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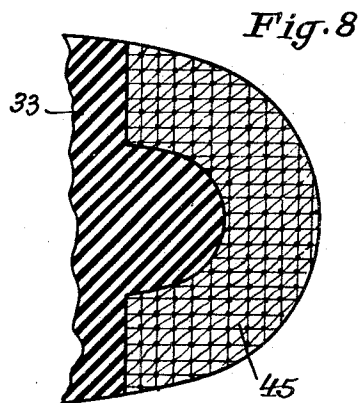
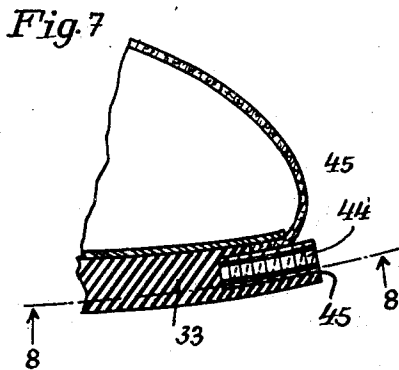
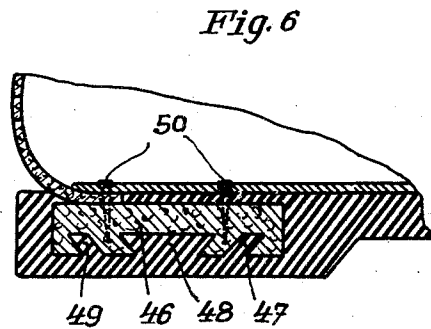
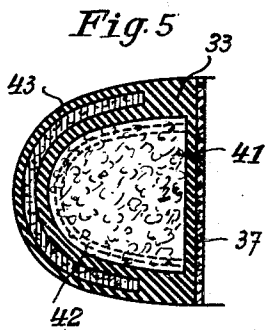
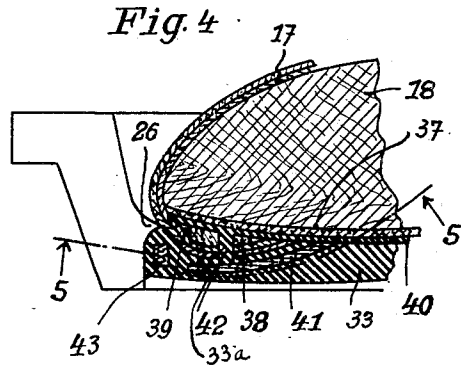
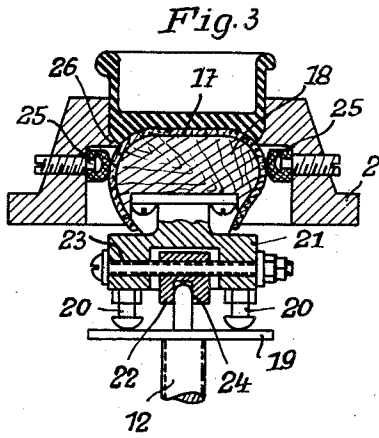
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METHOD FOR THE MANUFACTURE OF FOOTWEAR

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2 Sheets-Sheet 2



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METHOD FOR THE MANUFACTURE OF FOOTWEAR

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5 Claims. (Cl. 18—59)

This invention relates to method for the manufacture of footwear.

It has for its object generally to provide a method for the manufacture of an article of footwear having an upper of leather or other suitable material and a sole, heel and/or combined sole and heel moulded to shape, vulcanized and attached to the upper in a single operation whereby shoes having a more permanent connection between the upper and the sole may be produced.

A further object of the invention is to provide a method for the manufacture of footwear by moulding the shoe sole, heel and/or combined sole and heel and attaching it to the upper by vulcanization in a single operation.

Another object is to provide a method for the manufacture of shoes or parts thereof consisting of the steps of pressing a sole edge forming mould against a lasted upper and thereafter causing a sole forming mould member to be moved relative to said lasted upper and sole edge forming mould to apply pressure to the sole forming material and thereby cause the sole to be moulded to the desired shape, and applying heat to said sole forming material to cause said sole to be vulcanized and simultaneously attached to said upper.

Another object is to provide a method for the purpose described in which the entire upper is exposed to the atmosphere so as to prevent excess heating thereof.

Other objects of the invention will be apparent from the following description taken in connection with the drawings attached, wherein:

Fig. 1 illustrates a longitudinal section through the apparatus, the lasted upper being shown in elevation;

Fig. 2 shows the same parts separated, the last supporting pillars being, however, shown in elevation;

Fig. 3 is an enlarged cross sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal section through the toe of one form of shoe made in accordance with the invention;

Fig. 5 is a cross sectional view taken on the curved line 5—5 of Fig. 4;

Fig. 6 is a cross sectional view showing a modified form of heel;

Fig. 7 is a cross sectional view showing a modified form of toe construction; and

Fig. 8 is a cross section on the line 8—8 of Fig. 7.

In said drawings a preferred form of apparatus

is shown consisting generally of a frame member 1, a sole edge forming mould 2, a mould applying member 3 and the sole bottom mould member 4. The frame is provided with suitable means for supporting the last 13, which means may comprise pillars 8, 9 and 10 preferably mounted for longitudinal adjustment, as by an adjusting nut 7 cooperating with a threaded adjusting bolt 6 (Figs. 1 and 2). These posts may be rigid or, as shown in Fig. 1, may be provided with springs 11 so as to bias the central last supports 12 in an upward direction. Said springs 11 are shown as bearing upon the bottom of a recess within the pillars and press upward against an adjustable nut threaded upon the supports 12. The initial position of supports 12 may be adjusted by means of the screw caps 13 and the extent of motion of the supports 12 may be regulated by means of nuts 14. The forward support member 12 is arranged to support the toe part 15 of the shoe, and is preferably provided with an upholstered cradle 16 in order to prevent possible injury to the material of the upper.

In the production of footwear in accordance with the invention, the shoe upper 17 is first placed upon the last 18 in the usual manner. Thereupon the last 18 is placed upon the supports 12 generally as shown in Fig. 1. It may be desirable to provide a special arrangement to assure correct registration of the last with the vulcanizing moulds, for which purpose the support 12 of the pillar 8 may be provided with a plate 19 (see Fig. 3) against which bear adjusting screws 20 which are located in an extension 21 of the last 18 so that by adjusting the screws 20 leveling of the last may be accomplished. Similarly the last may be provided with a slide member 22 which is transversely adjustable by means of the adjustment screw 23. The slide member 22 is preferably formed to cooperate with threads on the adjustment screw 23 and is provided with an opening to receive the stud 24 carried by the support 8. Furthermore, to assure correct registration of the sole edge forming mould 2 relative to the last, upholstered adjusting screws 25 may be provided. The sole edge forming mould 2 is preferably provided with a relatively sharp sealing edge 26 which engages the shoe upper at all points around its periphery at the junction of the upper and sole. For convenience in removing the mould 2 from the shoe after vulcanization, it is preferably formed in two parts and dowel pins 27 may be provided to assure the proper registration of the parts. The assembled

sole edge forming mould is thereupon placed upon the mould frame 1, its correct registration being assured by means of dowel pins 28. The mould applying member 3 with which is preferably associated the sole forming member 4 is now placed in position upon the member 2, it being understood that rubber sole forming material, preferably in a fluid or semi-liquid, readily flowing, yet unshaped state, has previously been placed upon the lasted upper and/or insole. The members 3 and 4 may be separately handled and assembled, but for convenience they are associated together as by bolts 29 rigidly attached to one of them and slidably associated with the other, and the members 3 and 4 are preferably held apart by means of springs 30.

In the condition of assembly just described the assembled vulcanizing mould is acted upon by some device which will cause the parts to be pressed together for which purpose an ordinary vulcanizing press serving to receive a large number of said moulds may be used. Upon application of pressure upon the member 4 the following occurs:

(1) The parts of the sole edge forming mould 2 are pressed against each other transversely due to the action of the wedge shaped surfaces 31 on the member 2 being engaged by the corresponding surfaces 32 formed on the member 3;

(2) Thereafter the sole edge forming mould 2 is bodily pressed against the shoe upper 17 into the position shown in Fig. 3. During this motion sufficient pressure of the sealing edge 26 against the shoe upper 17 is developed to prevent the egress of the rubber sole forming material upon the subsequent application of pressure thereto. During this time the springs 30 are being compressed.

(3) As soon as this sealing pressure has been provided further motion of the member 4 causes its sole forming surface to come into contact with the sole forming material, thus applying pressure thereto and causing the unvulcanized material to flow into all parts of the mould, thus forming the sole and/or heel into the desired form.

The parts are left in this position (Fig. 1) while heat for vulcanization is applied to the member 4 and/or the last by any known or suitable means and for the time required for vulcanizing the rubber into a sole and/or heel and attaching it to the upper and/or insole.

It will be noted that the member 4 is arranged to telescope with respect to the sole edge forming member 2. In order to permit of the egress of excess rubber, the fit between these parts is preferably made sufficiently loose so that this excess rubber may be extruded out of clearance space or the opening 34 between said parts. It will be noted that by this arrangement the excess material is extruded in a direction generally parallel to the motion of the press so that when it is subsequently removed the appearance of the edge of the sole will not be interfered with.

By this arrangement it will be seen that in a single stroke of the press the sole edge forming mould is pressed together transversely and is then pressed against the shoe upper before the application of pressure to the sole material by the action of member 4, whereby the extrusion of the rubber between the edge forming mould and the upper is prevented. This construction also prevents application of excess pressure of the edge mould 2 against the shoe upper 17 because the bottom edge 35 of the mould 2 engages the upper edge 36 of the base 1, thus limiting the motion.

In order to secure a particularly elastic bearing of the sealing edge 26 upon the upper material of shoes made in accordance with the invention they may be provided with a leather strip 38 fastened to the insole 37 somewhat inwardly from the toe of the shoe. In this way a somewhat hollow space 39 is produced into which the upper material may recede due to the pressure of the edge 26. A particularly firm connection of the rubber sole 33 with the toe can be secured if an unvulcanized rubber sheet 40 is placed between the insole 37 and the leather strip 38. If a strip such as 38 is used it is preferably perforated so as to provide a number of rubber connecting links such as 33a to provide a firm bond between the sole and the insole. As shown in Fig. 4 that part of the upper material which extends over the insole is correspondingly perforated. Such perforations in the upper material may be provided whether or not the strip 38 is used. Furthermore, a stiffening or reinforcing insert 41 may be provided in the toe part made preferably out of fibre or other stiff material and preferably attached to the upper by suitable means such as stitching 42. To secure further strengthening a strip 43 of strong stiff material may also be inserted in the sole 33 along the edge of the toe part thereof. Such an insert serves to distribute the stresses and to assure increased wear.

It will be noted that the construction of the edge forming mold 2 and the means for supporting the last, the edge forming mold, and the bottom plate are such that the upper of the shoe is substantially entirely exposed to the atmosphere during the vulcanizing operation, as a result of which the upper is protected against overheating which might result in damage thereto. For this reason the process may be used in the manufacture of shoe having leather uppers.

Fig. 7 shows a modified form of toe reinforcement in the form of a preferably U-shaped member 44 made of leather, fibre, rubber or other suitable material preferably preliminarily attached to the upper and/or insole as by sewing, cementing or the like. Its upper and lower faces may be covered with fabric or the like 45. Upon carrying out the process outlined above the reinforcement 44 is moulded into the sole 33 with only its outer edge exposed.

In order to make the shoe lighter and at little cost, it may be desirable to provide a heel insert such as the block 46 shown in Fig. 6. This insert may be made of wood or other suitable strong light material and in order to assure a strong bond between the heel insert and the rubber surrounding said insert it may be desirable to provide said insert with cuts such as 47, 48 and 49 to assure proper interlocking of the rubber with the insert. This insert is preferably attached to the upper or insole as by nails 50.

It may be desirable in some cases to apply to the surfaces to which the rubber is to be attached by vulcanization some suitable coating to facilitate the vulcanization of the rubber to said surfaces. This coating may consist of rubber dissolved in a suitable solvent, rubber cement, latex, or the like.

Various changes may be made in the footwear described above, the method of manufacture, and the apparatus therefor, without departing from the invention, it being understood that the embodiments shown in the drawings and described above are merely to be taken as an example of the invention, the scope of which is set forth in the claims which follow.

What is claimed is:

1. Method for the production of shoes with rubber soles vulcanized thereto comprising placing an upper upon a last, placing semi-liquid, unshaped vulcanizable sole forming material on said lasted upper, applying a sole edge forming mold upon the lasted upper, placing upon said edge forming mold a sole bottom forming mold member which is so formed that vertical movement thereof toward the last first presses the sole edge forming mold in sealing relation against the lasted upper and upon further vertical movement presses the sole bottom forming surface against the sole forming material and compresses said material without imparting further movement to said sole edge forming mold, and vulcanizing said material while thus compressed.

2. Method for the production of shoes with rubber soles vulcanized thereto comprising placing an upper upon a last, placing semi-liquid, unshaped vulcanizable sole forming material on said lasted upper, applying a sole edge forming mold upon the lasted upper, placing upon said edge forming mold a sole bottom forming mold member which is so formed that vertical movement thereof toward the last first presses the sole edge forming mold in sealing relation against the lasted upper and upon further vertical movement presses the sole bottom forming surface against the sole forming material and compresses said material without imparting further movement to said sole edge forming mold, placing said assembly between the heated jaws of a press, closing said press so that the sole edge forming mold is first pressed into sealing relation against the lasted upper and the sole mold is then pressed against said material and holding the press closed while said material is being vulcanized.

3. Method for the production of shoes with rubber soles vulcanized thereto comprising placing an upper upon a last, placing semi-liquid, unshaped vulcanizable sole forming material on said lasted upper, applying to the lasted upper a multi-part sole edge forming mold formed with downwardly and outwardly extending pyramidal surfaces, placing upon said edge forming mold a sole bottom forming mold member provided with a member having downwardly and outwardly extending pyramidal surfaces, placing said parts into a press and closing the press whereby the sole

edge forming mold is first pressed into sealing relation against the lasted upper and thereafter the sole bottom forming surface is pressed against the sole forming material and said material is compressed without imparting further movement to said sole edge forming mold, and vulcanizing said material while thus compressed.

4. Method for the production of shoes with rubber soles vulcanized thereto comprising placing an upper upon a last, placing semi-liquid, unshaped vulcanizable sole forming material on said lasted upper, applying to the lasted upper a sole edge forming mold, placing upon said edge forming mold a sole bottom forming mold member which is so formed as to telescope into said edge forming mold in such a way as to leave a clearance space for the extrusion of excess material, which space does not alter when the sole mold is moved into the edge forming mold, pressing the sole edge forming mold into sealing relation against the lasted upper, pressing the sole bottom forming surface against the sole forming material, compressing said material, extruding the excess material through the space between said molds and vulcanizing said material while thus compressed.

5. Method for the production of footwear comprising placing an upper upon a last, placing unshaped semi-liquid vulcanizable sole-forming material upon said lasted upper, applying to said lasted upper a sole-edge forming mould, placing upon said sole-edge forming mould a sole-bottom forming mould member, applying to said sole-edge forming mould a limited and adjustable pressure to secure suitable sealing relations between said sole-edge forming mould and said lasted upper, thereafter pressing said sole-bottom forming mould member against said sole-forming material and into a predetermined position so as to form a shoe sole having a predetermined thickness while leaving a clearance space between the inner edge of said sole-edge forming mould and the outer edge of said sole-bottom forming mould member, extruding excess sole-forming material simultaneously through said clearance space, vulcanizing said material under pressure to form a shoe having vulcanized sole-material extending from the bottom of the sole, and trimming off said excess of vulcanized sole material.

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