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Wolstenholme et al.

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[54] **INSOLE**

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[51] **Int. Cl.** **A43b 13/38**

[58] **Field of Search** 36/43, 44, 28, 71

[56] **References Cited**

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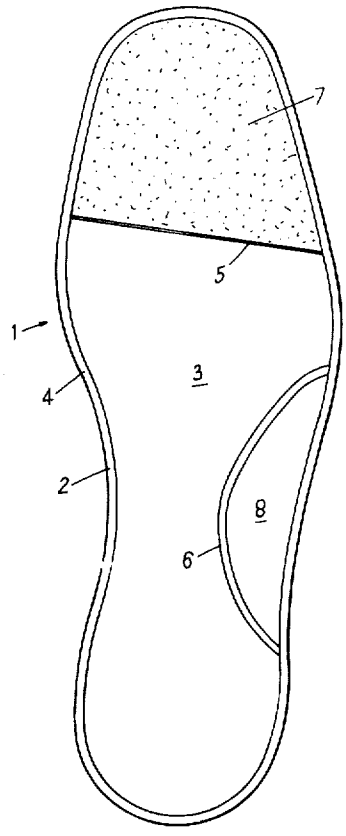
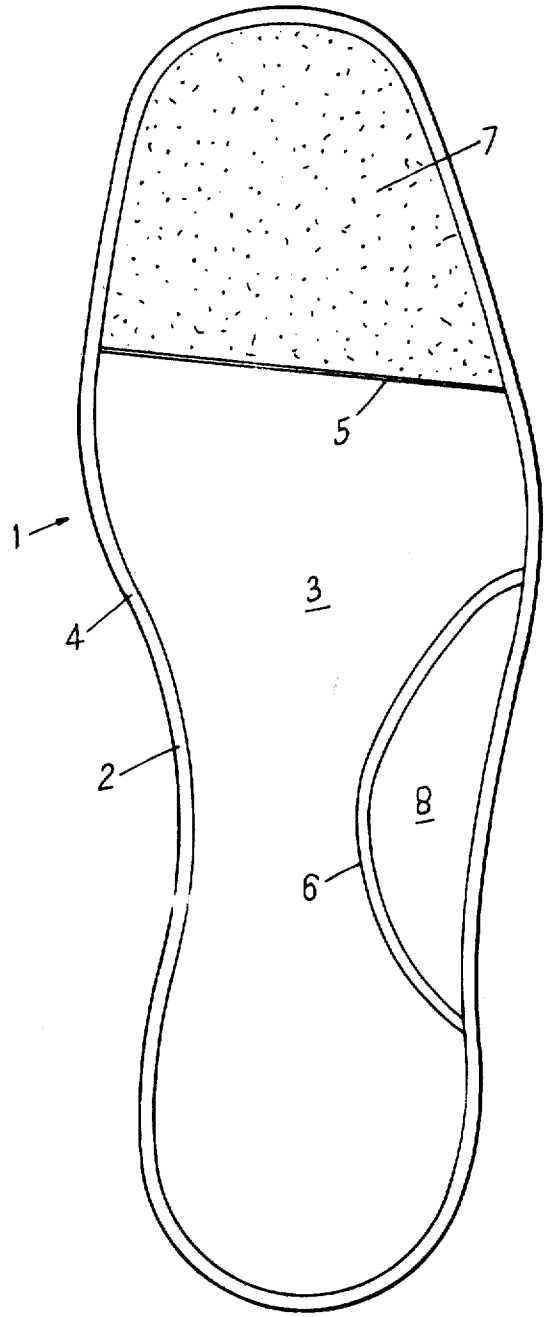
[57] **ABSTRACT**

In an insole for use in, or actually defining the sole of, footwear, an envelope generally shaped like a foot or a portion of a foot and preferably made of a plastics material such as polyurethane or polyvinylchloride, and having a perimeter which is adapted to remain of stable configuration under the weight of the wearer, has at least one region containing a liquid having a viscosity at 37°C which is substantially equal to that of glycerine at that temperature. The said region may be bounded at the front by a transverse line in the vicinity of the metatarsal head of the toes, by arcuate zones (concave in plan view) in the vicinity of the instep and a substantially semi-circular end zone in the vicinity of the heel of the foot.

10 Claims, 1 Drawing Figure




7
5
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INSOLE

This invention relates to an insole for use in footwear.

Although a pair of insoles would normally form a separate article of commerce from, and be intended for insertion in, a pair of boots or shoes, it could also conceivably be integral with, so as to form part of, such footwear. Accordingly, for the purpose of this specification, the term "insole" is intended to cover both the possibilities and not to be regarded as limited to an article separate from the boot or shoe in which it is intended to be worn; that is to say, it is intended to connote an item in, or for use in, footwear on which the underside of the wearer's foot rests.

With a view to increasing the comfort (or decreasing the discomfort) of the wearer of footwear, many different kinds of insole giving a "padding" or cushioning effect have previously been proposed. It is an object of the present invention to provide an insole capable of giving the wearer a greater degree of comfort by giving the foot a greater degree of support in the manner required in the course of its normal movements.

In an insole according to the present invention, an envelope has at least one flexible side generally shaped like a foot or a portion of a foot, a perimeter which is adapted to remain of stable configuration when pressure is applied to the said side, and at least one region in which the envelope is charged with a liquid having a viscosity at 37°C which has a value substantially equal to that of glycerine at that temperature.

The said region is preferably bounded at the front by a transverse line forward of the metatarsal heads of the toes, by arcuate portions of the perimeter of the insole, concave in plan view, on either side of the foot in the vicinity of the instep and a substantially semi-circular end portion of the perimeter in the vicinity of the heel.

The envelope is preferably made of a plastics material, such as polyurethane film or polyvinylchloride, the said perimeter of which is preferably defined by a weld.

Apart from the important viscosity characteristic of the said liquid, the latter should also be innocuous (in the event of failure of a said weld) and devoid of properties tending to inhibit welding of the said perimeter.

If desired, the said envelope may be partly or entirely surrounded by a further envelope or skin of like material, and additional cushioning obtained by providing an air cushion in the space between the two envelopes; in such a construction, a self-sealing air valve may be provided for the purpose of "blowing up" the said space with a predetermined amount of air, depending on the orthopaedic requirements of the wearer.

One form of insole embodying the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawing which shows the right hand one of a pair of said insoles in plan view.

Referring to the drawing, an envelope **1** consists of an upper and a lower sheet of polyvinylchloride, defining a top and a bottom side generally shaped like a foot.

These two sheets of PVC, each of which is **0.020** inch thick, are joined together along a perimeter in the form of a weld seam **2** in such a way that the configuration of the envelope remains stable when pressure is applied to the upper side by the foot of the wearer.

In a region **3**, bounded by perimeter zones **4, 5** and **6**, the envelope is charged with between **5** and **60** cubic centimetres of glycerine, the amount depending on the size of the insole.

A zone **7** of the envelope, forward of the metatarsal heads of the wearer's toes and separated from the region **3** by the weld **5**, contains a foam plastics material. This zone **7** is desirable to provide additional cushioning particularly for the benefit of wearers suffering from "claw toes", the foamed material preferably being foamed PVC.

A zone **8**, separated from the region **3** by the arcuate weld **6** is left empty; i.e. it contains neither the liquid contained in the region **3** nor the foamed PVC contained in the zone **7**.

In the manufacture of an insole in accordance with the invention, the envelope is first produced by welding together the two sheets of PVC defining the two sides of the insole, leaving a small gap in the weld through which the required quantity of liquid is introduced, whereafter the perimeter is sealed off by closing up the said gap by a further welding operation.

It will be appreciated that the quantity of liquid used in an insole depends not only on the size of the insole (which is produced in a range of sizes, similar to the usual range of sizes of boots and shoes) but also on the orthopaedic or other medical requirements of the wearer, particularly if the insole is to be used to alleviate an orthopaedic disorder, rather than to add to the comfort of walking of a wearer with normal healthy feet.

In order to provide the most comfortable rate of transference of the cushioning effect along and across the insole, as pressure on it is cyclically transferred to different parts of the said region, the rate of flow of the liquid to and from those parts is a critical characteristic, dependent on the hydraulic conditions prevailing, of which the viscosity of the liquid probably constitutes the most important parameter.

The invention also includes within its scope any footwear having an insole as hereinbefore defined and described disposed therein or forming part thereof. Indeed, certain special footwear, e.g. for a particular remedial, sporting or other recreational requirement may have merely one sole, such sole being constructed in the manner of the said insole; hence the term "insole" should not be construed at being limited to a sole which is necessarily associated with some further and outer sole, since it may, also within the scope of the invention, constitute the only sole of the footwear.

As an alternative to polyvinylchloride, the envelope **1** may consist of an upper and a lower sheet of polyurethane film having a thickness of, for example, between **0.005** inch and **0.015** inch, and preferably a thickness of **0.010** inch.

We claim:

1. An insole defined by an envelope having at least one flexible side generally shaped like at least a portion of a foot and welded about the perimeter;

a first zone in said envelope defining a single cavity bounded at the front by a transverse line forward of the metatarsal heads of the toes of the foot, by arcuate perimeter portions concave in plan view on either side of the foot in the vicinity of the instep of the foot and a substantially semi-circular end perimeter portion in the vicinity of the heel, and said first zone containing a liquid sealed inside; and

a second zone in said insole defining an empty zone bounded by a portion of the perimeter of said in-

sole at an area of arch support and by a weld inwardly of said portion also in said area of arch support.

2. An insole according to claim 1 wherein said liquid has a viscosity at 37°C substantially equal to that of glycerine at that temperature.

3. An insole according to claim 1, wherein the envelope is made of a plastics material.

4. An insole according to claim 3, wherein said material is polyurethane film.

5. An insole according to claim 3, wherein the material is polyvinylchloride.

6. An insole according to claim 5, wherein said envelope is made from a sheet of said polyvinylchloride 0.020 inch thick.

7. An insole according to claim 4, wherein said film is 0.010 inch thick.

8. An insole according to claim 1, wherein said first zone is charged with between 5 and 60 cubic centimetres of glycerine.

9. An insole according to claim 1, wherein forward of the metatarsal heads of the wearer's toes and separated from said second zone by a weld, a third zone of said insole containing a foam plastic material.

10. Footwear having an insole according to claim 1 forming part thereof.

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