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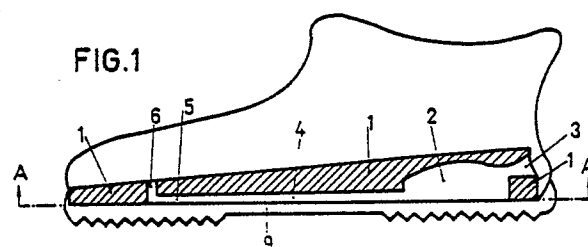
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Unidirectional air flow ventilating shoe and insole.

A unidirectional airflow ventilating shoe having an ordinary upper and sole. A unidirectional airflow ventilating layer (1) is provided on the sole inside the shoe. The ventilating layer has a compressible cavity (2), air inlet (3), main airflow passage (4), branches (5) and air outlets (6). Fresh air outside the shoe is forcedly unidirectionally sucked into the ventilating layer and blown out to fore part inside the shoe.



To convenience sake, a unidirectional airflow ventilating insole can be made for any kind of shoes.

The insole comprise an upper portion (7) and lower portion (8). The structure and shape of the upper portion is the same as that of the ventilating layer (1). Lower portion (8) can either form an entirety with upper portion (7), or be an elastic substrate adhered to the bottom surface of the upper portion with adhesives. The insole can be used in any kind of shoes and attain the same result as unidirectional airflow ventilating shoes of the present invention.

A Unidirectional Airflow Ventilating Shoe and A Unidirectional Airflow Ventilating Insole for Shoes

This invention relates to a kind of shoe, in particular, to a kind of unidirectional airflow ventilating shoe and unidirectional airflow ventilating insole for shoes.

The existing air-blow shoes (FR 2543803, FR 2548527, DE 3336605 and JP 58-130002) focus on either improving the air permeability or accelerating air permeability by increasing the circulation of air within the shoes. As a result, replacement of fresh air is not possible until the gas in the shoes is discharged and therefore the rate of air permeability is very low. Other kinds of shoes with air-pump, such as DE 3206631, JP 57-134102, GB 2098851, are better ventilated than the air-blow shoe mentioned above. However, the production process thereof is more complicated due to the adoption of a pump and check valve, and since extra materials are required, the production cost and market price are increased. Moreover, the technique for producing the air-pump shoes is not applicable to casual and sports shoes because the adoption of the pump and valve will make the wearer uncomfortable. Up till now, Only one type of such air-pump shoes is manufactured in Taiwan. As metallic spring and ebonite are used for adopting the pump body and valve thereof, only shoes with hard soles of complicated structure and high cost can be manufactured.

The object of the present invention is to provide a kind of unidirectional airflow ventilating shoe and unidirectional airflow ventilating insole for shoes, wherein fresh air outside the shoes is forced unidirectionally into the front part of the feet so as to attain higher rate of ventilation.

As far as the appearance, the sole and the structure of the upper part of the shoes are concerned, there are no differences between the ventilating shoes of the present invention and ordinary shoes. To achieve the object of the invention, there is a unidirectional airflow ventilating layer on the sole inside the shoe. The heel portion of the layer is provided with a compressible cavity at the bottom surface of the layer. The back upper portion of the layer is provided with an elastic closable air inlet and the front portion with an elastic main airflow passage leading to the front part of the layer. The fore end of the main airflow passage is splitted up into several branches. The fore end of each branch is provided with an air outlet leading to the upper surface of the layer.

The present invention will be apparent from the following description, made by way of the example with reference to the accompanying drawings, wherein:

Fig. 1 shows a unidirectional airflow ventilating shoe and the position, shape and structure of a unidirectional airflow ventilating layer inside the shoe.

Fig. 2 illustrates the position and the shape of the compressible cavity, the main airflow passage, the branches, air inlet and air outlets.

Fig. 3 is the back view of the unidirectional airflow ventilating layer which shows the cavity and the air inlet in the heel portion of the shoe.

Fig. 4 illustrates the first action of the step a wearer takes. When the heel portion of the shoe touches the ground, the air inlet of the unidirectional airflow ventilating shoes will be closed under pressure.

Fig. 5 is the back view of the ventilating layer in which the air inlet is in a compressed and closed state.

Fig. 6 illustrates the path of circulation and the flowing out of the air inside the cavity and the main airflow passage and the branches thereof when the centre of gravity of the wearer is shifted forward.

Fig. 7 illustrates the last action of the step taken by the wearer. When the heel portion of the shoe is lifted and the front part of the shoe touches the ground, the main airflow passage will be at a folded and closed state and fresh air is sucked through the air inlet into the cavity of the layer.

Fig. 8 is a cross-section view illustrating the shape and structure of a unidirectional airflow ventilating insole of the present invention for shoes.

It can be seen from Fig. 1 that the unidirectional airflow ventilating layer (1) of a unidirectional airflow ventilating shoe is a sole-shaped elastic material consisting of a thick heel portion and thin front portion, the bottom surface of the elastic material being pressed closely to the sole (9) of the shoe. As shown in Fig. 2, a cavity (2) is provided in the heel portion.

The cross-section of the cavity is arch-shaped, with the peak point of the arch being about 3/4 of thickness of the heel portion and the maximum section area of the arch about 4/5 of the section area of the heel portion, thus guaranteeing a certain capacity and maintaining a considerable degree of elasticity. An air inlet (3) is opened up backwardly at the back upper portion of the cavity (2). As illustrated in Fig. 1, air inlet (3) at rear end of the heel is connected to the heel portion inside the shoe. The cross-section of air inlet (3) in Fig. 3 is in the shape of a sharp leaf so that it can be completely closed under pressure.

A main airflow passage (4) is opened up from

the front of the cavity (2) to the fore sole (Fig. 2). The crosssection of main airflow passage (4) is arch-shaped and the ratio of the height and width is 1:3. The passage is completely closed when bent. As shown in Fig. 2, the main airflow passage (4) is divided into branches (5) at the front end thereof, preferably 2-4 branches. The crosssection of branches (5) are preferably in the shape of semi-circles. A cylindrical air outlet (6) is opened up at the front end of each branch (5) and directed at the root of the toes in the shoe (Fig. 3). The entire layer (1) can be stuck onto the sole of the shoe.

While the wearer walks, the heel portion will touch the ground first, as shown in Fig. 4. Air inlet (3), being located at the part which first touches the ground, will be closed under heavy pressure of the wearer as illustrated in Fig. 5. It can be seen from Fig. 6 that with the centre of gravity being shifted forward, the point of the shoe which touches the ground will also be moved forward. In the meantime, cavity (2) is compressed from the back to the front and the air in the cavity is flowing out through main airflow passage (4), branches (5) and air outlet (6) to the front part of the shoe, and then flowing out through the eyelet, the gaps between the tongue and the edge of the shoe's upper portion.

When the heel portion is lifted and the fore sole touches the ground, the shoe is bent. That will cause main passage (4) to be bent and closed. In this way, air in the fore part is hindered from going back into cavity (2) and therefore the air only goes in one direction. Concurrently, air inlet (3) is elasticity opened. The fresh air outside is sucked into cavity (2) through the gap between edge of shoe's upper portion and the foot heel (Fig. 7). As a result, a process of unidirectional airflow ventilating is accomplished in every step the wearer takes.

For convenience sake, this invention also provides a unidirectional airflow ventilating insole comprising upper insole (7) and lower insole (8), as shown in Fig. 8. The structure of the upper insole (7) is the same as that of ventilating layer (1) of said unidirectional airflow ventilating shoes. Cavity (2), air inlet (3), main airflow passage (4), airflow branches (5) and air outlet (6) are provided in a piece of elastic material. Lower insole (8) can either form an entirety with upper insole (7), or be an elastic substrate in the form of a sole closely sealed to the bottom surface of the upper insole.

A pair of unidirectional airflow ventilating shoes can be made without increasing material cost by replacing the middle soles of such soft-sole shoes as ordinary walking shoes and sport shoes with the unidirectional airflow ventilating insole. In applying the ventilating insole to boots, an air channel provided at the upper portion of each boot and connected with the air inlet of the ventilating insole is

enough to change an ordinary boot to a unidirectional airflow ventilating boot. Using the ventilating insole in any kind of shoes can attain the same result as unidirectional airflow ventilating shoes.

The present invention has several distinctive advantages. For example high rate of ventilating can be accomplished by fresh air outside shoes unidirectionally flowing into the front part, which is the dampest and hottest part inside the shoe, so that the wearer can feel wind blowing towards his feet. This feature also helps prevent stink and disease of feet. Besides, since the material used is cheap and the structure is simple, the manufacturing process is convenient and the production cost is low. As no pump body or valve is required, such kind of shoes are comfortable to wear and the insole is suitable to be used with shoes of all classes, regardless of the materials used for the vamp and sole, the thickness of the heel and the height of the upper part of the shoes.

A further merit of the invention is that people suffering from foot disease may spray medical lotion frequently into the unidirectional airflow ventilating layer of the shoe or the cavity and airflow passage of the ventilating insole. As a result, the medical lotion would be blown to the fore part of the feet while the wearer walks. Furthermore, perfume may also be sprayed into the cavity and passage so as to prevent the feet from stinking.

Two specific embodiments are described hereunder:

The first embodiment is a unidirectional airflow ventilating shoe.

A 30 mm thick PVC (polyvinyl chloride) or PU (polyurethane) piece is cut into the shape of a sole with the front part cut to 8 mm thick and the longitudinal section being in the form of a right-angled trapezium. An arched cavity is excavated at the heel part with the thickest part being 22 mm. The external edge of the cavity has 8 mm wide allowances and the capacity of the cavity is approximately 6000 mm³. An arched-shaped main airflow passage excavated at the front of the cavity is 3 mm tall and 12 mm wide and is divided into at least two branches as it reaches the front sole; each of said branches is 3 mm tall and 6 mm wide. Cylindrical air outlets which have diameters of 6 mm are vertically excavated at the front end of each branch, penetrating the piece. Air inlet with tapered leaf-shaped cross-section which are 18 mm wide and 5 mm tall is excavated at the rear upper part of the cavity. The air inlet penetrates backwards the piece. Taking out the middle sole and inner lining cloths of a readymade sports shoe with low upper, applying adhesives all over the sole of the shoe and sticking the excavated surface of the above manufactured piece on the sole, then a unidirectional airflow ventilating shoe will be

formed. An experiment shows that about 5000 mm³ fresh air is blown out of the outlets with each step the wearer takes.

The second embodiment is a unidirectional airflow ventilating insole for shoes.

A 20 mm thick synthetic rubber piece is used as an upper insole. The same processing technique used in the first embodiment is employed. Since the elasticity of rubber is stronger, the thickness of the synthetic rubber can be thinner. The front part is cut to 6 mm thick and the capacity of the cavity is about 4000 mm³. The arch-shaped main airflow passage is 2 mm tall and 12 mm wide; each of the branches is 2 mm tall and 6 mm wide. The sharp leaf-shaped air inlet is 18 mm wide and 3.5 mm tall. The air outlets are cylindrical which have diameters of 6 mm.

Using 1.5 mm thick soft plastic pieces as a lower insole and adhering the lower insole tightly to the excavated surface of the upper insole with adhesives, then a unidirectional airflow ventilating insole is formed. The ventilating insole can be used in any kind of shoes and about 3000 mm³ fresh air is blown out of the air outlets with each step while walking.

The above embodiments are only examples for describing the present invention. They should not have any limitations on this invention, i. e. simple improvements or alterations made by persons skilled in the art within the scope defined by the claims should be understood as not going beyond the scope of the invention. For instance, alterations can be made on the sizes of the cavity, the main airflow passage, the branches and the air outlets of the unidirectional airflow ventilating shoes or the ventilating insole corresponding to the sizes of various kinds of shoes. The numbers of branches and air outlets can also be increased or reduced, etc.

Claims

1. A unidirectional airflow ventilating shoe comprising an upper portion and a sole,
characterized in that

a unidirectional airflow ventilating layer is provided inside the shoe on the sole, the ventilating layer having a compressible cavity at the bottom surface in the heel portion of the layer; an elastic closable air inlet open to the inside of the shoe at back upper portion of the cavity; and an elastic main airflow passage at the front portion of the cavity leading to the fore part of the layer, the fore end of the airflow passage being divided into several branches, the fore end of each branch being provided with an air outlet leading to the upper surface of the layer.

2. The ventilating shoe according to claim 1, characterized in that the cavity is arch-shaped and the cross section of the air inlet has the shape of a sharp leaf.

3. The ventilating shoe according to claim 1, characterized in that the cross section of the main airflow passage is arch-shaped, which is completely closed when the ventilating layer is bent.

4. The ventilating shoe according to claim 1, characterized in that the numbers of the branches are 2 - 4 and the cross section of each branch is in the shape of a semi-circle.

5. The ventilating shoe according to claim 1, characterized in that the cross section of each air outlet is cylindrical.

6. A unidirectional airflow ventilating insole for shoes,

characterized by

comprising an upper portion and a lower portion, the upper portion having a compressible cavity in the heel portion of the insole; an elastic closable air inlet at back upper portion of the cavity open to the back upper surface of the insole; and an elastic airflow passage at the front of the cavity leading to the fore part of the insole, the fore end of the main airflow passage being divided into several branches, the fore end of each branch being provided with an air outlet leading to the upper surface of the insole, the lower portion being an elastic sole-shaped plane bottom of insole.

7. The ventilating insole according to claim 6, characterized in that the cavity is arch-shaped and the cross section of the air inlet has the shape of a sharp leaf.

8. The ventilating insole according to claim 6, characterized in that the cross section of the main airflow passage is arch-shaped, which is completely closed when the insole is bent.

9. The ventilating insole according to claim 6, characterized in that the numbers of the branches are 2 - 4, the cross section of each branch being in the shape of a semi-circle.

10. The ventilating insole according to claim 6, characterized in that the cross section of each outlet is cylindrical.

11. The ventilating insole according to claim 6, characterized in that the lower portion of the insole is separated from the upper portion, which is an elastic substrate in the shape of the sole and is adhered to the bottom surface of the upper portion of the insole with adhesives.

FIG.1

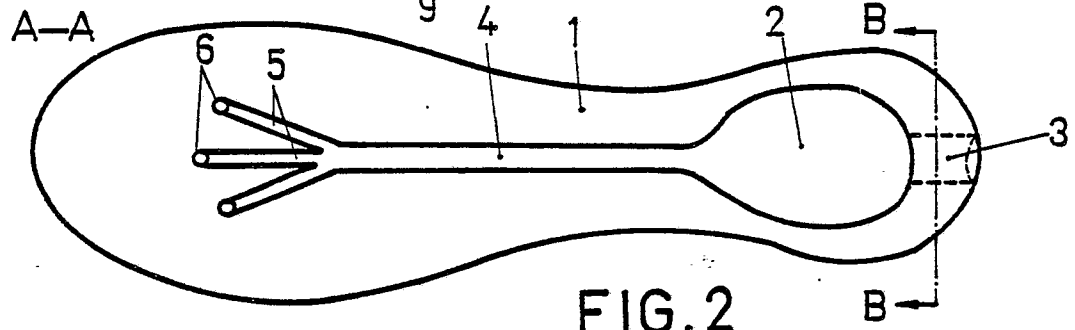
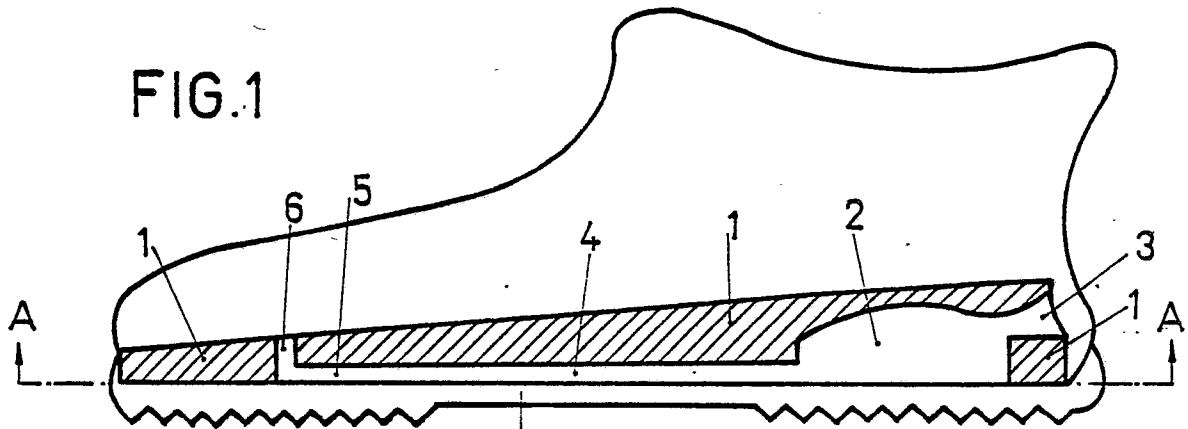


FIG.2

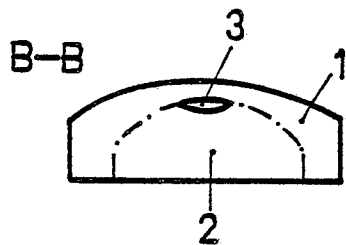


FIG.3

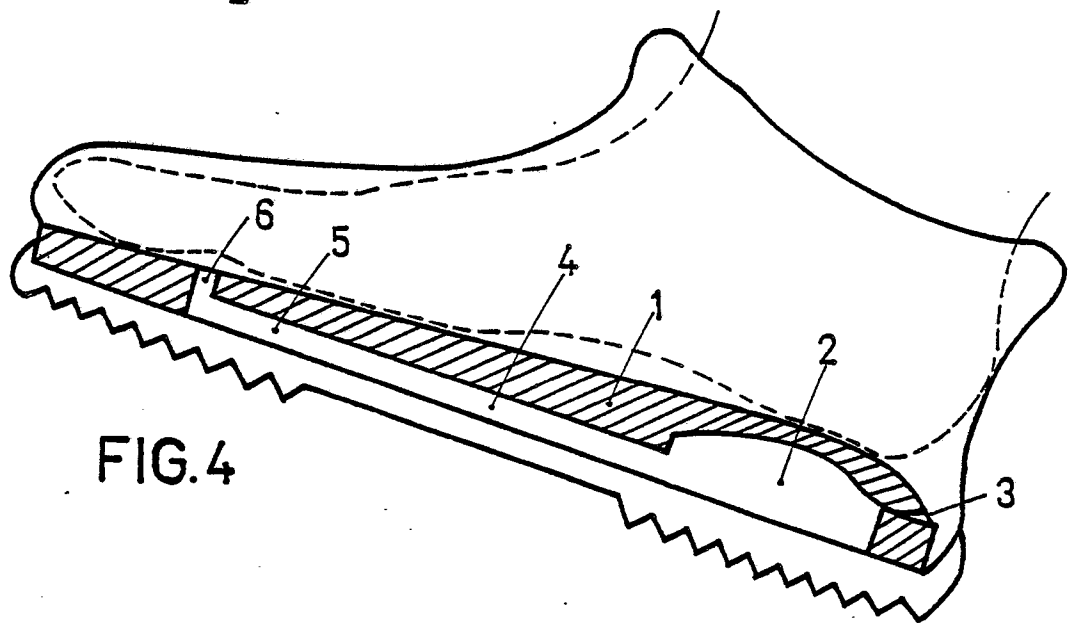


FIG.4

FIG.5

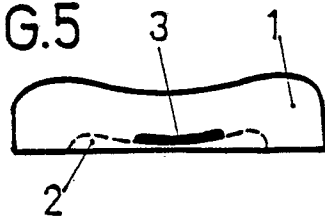


FIG.6

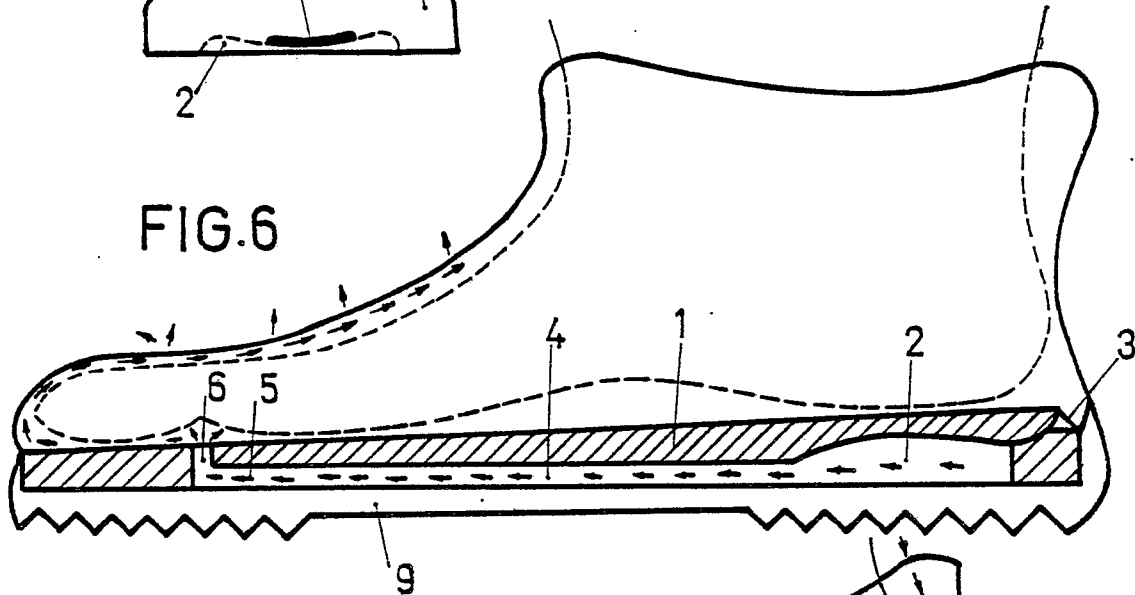


FIG.7

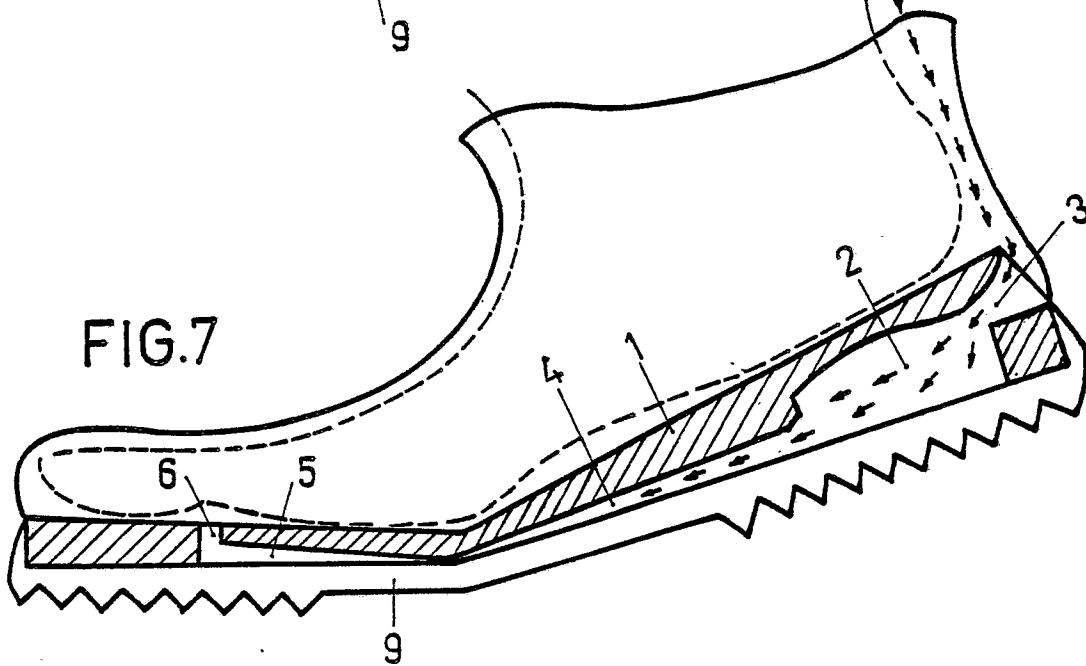


FIG.8

