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H. M. SMITH ET AL

3,469,576

FOOTWEAR

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Fig. 1.

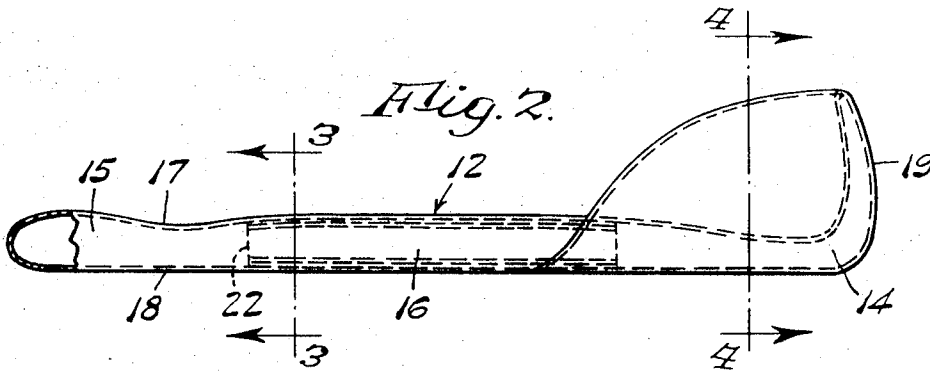
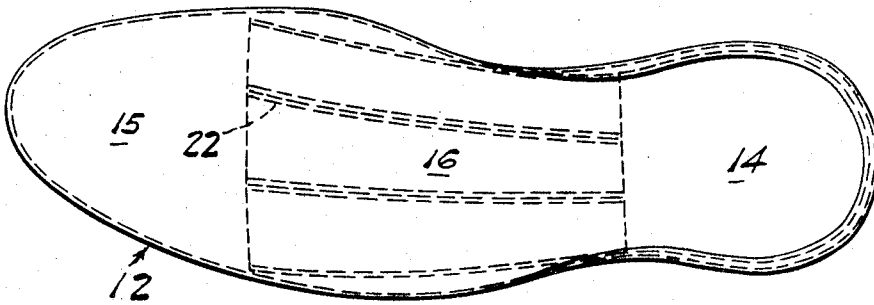


Fig. 3.

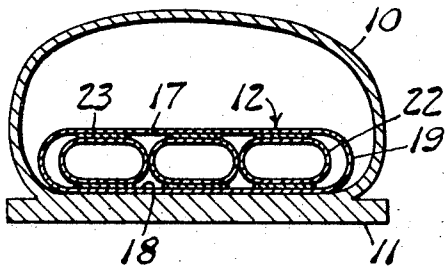


Fig. 4.

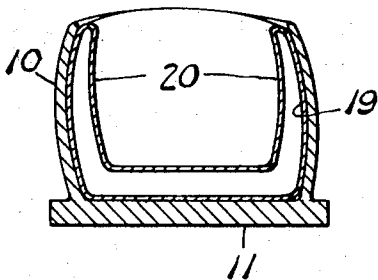


Fig. 5.

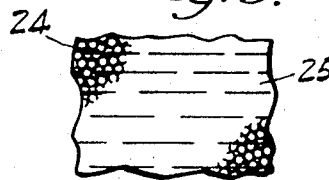
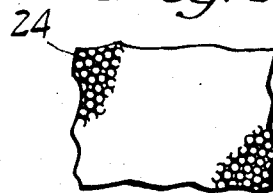


Fig. 6.



INVENTORS
HENRY M. SMITH &
JACK A. EVERTS
Christel & Bean
ATTORNEYS

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FOOTWEAR

Henry M. Smith, 26 Minnesota Ave., Buffalo, N.Y.
14214, and Jack A. Everts, 441 Stolle Road, Elma,
N.Y. 14059

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4 Claims

ABSTRACT OF THE DISCLOSURE

An article of footwear wherein the inner sole structure of the shoe includes a flexible envelope conforming in outline to the wearer's foot and having an upward extension at the heel portion. The envelope has a plurality of lengthwise channels and contains a flowable material consisting of solid particles such as phenolic beads in a lubricative liquid material such as mineral oil. The channels retard flow of the material under pressure from a wearer's foot and direct the flow generally lengthwise of the shoe.

This invention relates to a podiatric device or appliance for use with or as a part of a shoe or similar article of footwear. The device may be either an inserted insole type unit or an integral part of the shoe structure and operates by weight transference and hydraulic resistance to support and cushion the foot to afford the maximum body weight-bearing efficiency, resulting in minimal specific pressures uniformly dispersed over as great an area of the foot as is attainable. The device of the present invention further functions to fill the concavities of the foot and to surround and cushion the convexities thereof, thereby relieving all specific points of pressure which normally tend to produce abnormalities such as callouses, bunions, corns and other malfunctions of the foot generally attributed to improperly devised footwear.

Additionally, this podiatric device functions to cradle and stabilize the heel, generally considered to be the rudder of the foot, so that in the course of a step the foot is directionally guided forward in a straight line. The mechanical operation of the present podiatric device and various other novel features of construction inherent in the footwear of the present invention are pointed out in detail in conjunction with the following description of a typical embodiment thereof, considered in conjunction with the accompanying drawing, wherein like numerals represent like parts throughout the various views, and wherein:

FIG. 1 is a plan view of a preferred embodiment of the podiatric device of the present invention;

FIG. 2 is a side elevation view thereof;

FIG. 3 is a transverse cross-sectional view taken about on a line 3—3 of FIG. 2;

FIG. 4 is a transverse cross-sectional view taken about on line 4—4 of FIG. 2, and showing portions of the footwear;

FIG. 5 is an enlarged fragmentary view of one form of a flowable medium contained within the device shown in FIG. 1; and

FIG. 6 is a view similar to FIG. 5 and showing another form of a flowable medium.

Referring now to the drawing, and particularly FIG. 3, there is shown, in cross-section, an article of footwear comprising an upper 10 and an outsole 11, and the podiatric device structure generally designated 12, the upper being secured along the lower margin to the outsole by conventional fastening means. Insole 12 may be secured within the shoe by fastening the lower surface to the upper surface of the outsole 11, thus forming an integral

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part of the shoe structure, or in the illustrated form, the insole may be placed within the shoe and retained in proper position by a corresponding and irregular lateral contour of the upper adjacent to the lower margin thereof, whereby the insole may be readily inserted into substantially conventional footwear.

The insole portion 12 of this podiatric device comprises an envelope or hollow device formed into the general shape of a conventional insole in part, that is, having a heel structure, toe structure and arch portions indicated at 14, 15 and 16, respectively in FIG. 2, such envelope including lower walls 17 and 18 and side walls 19. The side walls 19 at the heel portion, as shown in FIG. 4, extend upward and around the lateral and posterior areas of the heel and have inner wall portions 20 spaced therefrom, forming a chamber for receiving the heel. The envelope structure, shown herein as extending upwardly at the heel portion, may also extend upwardly and about other portions of the foot as desired and to provide the flowable medium cushioning effect about or at any desired portion of the sides of the foot or across the toe and/or instep portions thereof. The envelope may be formed of any suitable resilient flexible material, such as rubber or other elastomeric or plastic components.

Extending from the anterior extremity of the arch of the foot backward to the posterior extremity of the arch are lateral tubular channels 22 constructed of an elastomeric film which can vary in flexibility and number and diameter, as needed, to properly control the flow of the transfer medium from the forward area to the heel area. These channels are disposed within the insole or envelope 12 in side by side relation, as lateral tubular flutes inserted between the upper and lower portions of the device, so that they appear as a series of tubes or round pipes fastened at the top and bottom of the envelope, so that they cannot move forward or backward, but may expand diametrically as required.

The medium contained within the envelope may be an encapsulated medium composed of a very low specific gravity hollow spheroidal organic hydrophobic, or hydrophilic body, designated 24 in FIGS. 5 and 6, such as hollow glass spheres or phenol formaldehyde resinous microspheres also sometimes called phenolic beads or micro balloons. Also suitable for this use are soluble or colloidal suspensions in a liquid external phase, designated 25 in FIG. 5. These bodies may be used alone, as at 24 in FIG. 6, or suspended in a liquid, fluid, or gas to enhance the flow property of the microspheres or colloidal suspensions.

During the course of a normal step, the podiatric device of the present invention functions as follows: as the posterior area, or heel, comes down and pressure is exerted on this area of the weight transfer medium, the medium is pushed forward through and/or around the tubes or flutes to the anterior, or forward area, around and under the toes, but confined within the wall structures 17 and 18. As this material is forced through the channels 22 into the toe portions, the channels or flutes act to restrict the flow in the area of the arch and expand under this influence of restricted flow to cradle and apply supporting pressure against the arch while the flowable medium in the toe and heel portions applies like supporting pressure through the associated upper wall 17 and against the toe and heel portions of the foot. In this manner, the weight is distributed over the largest possible area, minimizing and practically eliminating specific pressure points, thus reducing friction.

As the step proceeds and the weight shifts from the heel to the toe area, the medium is again forced through the channels and into the heel area designated 20 in FIG. 4. Again, the supporting pressure is distributed over the entire area of the foot.

To further enhance the operation of this podiatric device, it is intended to incorporate in the upper portion of the shoe 10 an expandable resilient material which will yield with a minimum of pressure to relieve any prior foot distresses caused by conventional footwear.

Further, the restrictive tubular channel or flute devices may be incorporated in any section of the podiatric device or shoe structure in order to properly regulate the flow of the medium to afford the maximum cushioning effect as herein intended.

Having thus described and illustrated the preferred embodiment of our invention, it is understood that such description and illustration is by way of example only and that such modifications and changes as may suggest themselves to those skilled in the art are intended to fall within the scope of the present invention, which is limited only by the scope of the appended claims.

We claim:

1. A podiatric device comprising a shoe having an insole comprising a flexible envelope conforming generally in outline to and extending substantially the full length of a wearer's foot and having an upper wall adapted to engage against the underside of such wearer's foot and a lower wall connected along its side edges to the upper wall to form a closed envelope, collapsible and expansible chambers within the front and rear portions of said envelope extending substantially the full width of the ball portion and the heel portion, respectively, of the wearer's foot, a plurality of tubular channel members extending lengthwise of and secured medially within said envelope generally in the area of and extending substantially the full width of the arch of the foot and establishing fluid communication between said chambers, and a flowable medium comprising finely divided solid particles and a lubricative material in said envelope flowable between said chambers through the channel members for supporting the wearer's foot whereby uniformly distributed

supporting pressure is applied along the entire underside of the foot, said tubular channel members being relatively thin walled whereby shifting pressure from heel to toe in walking progressively compresses said tubular channel members to cause fluid flow forwardly therethrough to expand the front chamber as the rear chamber collapses and vice versa.

2. A podiatric device according to claim 1 wherein said channel members are secured along their top and undersides to the respective upper and lower walls of said envelope.

3. A podiatric device according to claim 1 wherein the envelope includes an upstanding portion adjacent its periphery at the heel portion thereof for engaging about lateral and posterior portions of the heel of a foot, said flowable medium communicating into such upstanding portion of said envelope to provide yieldable support against said heel portions.

4. A podiatric device according to claim 1 wherein said channels taper toward said heel portion and are progressively reduced in cross-sectional area from adjacent the toe portion to adjacent the heel portion.

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DALTON L. TRULUCK, Primary Examiner

JOHN D. YASKO, Assistant Examiner

U.S. Cl. X.R.

128—25.2, 582, 594