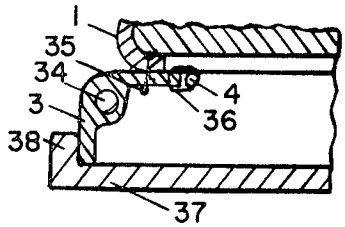


FIG. 5

METHOD OF MAKING FOOTWEAR

This is a division of application Ser. No. 120,078, filed Mar. 2, 1971, now U.S. Pat. No. 3,701,273, which is a continuation-in-part of our application Ser. No. 34,003, filed May 4, 1970, now U.S. Pat. No. 3,659,301.

KNOWN ART

It is customary to stitch a string to the edge of the lasting margin of an upper, to place the upper on a last and to tighten the string to pull the lasting margin onto the sole surface of the last until the desired lasting effect is obtained in the judgment of the operator, whereupon the string is knotted.

PREFERRED EMBODIMENTS

According to the invention the lasting string is secured to the lasting margin of the upper together with a welt strip, preferably by a single stitching. The upper is then placed upon a last with stops on the sole surface of said last, which might be pins. The lasting string is then tightened until it and the lasting margin abut the pins. This eliminates the need for skilled workers and assures that no overlasting occurs. If a sole comprising elastomeric material is to be molded directly to the upper, it is preferred to provide a continuous rim inside of the feather edge of the last, which then not only provides a stop to prevent overlasting, but also a sealing wall to prevent the escape of elastomeric material into the interior of the shoe. After demolding of the shoe from the last, the open groove in the sole can be filled. It is further preferred to create the rim by providing in the last a retractable sole plate which projects inwardly of the feather edge of the last into the sole space. After molding the sole shell, the sole plate of the last might be retracted without removing the last from the mold so as to permit the formation of a porous filler of the sole. Such retractable plate might be at least partially replaced by a membrane.

The use of an inside stop for the lasting margin allows the use of a completely prefinished welt, be it leather, rubber, etc. which in the mold will be touching the side wall of the mold cavity. The spacing between the stop for the inner edge of the welt and the side wall of the cavity can be selected to fit exactly the dimensions of the prefinished welt. No elastomeric material, be it rubber or other elastomeric material, will then penetrate between the outside of the welt and the mold wall and there will be no need for buffing or other finishing of the sole edge.

The deformation of the last for sealing purposes is useful not only for the prevention of spew on the inside of the sole, but can be provided also for the outside of the shoe. For this purpose the invention provides a slight projection outwardly on the outside of the last above the feather edge thereof. The lip of the side wall of the mold is arranged slightly above said projection so that the material of the upper is squeezed between said lip and said projection. By allowing the last a slight movement in relation to said lip in a direction away (vertically) from the shoe sole, the sealing pressure which heretofore was exerted essentially horizontally (parallel to the sole surface) is then, according to the invention, essentially in a vertical direction.

The projection might also be created by providing a recess in the last. After removal of the finished shoe from the last, the resiliency of the upper will straighten

the curvature existing in the upper and no inconvenience will be experienced by the wearer of the shoe. This arrangement is also useful for shoes with high foxing, such as basketball shoes.

In the drawings:

FIG. 1 is cross-section of a shoe according to the invention, while in a molding device for elastomeric soles;

FIG. 2 shows in a similar cross-section, a shoe with a high foxing;

FIGS. 3 and 4 are cross-sections of other embodiments of the invention;

FIG. 5 is a section through the heel part; and

FIG. 6 is a section through the sole edge.

FIG. 1 shows the upper 1 on the last 2. At the lasting margin 11 of the upper 1 a strip 3, such as a prefinished welt, and a lasting string 4 are fastened by a stitching 5. The last 2 has a recess 6 into which a last sole plate can be withdrawn. The side walls 8 of the sole forming cavity with the lip 9 close as usul by a sideways movement (parallel to the sole surface). A bottom plate 10 is used to mold the outer sole. The edge 12 of the last sole plate 7 serves during the lasting of the upper as a stop for the inner edge of the lasting margin and prevents the overlasting of the upper. The plate 7 can be withdrawn into the space 6 to make room for a pillow such as formed by expanding a mix for porous rubber. In some cases it might be preferred to use fixed pins, rims, or plates as stops for the lasting margin 11 to prevent overlasting. By selecting the spacing between the stop 12 and the cavity wall 13 to correspond exactly to the welt dimension it can be prevented that sole molding material covers the outside of the welt. No finishing will then be needed.

FIG. 2 shows a similar arrangement with not only a deformation of the last at its sole surface to act as a stop and for sealing purposes, but also a deformation on the outside of the last corresponding to the upper edge of a desired foxing. Here the deformation is a recess 14 covered by the upper 1. When the lip plate 9 is moved sideways with the cavity wall 8 it pushes the material of the upper into the recess 14. The sealing pressure is then increased by the molding pressure. Sufficient sealing pressure can be obtained in this manner with very little sideways pressure against the material of the upper by the lip plate, thus without damage to the upper. After separating the lip plate from the upper on completion of the molding of the sole the upper returns to its normal position, as shown in dotted lines at 15.

In the embodiment of the invention shown in FIG. 3, the last 2 has in its body a heating element 18 so that the preferably previously mulled upper 1 can be heated while on the last to a temperature high enough to cause the upper to shrink to a tight and permanent fit. The sole plate 20 of the last is separated from the body of the last by the space 23 by means of spacers 21 to keep the lasting margin of the upper at a lower temperature which does not prevent the setting of thermoplastic sole material injected into the mold cavity. Deformations on the last sole plate such as the rim 22 preventing overlasting and projections 29 which fill partially the mold cavity for sole weight reduction, greater resiliency, and comfort, help to manufacture a better shoe at lower costs. Deformations on the last such as pins 16 or projections 17 serve to locate the upper rim of the upper.

The bottom of the sole cavity might comprise, as shown in FIG. **4**, a rim part **30** and a center part **31** independently of each other movable towards and away from the last bottom. This allows either to mold first the rim part of the sole while the center part **31** presses the lasting margin of the upper against the last, or to flatten the welt against the cavity wall by the rim part **30** while molding the center part of the sole. FIG. **4** shows the rim part **32** molded first, then mold parts **30** and **31** withdrawn to mold the center part of the sole **33** and the entire tread sole. The side wall of the mold cavity has a rib **27** to bend the margin of the strip **3** into the elastomeric sole materil as shown at **27**. The lasting string **4** is stitched only to the strip **3**, preferably before stitching the strip **3** to the lasting margin **11**. It is preferred to use extruded elastomeric material for the strip **3**.

As shown in FIG. **5**, such extrusion might be rounded and have a hollow core **34**. One stitching **35** might secure the extrusion to the upper **1** while the stitching **36** secures the lasting string to the horizontal leg of the extrusion **3**. Holding means such as a rim **38** connected to the mold bottom **37** hold the extrusion **3** in place during the injection of the elastomeric sole material into the cavity. By using thermoplastic material for both the extrusion and the sole material, a homogeneous bond is assured for the entire sole. If the strip **3** is preformed to facilitate the stitching to the upper, it is preferred to select for the strip material which can be postformed (molded) under the pressure of molding the sole.

FIG. **6** shows a section through the heel area of a shoe in which the strip **3** is extended to form the heel cover **40**, stitched with the lasting string to the upper. Holding means **41** are used to give the heel cover the desired shape on the outside of the heel. A heel filler **42** reduces the amount of elastomeric material for the heel. Other holding means **43** shape the heel breast, while connected to the sole plate **44** of the mold. Projections **46** of the holding means locating in grooves of the plate **44** with tapered walls, or projections of the plate, as shown at **48**, with grooves in the holding means as shown at **47**, secure the correct position of these means during molding. If undercuts are present, as shown, the holding means are separated from the bottom plate before they are removed from the shoe. The holding means are preferably interconnected, or connected to a mold side frame. The invention allows not only by suitable selection of the strip stitched to the upper to reduce the costs of manufacture, as the use of finished extrusions, braids, etc. is far less expensive than ornamentation of the sole rim after molding, but the use of extrusions, etc. covering at least the major part of the side surface of the sole rim higher wear resistance of the shoe is obtained. Further, the weight reduction of the sole of FIG. **3** and the heat set obtained while the upper is on the mold last improve the quality of the shoe. If desired, the entire bottom part of the mold cavity **30** and **31** can be advanced to the rib **26** to mold the invisible part of the elastomeric sole, and in a second step withdrawn to mold the tread sole which then will be also visible at the side surface of the sole rim.

What is claimed is:

1. Method of manufacture of shoes with uppers of material such as leather, comprising placing and lasting an upper onto a last having a deformation therein, placing said last and upper in contact with the lip of a sole mold cavity, and deforming said upper at least temporarily to force said upper material below said lip into said cavity to widen its periphery below said lip.

2. The method according to claim **1** further characterized in that said last deformation includes an open recess bridged by the material of said upper and tensioned by said lip.

3. The method according to claim **2** further characterized in that said recess is located between the edges of a last sole plate and its last body and said last sole plate is insulated from the preferably heated last body.

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