Aug. 31, 1954 A. A. ROOT 2,687,554

APPARATUS FOR MOLDING TREAD MEMBERS TO SHOE UPPERS

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Fig. 1

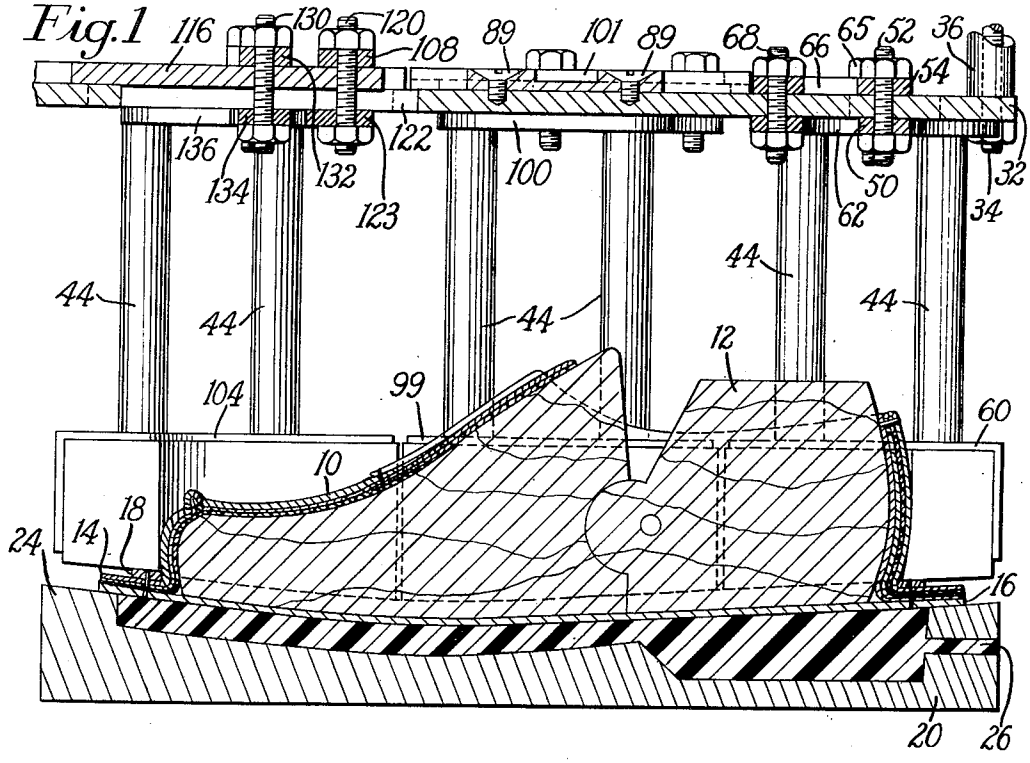
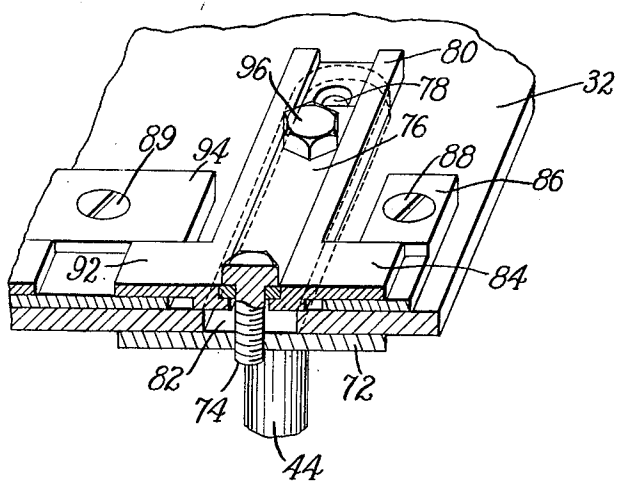


Fig. 3



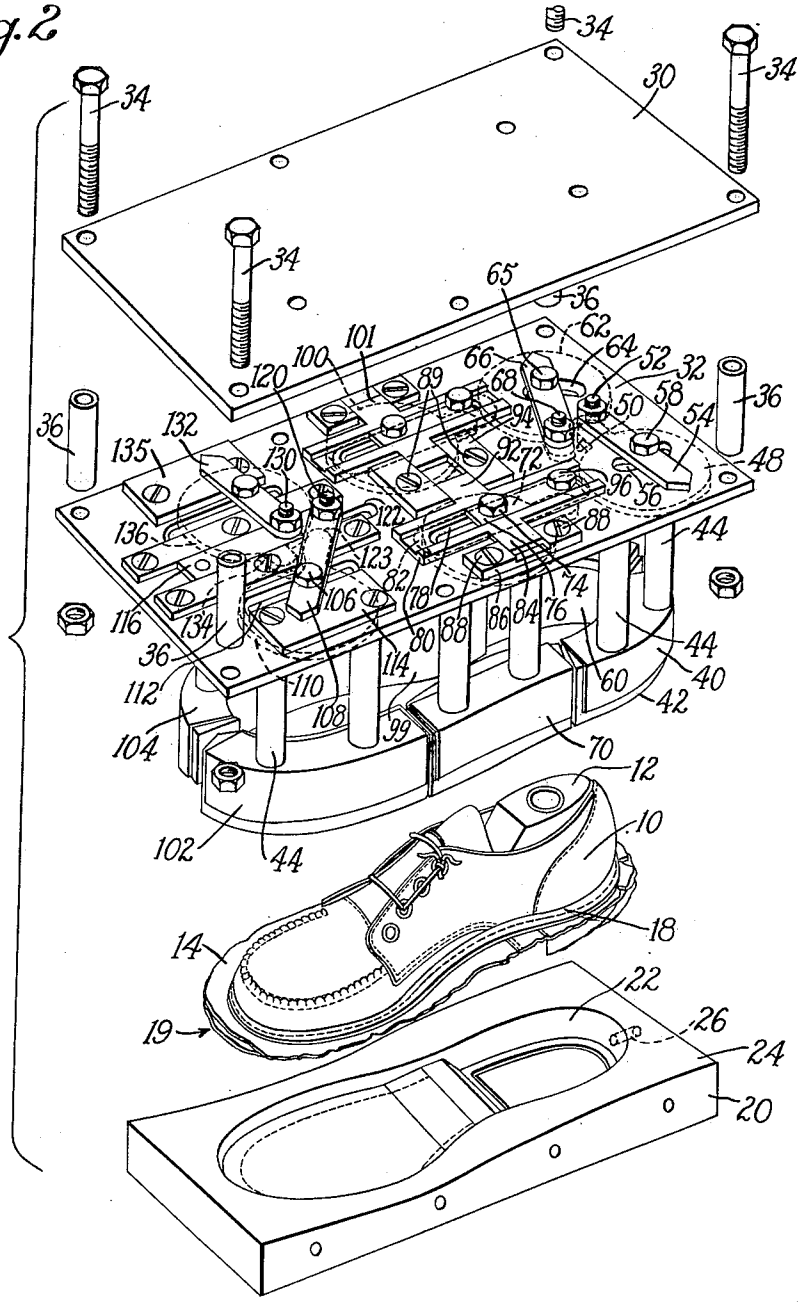
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APPARATUS FOR MOLDING TREAD MEMBERS TO SHOE UPPERS

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Fig. 2



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APPARATUS FOR MOLDING TREAD MEMBERS TO SHOE UPPERS

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2 Claims. (Cl. 18—34)

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This invention relates to molds, and more particularly to apparatus for molding tread members such as soles and/or heels to shoe uppers to form integral footwear structures.

A novel method of molding a sole and heel to a shoe is disclosed in my United States Letters Patent No. 2,651,118, granted September 8, 1953, in the practice of which there was utilized a mold of simple and inexpensive design which while it performed its function excellently made no provision for accommodating the many and various shoe sizes and shoe last styles necessarily encountered in commercial shoe manufacture.

It is an object of the present invention to provide an improved apparatus for use in carrying out a method of the nature above referred to and which is simple in construction, inexpensive, and yet possesses the additional characteristic that is readily adaptable for treatment of shoes of a number of sizes and styles in joining bottom portions or tread members thereto.

It is an important feature of the invention to provide rigidly backed sections in a molding apparatus for resiliently confining a welt portion of a shoe against a recessed plate to conform moldable material into a desired sole or tread member attached to the shoe. Another feature comprises an adjustable arrangement of rigidly backed mold sections with resilient or rubber-like portions for contacting a welt of a shoe and holding the shoe in cooperative relation with a recessed plate to form a mold for a tread member of the shoe.

The features of the invention will now be described in detail in the specification and pointed out in the appended claims.

In the drawings,

Fig. 1 is a sectional view through apparatus embodying the present invention, a lasted shoe being shown therein;

Fig. 2 is an exploded perspective of the apparatus with a shoe to be treated, the apparatus being the same as the one shown in section in Fig. 1; and

Fig. 3 is a perspective view in section of a portion of the apparatus shown in Fig. 2.

In the practice of the method of applying a bottom or tread member to a shoe as taught in the above-mentioned Patent No. 2,651,118, a partially completed shoe 10 is mounted on its last 12 which will retain it in shaped position for molding a sole thereon. Such a shoe which may be of the conventional stitchdown type will have the margins 14 of the shoe upper flared outwardly and staple or thread lasted to an insole 16 (Fig. 1). Welting 18 is attached to the margins 14 with the stitching passing through the margins and the insole 16 forming a multilayer flange 19 (Fig. 2) which is availed of in practicing the sole attaching method of the Patent No. 2,651,118 heretofore referred to and using the apparatus to which the present invention pertains.

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In the instant application and claims it will be understood that the term "shoe" is intended to indicate an article of footwear broadly and to include within its scope a slipper as well as a shoe of any of the various forms of construction using welting, whether such forms be of the McKay, Goodyear welt, stitchdown, Littleway or cemented type.

The bottom of the partially completed shoe 10, and in this case the bottom of the insole 16, is coated with a suitable resin latex such as polyvinyl chloride latex (54.6% solids content) known as Geon latex 11. Other aqueous dispersions or latices of resins compatible with the resin to be molded on the shoe may be used. When the bottom surface of the shoe has been treated with the resinous material, it is preferably dried and is then ready for the attachment to the sole member using the apparatus of the present invention. The coating or treating of the insole eventually to bring about a strong bond between the shoe and the outsole ultimately to be molded thereon is preferred but in so far as the present invention is concerned, the treatment of the insole may be omitted. The apparatus, as herein disclosed and forming one embodiment of the present invention, includes a heat conducting metallic plate 20 having a recess 22 of sufficient size and of the desired shape of the shoe bottom member to be molded for a given range of a number of shoe bottom sizes. The top surface 24 of the mold plate 20 is shaped to conform to the heightwise curvature of the bottom face of the last 12 and the insole 16. A sprue passage 26 is formed in the metallic plate 20 and leads to the heel end of the recess 22. A supporting plate 30 (Fig. 2) is adapted to be attached to the upper platen of a press with the plate 20 resting on the lower platen of the press. The plate 30 may be attached to the upper platen of the press by suitable means, not shown, and the apparatus is so constructed that the major portion thereof may be raised or lowered with respect to the plate 20 by the opening and closing of the press platens for the insertion of a shoe.

Another plate 32 (hereinafter called the second plate) is attached to the supporting plate 30 by four bolts 34 and maintained in spaced relation with that plate by ferrules or short pieces of tubing 36 through which the bolts 34 pass.

Suspended from and adjustably related to the plate 32 are six rigidly backed sections, each of said sections being made up of a metallic member of L-shaped cross section contributing the rigidity and to which is adhesively attached a block of resilient rubber-like material the surface of which is rather soft and will yield under pressure, as well hereinafter appear. One rigidly backed section 40 carrying a resilient block 42 is attached to the plate 32 by means of a pair of tubular members 44 which are welded to the section 40 and also to a circular plate member 48 which is held in relative as well as inward and outward adjustment relative to and in contact with the plate 32. Each of the six rigidly backed sections is provided with two tubular members 44 welded to circular plates and to the sections. It will be appreciated that four of the six sections should be rotatively as well as laterally adjustable in order to accommodate various sizes and styles of shoes. The plate 48 has an arm or tab 50 through which a bolt 52 is passed attaching the plate 48 to the plate 32. A finger 54 is also held by the bolt 52 but is located above the plate 32 and this finger passes beyond an arcuate slot 56 cut in the plate 32 with the bolt 52 as a center. A bolt 58 passes through the finger 54 and the slot 56 and is threaded into the center of the plate 48. With this construction the rigidly backed section 40 may be rotatably adjusted to a small but adequate extent with respect to the plate 32 and also adjusted inwardly or outwardly and with the bolt 52 as a center (due to the slot 56). A section 60 (Figs. 1 and 2) is similar to the section 40 and is also of the proper shape to conform with the heel end of the shoe 10. It is supported on a plate 62 in a manner similar to section 40. An arcuate slot 64 is provided in the plate 32 and extending through the slot 64 is a bolt 65 passing through a finger 66 and threaded into the plate 62. Another bolt 68 passes through the finger 66 and a tab of the plate 62 and is placed on the longitudinal center line of the plate 32 and adjacent the bolt 52. The section 60 is seen therefore to be rotatively and laterally adjustable.

A rigidly backed section 70, also made up of a rubber-like portion or block and a rigid metallic supporting member, is suspended from a circular plate 72 which is held in adjustable relation with respect to the plate 32 by means of a bolt 74, the bolt 74 passing through a rectangular plate 76 (Fig. 3), a slot 78 in a cross-shaped member 80, and a slot 82 in the plate 32. One arm 84 of the cross-shaped member is retained in a guideway of a block 86 attached to the plate 32 by two screws 88. A second arm 92 of the cross-shaped member 80 is retained in a guideway of a central block 94 held to the plate 32 by screws 89. A bolt 96 passes through the rectangular plate 76, the narrow slot 78 in the member 80, the wider slot 82 in the plate 32 and is screwed into a tab on the circular plate 72. The cross-shaped member 80 is laterally or inwardly and outwardly adjustable with relation to the plate 32 as necessary clearances are provided between the cross-shaped member and the blocks 86 and 94 as Fig. 3 clearly shows. The slots 78 and 82 permit lengthwise adjustment. Assuming that the cross-shaped member 80 is moved outwardly, bolts 74 and 96 will move outwardly and to the same extent. Section 70 is therefore laterally adjustable but is not rotatable.

A fourth rigidly backed member 99 is also attached to the plate 32 in a manner similar to that of the section 70 and the block 94 serves in the lateral adjustment of the section 99, as well as for the section 70. A circular plate 100 and a cross-shaped member 101 are used in the adjustment of the section 99.

Two rigidly backed toe sections 102 and 104 are also provided and are attached to the plate 32 for lateral and rotative adjustment. A bolt 106 (Fig. 2) passes through an arm 108 and is threaded into a circular member 110 to which the section 102 is rigidly attached. The bolt 106 passes with a substantial clearance through an elongated and wide slot 112 in the plate 32. One end of the finger 108 is arranged to rest on a plate 114 attached to the plate 32 and the other or inner end of the finger 108 is in pivotal relation with a sliding plate 116 due to a bolt 120 which passes through the finger 108, the plate 116, a slot 122 in the plate 32, and a tab 123 of the circular plate or member 110.

The sixth section 104 is also adjustably held in position with respect to the plate 32, and a bolt 130 is provided as a pivot point, which bolt passes through a finger 132 one end of which rests on a block 135. The bolt 130 also passes through the slidable plate 116, the slot 122, and a tab 134 of a circular plate 136.

As the six segments or rigidly backed sections are in adjustable relation laterally with respect to the plate 32, the resilient rubber-like blocks of those sections may readily be made to conform to the curvature of the edge of the bottom of the shoe, the blocks preferably engaging the shoe in the crease between the welting 18 and the shoe upper. It is not essential that the ends of the sections or rubber blocks abut but substantial gaps or spaces may be left between the sections without any difficulty occurring in the operation of the apparatus. The rigidity of the multi-layer flange 19 of the shoe 10 is such that more than adequate injection pressure may be employed in using the apparatus without causing any undue displacement or distortion of the flange.

In operation, the lasted shoe is placed upon the heat conductive plate 20 in proper relation to the recess 22 and the platens of the press between which the molding apparatus is placed are closed with the result that the rubber blocks of the rigidly backed sections of the mold extend into the welt crease and closely confine the welt, shoe upper margin, and insole margin against the upper surface 24 of the plate 20. The tubular members 44 are of such length that sufficient clearance is provided for the range of sizes (heightwise) of shoes and lasts to be considered in the operation.

A fluid dispersion of resin particles is injected through the sprue passage 26 and fills the cavity or recess 22 to conform that resin material to the proper shape for an outsole. Heat may be applied to the plate 20 in any of various ways to cause the resin to set and form a shoe bottom possessing the requisite toughness, hardness and resilience to render it suitable for use as a shoe sole.

After the composition in the recess 22 has been set up the molding apparatus may be opened (separating the rigidly backed sections from the heating plate 20 by opening the press platens) and the shoe removed. Any excess material at

the edges or margins of the shoe, including the outsole and heel portions, may be trimmed off.

The mold recess is preferably filled with a fluid dispersion of resin particles combined with a liquid plasticizer and the volume of injected material is defined by the bottom of the insole 16, the sides of the recess in the plate 20, and the bottom surfaces of the recess when the shoe 10 is positioned with relation to the plate 20 as shown in Fig. 1.

Resin dispersions employed in the use of the present apparatus are liquid to pasty mixtures of from 30% to 70% of thermoplastic resin particles in from 70% to 30% of a liquid plasticizer having no substantial solvent action on the resin when cooled, but capable of combining physically with the resin particles when the dispersion is heated to form a uniform mass of plasticized resin. The relative proportions of resin and plasticizer will be selected depending upon the physical properties desired in the final tread surface.

Resin dispersions which have been found satisfactory in the use of the present apparatus include: a dispersion of particles of a copolymer of vinyl chloride and vinyl acetate containing from 85 to 88% of vinyl chloride (Vinylite VYNV) in a substantially equal quantity by weight of dioctyl-phthalate; a dispersion of 50 parts of particles of a vinyl chloride, vinyl acetate copolymer containing from 80 to 88% of vinyl chloride, in 45 parts of dioctyl-phthalate; and a dispersion of 50 parts of a vinyl chloride, vinyl acetate copolymer known as Geon 100X210, and 49 parts of an ester type plasticizer which may be tri-cresyl phosphate, dibutyl phthalate or, dioctyl-phthalate. Other dispersions of resins may be used which become gelled when heated and fillers may be incorporated as well as dyes or pigments.

The heating may be effected in various ways and may consume from 5 to 20 minutes, which is sufficient to cause solution and/or gelling of the resin by the plasticizer, e. g. a temperature of from 270° to 325° C. with the vinyl chloride and vinyl acetate copolymer dispersions referred to. The action of a high frequency electric field may be utilized in effecting the requisite temperature.

With a wide welt extension one heat transfer plate 20 will serve for at least four sizes of shoes and the rubber-like blocks of the rigidly backed sections of a given molding apparatus permit considerable variation not only in sizes but also in the last styles for the rubber-like material conforms readily and accurately with the last. A suitable composition for the rubber-like blocks would be a synthetic rubber or a silicone rubber but the selection of such a rubber-like composition which will withstand deterioration in the presence of heat is not a part of the present invention and is easily within the capabilities of a chemist to ascertain.

In the event that it is desirable that a given apparatus should be made suitable for more than four sizes of shoes, then inserts (not shown) may be made to fit between the opposed ends of the sections to bridge the gap between the inserts. It will be appreciated, however, as has been indicated above, that a substantial gap may be left between the opposed ends of the sections without any difficulty occurring as the pressure necessary for injection need not be great and the welt section of the shoe is of substantial rigidty over a short length.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for molding a tread member on a shoe having a portion of the upper material flanged outwardly, said apparatus comprising a plate which has a tread molding recess of the general configuration of a shoe bottom and a surface surrounding said recess having heightwise variations corresponding to those of the bottom of a last, said surface surrounding said recess being adapted to cooperate with the flange of a shoe pressed against said surface in a molding operation to form a seal, a sprue leading through the plate to the recess, resilient sections which form the outline of a shoe, and a rigid framework to which said sections are attached for transmitting pressure to said sections, said framework being adapted to be moved to bring said sections into contact with the outwardly flanged portion of a shoe placed on said plate and covering said recess to confine the flange in yielding engagement with the various heightwise variations of said surface surrounding the recess of said plate.

2. The apparatus of claim 1 wherein the resilient sections form the general outline of a shoe and means are provided in said framework for adjusting said sections to the outline of a selected shoe.

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