

[54] ATHLETE'S FOOTS PREVENTIVE DEVICE
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[51] Int. Cl. A43b 7/06
[58] Field of Search 128/588; 36/3 B,
36/3 R, 76 R, 8.1

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[57] **ABSTRACT**

A device for preventing athlete's foot or other eczema is provided which operates with the walking motion of the user's feet and includes bellows units adapted to be arranged beneath the plantar arches of his feet. The bellows units are each operable to expand and contract as the user's heel rises and falls and thus eject air into the interior of the shoe through orifices formed in the walls of the unit. Such ejection of air causes air flows in the shoe interior effectively to prevent any accumulation of moisture or temperature therein.

2 Claims, 8 Drawing Figures

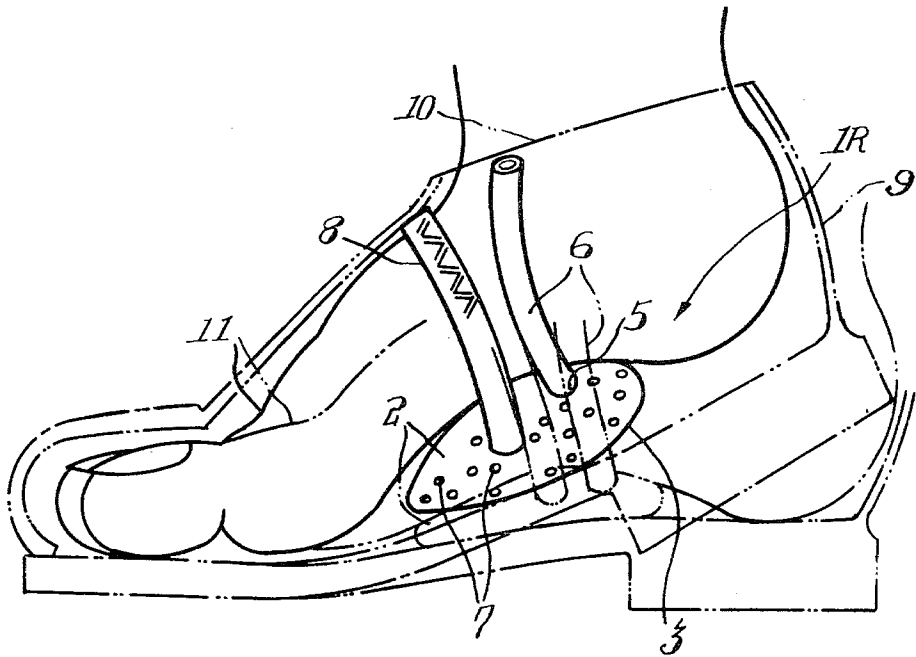


Fig. 1

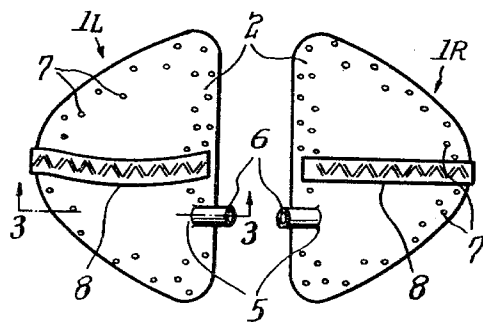


Fig. 2

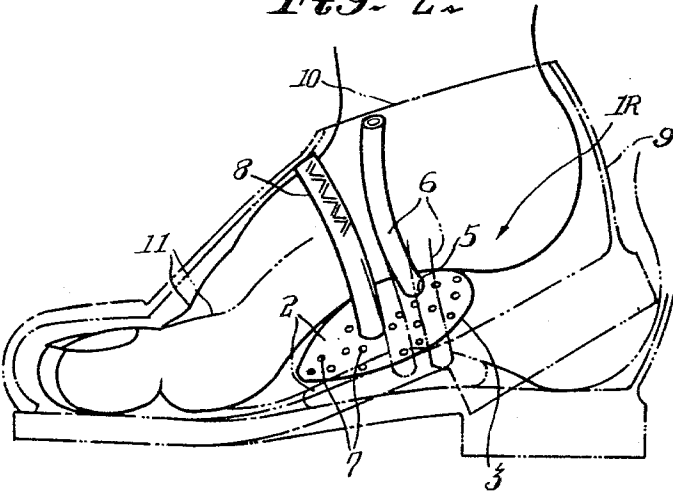


Fig. 3

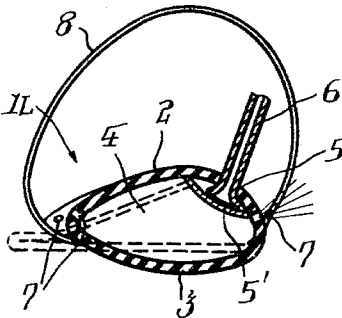


Fig. 4.

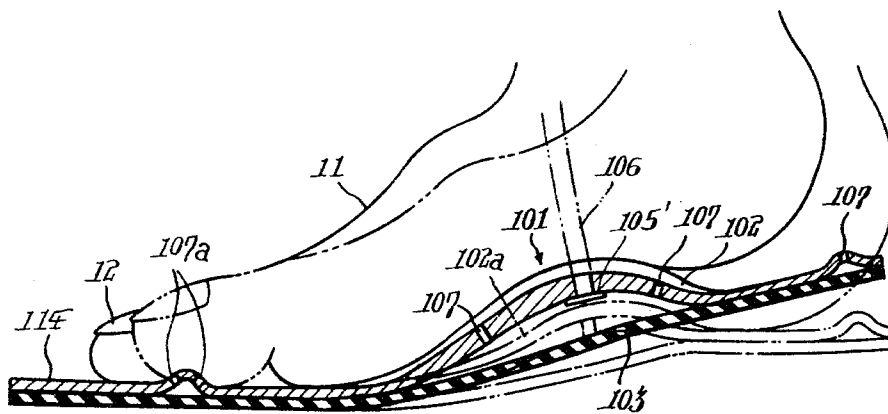


Fig. 5.

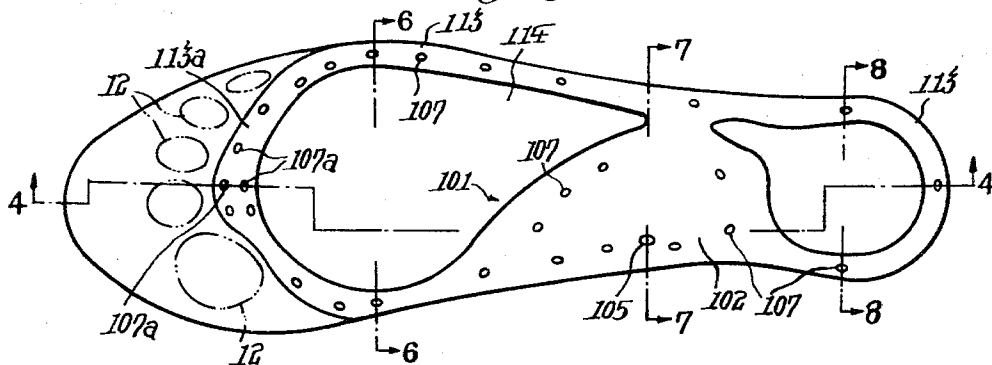


Fig. 6.

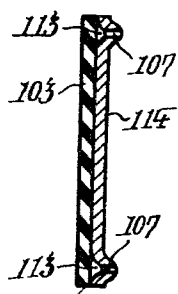


Fig. 7.

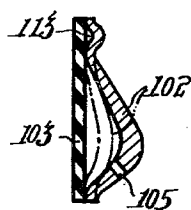
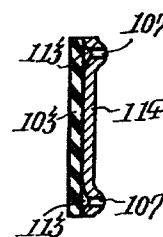


Fig. 8.



ATHLETE'S FOOTS PREVENTIVE DEVICE

This invention relates to devices for preventing athlete's foot or other eczema usually caused on feet, as they often get stuffy in shoes and is intended to form air flows in shoes thereby effectively to prevent any accumulation of moisture or temperature around the feet therein.

Sweating or skin respiration of foot skin usually causes accumulation of moisture within shoes worn thereon and thus causes the feet to get or musty stuffy. This phenomenon is remarkable particularly between toes, frequently causing offensive skin diseases including athlete's foot or other eczema. In order to prevent such phenomenon it is necessary to prevent any stagnation of moisture or temperature within the shoes surrounding feet.

The primary object of the present invention is to provide a device including bellows unit which are interposed between the user's feet and shoes worn thereon and operable with the foot motion during walking to cause air flows in the interior of the shoes.

Another object of the invention is to provide a device of the kind described which includes bellows units operable to draw in external air and eject it into the shoe interior and thus servable not only to cause air flows therein but also to force out any moist air present to the outside of the shoes so that the air therein may always be kept fresh.

A further object of the present invention is to provide a device of the kind described which includes means for conducting air to particular locations around feet as it is ejected from the bellows for the purpose of positively assisting the formation of air flows in local places where moisture is particularly liable to collect.

Other objects of the present invention are to provide for each of the bellows units an air inlet port enabling it to inhale air at all times in an efficient manner, to provide for each bellows unit an air inlet tube arranged in a position not to be affected by the walking motion of the user's foot in any undesirable manner and thus enabling the bellows to act positively to inhale external air, and to provide means for attaching the bellows units to the underside of the plantar arches of the user's feet or for arranging the same in shoes in a predetermined position to lie under the plantar arch of the respective foot.

To attain these objects, the present invention provides an athlete's foot preventive device which includes bellows units formed of appropriate elastic sheet material such as relatively thick rubber or flexible synthetic resin sheet material and capable of maintaining their own shape in the free state but elastically deformable under external force, said bellows units being comprised each of a bottom section and a generally hill-shaped top section having a top contour substantially conforming to the plantar arch of human foot and defining together with the bottom section an interior space large enough to fill the space formed between the plantar arch and the top sole surface of the shoe put on the foot when the user's heel is raised therein. Such bellows units are made in a right-and-left symmetrical pair for use on right and left feet. Also, two bellows unit of the pair are each formed with an air inlet port or aperture including non-return valve means in those sloped inside walls of the respective top sections which face each other when such bellows units are arranged under the plantar arches of the user's feet.

Also, the bellows units are each provided with an air inlet tube which is connected at its base end to the air inlet port of the unit for communication with the interior space thereof and can be led along the inside wall of the shoe substantially to reach the top opening thereof through which the user's foot is inserted, thereby enabling the bellows unit to inhale external air with efficiency.

A multitude of small air orifices are formed through the peripheral walls of the bellows units as well as through the walls of tubular air conduits extending from the unit bodies in communication with the interior space therein.

The bellows units described above may be made for use as an attachment to respective feet with the provision of appropriate extensible string or lace means or be formed on respective base plates adapted to be arranged in shoes on the top sole surface thereof.

In either case, the device of the invention is arranged in the shoes between the plantar arch of the user's feet and the top sole surface of the shoes and each time when his heels are raised in walking, the associated bellows unit restores its free or original shape to inhale air. On the other hand, when his heel is lowered the bellows unit is compressed to eject the air previously held in its interior space through the air orifices directly to the outside of the unit or through the intermediary of the tubular air conduits to required locations such as between the toes so that the air in the shoe is effectively disturbed and replaced by external fresh air.

The present invention will now be described in further detail in connection with the accompanying drawings, which illustrate a few practical embodiments of the invention and in which:

FIG. 1 is a plan view of an eczema preventive device embodying the present invention and designed for attachment to feet;

FIG. 2 is an explanatory side view showing one half set of the device of FIG. 1 as attached to the right foot, looking from the left-hand side thereof;

FIG. 3 is a vertical cross-sectional view taken through the line 3—3 in FIG. 2;

FIG. 4 is a cross-sectional elevation showing one half set of an athlete's foot preventive device of the sole type embodying the present invention and taken through the line 4—4 in FIG. 5;

FIG. 5 is a plan view of same;

FIG. 6 is a cross-sectional view taken through the line 6—6 in FIG. 5;

FIG. 7 is a cross section taken through the line 7—7 in FIG. 5; and

FIG. 8 is a cross section taken through the line 8—8 in FIG. 5.

Referring first to FIG. 1, the device comprises a pair of right and left bellows units of symmetrical configuration and formed of elastic sheet material. Each of the bellows units is comprised of a top section 2 having a top contour substantially conforming to the plantar arch of one's foot and a bottom section 3 and can maintain its own shape in the free state. The top section 2 is generally hill-shaped, defining together with the bottom section 3 an interior space 4 large enough to fill the space formed between the plantar arch of the user's foot and the top sole surface of the shoe worn thereon when the user's heel is raised. The bottom section 3, formed of elastic sheet material similar to that of the top section, is joined to the latter along the periphery

thereof and has a flattened downwardly convex spherical shape in the free state.

As clearly shown in FIGS. 1 and 3, the bellows units are each provided with an air inlet port 5 opening through the sloped side wall of the top section 2 which faces the corresponding side wall of the top section of the other unit when the units are arranged under feet. Provided in association with the air inlet port 5 is a non-return valve comprising a flap diaphragm 5' as shown. An air inlet tube 6 is secured at its base end to the air inlet port 5 in communication with the interior space 4 of the bellows unit and is formed of a flexible but hardly collapsible tubular material, having an appropriate length to enable its upper or free end to be led to the top opening of the shoe.

A multitude of small air orifices 7 are formed in the peripheral walls of the bellows unit.

The bellows units 1R and 1L are each fitted with an extensible string 8 such as a rubberized band so that the user may be readily attach them the plantar arches before he puts on the shoes. It is to be noted that the air inlet tubes 6 are each led to the top opening 10 of the shoe, passing between the inside face of his foot 11 and the adjacent shoe wall.

When the user walks with shoes 9 put over the device of the invention, fitted directly to his feet as described above, each time his heels are raised the bellows units are allowed to restore their original shape shown in FIGS. 2 and 3 by the solid lines thereby to inhale air through the non-return valves. On the other hand, each time his heels are lowered the units are compressed as indicated in these figures by the dotted lines and eject air to the spaces around his feet through the air orifices 7 to cause air flows in the shoes. In the illustrated embodiment, the air inlet tube 6 provided in connection with the air inlet port enables the bellows unit efficiently to inhale fresh air from outside so that any moist air formed in the shoes can be positively replaced by the fresh external air. The provision of air inlet tubes 6 is particularly advantageous in cases where the device is used with boots, rain shoes or other high shoes.

The air inlet port 5, being provided in the sloped inside wall of the top section 1, is at all times positioned apart from the foot sole, enabling free inhaling action of the bellows unit. Also, the air inlet tube 6 can function free from any undesirable influences of the foot motion as it is led along the inside of the foot, which is always spaced from the adjacent shoe wall.

The bellows units can also be made in the form shown in FIGS. 4 to 8.

As seen in these figures, the top section of the bellows unit 101 is formed on a base plate 103 adapted to be placed on the top sole surface of the shoe and in a position to face the planar arch of the user's foot. The top section 102 is generally hill-shaped having a top contour substantially conforming to the plantar arch of the user's foot and in the free state defines a large interior space 104 in the unit together with a bottom section thereof which is formed as a part of the base plate 103. Thus, when the user's heel is raised in the shoe for walking, the top section 102 can expand to fill the space formed between the shoe sole and the foot, keeping contact with the plantar arch thereof. Numeral 105 indicates an air inlet port formed in the sloped inside portion of the top section 102 of the unit and provided with a non-return valve, for example, in the form of a valve diaphragm 105'.

In this embodiment, the base plate 103 is so shaped as to extend over the entire sole surfaces of the user's foot along the planar top surface of the shoe sole and carries a tubular air conduit 113 which extends through the space formed between the top surface of the plate and the user's foot and is at all times communicating with the interior space 104 of the bellows unit. The air conduit 113 thus arranged on the base plate along the foot periphery includes a transversely extending portion or conduit 113a lying between the shoe sole and the root portions of the toes. This arrangement gives no discomfort to the user's foot and the device with such arrangement can be employed without causing the user to feel uneasy about the presence of such device in his shoes.

Also, in this embodiment, the tubular air conduits 113 and 113a are continuously formed by raising the extended marginal portion of the elastic sheet forming the top section 102 and are adhesively closely joined on opposite sides to the top surface of the base plate 103 in airtight relation thereto in the same manner as the peripheral edges of the top section 102.

As in the previous embodiment, a multitude of air orifices 107 are formed in the peripheral portion of the top section 102 and in the wall of the air conduit 113 at appropriate locations thereon. The transversely extending conduit portion 113a, lying under the toe roots, is formed with a multitude of air orifices 107a opening toward the gaps between the toes.

When the user, who wears shoes having the base plates 3 arranged on the shoe soles, raises his heels for walking, the top section 102 of the bellows unit 101 expands to restore its original shape, as shown in FIG. 4 by the solid lines, and inhales air. On the other hand, when the heel is lowered, the top section is compressed as indicated by the dotted lines and ejects air around the foot through air orifices 107 while positively causing air flows in locations as between toes where moisture or temperature is liable to collect.

It will be obvious that the bellows units 101 described above can readily be provided with an air inlet tube 106 like the one in the previous embodiment.

While the invention has been shown in a few preferred forms, it is obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from its spirit and scope of the claimed invention.

What is claimed is:

1. An athlete's foot preventive device comprising bellows units each comprised of a base plate adapted to be arranged on the top sole surface of the shoe and a generally hill-shaped top section formed of an elastic sheet material enabling the section to maintain its own shape in the free state and having a top contour to fit the plantar arch of the user's foot, defining together with a bottom section formed of a portion of said base plate an interior space large enough to fill the space formed between the foot sole and the top sole surface of the shoe as worn on the user's foot when the user's heel is raised, an air inlet port formed in the sloped inside portion of said top section and having a non-return valve means, a tubular air conduit formed on said base plate in a position to extend along the periphery of the user's foot and in communication with the interior space of the respective bellows unit, and a multitude of small air orifices formed through the peripheral wall of said top

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section of said bellows unit and through the wall of said tubular air conduit.

2. An athlete's foot preventive device as claimed in claim 1 in which said tubular air conduit includes a portion formed to extend transversely through the space 5

under the roots of the user's toes and having small air orifices opened to eject air toward the spaces between the toes.

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