July 17, 1962 H. EVANGELISTA 3,044,188

VENTILATED FOOTWEAR

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FIG. 1.

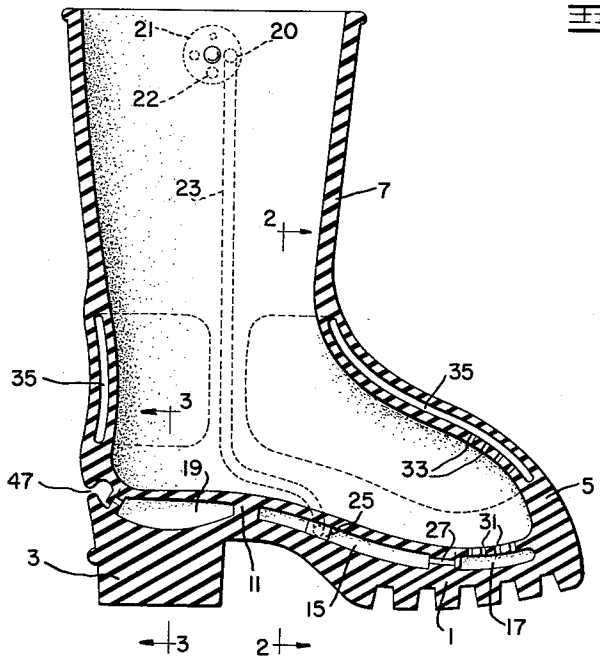
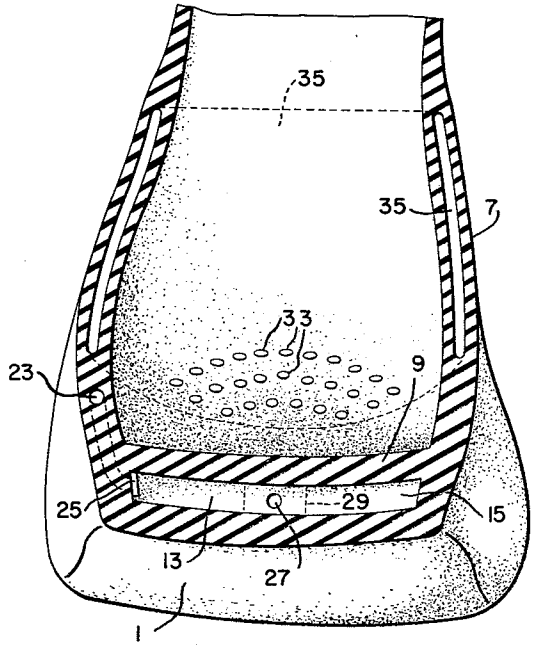



FIG. 2.




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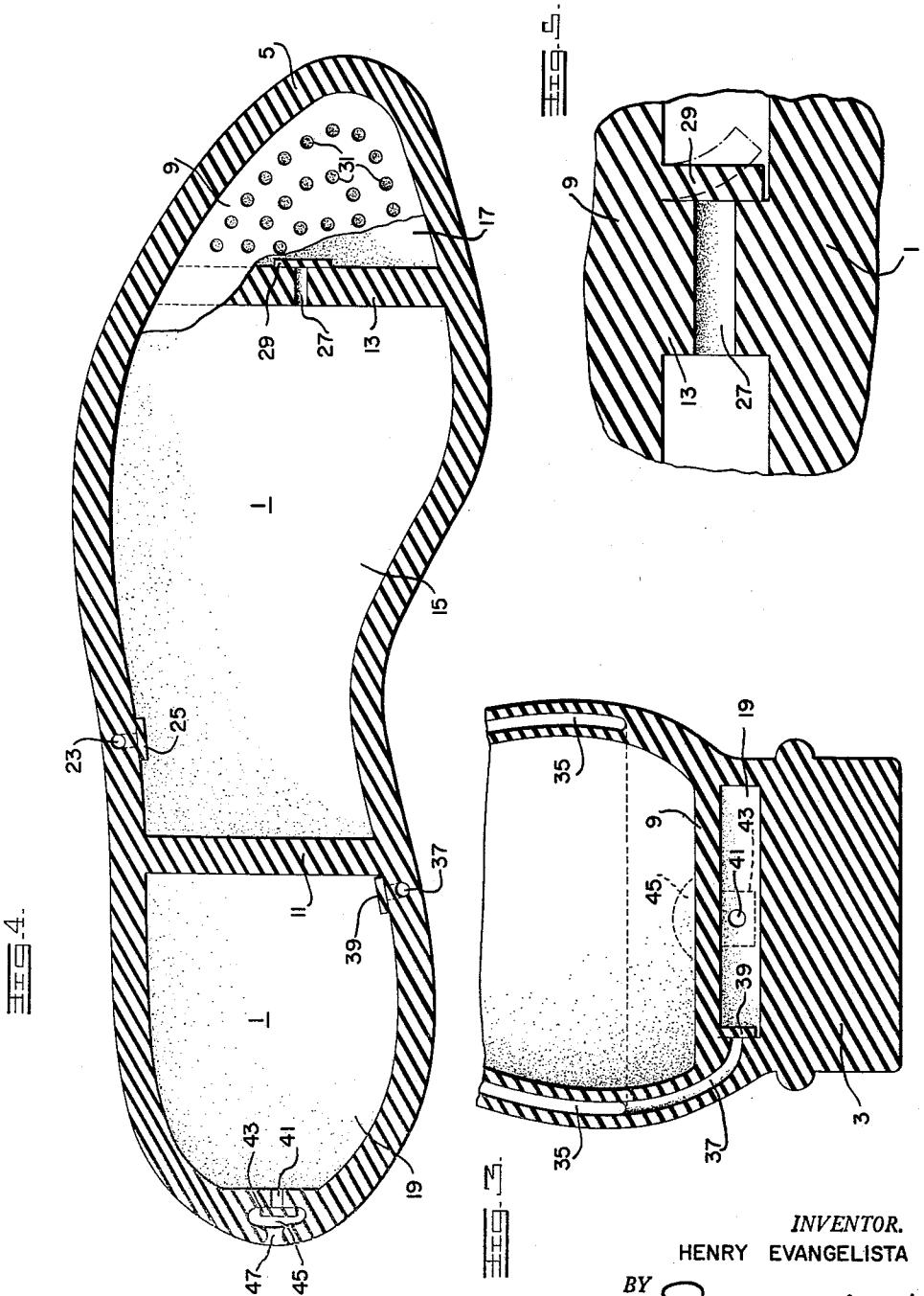



FIG. 4.

FIG. 5.

FIG. 3.

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# VENTILATED FOOTWEAR

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5 Claims. (Cl. 36—3)

The present invention relates to ventilated footwear, and more particularly to footwear of the type having means for forcing air into and out of the footwear during walking. The invention has utility both in connection with footwear having laces and in connection with pull-on footwear having no laces. The invention is useful primarily in footwear constructed of relatively air-impervious materials such as leather or rubber or combination of the same; and although the invention is useful for oxford-style footwear, it is of greatest utility for footwear more difficult to ventilate, that is, footwear of at least ankle height.

An object of the present invention is the provision of footwear adapted both to force air into and to force air out of footwear during walking.

Another object of the present invention is the provision of footwear adapted to cause air to follow a predetermined circuitous course through the footwear during use.

A further object of the present invention is the provision of footwear adapted to force air along a one-way path through the toe portion of the interior of the footwear.

Finally, it is an object of the present invention to provide footwear that will be relatively simple and inexpensive to manufacture, comfortable to wear, and rugged and durable in use.

Other objects and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side cross-sectional view through an article of footwear according to the present invention;

FIGURE 2 is a cross-section taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a cross-section taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a view from above of the region of the sole of an article of footwear according to the present invention with most of the insole broken away; and

FIGURE 5 is an enlarged fragment of FIGURE 1.

Referring now to the drawings in greater detail, there is shown an article of footwear according to the present invention which, for purposes of illustration, is a waterproof boot of the type having no laces. The boot has a sole 1 and a heel 3 at one end and a toe 5 at the other end. An upper 7 of conventional shape extends upwardly from sole 1.

An insole 9 follows generally the upper contour of sole 1 but is spaced above sole 1 to provide air space between the sole and insole, by portions of upper 7 adjacent sole 1 and also transverse partitions 11 and 13. In addition to spacing the insole above the sole, partitions 11 and 13 divide the air space between the sole and the insole into a first compartment 15 between the heel and the toe, a second compartment 17 at the toe and a third compartment 19 at the heel. As will now be described, ventilating air passes from one to another of the first, second and third compartments in that order.

Air enters first compartment 15 from the exterior of the boot through an inlet opening 20 disposed adjacent the top of the boot. The inlet opening is thus positioned not only to space it above water in which the boot may be partly immersed, but also to assure that when the boot is worn with a trouser leg extending down over the upper,



the air which enters inlet opening 20 will be somewhat warmed by body heat.

The quantity of air entering inlet opening 20 is regulated by a valve disc 21 mounted on the outer side of the upper for rotation on a stud or rivet or the like. Disc 21 has a plurality of holes 22 therethrough of various sizes, adapted to register selectively with opening 20 to provide means for regulating the quantity of air that enters the boot.

This inlet air then passes downwardly through passageway 23 disposed vertically along the side of the boot and enters into compartment 15 from the side, as best seen in FIGURES 1, 2 and 4. In order to assure that movement of air through passageway 23 will be only from the exterior to compartment 15, and not in the reverse direction, one-way valve means are provided comprising a flap 25 which normally yieldably closes the exit end of passageway 23 but which opens upon a reduction of pressure in compartment 15 to permit air passage therepast. The boot of the illustrated embodiment is constructed of rubber and is of molded and cemented construction, and flap 25 is similarly constructed of rubber and may be molded but is preferably cemented to the underside of insole 9.

The exit of air from compartment 15 is accommodated by a passageway 27 communicating between compartments 15 and 17. One-way valve means comprising flap 29 similar to flap 25 permits passage of air only from compartment 15 to compartment 17 and not in the reverse direction.

Air leaves compartment 17 through a plurality of holes 31 that extend through insole 9 at the toe of the boot, and enters the interior of the toe of the boot. This air passes about and between the toes of the wearer and through the toe of the sock. It is particularly important that the air be applied to the foot of the wearer at the toes as this is where perspiration tends to be the greatest. This air tends to evaporate such perspiration; and as the location of inlet opening 20 can assure that the air entering the boot is warmed by the body, the warmed air not only aids in evaporating perspiration but also warms the toes in cold weather.

The upper portion of toe 5 of the boot is provided with a plurality of holes 33 through the inner wall thereof, which communicate between the interior of the boot at the toe and a duct 35 defined between spaced inner and outer walls of upper 7 about most of that portion of the upper that receives the foot of the wearer, as seen in FIGURES 1, 2 and 3. Thus, duct 35 is relatively thin and of considerable extent in several directions. If desired, the walls of the duct may be maintained spaced apart by small inserts of rubber or the like (not shown). Naturally, the spacing of the walls which define duct 35 is quite valuable as providing an insulating effect in cold weather. A passageway 37 communicates between duct 35 and compartment 19 at the heel, as seen in FIGURES 3 and 4, and the outlet of passageway 37 into compartment 19 is normally closed by one-way valve means comprising a flap 39 similar to flaps 25 and 29, so that air passes through passageway 37 only from duct 35 into compartment 19 and not the other way. From compartment 19, air is exhausted to the exterior of the boot through passageway 41 closed on its outer side by one-way valve means comprising flap 43 similar to flaps 25, 29 and 39, so that passage of air through passageway 41 is permitted only from compartment 19 to the exterior of the boot and not the other way. To avoid such damage to flap 43 as might occur if it were exposed, flap 43 is disposed in a pocket 45 at the heel of the boot, the pocket opening to the exterior through outlet opening 47. Outlet opening 47 need not be spaced above the

level of the water into which the wearer may step, as passageway **41** is closed to such water by flap **43**.

It will thus be noted that compartments **17** and **19** communicate with the exterior of the boot and with the interior of the boot at the toe and that compartments **15** and **17** communicate with each other. In addition, compartment **17** communicates with the interior of the boot at the toe. It will also be noted that the course of passage of air is limited to passage from the exterior of the boot to compartment **15**, to compartment **17**, to the interior of the boot at the toe, through duc **35** to comparment **19** and back to the exterior of the boot. Stated another way, the air space is divided into one chamber **19** at the heel and another chamber **15** forward of the heel, the one-way valve means **21** and **29** in conjunction with their associated duct means permitting flow of air into chamber **15** only from the exterior and out of chamber **15** through **17** and **31** only to the interior of the boot. Chamber **19** is thus a rear chamber at the heel, while chamber **15** is a forward chamber forward of the heel.

In use, as the ball of the wearer's foot presses down on compartment **15**, this first compartment is reduced in size because insole **9** above at least compartments **15** and **19** is resiliently deformable. Air is forced out of compartment **15**; but it cannot leave through passageway **23** because flap **25** prevents air flow in this direction. Instead, air from compartment **15** is forced through passageway **27** past flap **29** and into compartment **17**, from which a corresponding amount of air is forced through holes **31** into the interior of the boot at the toe. A roughly corresponding amount of air is thus forced from the interior of the boot at the toe out through holes **33** into and through duct **35** and passageway **37** past flap **39** into compartment **19**. When the wearer of the boot first takes another step and his heel presses downward, compartment **19** is reduced in size and air in this compartment is forced out through passageway **41** past flap **43** through pocket **45** and opening **47** to the exterior of the boot. Air from compartment **19** cannot pass back through passageway **37** and duct **35** as flap **39** prevents air flow in this direction. Thus, the structure defining compartments **15** and **19** serves in effect as a pair of alternately actuated resiliently deformable bellows operated by the ball and heel respectively of the wearer's foot during different portions of each step taken by the wearer.

From a consideration of the foregoing disclosure, it will be obvious that all of the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand. Such modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

What I claim is:

1. An article of footwear having a heel and a toe and a sole, an insole normally spaced from the sole to establish air space beneath the insole, means dividing said air space into one chamber at the heel and another chamber forward of the heel, one-way valve and duct means permitting flow of air into said one chamber only from the interior and out of said one chamber only to the exterior of the article of footwear, and one-way valve and duct means permitting flow of air into said another chamber only from the exterior and out of said another chamber only to the interior of the article of footwear.

2. An article of footwear having a heel and a toe and a sole, an insole normally spaced from the sole to establish air space beneath the insole, means dividing said air space into a rear chamber at the heel and a forward chamber forward of the heel, duct means extending between both said chambers and the interior of the article of footwear at the toe, one-way valve means permitting flow of air into said forward chamber only from the exterior of the article of footwear, one-way valve means permitting flow of air through said duct means from said forward chamber only to the interior of the article of footwear at the toe, one-way valve means permitting flow of air through said duct means from the interior of the article of footwear at the toe only to said rear chamber, and one-way valve means permitting flow of air out of said rear chamber only to the exterior of the article of footwear.



3. An article of footwear having a heel and a toe and a sole, an insole normally spaced from the sole to establish air space beneath the insole, means dividing said air space into a first chamber between the heel and the toe, a second chamber at the toe and a third chamber at the heel, and one-way valve and duct means permitting flow of air from the exterior of the article of footwear only to said first chamber, from said first chamber only to said second chamber, from said second chamber only to the interior of the article of footwear, from the interior of the article of footwear only to said third chamber, and from said third chamber only to the exterior of the article of footwear.

4. An article of footwear having a heel and a toe and a sole, an insole normally spaced from the sole to establish air space beneath the insole, means dividing said air space into a first chamber between the heel and the toe, a second chamber at the toe and a third chamber at the heel, and one-way valve and duct means permitting flow of air from the exterior of the article of footwear only to said first chamber, from said first chamber only to said second chamber, from said second chamber only to the interior of the article of footwear at the toe, from the interior of the article of footwear at the toe only to said third chamber, and from said third chamber only to the exterior of the article of footwear.

5. An article of footwear having a heel and a toe and a sole, an insole normally spaced from the sole to establish air space beneath the insole, means dividing said air space into a first chamber between the heel and the toe, a second chamber at the toe and a third chamber at the heel, elongated duct means extending between the interior of the article of footwear at the toe and said third chamber, and one-way valve and duct means permitting flow of air from the exterior of the article of footwear only to said first chamber, from said first chamber only to said second chamber, from said second chamber only to the interior of the article of footwear at the toe, through said elongated duct means only from the interior of the article of footwear at the toe to said third chamber and from said third chamber only to the exterior of the article of footwear.


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