July 3, 1951 J. W. MEAKER 2,558,973

VENTILATED SHOE

Filed Feb. 6, 1948

FIG. 1.

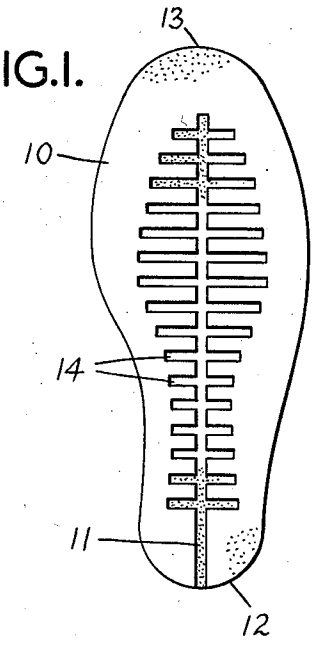


FIG. 2.

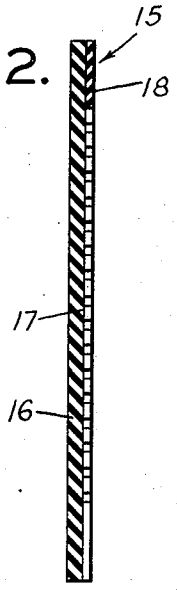
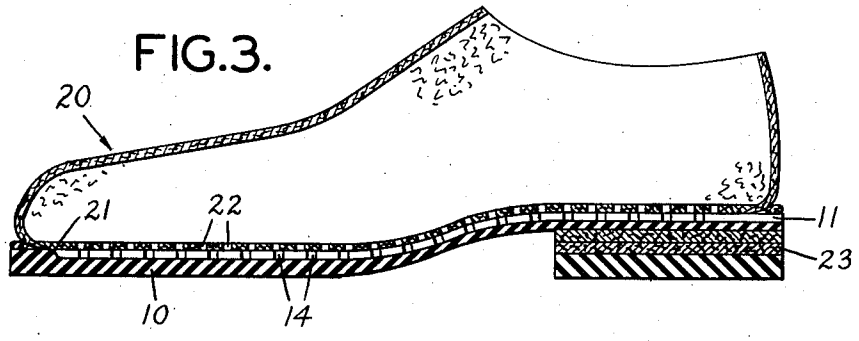


FIG. 3.



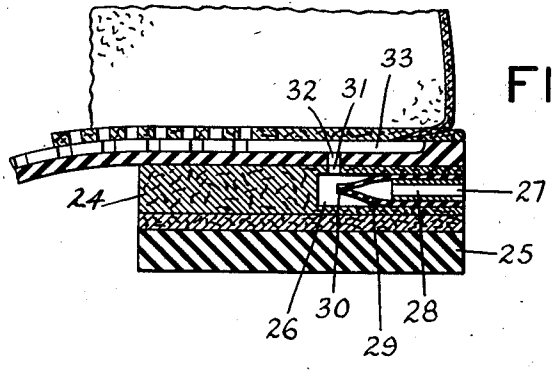


FIG. 4.

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VENTILATED SHOE

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1 Claim. (Cl. 36—3)

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This invention relates to improvements in footwear and it relates more particularly to shoe sole constructions for promoting the flow of air through, or ventilation of, shoes, slippers and the like.

It is known that the leather used in shoe soles varies widely in its porosity and for that reason some shoes seem to feel warmer and less comfortable than others. Also, it is known that natural and synthetic rubber soles, and certain rubbery plastic soles, which are not at all porous, have the same characteristic of feeling excessively warm. The reason for discomfort is, of course, the blocking of the flow of air through the shoe so that normal evaporation cannot take place and the cooling effect of evaporation is lost. This action of the relatively non-porous leathers and the rubbery soles is especially noticeable when perspiration increases, as during the summer. As a corollary to the lack of proper ventilation of shoes, the growth of fungus, such as "athlete's foot" is encouraged to such an extent that many people find it impractical to wear shoes which do not have perforated uppers in the summer-time.

It has been suggested heretofore that the soles of shoes might be provided with internal passages which communicate with the interior of the shoes by means of perforations in the insole so that air is pumped through these passages and perforations as the wearer walks. Some of these shoe soles have been provided with porous fillers or grooves which communicate with the atmosphere through perforations in the sides of the soles. These constructions are generally satisfactory when the footing is dry, but, under wet or rainy conditions, the soles act to admit or pump water into the interior of the shoe. Other shoes have been provided with a plurality of spacing strips between the outsole and the insole which communicate with the atmosphere by means of vents at the counter or at the edges of the soles. Such arrangements are not very satisfactory for the strips soon form ridges in the insole which make the shoes uncomfortable.

In addition to the above-noted defects of the prior ventilated soles, they have the disadvantage of requiring substantial modification of normal manufacturing procedures in order to produce them.

An object of the present invention is to provide ventilated shoe constructions which overcome the disadvantages of the prior sole constructions pointed out above.

Another object of the invention is to provide an improved shoe sole construction wherein air

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is more positively circulated through the shoe while the wearer is in motion.

An additional object of the invention is to provide a shoe sole which assures ventilation of the shoe while not differing noticeably in appearance from prior unventilated shoe sole constructions.

Other objects of the invention will become apparent from the following description of typical shoe soles embodying the present invention.

In accordance with this invention, I have provided an outsole with a grid work of narrow passages or grooves which extend to the edge of the sole only at that portion above the heel of the shoe. The passages or grooves may be formed in the outsole by molding, if the soles are of rubber or plastic, or by cementing to leather, plastic or rubber soles a thin layer of leather, plastic, or impregnated fabric having slots forming the grid work cut or otherwise formed in it.

Outsoles of the type described are used in conjunction with insoles which are provided with a multiplicity of small perforations through which air flows from the passages in the outsole to the interior of the shoe.

The outsoles may be attached to the insoles and uppers in the same way as any conventional leather or rubber sole so that no changes in manufacturing operations or shoe making machinery are required for producing my new shoes.

The above-described arrangement wherein the passages in the outsole extend only to the heel edge of the sole has the advantage of making the shoes as satisfactory for wear in all kinds of weather as ordinary unventilated shoes. The inlet of the grid of passages is elevated by the heel of the shoe so that water cannot enter the passages unless it is deeper than the heel of the shoe, in which event, the shoe would be wet anyway. Moreover, the opening at the heel has the advantage of improving the air pumping action of the sole. During walking, the weight is first placed on the heel and then transferred forwardly to the toe. The weight has a tendency to contract or compress the passages and thus the air is forced forwardly and up through the porous insole.

Even more positive pumping action can be attained by mounting a small and simple valve in the inlet passage or in the heel of the shoe so that air can flow into the grid work of passages through the valve but cannot flow out through the valve. A positive circulation and enhanced ventilation are thereby assured.

For a better understanding of the present invention, reference may be had to the accompanying drawings, in which:

Fig. 1 is a top plan view of a typical form of outsole in accordance with the present invention;

Fig. 2 is a view in longitudinal section of a modified two piece outsole;

Fig. 3 is a view in longitudinal section of a shoe embodying the present invention; and

Fig. 4 is an enlarged view in longitudinal section of the heel of a modified shoe showing details of a valve for positively circulating air through the shoe.

The principal feature of my new shoe construction is the provision of a novel type of outsole 10, shown in Fig. 1, which may be formed of any suitable material such as leather, rubber, synthetic rubber or rubbery synthetic plastic. The upper surface of the outsole 10 is provided with a series of grooves or channels including a longitudinally extending channel 11 which extends from the edge of the heel portion 12 of the outsole along the upper surface of the sole and terminates in spaced relationship to the tip or toe end 13 of the sole. The channel 11 communicates with a plurality of transverse grooves or channels 14 which intersect the channel 11 and have their opposite ends terminating inwardly of the edges of the sole. The reason for this arrangement of the channels will be explained in greater detail hereinafter. The channels 11 and 14 in the upper surface of the insole may be molded therein if the sole is formed of rubber or rubbery material. If the sole is formed of leather, they may be cut or scarfed in the surface of the sole 10. It is also possible, as shown in Fig. 2, to form a laminated outsole 15 in which the under or ground contacting portion 16 has a smooth upper surface 17 and the grid work of channels is provided by cementing or otherwise securing a thin strip of rubber, leather or other material 18 to the upper surface 17 of the outsole 15. This layer 18 is provided with slots corresponding to the grooves 11 and 14, but these slots extend completely through the layer of material 18 so that when it is cemented in place, a plurality of channels or grooves is provided on the upper surface of the sole 15.

The channels or grooves 11 and 14 are relatively shallow and narrow. For example, they may vary in depth between about $\frac{1}{32}$ and $\frac{1}{16}$ of an inch and their maximum width preferably should not exceed about ⅛ of an inch. Such narrow and shallow grooves do not cause the insole to become rough or corrugated.

Outsoles of the type described above are applied to the uppers of shoes in the same way as conventional leather, rubber or plastic soles. The insole of the shoe 20, for example, as shown in Fig. 3, differs from the ordinary insole in that it is provided with a large number of perforations. Thus, the insole 21, which may be of otherwise conventional construction and formed of a sheet of leather or leather and fabric cemented together, is provided with a great many small perforations 22 extending completely through it for communication with the channels 11 and 14 in the upper surface of the sole 10. The perforations 22 may vary from about $\frac{1}{32}$ to $\frac{1}{16}$ of an inch in width and may be formed at random in the insole 21 so that at least some of these perforations will overlie and communicate with the channels 11 and 14.

It will be understood that the sole construction of the shoe may be of the familiar welted type or any other type, the only requirement being that the outermost ends of the channel 11 near the tip 13 of the sole and the ends of the channels 14 adjacent the sides of the sole shall terminate inwardly of the edges of the sole. In this way, all of these channels except the rear end of the channel 11 are closed, and thus, moisture cannot readily seep into the channels and thereby enter the shoe. The open end of the channel 11, as shown in Fig. 3, is disposed above the level of the heel 23 of the shoe and for that reason it is unlikely to admit moisture into the shoe unless the water is so deep that the sole and part of the upper are completely immersed.

By arranging the only opening to atmosphere for the group of channels at the heel of the shoe, an improved circulating action is provided. Thus, as the wearer walks, the weight is first applied to the heel 23 which tends to cause the open end of the channel to be closed. As the weight is transferred forward, the air is forced along the channels toward the toe of the shoe and upwardly through the perforations 22 into the interior of the shoe, thereby causing a forced circulation of the air. Such forced circulation of the air increases evaporation within the shoe and makes the shoe much cooler to wear than the ordinary shoe having a relatively non-porous or impervious sole thereon.

If desired, an even more pronounced pumping of the air through the shoe can be obtained by providing a check valve mechanism which permits the flow of air into the channel 11 from the atmosphere, but prevents air from being forced out except through the perforations in the insole 21 of the shoe. In this modification, the valve may be inserted in the outer end of the groove 11 or it may be inserted in the heel of the shoe where more space is available. Such a construction is disclosed in Fig. 4 of the drawings. In this form of shoe construction, one of the lifts 24 of the heel 25 of the shoe is provided with a bore or opening 26 in which is mounted a valve member 27. The valve may be of the rubber flap valve type including a metal or plastic tube 28 having a tube of resilient rubber 29 thereon, the inner ends 30 of the tube 29 being flattened and normally in engagement. Such a valve is well-known. The flattened ends 30 of the valve spread apart to permit air to flow between them, these flaps closing together to prevent flow of air in the other direction. The air entering through the valve 27 flows through a passage 31 extending upwardly through the heel and communicating with an opening 32 extending through the sole, as shown in Fig. 4. The opening 32 communicates with the lengthwise channel 33 in the outsole, this latter channel being closed at both ends in this form of the invention but otherwise corresponding to the grooves 11 in Fig. 1. With this arrangement, the compression and expansion of the sole and the grooves therein during walking will create a pumping action forcing the air upwardly through the perforated insole to assure positive ventilation of the shoe. It will be understood that the form of the invention described herein is illustrative and that the design of the grooves in the outsole may be modified very substantially so long as they do not extend to the outer edge of the outsole except near the heel portion. Therefore, the form of the invention described herein should be considered as illustrative and not as limiting the scope of the following claim.

I claim:

A ventilated shoe comprising an upper, an insole connected to said upper and having a multiplicity of small perforations therethrough, an

outsole having tread, shank and heel portions beneath said insole and connected to said upper, a heel fixed to said heel portions below said outsole, the latter having at least one groove in its upper surface extending from the rear edge of said heel portion toward the opposite end of said outsole along said heel, shank and tread portions and terminating in said tread portion short of said opposite end, and said outsole further having in its upper surface a series of narrow transverse grooves communicating with said one groove and said perforations and terminating short of the edges of said outsole.

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