

[54] **SHOE INNER SOLE AND ORTHOPEDIC SUPPORT**

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[51] Int. Cl. ....A61b 5/10

[58] Field of Search .....128/2 R, 2 S, 594, 128/595, 166.5; 264/222; 36/43, 44

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[57] **ABSTRACT**

A shoe innersole having a laminated construction of an upper leather-like layer, a center layer formed of an open-cell polyurethane matrix filled with a combination of lattices so as to be plastically deformable, and a bottom layer of a resilient rubber material. The innersole deforms in conformance with the impression of a wearer's foot so as to concurrently soften the foot fall by supporting a larger area of the foot while providing a resilient cushioning effect. In another embodiment, the innersole incorporates an additional area which cups under and provides a minor amount of support to the arch region of the wearer's foot.

In addition, the innersole is used by an orthopedic physician to obtain a record of the actual pressure exerted by a foot in a shoe for the purpose of prescribing or diagnosing the foot problems of a patient.

**7 Claims, 4 Drawing Figures**

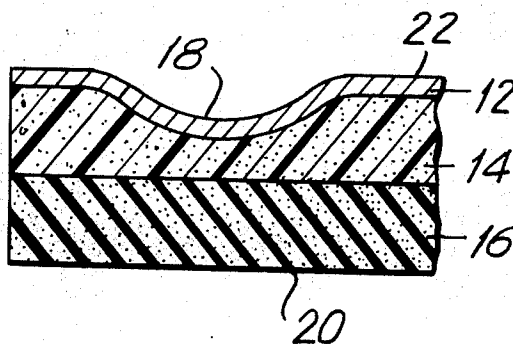


FIG. 1

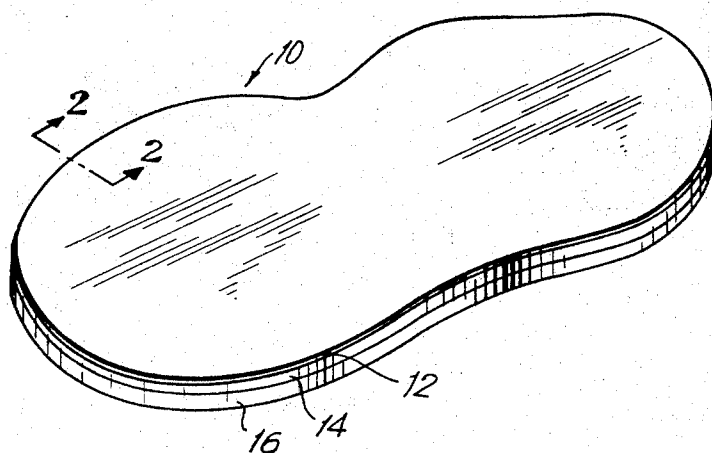


FIG. 2a

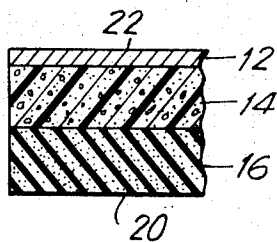


FIG. 2b

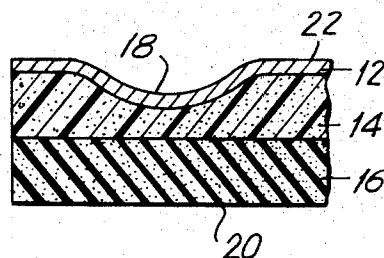
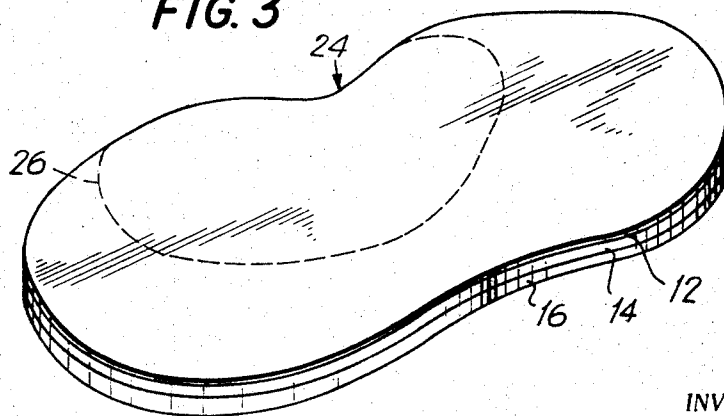


FIG. 3



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## SHOE INNER SOLE AND ORTHOPEDIC SUPPORT

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to cushioned innersoles for shoes or boots and, more particularly, a laminated innersole construction having a plastically deformable interlinear layer adapted to conform to the shape of a wearer's foot so as to provide orthopedic support thereof while concurrently forming a cushion tending to soften the wearer's footfall. Further, the innersole can be removed after use to become a permanent record of the pressure areas of the foot for use in diagnosis of foot ailments.

## 2. Description of the Prior Art

In order to provide a high degree of foot comfort when wearing shoes or boots, various types and forms of cushioned innersoles have been previously proposed and are currently widely distributed and marketed. Among presently known innersoles of this type are those which are adapted to be inserted into a boot or shoe and designed to conform to the contour of the wearer's foot, thereby providing a resilient cushion which will alleviate or minimize pressure concentrations which may cause callouses or similar discomfiting effects on the foot. Generally, the prior art laminated innersoles include a center or interlinear cushioned portion formed from a resilient material, generally constituted of a rubber or sponge-like polyurethane, which will impart the cushioning effect in response to the pressure of the wearer's foot by yielding and then resiliently springing back upon removal of the foot from the shoe or boot. The inherent resilience of these innersoles, although providing a cushioning effect, is not suitable to permit the innersole to permanently deform so as to adapt to the configuration of the wearer's foot, thereby failing to provide for an orthopedic support for the foot and particularly the ball area thereof.

## SUMMARY OF THE INVENTION

The present invention obviates or ameliorates the disadvantages and drawbacks encountered in prior art cushioned innersoles by providing a novel and unique laminated cushioned innersole which is particularly adapted to form a self-shaping, soft undercushion or foot support for wearers having orthopedic walking problems. In this connection, the present invention contemplates an orthopedic laminated, cushioned innersole which in essence, for a shoe wearer having an orthopedic problem caused by a too hard ball of the foot, will replace the function of the fatty foot ball tissue which tends to break up and be displaced during walking, thereby causing pain and discomfiture to the wearer.

Essentially, the present laminated innersole is constituted of an upper layer, preferably made of leather or a vinyl plastic, having a smooth top surface along which the foot of the shoe wearer may readily slide. An interlinear or center layer is adhesively fastened or bonded to the lower surface of the upper layer, and is formed of a deformable cushioning material such as, for example, an open-cell polyurethane matrix having sponge-like properties which is combined with a filler or interstice of lattices providing for the plastic deformation of this layer so as to conform to the foot shape pressing

thereon. A bottom layer is adhesively fastened to the interlinear cushion layer, and consists of a resilient layer of a natural or synthetic rubber material having a generally high-friction, non-skid lower surface adapted to engage the surface of the shoe or boot to thereby prevent relative sliding motion between the shoe and the innersole upon movement of the wearer's foot, while concurrently affording sufficient cushioning effect to soften the foot fall during walking.

Since the latex-filled polyurethane matrix of the center or interlinear layer remains deformed in response to the pressure exerted thereon by the wearer's foot even after removal of the foot from the shoe, it is particularly adapted to provide an orthopedic cushion support which remains particularly shaped to the configuration of the wearer's foot. This, in combination with the resilient bottom layer, will assure the constant and required support for those portions of the foot which are in need of cushioning, i.e., the ball of the foot.

Another aspect of the cushioned innersole according to the present invention is that it may be fitted with an arch-support structure, thereby facilitating the cushioning of the ball of the foot while concurrently providing an arch support so as to simultaneously alleviate more than one relatively common orthopedic problem.

Accordingly, it is a primary object of the present invention to provide for an improved laminated, cushioned innersole for a shoe or boot.

Another object of the present invention is to provide a laminated innersole having an interlinear cushioned layer constituted of a polyurethane matrix having a combined intersticed latex filler.

Still another object of the present invention is to provide a laminated, cushioned innersole having an interlinear layer of a lattice-filled open-cell polyurethane matrix adapted to permanently deform in response to pressure from a wearer's foot so as to form an orthopedic support while providing the desired foot cushioning effect.

Yet another object of the present invention is to provide a laminated, cushioned innersole of the type described including an arch-support structure.

## BRIEF DESCRIPTION OF THE DRAWING

These and other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view of one embodiment of a laminated cushioned innersole according to the present invention;

FIG. 2a is an enlarged, fragmentary sectional view along line 2—2 in FIG. 1 before deforming pressure has been applied thereto;

FIG. 2b is an enlarged, fragmentary sectional view along line 2—2 in FIG. 1 after deforming pressure has been applied thereto; and

FIG. 3 is a perspective view of a second embodiment of a laminated cushioned innersole according to the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

Referring now in detail to the drawing, wherein like reference numerals designate like or similar parts throughout the several views, FIG. 1 illustrates an innersole 10 adapted to be inserted into a shoe or boot (not shown).

The innersole 10 is of a laminated construction, consisting of an upper layer 12, a center or interlinear layer 14, and a bottom layer 16. All of the layers 12, 14 and 16 are bonded or fastened together by means of a suitable adhesive positioned between each of the layers.

As illustrated in FIGS. 2a and 2b of the drawings, the upper layer 12 is formed of a material which will facilitate the easy insertion of a wearer's foot into the shoe and permit sliding thereof along the length of the innersole 10. Layer 12 is preferably formed of leather, vinyl plastic or any other material exhibiting similar leather-like physical characteristics.

Center or interlinear layer 14 is essentially constituted of a relatively heavier thickness of an open-cell or foamed polyurethane having its matrix intersticed or filled with a combination of lattices which will afford this layer a higher degree of plasticity. When pressure is exerted upon this layer 14, by the deforming pressure upon layer 12 caused by the weight of a wearer's foot, the latex-filled polyurethane will plastically deform so as to conform to the configuration of the foot. The deformation of layer 14 will be essentially permanent, in effect, when the wearer removes the innersole 10 contained in the shoe, an impression 18 which has been made on layers 12 and 14 will remain so as to form an orthopedically accurate mold of the bottom of the foot.

The bottom layer 16 of the innersole 10 is preferably formed of a resilient material which may be, for example, natural or synthetic rubber, or any other material exhibiting rubber-like resilient cushioning properties. This layer 16, when the pressure of the wearer's foot on the innersole 10 is relieved will spring back to its initial undeformed configuration, so as to constitute a resilient cushion. As is evident, the rubber-like material of layer 16 forms a bottom surface 20 having a generally high co-efficient of friction which will prevent the sliding of the innersole 10 in the shoe or boot upon movement of the foot along the upper surface 22 of layer 12, thereby maintaining the required position of the innersole within the shoe.

The permanent deformation of layer 14 in conformance with the impressions thereon by the bottom of a wearer's foot provides an excellent orthopedic mold showing the exact configuration of the bottom of the foot. By advantageously combining layers 12 and 14 with a resilient bottom layer 16, which will cushion the foot fall of the wearer of the shoe containing the innersole 10, a superior cushioning support is provided for the bottom of the foot. This support is particularly important and advantageous for users of the innersole who are subject to orthopedic or foot problems evidenced by an excessively hard ball of the foot. The laminated innersole 10, by employing a plastically deformable interlinear layer 14 permits the deforma-

tion of the innersole to correspond with the impressions of the foot, while concurrently providing a desirable cushioning effect on the foot, thereby softening the foot fall and replacing the fatty tissue in the foot which is broken up and displaced through walking, particularly in the foot ball area.

In the embodiment of FIG. 3 of the drawing, an innersole 24 is illustrated which is essentially similar to the innersole 10 of the embodiment of FIG. 1, by including an upper layer 12, interlinear layer 14 and a bottom layer 16 made exactly like those in the innersole of the previous embodiment. However, in this embodiment, the innersole 24 includes an arch support member 26 which is preferably interposed between layers 14 and 16. The arch support member 26 may be formed of steel or similar suitable material commonly used in forming supports for shoe wearers who are commonly subject to this type of orthopedic problem. The arch support may be one which is commercially available and has been previously incorporated into the innersole 24, or alternatively may be made on the basis of an orthopedic mold constructed by a physician and then inserted into a laminated innersole in accordance with the present invention.

The foregoing disclosure relates to only preferred embodiments of the invention, and is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of disclosure, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A laminated cushioned innersole for insertion into a shoe or boot, comprising an upper layer of a generally smooth low-friction material, a bottom layer of a generally resilient material, and an intermediate permanently deformable cushioned layer disposed between said upper and lower layers in laminated co-extensive relationship therewith, said deformable cushioned layer being formed of lattices constituting an open-celled polyurethane matrix and a latex filler material so as to facilitate permanent plastic deformation of said cushioned layer to conform to the bottom shape of the foot of a wearer while maintaining a cushioning effect.

2. An innersole as claimed in claim 1 wherein said upper layer comprises leather having its upper surface adapted to be engaged by the foot of the wearer.

3. An innersole as claimed in claim 1 wherein said bottom layer is natural rubber.

4. An innersole as claimed in claim 1 wherein said bottom layer is synthetic rubber.

5. An innersole as claimed in claim 1 wherein said upper layer is a vinyl plastic material.

6. An innersole as claimed in claim 1 including adhesive means for bonding said layers in said laminated relationship.

7. An innersole as claimed in claim 1 wherein said innersole includes arch-support means positioned in the region adapted to be engaged by the arch of the foot of the wearer.

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