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[76] Inventors: Rex E. Richmond; George Spector,	3,044,188	7/1962	Evangelista	36/3 R
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Primary Examiner—Richard J. Scanlan, Jr.

- [52] U.S. Cl. 36/43, 36/29
- [51] Int. Cl. A43b 13/38
- [58] Field of Search..... 36/43, 71, 2.5 AA, 28, 36/29

[57] ABSTRACT

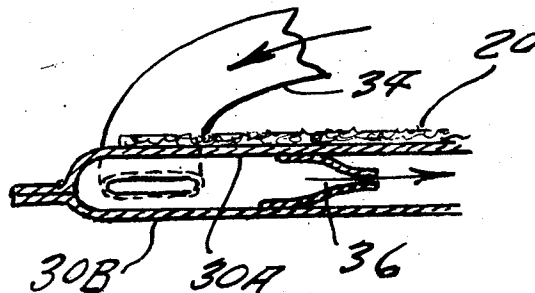
An insole for a shoe which is hollow and filled with a fluid. Means in the insole prevent surges of fluid between toe and heel as the wearer walks.

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5 Claims, 8 Drawing Figures



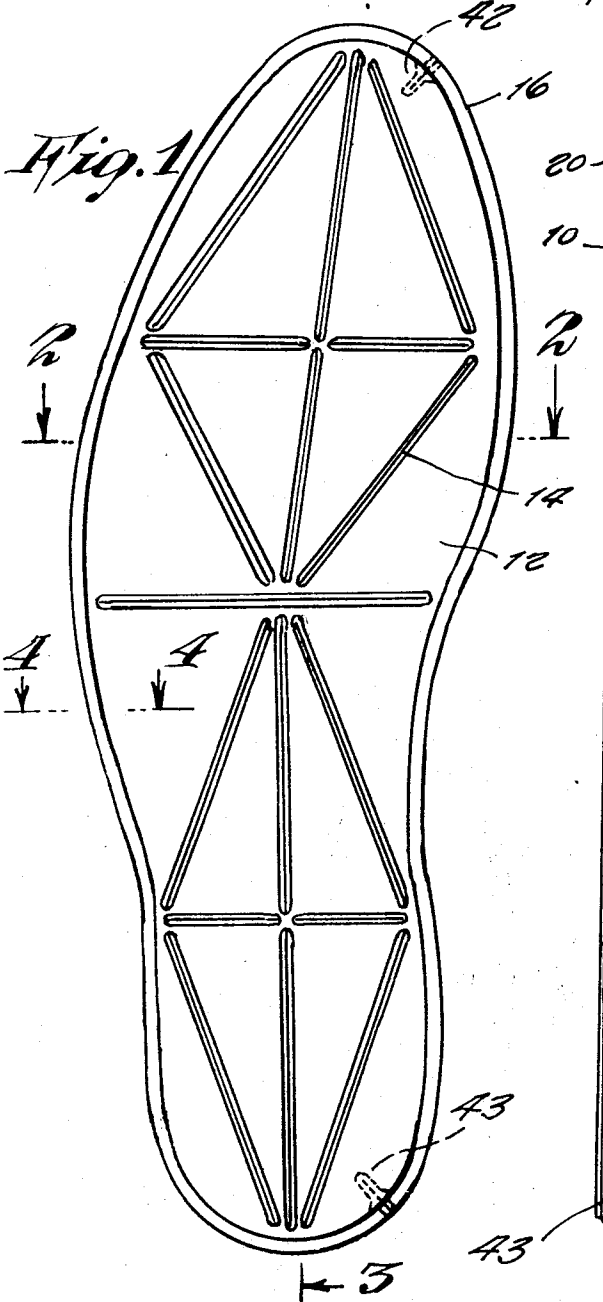
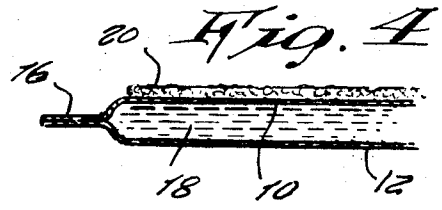
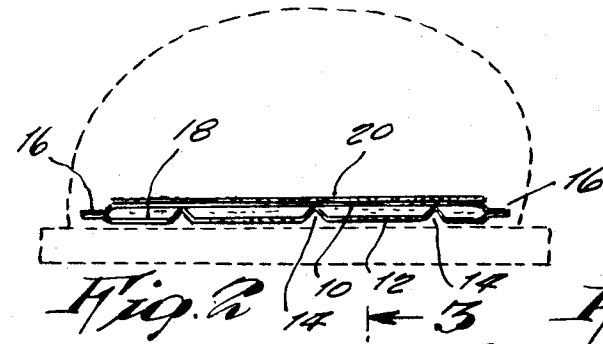


Fig. 3

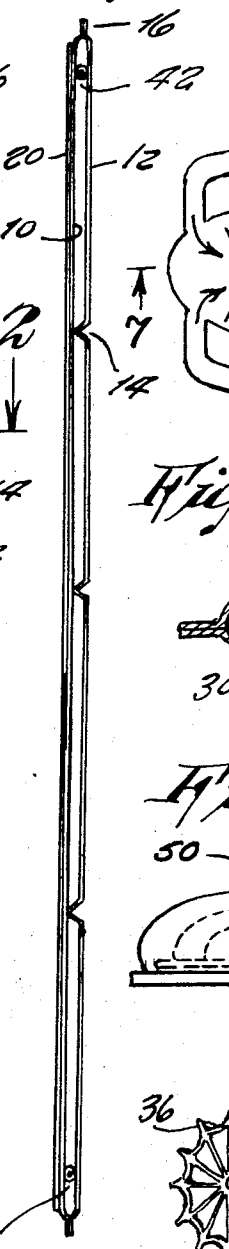


Fig. 6

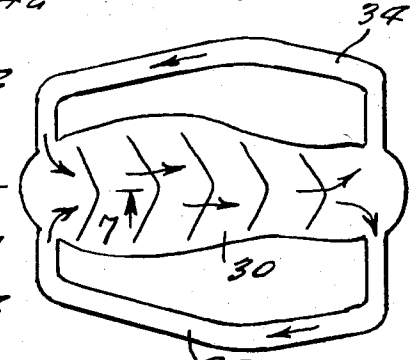


Fig. 7

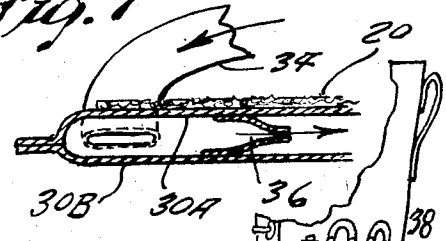


Fig. 5

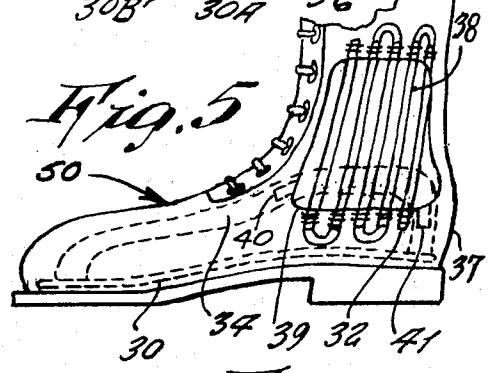
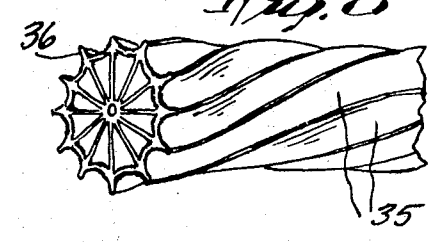


Fig. 8



FLUID FILLED INSOLES

SUMMARY OF THE INVENTION

My invention is directed toward shoes having insoles specially designed to provide full uniform resilient support for the feet of the user whether the user is moving or standing still. To this end the insole is hollow and filled with a suitable fluid. Means are provided in the sole to prevent surges of fluid between toe and heel as the user walks or runs and exerts pressure on different parts of the foot. Additional means can be provided to produce a pumping action to circulate the fluid through special cooling ducts and vents in the shoe whereby the fluid is cooled and produces a cooling action on the shoe itself thus providing enhanced comfort.

FIG. 1 is a bottom view of the invention.

FIG. 2 is a cross section on line 2—2 of FIG. 1

FIG. 3 is a cross section on line 3—3 of FIG. 1

FIG. 4 is a cross section on line 4—4 of FIG. 1

FIG. 5 is a view of a shoe showing a modified design of the invention incorporated therewith in which the lift and fall of the foot over the inner sole causes a pumping action of the fluid so it travels past vent holes in the shoe so to cool the liquid.

FIG. 6 is a plan view of the inner sole and its cooling ducts integral therewith, shown removed from the shoe and laid out flat.

FIG. 7 is a detail on cross section 7—7 of FIG. 6, showing the one way flap valves for the fluid.

FIG. 8 is an enlarged fragmentary view of a cooling tube used in the construction illustrated in FIG. 5.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIGS. 1—4, a hollow insole has a flat horizontal top surface 10 and a bottom surface 12 with inwardly extending ribs 14 which extend longitudinally and transversely as well as diagonally and which reach surface 10. The peripheral edges 16 of both surfaces extend downward from surface 10 and upward from surface 12 into horizontal mating sealing engagement. The ribs and edges thus define boundaries of a plurality of hollow chambers disposed side by side and filled with a fluid 18 such as water or gases. Surface 10 is surmounted by a flat yielding horizontal top layer 20.

When a user steps on the sole or merely stands thereon all portions of the foot have uniform full resilient support. The ribs prevent surges of fluid between toe and heel as the user walks and exerts pressure on different parts of the foot.

In FIGS. 5—7, shoe 50 has an insole 30 with elevated ducts 34 connected thereto that as the user walks, the fluid is circulated around the sides of the shoe. One way valves 36 integral with top and bottom flat surfaces 30A and 30B of the sole insure circulation paths for the fluid which travels as shown. The ducts provide a cooling action cooperating with air cooling vents 32 formed in the shoe upper as the rise and fall of the foot over the inner sole causes a pumping action for the fluid.

As shown in FIG. 5 a heel 37 is cooled by a spiral fluted or finned coil 38 formed in a small radiator 39 located on the outer side of the shoe or boot. Nipples 40 and 41 at opposite ends of the radiator communicate with duct 34, thereby providing for flow of fluid from duct 34 through the radiator-coils and back to the duct 34.

in FIG. 8 there is illustrated a detail of the cooling coil 38 which includes a wall that is spiral-fluted as shown at 35 and which includes fins 36, in order for a quick heat exchange action so to dissipate heat and cool the coolant liquid moving through the coil. The fins 36 extend through the inside of the tube and to the outside thereof as well, as shown.

As shown in FIGS. 1 and 3 it is to be noted that a self sealing filler valve 42 is installed at the toe end of the insole, and a self sealing air purge valve 43 is installed at the heel end of the insole. The filler valve 42 is provided for the purpose of fluid being injected there-through into the sole. The air purge valve 43 is provided for the purpose of allowing entrapped air to escape from the interior of the insole.

The filler valve is similar to those used on footballs, basket balls, volley and beach balls, and serves to provide a proper resilience in order to support the weight of the feet thereupon. Each size of insole might require a different amount of fluid therewithin accordingly for ideal support.

The air purge valve is essential so that all trapped air is removed otherwise a bulbous effect would result and the fluid would not be evenly distributed throughout the insole cavity so that a perfect cushioning would be prevented.

One way valve 36 (FIG. 7) is a conventional flap valve which is secured to the surfaces 10, 30A and 30B (or surfaces 10 and 12 of FIG. 2). With the open end serving as an inlet and flexible closure flaps at the outlet end. Pressure from the weavers foot expands the outlet flaps causing them to open and permit the flow of fluid in the desired direction. One or more of valves 36 may be located in series transversely across the width of insole 30 as indicated diagrammatically by the V-shaped lines of FIG. 6. It is to be understood that similar valves can be provided between the ends of the diagonal ribs 14, whereby flow can occur only from sole to heel, provided that a return flow duct such as 34 of FIG. 6 is provided in the shoe upper.

It is to be understood that the ribs 14 do not restrict flow completely but merely restrain or impede flow whereby surging of large quantities of fluid from one compartment to another is prevented.

While certain novel features of our invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing from the spirit of the invention.

We claim as follows:

1. A hollow fluid filled insole with toe and heel portions formed from resilient material having spaced upper and lower surfaces peripherally sealed in combination with a duct extending externally from the insole connecting the toe and heel portions including a valve extending transversely across the interior of the insole connecting between opposing portions of the peripheral seal, said valve permitting flow only in one direction responsive to pressure in said insole generated by the user's foot.

2. An insole as in claim 1 including ribs extending from one of the surfaces towards the other forming substantially defined pockets through which fluid flow is restricted preventing large surges therethrough.

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3. An insole as in claim 2 in further combination with a shoe upper having an external radiator with an inlet and outlet connected to the duct.

4. An insole as in claim 3, wherein the radiator has fluted coils.

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5. An insole as in claim 1 in further combination with a shoe upper having an external radiator with an inlet and outlet connected to the duct.

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