June 3, 1952 D. R. BRADY 2,599,317

SHOE INSOLE

Filed Aug. 2, 1946

FIG. 1.

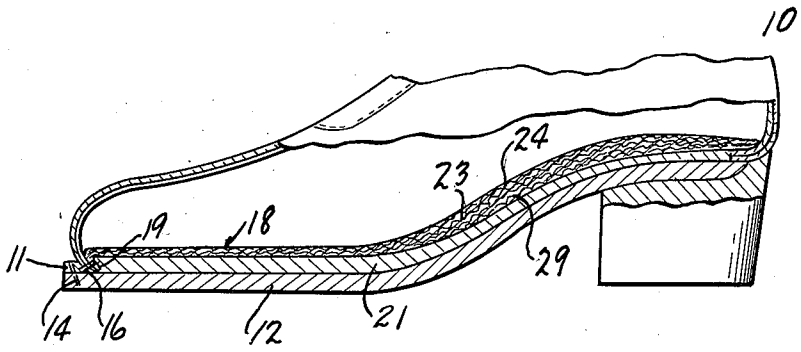



FIG. 2.

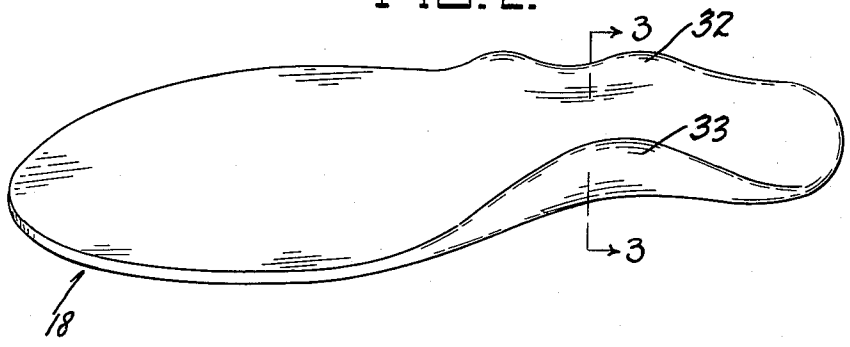



FIG. 3.

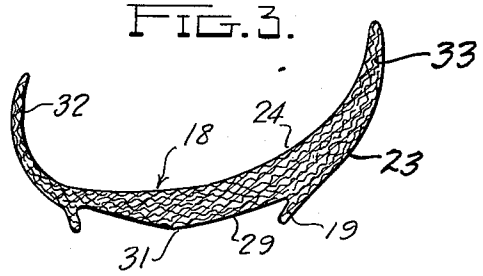



FIG. 4.

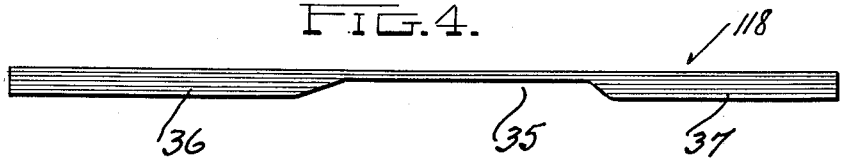
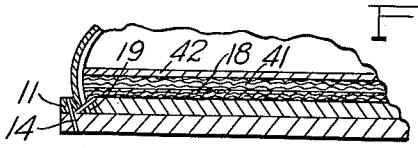



FIG. 5.




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## SHOE INSOLE

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2 Claims. (Cl. 36—44)

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This invention relates to shoes and like articles of footwear and particularly to improved shoe sole construction.

Shoes have conventionally been made with leather or leather-like composition insoles to which the shoe upper and the outer sole are fastened by stitching or cementing, the outer sole usually being secured to the insole through means of a welt. Even in cases where the best leather is used for the shoe insole the shoe loses its shape after a period of time due to the deformation of the insole. This deformation of the sole may be attributed to the effect of the moisture to which the insole is normally exposed and the weight of the wearer tending to deform the sole while it is moist and most easily deformed.

A serious disadvantage of leather or leather-like type insoles is that after a shoe has absorbed considerable moisture as during wet weather and the shoe has been allowed to dry the shoe becomes stiff and if a shoetree has not be placed in the shoe while it dries, it is very apt to have dried in such a way that the shoe has stiffened with the sole curved or otherwise misshaped. Frequent exposure of ordinary shoes to moisture also causes deterioration of the leather of the insole and where the moisture is present for a long period the sole may mildew and rot so that the life of the shoe is greatly shortened.

In conventional shoe construction means are provided for stiffening and giving added support to the arch portion of the sole by fastening to the under side of the arch portion of the insole a stiffening element in the form usually of a ribbed strip of vulcanized fiber, metal, or the like. In time the stiffener either breaks down or becomes loosened where it is attached to the insole with a resultant sagging of the arch portion of the shoe. When this occurs support for the arch of the foot is no longer provided with consequent discomfort to the wearer.

It is an object of the present invention to provide a shoe construction wherein the insole forms a base for the shoe with the insole being of permanent shape and not subject to permanent deformation so that the useful life of the shoe is increased.

It is a further object of the invention to provide a shoe construction including an insole that is of desired flexibility throughout the life of the shoe; to provide an insole that cannot absorb moisture and consequently will not stiffen after the shoe has been subjected to wet conditions, and that will not mildew nor support other fungus growth.

It is another object of the invention to provide

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a shoe construction including an insole shaped to fully conform to the shape of the human foot especially in the portions overlying the arch of the wearer's foot to provide full support for the arch portion of the foot and to provide such support that is of permanent character.

In athletic type shoes it is desirable to give additional support to the heel and ball portions of the foot especially when the shoes have metal spikes or rubber cleats attached. Conventionally this added support has been provided by incorporating tempered steel plates in the sole construction of the shoe which underlie both the heel and ball portions of the foot.

It is an object of the present invention to provide athletic type shoes having added strength in the portions of the sole underlying the heel and ball portions of the foot but without the need for steel or other metal plates or other means that would add weight to the shoe.

In the drawings:

Figure 1 is a longitudinal sectional view of a shoe constructed in accordance with the present invention;

Figure 2 is a perspective elevational view of the shoe insole of the present invention;

Figure 3 is a cross sectional view of the insole taken on the line 3—3 of Figure 2;

Figure 4 is a side elevational view of an insole for athletic type shoes constructed in accordance with the present invention; and

Figure 5 is a partial longitudinal sectional view of a shoe constructed following a modification of the invention.

Following conventional practice the shoe of the present invention comprises an upper 10, a welt 11, and an outer sole 12. The outer sole is secured to the shoe by being stitched as at 14 to the welt, and the welt and the upper are secured by stitching 16 to the margin of the insole 18. The stitches 16 either pass through the body of the insole or through a depending strip 19 that is part of the insole or that is secured to the insole adjacent its outer edge. The space 21 between the insole and the outer sole is usually filled with a suitable composition such as a mixture of granulated cork and mastic binding material.

The insole 18 of the present invention is a substantially continuous body of resinuous material 23 reinforced throughout with a plurality of layers of fabric 24. The fabrics 24 are of fibrous glass either in the form of interwoven yarns or intermatted fibers haphazardly arranged and bonded together by a suitable binding agent to form integral fibrous sheets.

Preferably the fabrics 24 are woven of yarns of glass fibers of the continuous type, that is, yarns in which a multiplicity of fine glass fibers or filaments, usually about .0003 inch or less in diameter, are intertwisted and are of such length as to extend substantially continuously throughout any given length yarn. Fabrics made from these yarns may be of a thickness no greater than several thousandths of an inch and are ideally suited for incorporation in the present insole construction because three or four or more layers of fabric may be employed to obtain the desired flexibility and strength while still providing a sole as thin or thinner and lighter in weight than previous leather insoles.

The insole 18 is constructed by impregnating a plurality of fabric layers with a selected ordinary laminating resinous material, then drying the resin impregnant, if desired, and then laying up the fabric layers in superposed relation over a form of desired shape. The superposed layers are then held in intimate contact with each other and held to the form by pressure exerted by means of an expansible rubber bag or in other suitable fashion.

At the arch portion of the insole additional layers of resin-impregnated fabric 29 may be laid up over the previously applied fabric layers to thicken the arch portion as shown in Figures 1 and 3 and form a rib 31 that serves to stiffen the arch portion of the insole and provide support for the arch of the wearer's foot. Adjacent the arched portion the fabric layers may also be cut and fitted to form flanges 32, 33 that will closely fit the arch of the wearer's foot to provide additional support so that the arch of the foot is fully engaged by a supporting surface corresponding in shape closely to the shape of the arch.

If desired, however, the insole of the present invention may be made substantially flat throughout, similar to conventional leather insoles, and metal or other stiffeners may be fastened to the insole at the lower side of the arched portion following conventional practice. Also in certain cases as in the manufacture of insoles for athletic shoes it may be desirable to employ less fabric layers in the instep portion, as in the region 35 of the insole 118 of Figure 4, than in the balance of the insole to provide the greater flexibility at the arch portion of the insole that has been found desirable in these and certain other types of shoes. In such cases, the portions 36 and 37 of the sole underlying the ball and heel of the foot are desirably of sufficient thickness to be rigid under the stresses accompanying use of the shoe, with the portion 35 being sufficiently flexible to permit flexing of this portion during flexing of the foot.

As shown in Figure 5, wherein similar parts are designated by similar reference numerals, a layer 41 of intermatted fibrous glass may overlie the upper face of the insole 18. This intermatted layer has a cover 42 thereover of conventional material and the intermatted layer has sufficient resiliency to provide a cushion for the foot of the wearer.

While it is possible to fasten the upper 10 and the welt 11 to the insole by stitches passing directly through the body of the insole following the practice sometimes employed in present day shoe construction, it is preferable to provide the flange 19 about the edge of the insole to form a means for connecting the welt and upper by stitching to the insole.



The flange 19 may be formed at the time the insole is molded as above described or it may be formed by a strip of fabric or leather cemented over part of its width to the insole proper along its margin. If the flange is formed at the time the insole is molded, it is possible to lay strips of fabric over the insole about its margin, each strip being resin impregnated over a part of its width and the other part of the width of the strip being separated from the other fabric layers during curing of the resin by interposing a sheet of cellophane between the unimpregnated part of the strip and the next adjacent layer of resin-impregnated fabric. After the resin impregnant of the insole has been cured the unimpregnated part of the strip may be bent up from the surface of the insole to form the flange 19.

While the resin impregnant of the present insole may be any ordinary laminating resin it is preferred to employ those resins known as the low pressure-curing thermosetting resins. The use of these resins permits the resin impregnant to be cured with the application of relatively low pressure on the superposed layers of fabric, pressures in the neighborhood of 15 to 25 pounds per square inch usually being ample.

The low pressure-curing resins particularly adapted to the present invention comprise the modified phenolic type resins, urea formaldehyde, melamine formaldehyde and aniline formaldehyde, as well as allyl resins and lignin plastics or mixtures of such compounds. The nature of the modification step is varied, for example, by modifying phenolic resins or those of the cresylic acid derivative type by the use of a suitable catalyst or by refluxing the materials to the neutral or basic conditions or by compounding them with phlobaphene or other thermoplastic derivatives. Low pressure melamine and urea formaldehyde type plastics may be formed by modification with resorcinol or other suitable compounds. Others of the thermosetting plastics such as those of the allyl type need no preliminary treatment for materials of this class are already capable of being cured at low pressure. These low pressure-curing thermosetting plastics are known in the art and need no further description.

The combination of fibrous glass and resins employed in the present invention provides an insole of permanent shape and form since the resins have no cold flow and are not affected by the heat nor the moisture to which a shoe is normally subjected.

Various modifications may be made within the spirit of the invention and the scope of the claims.

I claim:

1. A shoe comprising an upper, an insole made up of a plurality of layers of fibrous glass interwoven fabric impregnated with a thermosetting resin extending as a continuous body throughout the insole, and a layer of intermatted fibrous glass overlying the upper face of the insole and having a covering thereover, said intermatted fibrous glass having a resiliency providing a cushion for the foot of the wearer.

2. A shoe comprising an upper, an insole made up of a body of thermosetting synthetic resin reinforced with glass fibers, and a layer of intermatted fibrous glass overlying the upper face of the insole and having a covering thereover, said intermatted fibrous glass having a resiliency providing a cushion for the foot of the wearer.

DAVID R. BRADY.

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