

Oct. 21, 1969

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3,473,178

METHOD OF MANUFACTURE OF FOOTWEAR

Filed Jan. 14, 1966

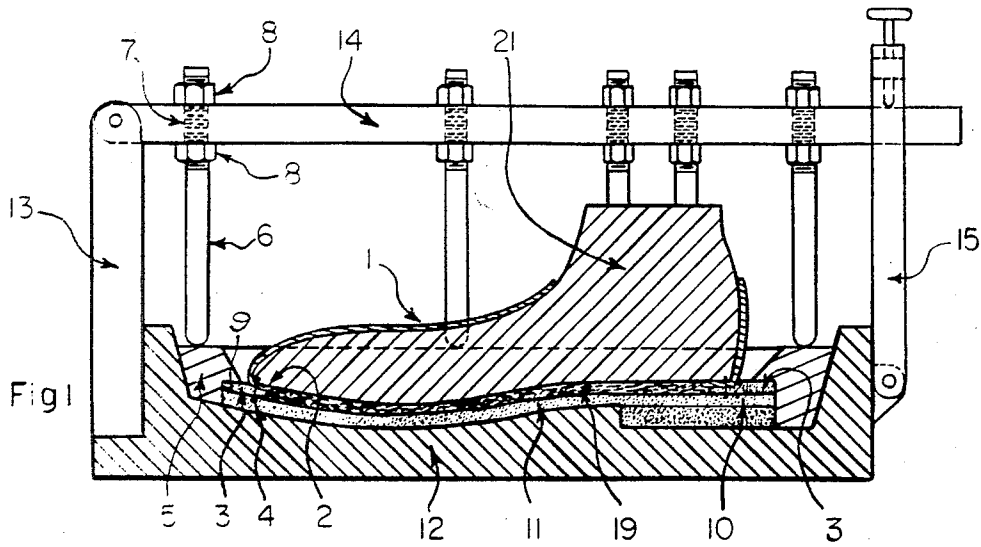


Fig. 2

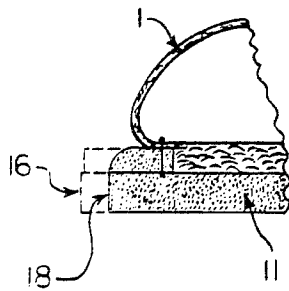


Fig. 3

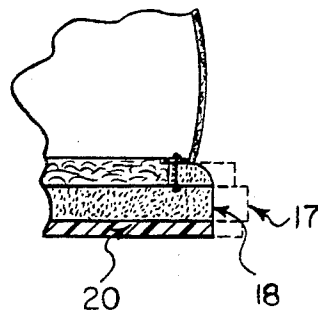
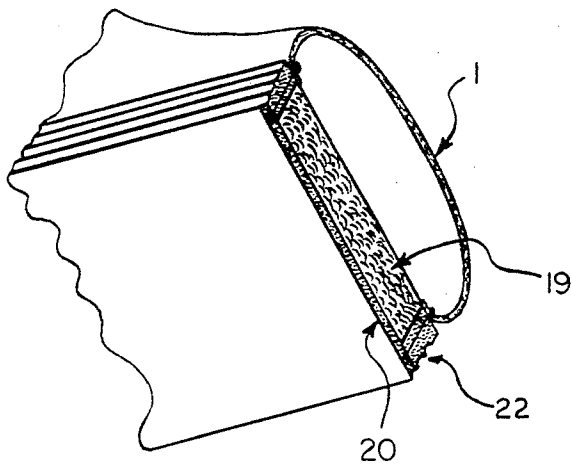


Fig. 4



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**METHOD OF MANUFACTURE OF FOOTWEAR**  
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Filed Jan. 14, 1966, Ser. No. 521,247

Int. Cl. A43d 9/00

U.S. Cl. 12-142

6 Claims

**ABSTRACT OF THE DISCLOSURE**

Method of manufacture of footwear wherein a welt of highly compressible porous elastomer is stitched to the bottom margin of the upper and the upper and welt are placed upon a last of a sole molding device, the footwear is tightened on the last, a side frame of the molding device is placed against the welt after which the tightening of the footwear on the last is removed to permit the welt to move outwardly into tight engagement with the side frame which compresses the welt against the frame and an outsole is then secured to the welt.

The invention refers to footwear such as shoes with an upper of leather and a sole of porous elastomer.

It is customary to manufacture such footwear by first pulling the lower margin of an upper of leather over a last to stretch and tighten the upper and securing the margin to a structural insole so that subsequently a prepared sole of porous elastomer can be cemented to the insole and the margin of the upper.

According to the invention shoes with elastomer soles are improved by a more secure connection between upper and sole and by increased flexibility as a result of the method of the invention, which arranges steps of shoe manufacture, known per se, in a novel and more advantageous way.

The invention is clarified hereafter in connection with the drawing which shows in FIG. 1 a cross section of the device used for the manufacture according to the invention, at the completion of the manufacturing cycle before the finished shoe is removed from the device. FIG. 2 shows in a larger scale a cross section through the toe and FIG. 3 a cross section through the heel of the shoe according to the invention. FIG. 4 shows a view, partially in section, of still another execution of the invention.

In the manufacture the upper 1 is prepared from pieces of leather. At the bottom margin 2 a welt 3 is fastened to the upper by the stitching 4. While the material for the welt was heretofore selected to be at least as strong as the material of the upper, i.e. stiff leather or solid rubber, the invention provides that the welting material consists of a highly compressible elastomeric material such as porous rubber preferably of the kind having closed cells. It has been found that while such material is strong enough to be stitched to the upper, it is at the same time highly compressible which is an essential feature in the process steps explained hereafter.

The so-prepared pre-welted upper is placed on the last, loosely. A structural insole is eliminated. The welt and with it the lower margin of the upper are held in their approximate position temporarily by clamps or threads, not shown. Then side frame 5, usually lengthwise divided in two parts, is then placed adjacent to the bottom margin of the upper, but in a distance thereof. The clamps are then removed or the threads cut so that the welt can slip back until its outer rim lies flush against the inside wall of the side frame. Push rods 6, adjustable by the threaded parts 7 and the nuts 8 are provided to hold the side frame 5 in a suitable distance from the upper so that a contact between the side frame and the upper is com-

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pletely eliminated. The bottom surface 9 of the welt and the top surface 10 of the previously prepared sole 11 are covered with a heat-setting cement before the sole 11 is placed into the corresponding cavity which is formed by the last 21, the side frame and a bottom plate 12. The bottom plate is provided with a linkage 13, 14, which carries the push rods 6 as well as the last 21. The closing lever 15 allows to hold the fore-mentioned parts together in the desired position, or to swing the last with the side frame outwardly for the removal of the finished shoe. The bottom plate 12 and the last are heated to a temperature sufficient for the heat setting of the cement on the surfaces 9, 10, a temperature which is sufficiently low so as not to damage the material of the upper, but usually sufficient to cause the material of the upper to shrink tightly to the last 21 and thereby receiving the set which assures satisfactory fit to the foot of the wearer. The compressibility of the welt material, such as porous rubber, is such that this spacing between upper and side frame can be achieved and after release from the side frame, the welt material can expand and return to the shape and location in relation to the upper which is desirable in the finished shoe. After removal from the last 21, the edge of the welt and the sole is shaped and the appearance improved by scouring, i.e. abrading it on an abrasive belt. In FIG. 2 and FIG. 3 the lines 16, 17 indicate the outside contour prior to the scouring to the uniform line 18.

As can be seen in FIG. 1 the compressibility of the welt 3 is used temporarily during the manufacture to eliminate any contact between the metal of the side frame and the leather of the upper. The compressibility also is important in that during the shrinking of the upper, the stitching 4 will at least at some parts of the perimeter move outwardly and compress the welt substantially. If the sole 11 also consists of porous elastomer such as rubber, preferably identical to the material of the welt, it will compress sufficiently so that only a thin layer of filler 19 might be required. Often the filler can be formed by a thin layer of a rubber mix with a blowing agent so as to form in situ the desired filling.

If desired, a more wear-resisting tread sole 20 can be cemented to the sole 11 simultaneously with the cementing of the sole 11 to the welt 3.

As can be seen in FIG. 3 the scouring of the outside rim of the porous rubber welt and the identical sole can be used to give the entire sole along its edge a shape different from the shape of the side frame 5. If a contour for the sole edge is desired which cannot be easily produced by scouring, or for any other reason, the invention provides that the porous rubber used for the welting and the sole is placed into the cementing device in a blown, i.e. expanded, but only incompletely vulcanized or cured state. In such case the side frame 5 and/or the bottom plate 12 can then be used to impress upon the welt and sole the desired final shape and configuration. In such cases the heating of the apparatus described above accomplishes not only the heat-setting of the upper and the heat-setting of the cement connecting welt and sole, but also the final shaping of welt and sole as well as the molding and curing of a sponge rubber filler. This can be seen in FIG. 4 where a scalloped or otherwise ornamented edge 22 forms the side of the sole.

What I claim is:

1. Method of manufacture of footwear with an elastomeric sole secured to a welt, comprising stitching a welt of highly compressible porous elastomer to the bottom margin of an upper, placing said upper and welt on the last of a sole molding device, placing means across the bottom of the footwear to engage the footwear and tighten the upper on the last, placing a side frame of the molding device against the welt, removing said means

from the footwear to permit the welt to move outwardly into tight engagement with said side frame thereby compressing the welt against said frame, and thereafter securing an outsole to said welt.

2. The method as set forth in claim 1 wherein the outsole is secured to the welt by adhesive.

3. The method as set forth in claim 1 further characterized in that a filler is cured between the last and the outsole.

4. The method as set forth in claim 1 further including the step of post-forming the welt to the configuration of the side frame.

5. The method as set forth in claim 1 further including the steps of removing the footwear from the molding de-

vice and reducing the perimeter of the sole by scouring the sole including the welt, to the desired configuration.

6. The method as set forth in claim 1 further characterized in that the sole is formed of porous elastomer.

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