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E. E. ROLLMAN ET AL
METHODS OF MANUFACTURE OF FOOTWEAR

2,789,295

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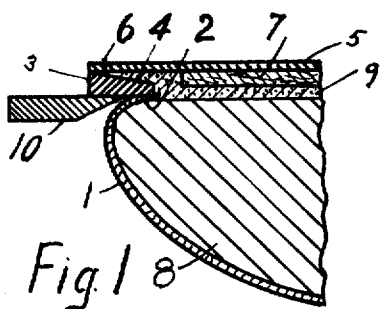


Fig. 1

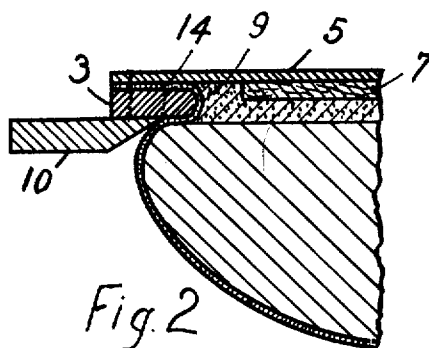


Fig. 2

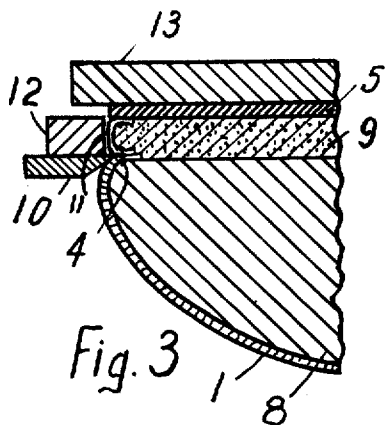


Fig. 3

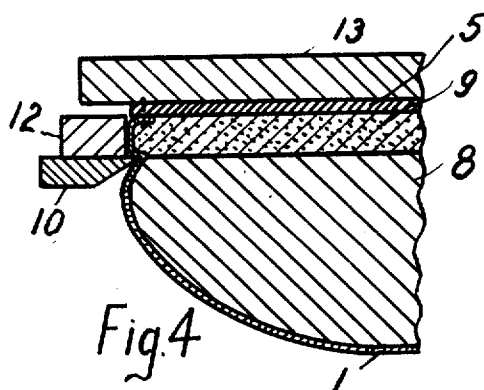


Fig. 4

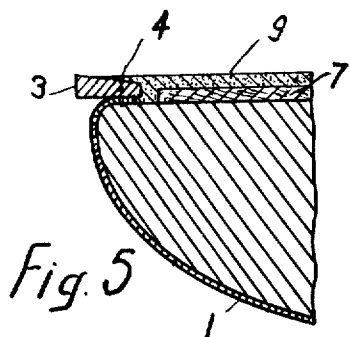


Fig. 5

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METHODS OF MANUFACTURE OF FOOTWEAR

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12 Claims. (Cl. 12--142)

The invention relates to the method of manufacture of footwear with soles containing rubber.

To obtain acceptable fit of the footwear and to assure that it maintains its shape while in use it is necessary to stretch the material of the upper, usually leather, during the manufacture of the footwear. To this end it is customary to perform the operation called "lasting," in which the lower margin of the upper is pulled over the edge of a last and tacked to an insole previously placed on the last. This insole is the element which holds the shoe bottom in the desired spatial position. The lasting is a relatively expensive operation and sometimes omitted for this reason, and replaced by providing a sock lining stitched to the lower margin of the upper. A last is slipped thereafter in the so-prepared sock, although the so-obtained fit of the upper on the last is at best incomplete.

According to the invention the expensive preliminary operation of lasting can be omitted, and the fit of the footwear improved by tightening the upper on the last, and securing the lower margin of the upper or parts connected thereto to a rubber layer set and vulcanized while the upper is held tightened. This eliminates not only the need for an insole as a structural part, which often has to be expensively pre-shaped, but assures a firm and resilient shoe bottom. It is advisable to use a heated last so as to obtain simultaneously a better and more permanent stretching and fitting of the upper and a proper and fast curing of the rubber.

The invention and its advantages are further clarified in the drawings which show in Fig. 1 a cross-section of the edge of a shoe prepared for the molding. Fig. 2 shows in a similar cross-section the edge of the shoe of a modified form while in the mold for the vulcanization of the shoe bottom. Fig. 3 shows in a similar cross-section an execution where a rubber layer forms the main sole. Fig. 4 shows in a similar view the edge of a shoe in which the rubber sole is enclosed by the platform wrapper. Fig. 5 shows in a similar cross-section the edge of a shoe within the mold which permits of forming the rubber sole within a casing formed by the upper welt and an outsole.

As shown in Fig. 1, the upper 1, which might be partly or completely lined prepared in the usual way by stitching together various pieces of leather or fabric, is provided on its lower rim with an outward protruding extension formed by a welt 3, which might be a strip of leather stitched at 4 to the upper 1. An outsole 5 in turn is stitched at 6 to the welt 3, the latter being of such thickness so as to leave space for a midsole between the last 8 and the outsole 5. Material for the midsole which comprises a layer 7 of felt, or similar material and a layer 9 of rubber mix, preferably to form porous rubber, is placed upon the last 8 and said upper is slipped over it, together with the welt and outsole. This can be done easily, as the upper is still of baggy appearance and does not yet fit the last tightly, as shown

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in Fig. 1. A lip 10 which may be divided into various segments and is part of the mold enclosing the shoe bottom, is then placed against the lower rim of the upper into the groove formed by the lower rim of the upper and the welt 3. The segments are moved then towards the center of the sole and thereby the upper is tightened on the last by pushing its lower rim inwards. This is the state shown in the Fig. 2. The assembly is then subjected to heat, preferably by heating the last 8. Under the influence of the heat, the rubber mix will expand and fill the space between the last and the outsole, and simultaneously bond to the margin of the upper and welt as well as to the outsole. As the porous rubber is completely enclosed by the leather welt and outsole, the shoe will offer better appearance and better resistance to wear than shoes with exposed porous rubber surfaces.

As shown in Figs. 3 and 4 the upper 1 might be stitched to the welt 3 by the seam 4 in such way that the rubber mix contacts only a part of the extension of the upper, not directly the welt strip 3.

Without deviation from the invention it might be of advantage to tighten the upper not by moving the lower rim inwards, but by holding the lower rim of the upper in the desired spatial relation while the upper is tightened by expanding the last. Various types of foreshortening lasts might be used, but we found that metal lasts with inserted electric heating elements are preferable. The lower rim of the upper can be held in the desired spatial relation by segmented lips 10 or by the outsole and welt, if the shoe bottom offers the rigidity to hold the lower rim of the upper in its place while the upper is stretched and the rubber layer vulcanized.

The term "lower margin of the upper" is used here to designate the very end of the upper usually used for the lasting operation, while the term "lower rim of the upper" is used to designate that part of the upper adjacent to, or forming part of, the outwardly extending rim of the sole. The lower rim of the upper might be formed by the material of the upper or by a strip fastened to the upper. The term "shoe bottom" is used here to designate those parts of the shoe which hold the lower margin of the upper and is formed in the example shown in Figs. 1 and 2 substantially by the rubber layer 9.

The term "outward extension" is used here to designate that part of a shoe which extends essentially horizontally outwardly from the lower rim of the upper to cover at least the upper rim of the sole. The outward extension might be a strip of material such as leather stitched to the upper, or it might be an outwardly turned part of the upper itself, which ends at the edge of the sole or continues downwardly to cover the side of the sole.

The method according to the invention is also used to advantage for shoes with platforms, as shown in Fig. 3, where the parts corresponding to those of Figs. 1 and 2 are designated by the same numerals. Here a platform wrapper 11, is shown stitched at 4 to the upper 1 to form again an outward extension and thereby a crease between the lower rim of the upper and the upper rim of the sole. During the heating of the shoe on the last 8 the rubber mix 9 expands and fills the platform completely. Once set, the expanded rubber will assure the maintenance of the desired shape of the platform and the shoe. If the wrapper 11 is not stiff enough to assure the desired contour of the platform during the curing of the rubber, an auxiliary mold comprising a frame 12 and a sole plate 13 might be used to limit the space of the expansion of the rubber. As shown in Fig. 4, the platform wrapper might be a piece of the upper 1, cut correspondingly larger and fastened to an outsole 5 before placing it on the last 8. The crease between the upper and the platform is produced by pushing into place the lip 10.

Fig. 5 shows a cross-section of the edge of a shoe in which the upper 1, to which a welt 3 has been fastened by the stitching 4, is held in the desired shape by the rubber sole 9 molded and vulcanized in situ, so as to hold the lower margin of the upper resiliently in the desired permanent position and to enclose at the same time a filler 7. If desired a tread sole 5 might be added after molding and vulcanization, but the shoe will be comfortable and durable also without such tread or wear sole.

For other types of footwear the methods described above might be altered without deviation from the invention. The composite shoe bottom shown in Fig. 2 might be replaced by a layer of rubber just strong enough to hold the margin of the upper in the desired spatial position and might then be less porous and more rigid as shown in Fig. 3, where the lower rim of the upper 1 is extended by the welt 3, which is placed behind the lip 10. The rubber layer 9, forming the sole, is contained between the frame 12 and the bottom plate 13 of the mold. Here again the rubber is sealed against the mold lip 10 by the welt 3 even if only very little or no pressure is exerted between the lip 10 and the upper 1. If rubber of sufficient strength is used it is possible for some types of footwear to use only a welt-like strip of rubber vulcanized to the lower margin of the upper to assure that the shoe bottom maintains its position, also after flexing it. In this instance as well as in other cases it might be of advantage to sew the outsole to the welt only after the vulcanization of the rubber or to prevent by other means the adherence of the rubber layer to the outsole, as then a worn outsole can be replaced easily without damage to the firm and waterproof shoe bottom.

The term rubber is used here for any natural or synthetic elastomer with qualities similar to those of rubber obtained from the Hevea plant. According to the type of elastomer used the, setting might occur at normal or elevated temperature.

What we claim and desire to secure by Letters Patent is:

1. Method of manufacture of footwear comprising placing upon the last of a vulcanization mold having a sole pressing plate shoe parts comprising an upper and a lower marginal portion extending therefrom, said lower marginal portion consisting only of shoe parts confined to the marginal region of said last, said marginal portion having a groove therein, holding said parts against the last only by means positioned in said groove, stretching said upper against the last, and, having placed within the space bounded by said last and said marginal portion a bulk of uncured rubber mix, pressing said sole plate toward said marginal portion thereby pressing said marginal portion against said means, and molding and vulcanizing said mix to said marginal portion thereby producing a sole element to hold said lower marginal portion in its permanent position.

2. The method as set forth in claim 1 wherein the stretching of said upper against said last is performed by

pushing said marginal portion toward the center of said last by said means.

3. The method as set forth in claim 1 wherein the stretching of said upper against said last is performed by expanding said last while said marginal portion is held in the desired permanent position by said means.

4. The method as set forth in claim 1 wherein said uncured rubber mix is for porous rubber.

5. The method as set forth in claim 1 wherein said marginal portion includes a welt strip.

6. The method as set forth in claim 1 wherein an outsole is secured to said marginal portion.

7. The method as set forth in claim 1 wherein said marginal portion includes a welt strip, and an outsole is secured to said marginal portion.

8. Method of manufacture of footwear comprising placing upon the last of a vulcanization mold having a sole pressing plate shoe parts consisting only of an upper having a lower marginal portion, said marginal portion having a groove therein, holding said parts against the last only by means positioned in said groove, stretching said upper against the last, placing within the space bounded by said last and said marginal portion a bulk of uncured rubber mix while said upper is maintained in its stretched condition, bringing the sole plate against said marginal portion and pressing said marginal portion against said means to close said space, and, while maintaining said space closed, molding and vulcanizing said mix to said marginal portion thereby producing a sole element to hold said lower marginal portion in its permanent position.

9. The method as set forth in claim 8 wherein the stretching of said upper against said last is performed by pushing said marginal portion toward the center of said last by said means.

10. The method as set forth in claim 8 wherein the stretching of said upper against said last is performed by expanding said last while said marginal portion is held in the desired permanent position by said means.

11. The method as set forth in claim 8 wherein said uncured rubber mix is for porous rubber.

12. The method as set forth in claim 8 wherein said marginal portion includes a welt strip.

References Cited in the file of this patent

UNITED STATES PATENTS

774,865	Butterfield	Nov. 15, 1904
1,775,290	Morrison	Sept. 9, 1930
1,839,984	McGhee	Jan. 5, 1932
1,955,720	Rollmann	Apr. 17, 1934
2,129,106	Szerenyi	Sept. 6, 1938
2,283,953	Rohrer	May 26, 1942
2,578,218	Ashworth	Dec. 11, 1951
2,580,245	Rollmann	Dec. 25, 1951

FOREIGN PATENTS

244,800	Great Britain	Jan. 6, 1927
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