FOOTWEAR AND ITS MANUFACTURE

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ABSTRACT

The invention discloses the forming of at least the toe portion of a shoe upper bottom margin prior to the placing of the upper onto a shoe form for the lasting. A new structure of a shoe upper and of the devices for its manufacture are also disclosed.

12 Claims, 3 Drawing Figures
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RELATED APPLICATION

This application is a continuation-in-part of our copending application Ser. No. 354,542, filed Apr. 26, 1973, now abandoned.

BACKGROUND OF THE INVENTION

The customary shoe manufacture comprises the stretching of the material of the upper, such as leather, over a shoe form (last), followed by the “wiping in” of the bottom margin of the often prewelded upper onto the surface of the last, and stabilizing the bottom margin in such position, mostly by securing said margin to a “lasting” insole, prior to securing the outsole to the shoe bottom.

SUMMARY

The invention secures various advantages by forming the lasting margin before applying a welt to said margin and before placing the upper onto a last for the tightening thereon to bring the upper into conformity with the shape of the last. The various ways in which such preforming can be achieved and the novel structures of shoe uppers, as well as the suitable devices for their manufacture are described hereafter in connection with the drawings, which show in FIG. 1 the forepart of a shoe upper as cut from flat sheet stock, with the preformed lasting margin; in FIG. 2 a section of a shoe having its structural lasting margin extended into the upper so that the only ornamental material of the upper, protected from the mechanical stresses during the wearing of the finished shoe, might be soft and light without reducing the wearing quality of the finished shoe; in FIG. 3 partly in cross-section, the same forepart in a die for the preforming of the entire forepart prior to assembling it with other upper parts.

In the customary shoe manufacture the upper is stretched tightly over a shoe form (last) before the bottom margin, usually called lasting margin, is “wiped in” and secured to a lasting insole. According to the invention, this sequence is reversed and the bottom margin is formed and stabilized in its shape before the upper is placed on a last for the purpose of attaching a sole to the bottom margin.

Such preforming of the bottom margin might be carried out as shown in FIG. 1 by pulling the inner edge 3 of the upper 1 against stops 8 by means of the string 5 which runs through the loose loops 4 and might be knotted at 6, in the manner known as string lasting. The stops 8 are on a sole plate 7 preferably slightly smaller than the sole plate of the last used for attaching the sole which might be done by direct molding of a sole to the upper in a mold. The bottom margin 2 is thereafter stabilized in its shape by pressure and/or heat, or by stitching. Preferably such stitching secures a welt to the bottom margin, with or without a centerless insole 10. The opening 9 (FIG. 2) of the insole not only allows the stitching to be carried out on the standard flat bed sewing machine, but allows also to tighten the upper on the mold last by pushing the preformed bottom margin towards the center of the shoe bottom.

The forming of the bottom margin reduces the circumference of the inner edge 3 so that in stitching to the welt 12 and/or the insole 10 no shirring of the lasting margin and less welt material is needed.

Various other methods of preforming the bottom margin might be used. The invention prefers to use 3-dimensional forming dies as shown in FIG. 3, in which the bottom margin 2 is formed together with cupping, i.e., the forming of the toe cap 1. To relieve the stresses in the material of the upper, the die might have in its bottom part 14 a convex and a concave portion 12, 13, which by placing on the mold last are united as indicated by the broken line 15 to form the toe cap.

A stretch forming sheet might be used, or a ram 22 to trim the edge 3 at the end of the drawing stroke. Such 3-dimensional dies, when used on rolls of sheet stock, eliminate a number of operations and handling. The welt 12 comprises preferably moldable elastomeric material which by the molding of the sole is molded into the desired shape of the sole edge.

When the material of the upper is of low strength, the invention provides a preformed bottom margin of elastomeric material of substantial strength to assure the permanent connection between vamp and sole. Such bottom margin of elastomeric material extends at least partly into the vamp and is secured to the inside of the vamp preferably by bonding.

FIG. 2 shows a section through the toe part of a shoe, having an upper 1 of weak but ornamental material such as thin, soft leather. Such shoe is made by placing upon a mold last (not shown) support material 18 such as thermoplastic sheet stock made pervious where it extends into the vamp. This might be done by perforations 19, or mesh might be used. Such perforations are preferably oriented to give the support 18 higher flexibility in the instep and/or might include slots 17 to facilitate the forming of the walking creases during the use of the shoe.

This support material, in one or several pieces, is preferably placed over a shoe lining, and covered with the ornamental upper 1. As the sole is to be secured directly to the bottom margin 2 formed by the support material 18, the ornamental upper material reaches only to the feather edge 23, where its edge becomes imbedded in the elastomer of the welt 12, molded into a sole edge by and during the molding of the sole 16.

The usual mold (not shown) for such molding comprises a heated, collapsible last, a side frame and a mold bottom member. By placing the preformed bottom margin of the upper onto the last sole plate and holding it there while expanding the last, the upper is formed and tightened and through the heat of the last set in the desired permanent shape as well as bonded to the support 18.

When no structural inner support is needed, the sequence of operations includes the preforming of the lasting (bottom) margin, the stitching of a welt to the preformed margin, the placing and lasting of the upper onto the mold last and finally the molding of a sole to the upper on the mold last. Preferably, the welt comprises moldable material so that by the molding of the sole also the welt is molded to form the rim of the sole.

The connection between the upper and the sole is further improved for weaker upper material by stitching the centerless insole on the inside and the welt on the outside of the bottom margin of the upper. If the bottom margin of the upper is reinforced by, or replaced by a structural support extending into the inside of the upper, the welt, if provided, is secured directly to the structural support material. Such material is preferably a thermoplastic elastomer which on the
heated mold last conforms to the last shape while bonding to the upper material and retains the shape permanently after cooling. Also thermosetting elastomers might be used, which cure under the influence of the heat of the mold last.

The provision of elastomeric material for the lasting margin has the further advantage of reducing the amount of upper material and of eliminating the "wiping in" of the bottom margin of the upper. The elastomer for the lasting margin may be combined with the upper material prior to the shaping of the upper, be it by vacuum or pressure forming. Sometimes an extrusion of PVC or other elastomers suitable for being molded into a sole rim may be used, said extrusion having an extension suitable for securing, by heat sealing or other methods to the flesh side of the upper. The outer edge of the extrusion is available to tighten thereafter the upper on the mold last.

As described above, the invention provides the pre-forming of the lasting margin before or at the same time as the stretch-forming of the upper itself, to be followed by stabilizing the lasting margin by means including attaching a welt in a subsequent operation.

In some instances, such as preparation of the upper for direct molding of elastomeric sole material to the upper, it is preferred to attach the welt while the upper is still held tensioned in the stretched condition, i.e., "fully lasted out." For example, the upper may be string-lasted in a known manner directly on the last of a sole molding device and a welt stitched to the lasting margin, or heat sealed thereto, while the upper is on said last under lasting tension. A recess may be provided in the last to allow the stitching needle to penetrate the thickness of upper and welt, or an electrode strip might be located in the last when heat sealing is considered.

For direct molding of elastomeric soles, it is possible to eliminate the "wiping in" operation by the flattening of the lasting margin against the last sole. The margin of the upper and the margin of the welt attached thereto will find room in the elastomeric sole material if these margins project from the edge away from the last sole. Accordingly, the invention can also be realized by using various models of the well known lasting machines where mechanical means such as grippers, knurling rolls, etc. pull the upper material over the last to achieve the stretch forming (lasting out) essential for high quality footwear, especially with leather uppers. These pulling means often act sequentially around the periphery (circumference) of the bottom margin of the upper. The invention also provides that the means for attaching a welt (or other stabilizing means) follows the pulling means to stitch, staple, heat seal, etc. the welt while the upper is under lasting (stretch-forming) tension. Other models of the lasting machines provide simultaneous pull over all or much of the bottom periphery of the upper, or the toe part only. If the welt is attached to the margin by stitching, the needle will progress sequentially along the periphery or if the attaching occurs by means of staples, the staples can be attached simultaneously.

It is known to mold elastomeric soles to welted uppers held on the mold last without the use of a structural insole by holding the upper on the last from the outside under tension by means of the lip plate which retains the welt in position. The invention, by attaching the welt to the upper while the upper is under the forming (shaping) tension assures that the upper will also be in fully lasted condition during the molding of the sole. If it is desired to apply the invention in the manufacture of wetless footwear, the stabilizing means such as a cord can be stitched close to the featherline, be it on the outside of the last, i.e., above the last sole, or inside of the featherline at the edge of the last sole. Also, an insole with a rim projecting away from the last sole could be provided with the bottom edge of the upper stitched to such rim at the featheredge line. In other instances only a rim portion could be attached to the rim bottom margin of the upper while it is held under lasting tension, be it on the outside or inside of said bottom margin. Such rim portion might be a flat strip or angular strip abutting the last sole or abutting, later on, the sealing edge of the mold cavity.

It is known to attach strips to the bottom margin of the upper prior to the stretch forming (lasting out) of the upper, but this severely limits the amount of stretch given to the material of the upper. Only by attaching such strips after completion of the stretch forming is it possible to locate such material to abut the featheredge of fully lasted uppers, i.e., by attaching such material to the margin of the upper while it is held under the tension of the completed stretch forming (fully lasted).

The method of the invention is of substantial advantage also if the welt is to be located above the featherline, i.e., the insole level. Then the upper may be stretch formed (lasted out) by string-lasting with the string located at the side of the last and with the welt or sealing strip attached the desired distance from the featheredge, i.e., the last sole while the upper is still held under tension of the stretch.

What is claimed is:

1. The method of manufacture of footwear with an upper of stretchable material such as leather, which includes the steps of placing the upper onto a last, forming and stabilizing the bottom margin at least along the featherline by securing a welt to the upper at the lasting margin to properly position the upper in a sole molding cavity, and then so positioning the upper in the sole molding cavity by the stabilized bottom margin, and molding a sole of elastomeric material to the upper.

2. The method of claim 1 wherein said welt is stitched to said upper close to the featherline while said upper is held under tension.

3. The method of claim 1 wherein said welt is attached to the bottom margin of the upper to abut against the last sole.

4. The method of manufacturing footwear having a sole molded to the bottom margin of the upper while the upper is tightened on a last of a sole molding device, including the steps of first shaping at least the toe portion of the bottom margin, second stabilizing said shaped margin, third placing said upper on a last and tightening said upper thereon, fourth bonding a sole to said bottom margin, and lastly removing the finished footwear from the last.

5. The method of claim 4 further characterized in that the stabilizing of the shaped bottom margin is obtained by stitching the same to a welt.

6. The method of claim 4 further characterized in that the stabilizing of the shaped bottom margin is by stitching the same to a centerless insole.
7. The method of claim 4 wherein the adjoining portion of the upper, above the bottom margin, is also formed prior to the lasting of the upper.

8. The method of claim 7 wherein the toe portion of the upper is pre-shaped into a convex and concave shape and is united into a single cupped shape by placing the toe portion on the last.

9. The method of claim 4 wherein said bottom margin of the upper has elastomeric sheet stock laminated to the inside thereof.

10. The method of claim 4 wherein said bottom margin of the upper comprises elastomeric sheet stock.

11. The method of claim 9 further including the step of laminating elastomeric sheet stock to the inside of the upper above the bottom margin thereof to form a structural shape holding therefor.

12. The method of claim 10 wherein the elastomeric sheet stock extends above the bottom margin and is positioned on the inside thereof to form a structural shape holding therefor.