

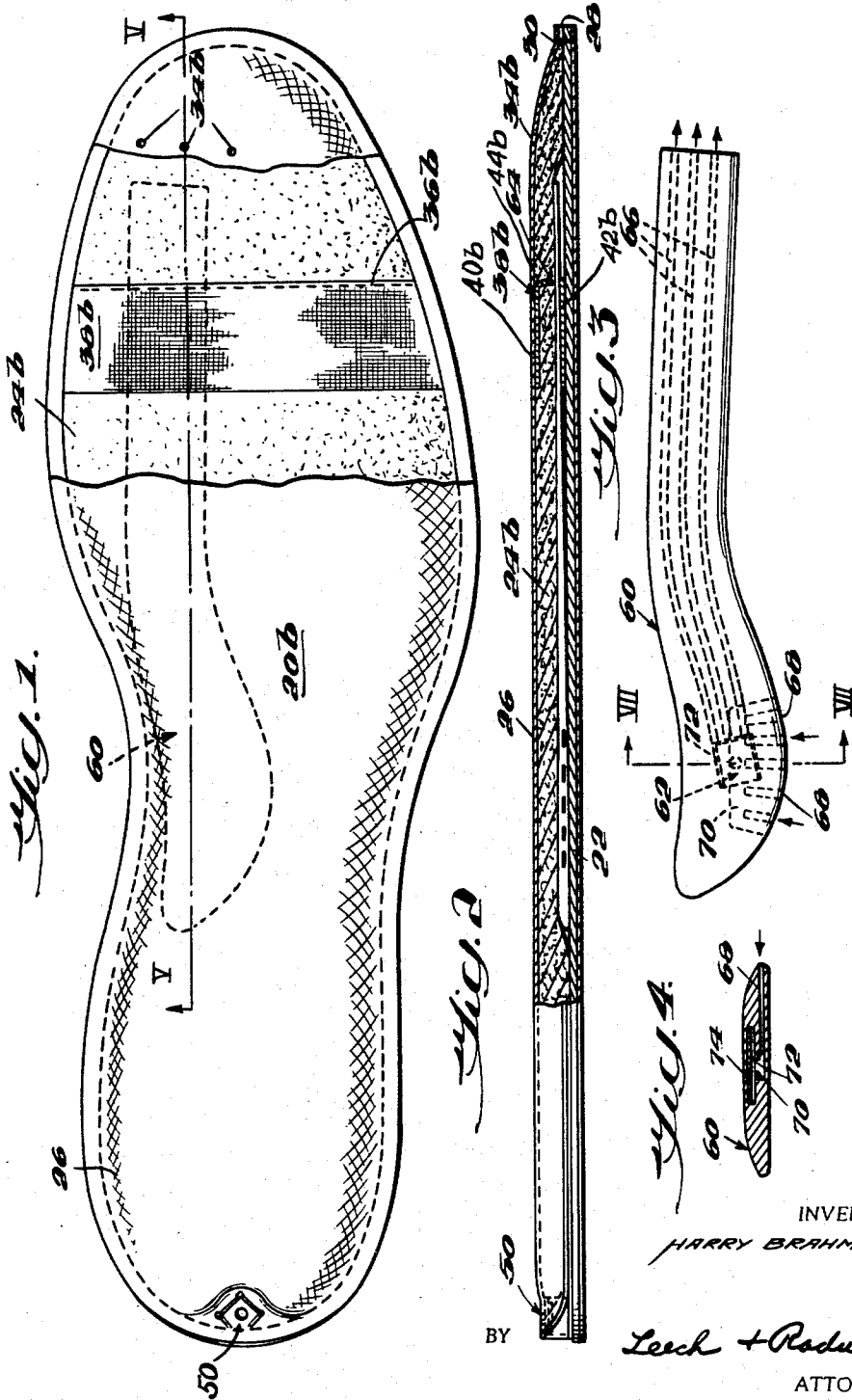
Oct. 24, 1961

H. BRAHM

3,005,271

VENTILATING INSOLE FOR FOOTWEAR

Original Filed May 20, 1954



INVENTOR

HARRY BRAHM,

BY

Leach + Radue

ATTORNEYS

1

3,005,271

## VENTILATING INSOLE FOR FOOTWEAR

Harry Brahm, Box 1857, Balboa, Canal Zone, Panama  
Original application May 20, 1954, Ser. No. 431,243, now  
Patent No. 2,797,501, dated July 2, 1957. Divided  
and this application June 19, 1957, Ser. No. 666,724  
2 Claims. (Cl. 36-3)

The present invention pertains to an improved ventilating, insole unit for footwear that may take the form of an insertable insole, or one adapted for embodiment in a standard shoe construction.

Many present wearers of shoes appreciate and demand the comfort of a cushion sole member but object to rubber outsoles, and find that the use of an ordinary insertable cushion insole tends to increase the problem of perspiration. It is also well known that excessive perspiration of the feet is a contributing factor to "athlete's foot" and similar skin diseases.

Therefore, it is the object of this invention to provide a cushion insole that will supply the desired comfort and at the same time minimize rather than increase the tendency of the feet to perspire.

The principal purpose of this invention is to provide a simple and inexpensive cushion insole construction that will continually supply air to the forward part of the foot and, particularly, to the toe area.

More specifically, it is intended to provide a cushion insole of laminated construction having a complete cushion layer of rubber-like material sealed between a top cover layer and a bottom insole blank, and equipped with means for continually drawing air in at the heel end and discharging it in the forward foot contacting area.

A further specific object of the invention resides in the provision of a laminated insole construction of the character indicated with a one-way air inlet valve disposed in its upper surface at the heel end extremity and having a plurality of very fine openings in the forward part of the cover layer so that air may be taken in at the heel end, pumped forwardly through the rubber-like layer, and discharged through the fine openings at a rate such that air has little tendency to flow into the insole through said openings.

A still further object of the invention resides in the provision of an insole of the same basic construction previously described and having a rearward pumping chamber defined by a pliable strip sealing the forward end of the rear part of the transversely divided rubber-like layer, and including a combined inner arch supporting and valved conduit member lying between the intermediate rubber-like layer and the insole blank, and extending forwardly through the pliable sealing wall to adjacent the forward top layer openings, for taking air from the shank area of the pumping chamber and feeding it directly to the forward and toe contacting area.

These and other objects of the invention resulting in economy of manufacture and efficiency in use will appear in the following detailed description of preferred embodiments of this invention, taken in connection with the accompanying drawings in which:

FIG. 1 is a top plan view of an insole unit having the top layer partly broken away to show details of the pumping chamber and of the valved arch supporting member;

FIG. 2 is a partially sectioned side elevation of the insole unit of FIG. 1, the section being taken along line V—V;

FIG. 3 is a top plan view of the valved arch supporting member of FIG. 1; and

FIG. 4 is a cross-sectional view taken on line VII—VII of FIG. 3.

In FIG. 1 the reference numeral 20b indicates the basic

2

cushioning and ventilating insole unit of this invention intended for a right foot. This unit comprises a relatively thin insole blank 22, which is preferably of leather, although suitable plastic, fabric, fibrous and other known materials having suitable properties may be used. The blank 22 is substantially covered by a full length intermediate layer 24b of finely porous sponge rubber, or the like, having its marginal edge beveled or tapered. Other rubber-like and resilient materials having the required characteristics may be used for the intermediate layer. The intermediate sponge rubber layer 24b is completely covered by a top layer 26 which is pliable and substantially impervious. It has been found that a friction fabric material having a smooth out-turned face resembling dull oilcloth is well suited to this purpose.

The insole and cover layers 22 and 26 are sealed together around their marginal portions, as best shown in FIG. 2. This bonding can best be accomplished by a marginal adhesive layer 28 and a continuous row of stitching 30 passing through the covering members 22 and 26 and said adhesive layer. With plastic materials the sealing may be accomplished by electrostatic fusion, heat application, or various other ways according to the specific nature of the materials used. The composite insole structure thus produced has a maximum thickness of approximately  $\frac{5}{16}$  of an inch when uncompressed, and is generally convex on the upper surface between the secured marginal portions, with an area of maximum thickness on the inner shank edge for underlying and mildly supporting the inner longitudinal arch of the foot. Compression of the cushion layer 24b at the opposite edge under foot pressure tends to increase the arch supporting effect.

It will be observed in FIGS. 1 and 2 that the forward portion of the cover layer 26 is provided with a plurality of fine, well-spaced holes or perforations 34b, lying generally in the area upon which the toes rest. The perforations 34b are pin-like in size, having a diameter of the order of 0.015-inch.

A one-way air intake valve 50 is mounted in and secured to the central, marginal heel and extremity of the insole unit 20b, as shown in FIGS. 1 and 2. This valve 50 may be of plastic construction and generally similar to the ones disclosed in H. Brahm Patent No. 2,474,815.

The adjacent end of the porous rubber insole layer 24b is suitably recessed to receive the valve 50, which may be secured between the insole blank 22 and the impervious cover layer 26 by an extension of the stitching 30, and by adhesive bonding of the contacting surfaces.

It will be seen that the porous rubber layer 24b is completely severed and separated along a transverse line 36b rearwardly of perforations 34b at the toe end, into what may be referred to as forward and rearward cushion portions. An airtight dividing wall is formed between these two rubber layer portions by a strip 38b of soft, pliable, airtight material, such for example as a thin rubberized fabric. The strip 38b is wrapped around the front edge of the rearward cushion portion of the intermediate layer 24b so that there are top and bottom parts 40b and 42b having an intermediate forward connecting wall 44b. The strip 38b is adhesively secured to all contacted surfaces of the sponge rubber layer 24b and also to the insole blank 22 and the cover layer 26. The lateral ends of this strip 38 are preferably anchored in the opposite sides of the seams formed between insole layer 22 and cover layer 26.

The insole unit of FIG. 1 has a relatively flexible member 60 projected forwardly through the pliable dividing wall strip 38b and provided at its rearward end portion with a one-way inlet valve 62 for passing air from the pumping chamber to the forward cushion portion while preventing return flow of air from the openings 34b in the

toe area of the cover layer 26. The heel end, one-way intake valve 50 is utilized as previously described.

The member 60 which is elongated and formed as a support for the inner longitudinal arch and as a light shank and sole stiffener is preferably of suitable plastic material. A vinyl chloride acetate resin sold under the trade-name "Vinylite" has been found satisfactory, and Celluloid, for example, could also be used. The member 60 lies against the under face of the cushion layer 24b.

The one-way valve 62 of simple, inexpensive construction is enclosed in the rearward arch supporting portion as shown in FIG. 4. The inner edge of this supporting portion is concaved in general conformity with the adjacent inner, sole edge, and the outer edge, which terminates centrally of the sole shank, is convexed in outline like the corresponding plan outline of the inner longitudinal arch of the foot of a wearer. It will be recalled that the intermediate sponge rubber layer 24b has its maximum effect in this same arch area, so that the valved portion of member 60 further adds to that effect.

The forward portion of member 60 is relatively narrow and spaced a substantial distance from the inner, sole edge beyond the shank part. The periphery of an opening 64 in wall strip 38b makes close engagement with the member 60, as shown in FIG. 5.

A plurality of spaced air conduits 66 extend through the body of member 60 from its forward edge to the valve 62. Referring to FIGS. 3 and 4, it will be seen that a plurality of spaced air inlet conduits 68 extend inwardly from the convex edge of the rearward portion of member 60 into a manifold chamber 70 beneath the valve 62. The manifold 70 is formed with a central, vertical valve port 72 that is normally closed by a resilient valve flapper 74 secured by its rearward edge to the chamber of valve 62, which chamber is in open communication with the ends of lengthwise air conduits 66. FIG. 7 shows valve flapper 74 in its elevated open position.

The integral valve and support member 60 can be fabricated from two thicknesses of plastic material suitably fused together after the conduit and valve spaces have been formed and the valve flapper secured in place.

When a partial vacuum is created in the pumping chamber containing the rearward part of the resilient layer 24b, in response to a release of compression by removal of foot pressure, air will be drawn in through the normally closed, one-way intake valve 50. Upon reapplication of foot pressure with the valve 50 having closed, air will be forced from the pumping chamber into the side conduits 68 of member 60. The pressure of air in conduits 68 will act through port 72 to open the valve flapper 74, as shown in FIG. 4, thus permitting the compressed air to flow forwardly through the lengthwise delivery conduits 66. These conduits 66 discharge air freely into the forward part of the resilient layer 24b ahead of the dividing wall strip 38b. The air then flows through the adjacent part of the resilient layer 24b and out of the openings 34b to ventilate and cool the toe zone of a wearer's foot.

It will now be fully apparent that this invention affords a simple, inexpensive cushion insole unit that is adapted to be insertable in a shoe, or built therein as a special insole during manufacture. In the illustrative embodiment the toe area is continually supplied with fresh air while the shoe containing the insole unit is in use. It has also been found that the remainder of the foot sole is

rendered more comfortable by the cooling effect of fresh air flowing lengthwise through the insole unit.

This application is a division of my parent and co-pending application Serial No. 431,243, filed May 20, 1954, which has matured into Patent No. 2,797,501, granted July 2, 1957.

While tried and preferred forms of this novel insole unit have been disclosed, it is to be understood that various changes can be made in the details of construction, materials, and arrangement of parts without departing from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, what I claim as novel and desire to secure by Letters Patent of the United States is:

1. A ventilating cushion insole unit comprising an insole blank, a porous, rubber-like cushion layer secured to one surface of said blank and being substantially coextensive therewith, said cushion layer being transversely severed into forward and rearward portions, a relatively impervious cover layer of pliable material extending over said cushion layer in conforming relation and bonded to the marginal portion of said blank, a pliable strip of airtight material wrapped around the severed edge of said rearward portion and adhesively secured thereto and to the insole blank and the cover layer to form a dividing wall between the cushion layer portions and a rearward pumping chamber, a first one-way air intake valve mounted in the heel margin portion of said insole unit and arranged to pass air into the rearward pumping chamber, and a flexible elongated member extending beneath the cushion layer from the shank area of the insole unit and through a close fitting opening in the dividing wall strip, said elongated member including a second one-way air intake valve adjacent its rearward end and being provided with air inlet conduits supplying air from the rearward pumping chamber to said second valve and air delivery conduits receiving air passed through said second valve and discharging such air into the forward position of said cushion layer, the area of the cover layer overlying the forward cushion layer portion being provided with a plurality of small spaced air discharge openings.

2. The combination of claim 1 in which said elongated member extends adjacent to and follows the inner edge of the shank portion of said sole, has the outer shank edge of its rearward end convexly shaped and extending halfway across said shank portion with the air inlet conduits extending from said convexly shaped inner edge, and is formed from plastic material.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |                    |               |
|-----------|--------------------|---------------|
| 1,260,942 | Price et al. ....  | Mar. 26, 1918 |
| 1,596,923 | Cooney .....       | Aug. 24, 1926 |
| 1,655,319 | Lowery .....       | Jan. 3, 1928  |
| 2,010,151 | Helwig .....       | Aug. 6, 1935  |
| 2,474,815 | Brahm .....        | July 5, 1949  |
| 2,560,120 | Miller et al. .... | July 10, 1951 |

##### FOREIGN PATENTS

|         |               |               |
|---------|---------------|---------------|
| 453,871 | Germany ..... | Dec. 23, 1927 |
| 595,976 | Germany ..... | Apr. 25, 1934 |

FIG. 2 is a partially sectioned side elevation of the section being taken at V-V.  
FIG. 3 is a top view of the insole unit.