Sept. 26, 1939. H. C. KING 2,173,968

MANUFACTURE OF SHOE BOTTOM UNITS

Original Filed Jan. 13, 1936 2 Sheets-Sheet 1

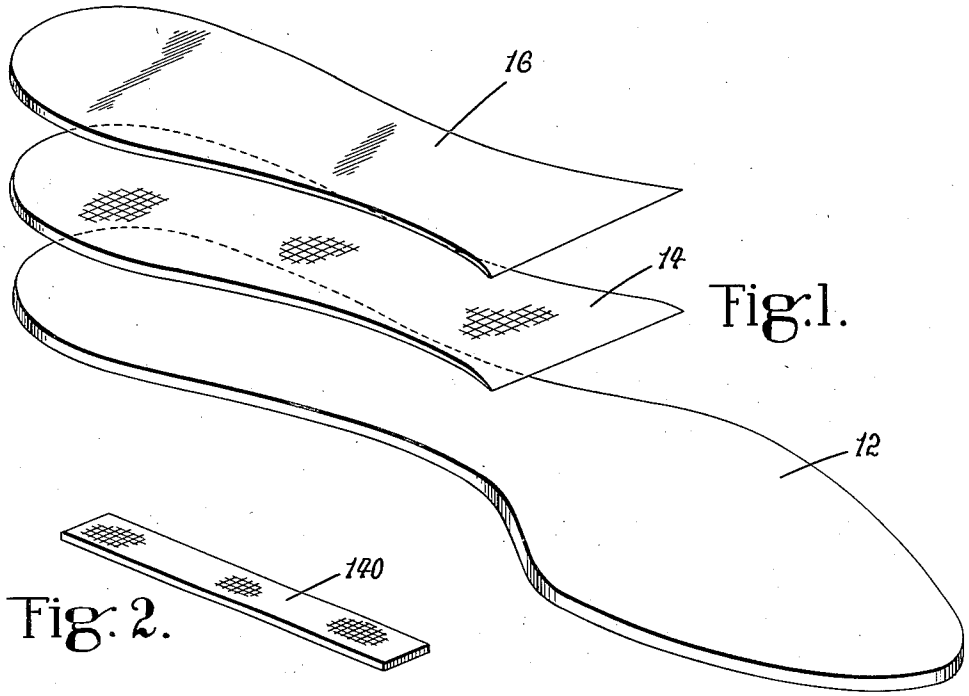


Fig. 1.

Fig. 2.

Fig. 3.

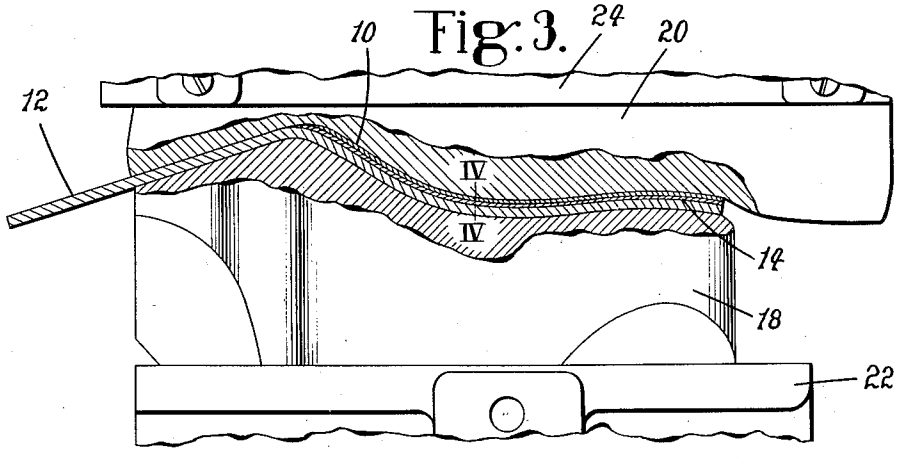
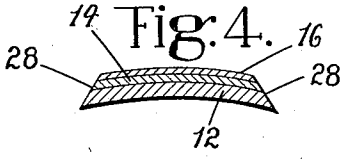


Fig. 4.



INVENTOR
Harry C. King
By his attorney
Victor Cobb.

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Fig. 5.

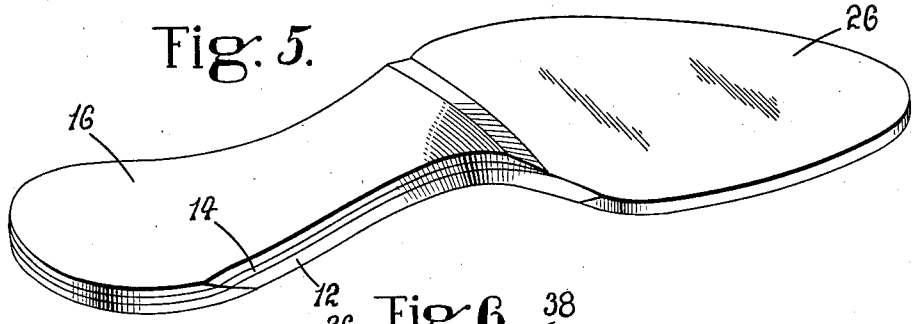


Fig. 6.

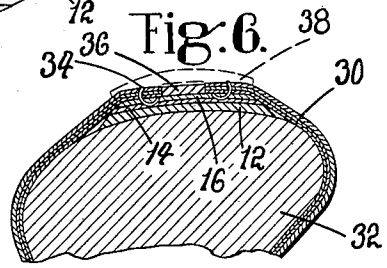


Fig. 7.

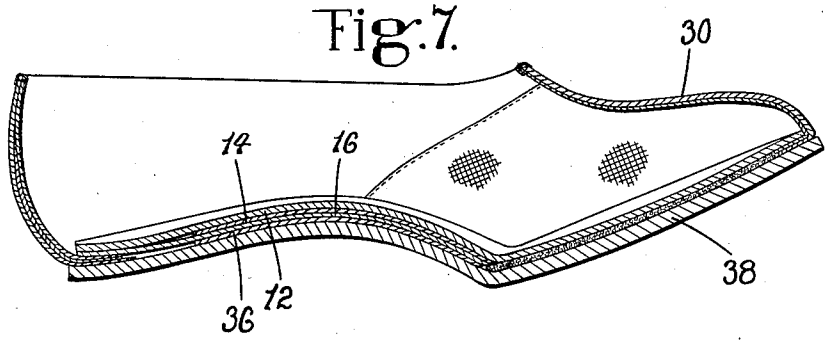
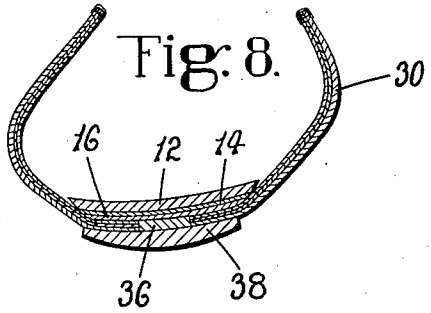


Fig. 8.



INVENTOR
Harry C. King
By his attorney
Victor Cobb

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UNITED STATES PATENT OFFICE

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MANUFACTURE OF SHOE BOTTOM UNITS

Harry C. King, Quincy, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Original application January 13, 1936, Serial No. 58,886. Divided and this application September 8, 1938, Serial No. 228,979

5 Claims. (Cl. 12—146)

This invention relates to improvements in shoe bottom units and to improved methods of making the same. The present application is a division of my earlier application, Serial No. 58,886, filed January 13, 1936.

It is customary to stiffen the shank portions of the bottoms of shoes by the use of shank stiffeners made of metal or wood. Such shank stiffeners may be practically rigid or they may have a certain amount of resiliency but invariably they are sufficiently stiff to interfere more or less seriously with the natural flexing of the muscles of the foot. Such stiffeners are supplied in different lengths and different "bends" for use in connection with lasts of different sizes and styles but for one reason or another the shank stiffener is liable to impart to the shoe bottom a contour which fails to conform accurately to the contour of the last bottom and which for that reason is not adapted to afford proper support for the foot. Moreover, considerable difficulty is often experienced in attaching shank stiffeners of wood or metal so that they will remain firmly secured in place throughout the life of the shoe.

For the purpose of avoiding such difficulties as those above mentioned I employ shank stiffening means which is more flexible and resilient than either wood or metal of the sort commonly used in making shank stiffeners, which is light in weight, which is capable of being secured in place without the use of such fastening devices as tacks, staples, stitches or the like and which is adapted to be molded to the contour of the bottom of the particular last or shoe in connection with which the shank stiffener is to be used. I have found that colloid-treated fabric, for example, fabric treated with nitrocellulose, is particularly suitable for use in stiffening the shank portions of shoe bottoms. In making use of a shank stiffener made of such fabric I render the stiffener sticky so that it will adhere readily to the shoe parts with which it is to come in contact and at the same time render it capable of being readily molded into conformity with the shape of the bottom of a last or shoe by applying to the stiffener a suitable solvent such as acetone. Thereafter the shank stiffener is made to adhere to the shoe bottom parts preferably by pressure applied by means of mold members one of which at least is shaped to correspond to the shape of the bottom of the last upon which the shoe is to be made so that the shank stiffener and the adjacent shoe bottom parts will be molded accurately to fit the last bottom.

As herein illustrated the shank stiffening means may be secured to an insole member before the insole member is assembled with an upper on a last thereby providing a reinforced insole or insole unit. In making such a reinforced insole or insole unit the shank stiffener may advantageously be shaped in edge contour to correspond to that of the heel and shank portions of the insole and preferably the shank stiffener is interposed between the insole and a heel and shank reinforcing piece which may be made, for example, from fiber or leatherboard and is preferably also shaped to correspond to the edge contour of the shank stiffener and the heel and shank portion of the insole. Thus, after the parts have been assembled and secured together under molding pressure, a shoe bottom unit is produced comprising an insole member, a reinforcing piece for the heel and shank portions of the insole member, and a resilient shank stiffener which is interposed between these parts and is permanently secured to both of them by means of adhesive produced by the action of the solvent upon the colloidal element of the shank stiffener.

The invention will now be explained with reference to the accompanying drawings, in which—

Fig. 1 is a perspective view of the component parts of a shoe bottom unit comprising an insole, a shank stiffener, and a heel and shank reinforcing piece;

Fig. 2 is a perspective view of a shank stiffener of a different form from that shown in Fig. 1;

Fig. 3 is a fragmentary view, partially in side elevation and partially in section, of a shoe bottom unit in course of construction, illustrating a convenient manner of applying the attaching and molding pressure;

Fig. 4 is a cross-sectional view of the shoe bottom unit, the section being taken along the line IV—IV of Fig. 3 and showing the unit as it appears after the lateral edges of its shank portion have been beveled;

Fig. 5 is a perspective view of the shoe bottom unit;

Fig. 6 is a cross-sectional view of a shoe in course of construction embodying my improved shoe bottom unit;

Fig. 7 is a longitudinal sectional view of a shoe having my improved shoe bottom unit embodied therein; and

Fig. 8 is a cross-sectional view of the shoe shown in Fig. 7.

Referring first to Fig. 1, 12 designates a full length insole, 14 a shank stiffener composed of a

colloid-treated fabric and having an edge contour corresponding to that of the heel and shank portions of the insole, and 16 a heel and shank reinforcing piece composed of fiber or similar material, the reinforcing piece 16 also having an edge contour corresponding to that of the insole. I prefer to employ a shank stiffener composed of a treated fabric, such as that disclosed in United States Letters Patent No. 1,820,198, granted August 25, 1931, upon application of A. F. Randolph.

In making my improved shoe bottom unit a solvent, for example denatured alcohol and acetone, is applied to the shank stiffener 14, as by means of a brush or by dipping the stiffener in the solvent, and the several parts of the unit are assembled in the relation indicated in Fig. 1, the stiffener 14 being interposed between the insole 12 and the reinforcing piece 16. The shank stiffener 14 having been softened and rendered sticky by means of the adhesive produced by the action of the solvent upon the colloidal element of the stiffener, the several parts are firmly secured together by means of pressure which, as illustrated in Fig. 3, may advantageously be applied by means of mold members comprising a rigid lower form 18 and a yielding upper pad 20. As shown, the insole-engaging surface of the form 18 is made to correspond to that of the bottom of a last so that when the mold and the form are brought together under pressure not only will the component parts of the bottom unit become firmly secured together but they will also be molded so as to conform to the shape of the bottom of the last. The form 18 may rest upon a support 22 and the pad 20 may be mounted upon a carrier 24 which is movable toward and from the support 22, the form and the pad, together with the means for supporting and relatively moving them, being preferably similar to corresponding means illustrated and described in United States Letters Patent No. 2,065,465, granted December 22, 1936, upon application of John M. Whelton. After the pressure supplied by the pad 20 has been maintained for a sufficient period properly to mold the shoe bottom members and firmly to secure them together and preferably also to allow the softened colloidal material to become hardened, the pressure is relieved and a molded shoe bottom member 26, such as that shown in Fig. 5, is produced. Advantageously, the opposite lateral edges of the shank portion, or of the shank and heel portions, of the unit may then be beveled, as indicated at 28 in Fig. 4, the better to adapt the unit for use in a shoe.

While the shank stiffener hereinbefore described corresponds in outline to that of the insole, satisfactory results may be obtained by the use of a shank stiffener which is substantially narrower than the insole, as shown at 140 in Fig. 2.

In making a shoe embodying my improved insole unit, the unit is assembled with an upper 30 on a last 32 (Fig. 6), the upper is worked over the last and its marginal portions secured in overlasted relation to the insole unit, for example, by means of staples 34, the latter preferably being of a type which will penetrate the reinforcing piece 16 without entering or at least without extending through the insole 12. A shank stiffener 36, formed of a colloid-treated fabric, and of a shape corresponding to that of the stiffener 140, may be applied to the outer surface of the insole in the space between the overlasted margins of the upper, the shank stiffener 36 having been softened by means of a solvent so that it will readily adhere to the insole and also to the outsole when the latter has been applied. The shoe is completed by laying an outsole 38 and securing it to the shoe bottom by such means as cement or through-and-through stitches.

In the use of my improved shoe bottom unit it will be found that the shank portion of the shoe, because of the inherent resiliency of the shank stiffening material, will yield readily to accommodate the natural movements of the bones and muscles of the foot in walking but will react promptly when the foot pressure is relieved so as to restore the shoe bottom parts to their original and normal shape. Thus, the foot is enabled to flex and relax in a natural manner and receives such exercise as is essential in order to maintain or restore proper foot posture and to provide for natural and adequate support of the various arches of the foot. Because of the character of the material with which the shank stiffening means is composed and the herein-described manner of treating and applying the stiffening means, the latter not only becomes firmly secured in place without the use of any of the usual fastening devices but the colloidal element of the stiffening means penetrates more or less into the adjacent shoe materials, impregnating the latter with a resilient stiffening substance and "fusing" the several shoe parts together into a practically coherent structure and imparting a certain amount of resiliency to the adjacent shoe bottom materials. Moreover, as a result of the molding of the shoe bottom unit while the shank stiffening means is in a softened or semi-plastic and adhesive state, the stiffening means as well as the rest of the unit is accurately molded to conform to the contour of the bottom of the last and when the softened shank stiffening means becomes hardened or set it serves to maintain the unit in the desired foot-conforming shape throughout the life of the shoe.

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

1. That improvement in methods of making insole units which consists in forming a full length insole, a stiff, non-metallic heel and shank reinforcing piece coextensive both lengthwise and widthwise with the heel and shank portions of the insole and a shank stiffener member of normally resilient material capable of becoming sticky when softened, softening said shank stiffener member sufficiently to render its opposite sides sticky and then interposing said softened member between said insole and said shank reinforcing piece, and applying pressure to said parts thereby causing them to adhere together to provide an insole unit.

2. That improvement in methods of making insole units which consists in forming a shank stiffener member of normally resilient material capable of becoming sticky when softened, softening said member sufficiently to render its opposite sides sticky and then interposing the softened member between a relatively flexible insole and a relatively stiff shank reinforcing piece, and molding the assembled parts into conformity with the contour of the bottom of a last thereby causing said parts to adhere together to provide a molded insole unit.

3. That improvement in methods of making insole units which consists in providing a relatively flexible insole, forming a relatively stiff

shank reinforcing piece and a piece of colloid-treated fabric so that each is coextensive with the shank portion of said insole, softening said colloid-treated fabric to render its opposite surfaces sticky, interposing the softened piece between said insole and said shank reinforcing piece with corresponding lateral edges of said parts in alinement, applying molding pressure to said parts thereby causing them to adhere together to provide an insole unit and shaping the unit to last bottom curvature, permitting said softened piece to harden while said parts remain under said molding pressure, and thereafter beveling the opposite lateral margins of the component parts of said molded unit.

4. That improvement in methods of making insole units which consists in forming a shank stiffener from a piece of fabric impregnated with nitrocellulose, applying a solvent to the surfaces of said shank stiffener to soften it and introducing the softened stiffener between a relatively flexible insole and a relatively stiff heel and shank reinforcing piece, and applying pressure to the assembled parts thereby causing them to adhere together to provide an insole unit.

5. An insole unit comprising a full length, relatively flexible insole, a relatively stiff heel and shank reinforcing piece, and a shank stiffener interposed between said parts and consisting only of a strip of colloid-treated fabric, said strip being secured by means of its colloidal ingredient to both said insole and said reinforcing piece, and said stiffener and said reinforcing piece each being coextensive both lengthwise and widthwise with the heel and shank portions of the insole.

HARRY C. KING.