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⑰ **Air shoe.**

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Description

An air shoe is herein defined as a shoe such as an athletic shoe or a sneaker, having ventilation passages to cause air to pass into the sole of the shoe and to cool the wearer's foot as the sole is alternately compressed and permitted to expand while the wearer runs or otherwise engages in sports or other activities. Air shoes are now quite common in commercial use.

According to the invention there is provided an air shoe as set out in claim 1 of the claims of this specification.

In one embodiment, a shoe has an outer sole of compressible material whose bottom surface may be designed or patterned as desired, for example to provide a desired tread for the shoe. An upper surface of such outer sole has at least one channel extending lengthwise from the heel portion of the shoe to the front sole or ball section and a multiplicity of channels in the lateral direction passing across the longitudinal channel or channels separating the upper surface or layer of the sole into a number of sections, each section having surrounding channels which both bring air across the foot and also contribute flexibility to the sole structure. The sole has at least two longitudinal channels. At the instep an open mouth whose lower surface is curved downwardly forms an opening or orifice joining at least one lateral channel to the outside or ambient air, thus both providing a source of air for the channel structure and greatly reducing the possibility of water contamination.

The outer edge of the upper surface of the sole is generally solid, either being free from channels or having channels of reduced depth, and the upper sole thus provides a strong circumference support area. The lateral channels are generally of curved depth of indentation, being deeper at the centre of the shoe and more shallow as they approach the edges of the sole. The sole extends beyond the outer line of the shoe.

In prior air shoes in actual public use there has been a solid intermediate layer or inner member positioned on the upper surface of the sole, this intermediate layer compressing against the channels or air reservoir. According to the present invention such intermediate layer or member is eliminated; this structure combined with the multiple channels and sectionalization significantly decreases shoe weight and further increases flexibility, particularly the ability of the individual sole sections to act individually on the sole of the foot. In the preferred embodiment of the invention, a porous inner sole is positioned directly on the upper surface of the sole.

French Patents 1,304,787 and 718,476 disclose shoe like arrangements having various channels in the soles thereof. However, the disclosures given in these patents is believed to be less relevant to the present invention than the above mentioned air shoes which are in public use.

In one embodiment of the invention there is a slip sole positioned on the upper surface of the

outer sole. This slip sole has a thin solid outer area or rim for "lasting" or fastening the shoe upper to the sole. The central area within this rim is spongy or porous and has an upper thin layer of mesh across the top and a thin foam body beneath the mesh, this foam body being made of polyurethane, rubber or the like. This slip sole is thin and exceptionally flexible, this being of great importance to athletes, and it circulates air from the channel pattern underneath and across the foot. If another insole is used, this slip sole enhances such other insole, leaving it also flexible and improving air circulation.

Examples of the invention will now be described with reference to the accompanying drawings in which:

Fig. 1 is a view of a shoe having an air cooled sole;

Fig. 2 is a top perspective view of a lower sole according to one embodiment of the invention;

Fig. 3 is a rear cross section of the sole shown in Fig. 2, taken along the line 3—3;

Fig. 4 is a side cross section of the sole shown in Fig. 2;

Fig. 5 is a top view of a slip sole according to one embodiment of the invention;

Fig. 6 is a side cross section of the slip sole shown in Fig. 5;

Fig. 7 is a top perspective view of a lower sole according to another embodiment of the invention;

Fig. 8 is a fragmentary top view of a portion of an inner sole according to Fig. 1.

In Fig. 1 is shown an athletic shoe generally designated 10 having an upper 11 of usual design including a casing 12, an opening (not shown) with a tongue 14, laces 15 and reinforcing elements 16. Lasted or secured to the bottom of the shoe upper 11 is an outer sole 17 comprising two sole body portions secured together across the sole area. Inside the shoe upper 11 are an inner sole 23 positioned against the upper surface 24 of the upper sole body 19. Positioned on inner sole 23 is a slip sole or lasting sole 25. The shoe upper 11 and the inner sole 23 are adapted to receive a wearer's foot in conventional manner in shoe design and construction, with or without slip sole 25. Both inner sole 23 and slip sole 25 have openings leading from outer sole 17 to the shoe interior.

In Fig. 2 outer sole 17 comprises tread body 18 secured to sole body 19 these two bodies 18 and 19 forming a unitary body. Tread body 18 extends forward beyond the front of sole body 19 and is adapted to curve upwardly around the toe of upper 11 as shown in Fig. 1. Tread body 18 is of suitable material and design such as a rubber sole with a conventional tread design adapted to meet a surface on which the wearer is standing, walking or running. Tread body 18 takes the major wear from use of the shoe. Upper sole body 19 is of the same or different composition.

The upper surface 27 of upper sole body 19 has two longitudinal channels 29 extending nearly the length of the sole body, terminating at the front

shortly behind the front end of sole 17 and terminating at the rear shortly in front of the heel end of sole 17. Sole body 19 has an instep area generally designated 31, slightly narrower than the rest of the sole body 19, with a heel area generally designated 32 and a ball area generally designated 33 adapted to be positioned beneath the ball of the foot of the wearer. Longitudinal channels 29 extend largely through the areas of the heel area 32 and the toe area, passing through the instep area 31. Within the heel area 32 are several lateral channels 35, three such lateral channels being shown. Within the ball area 33 are several lateral channels 36, six such lateral channels being shown. In the instep area 31 is a lateral channel 37. In the embodiment of the invention shown in Fig. 2, the single lateral channel in the instep area 31 interconnects with a port or mouth 39 which in turn communicates with the external environment.

On the upper surface 27 of sole body 19 area, accordingly, the various longitudinal channels 29 and the lateral channels 35, 36 and 37 which divide the sole body into a multiplicity of raised sections 38. As shown, the segments toward the center of the sole are bounded on all sides by such channels 35, 36 and 37, whereas at the edges of the sole body 19 such sections are bounded on three sides by such channels and on the outer or edge side of the sections they are integrally formed into the sole body. Referring to Fig. 2 is observed that instep channel 37 is at the throat of mouth 39 and is well raised above the level of the ground and generally will be above the height of a shallow puddle. As shown in Fig. 9, the bottom of the mouth 39 slopes sharply down toward the mouth opening, providing drainage for any water picked up at a puddle during use.

In Fig. 3 is shown the sole body 19 of the article shown in Fig. 1, having an outer sole or tread 18. Longitudinal channels 29 are shown, having a depth approximately the same as the depth of lateral channel 36 in the central shoe areas. As shown with reference to Figures 2 and 3, the ends of the lateral channel have upwardly curving end portions 41 reaching the surface 27 of the sole body a small distance short of the edge of the sole. In the Fig. 2 the ball portion of sole body 19 is wider than the body at the point of the cross section, thus conforming with a typical foot shape.

Similarly in Fig. 4 is shown the sole body 19 having a multiplicity of lateral channels 36 cut across the upper portion of the body. As can be seen in Fig. 4, the front section 42 of tread body 18 extends forward from the sole body 19, being adapted to be formed upwardly around the toe of shoe 10.

In Fig. 5 and Fig. 6 is shown a slip sole 25 having a solid outer frame 45 surrounding an inner air section having an upper foam layer 46 and a lower mesh layer 47. Around the edges of the frame 45 is stitching 49 or other means to fasten frame 45 to mesh 47.

In Fig. 7 is shown another embodiment of the

invention having a sole body 59 with a tread section 18 as in the embodiment of the preceding Figures. Sole body 59 has two longitudinal channels 69 running nearly the length of the shoe, as with the embodiment in Fig. 2. A multiplicity of lateral channels 66 cross longitudinal channels 69 along the upper surface of sole body 59, the lateral channels 66 extending to the edges of sole body 59 and opening to the surrounding environment. An instep lateral channel 67 terminates in outlet part 39. Thus the network of crossing channels 66 and 69 is accessed to the surrounding environment or atmosphere.

Longitudinal channels 29 and 30 are of relatively uniform depth throughout the greater part of the length thereof, and may, is desired taper to shallower depth and thus taper to the level of the surface of body 19 at either end of the shoe body. Lateral channels 36, as shown in Fig. 5 may also be of relatively uniform depth, tapering up to the surface of sole body 10 at the ends of the channels. One procedure of manufacture contemplates that the channels may be cut into or ground into the sole body with a round grinding implement. Thus, through the greater part of the length and width of the sole, lateral channels 36 and longitudinal channels 29 and 30 present a cross design of relatively uniform depth and channel width. In the embodiment shown in Fig. 1, this network of crossing channels communicates with the outside environment through instep channel 37.

In the embodiments of the invention shown in Figs. 2 and 7, and in the other related figures, there is a network of crossing channels running substantially the length and width of the shoe, communicating with the outside air and carrying the air beneath the foot of the wearer. These channels 29, 35, 36 and 37 also divide the sole into sections 38, as shown. These individual sections 38 support the foot of the wearer at the individual areas of each channel. Between the sections, the channels carry air from one position to another, lend flexibility to the sole by virtue of providing thinner sole portions, and in addition significantly decrease the weight of the sole. Since the sole 19 is a significant portion of the weight of the total shoe, this produces a significantly lighter and therefore more desirable shoe.

The entire sole 19 is more flexible as a result of the channel flexibility, permitting the sole to bend more easily with flexing of the foot during walking, running, or other activity. In addition, the individual sections 38 are flexibly movable with respect to one another. Thus, one section 38 may be raised as a result of pressure from the surface of which the person is standing or moving, while an adjacent or nearby section is not thus raised. As a consequence, the sole partly massages the foot during use, as each section individually moves in a massaging motion, and each section is individually compressed or released from compression, thus increasing the compression and expansion of the channels and the air in such

channels. As the wearer moves, stepping from one foot to the other, the sole in general and the individual sections 38 are slightly compressed and expanded causing channels 29, 35, 36 and 37 (or channels 66 and 69 of Fig. 7) to draw air into sole body 19 and spreading the air across the entire foot area. These channels are relatively shallow and the absence of a large reservoir as employed on certain air shoes causes the air to spread rapidly across the entire foot area.

Insole 23 shown in fragment in Fig. 8 is of a suitable material such as leather, plastic or the like. A very satisfactory material is a soft flexible molded plastic material covered on its upper surface with a soft fibrous layer fitting comfortably against a wearer's foot. A number of holes 30 passing through the insole from its upper surface through its lower surface to permit the passage of air therethrough. These holes 30 may be of relatively small size such as pinhole size or moderately larger than pinhole size.

The slip sole shown in Figs. 5 and 6 carries air to the sole of the wearer's foot, breathing as the wearer's foot presses on the slip sole and releases pressure. It is well adapted to be joined with the shoe of Fig. 1 and with the sole of Fig. 2 and Fig. 7 to assist in foot breathing and in rapid spread of air throughout all foot and show areas. In particular, as air enters channels 29 and 36 of the shoe in Fig. 2, slip sole 25 promptly leads such air through all the channels and to all foot areas.

Claims

1. An air shoe (10) having a shoe upper (11) and a sole (17—19) joined to the upper (11),
an outer sole (17) having a predetermined tread design (18) on its lower surface,

an upper surface (27) on said outer sole (17), and channels (29, 35, 36, 37) in said upper surface (27), characterized by

at least a pair of longitudinal channels (29) in said upper surface (27) extending from a position within the heel portion (32) of said sole (17) to a position within the ball portion (33) of said sole (17),

a multiplicity of lateral channels (35, 36, 37) in said upper surface (27) crossing said longitudinal channels (29) to divide said upper surface (27) into a multiplicity of individual sections (28, 38), each section (28, 38) at least partially surrounded by channels (29, 35, 36), at least one of said lateral channels (35) being in said heel portion (32), a plurality of said channels (36) being in the ball portion (33) and at least one of said channels (37) being in the instep portion (31) of said sole (17), to provide an intercommunicating network of channels (29, 35, 36, 37) as an air passage to the various longitudinal and lateral channels (29, 35, 36, 37) across a substantial area of said sole (17),

the channel (37) at said instep portion (31) leading from said intercommunicating channel network and terminating in an external mouth (39) at said instep location (31).

said mouth (39) having a bottom surface declin-

ing downwardly from said channel (37) to an open end at the edge of said sole (17).

2. A shoe as claimed in claim 1, further characterized by an inner sole (23) located on the upper surface (27) of said sole (17) and extending beyond the edges of the upper surface (27) of said sole (17), providing lasting between said sole (17) and said shoe upper (11).

3. A shoe as claimed in claim 1, further characterized by a plurality of said lateral channels (66) extend to the edge of said sole (17) to communicate with the external ambient atmosphere.

4. A shoe as claimed in claim 1, further characterized by

an inner slip sole (25) having an upper foam layer (46) adapted to contact a wearer's foot and a lower mesh layer (47),

an exterior frame (45) on said slip sole (25) attached to the shoe upper (11) to provide lasting thereto and to the lower mesh layer (47),

the communicating network of channels (29, 35, 36, 37) and the foam layer (46) of the slip sole (25) being adapted to provide air flow across substantially the entire foot area.

Patentansprüche

1. Ventilationsschuh (10) mit einem Schaft (11) und einer daran angebrachten Sohle (17...19), wobei eine Außensohle (17) an ihrer Unterseite ein vorgegebenes Laufprofil (18) hat und wobei die Außensohle (17) eine obere Fläche (27) aufweist, in der Kanäle (29, 35...37) vorhanden sind, gekennzeichnet durch wenigstens ein Paar von Längskanälen (29) in der oberen Fläche (27), die sich von einer Stelle im Absatzbereich (32) der Sohle (17) zu einer Stelle im Ballenbereich (33) der Sohle (17) erstrecken, ferner durch eine Anzahl von Seitenkanälen (35...37) in der oberen Fläche (27), welche die Längskanäle (29) kreuzen und die obere Fläche (27) in eine Anzahl einzelner Abschnitte (28, 38) unterteilen, die jeweils wenigstens zum Teil von Kanälen (29, 35, 36) umgeben sind, wobei sich zumindest ein Seitenkanal (35) im Absatzbereich (32), eine Anzahl von Kanälen (36) im Ballenbereich (33) und zumindest ein Kanal (37) im Ristbereich (31) der Sohle (17) befinden, so daß ein strömungsverbundenes Kanalsystem (29, 35...37) zum Luftdurchlaß zu den einzelnen Längs- bzw. Seitenkanälen (29, 35...37) in einem großen Teil der Sohle (17) gebildet ist, wobei der Kanal (37) im Ristbereich (31) von dem strömungsverbundenen Kanalsystem ausgeht und am Ristteil (31) in einer äußeren Mündung (39) endet, deren untere Fläche von dem Kanal (37) abwärts zu einer freien Öffnung an der Kante der Sohle (17) führt.

2. Schuh nach Anspruch 1, dadurch gekennzeichnet, daß auf der oberen Fläche (27) der Sohle (17) eine Brandsohle (23) angeordnet ist, die über die Kanten der oberen Fläche (27) der Sohle (17) hinausreicht und eine dauerhafte Verbindung zwischen der Sohle (17) und dem Schaft (11) bildet.

3. Schuh nach Anspruch 1, dadurch gekennzeichnet, daß eine Anzahl von Seitenkanälen (66) bis zu den Kanten der Sohle (17) reicht und mit der Umgebungsluft in Strömungsverbindung steht.

4. Schuh nach Anspruch 1, dadurch gekennzeichnet, daß eine Innen-Schlupfsohle (25) eine obere, am Fuß des Benutzers anliegende Schaumschicht (46) und eine untere Mattenschicht (47) aufweist, daß auf der Schlupfsohle (25) ein Außenrahmen (45) vorhanden ist, der am Schaft (11) angebracht ist und eine dauerhafte Verbindung dazu sowie zu der unteren Mattenschicht (47) bildet, und daß mittels des strömungsverbundenen Kanalsystems (29, 35...37) und der Schaumschicht (46) der Schlupfsohle (25) im wesentlichen eine Belüftung des gesamten Fußbereichs bewirkt wird.

Revendications

1. Chaussure ventilée (10) possédant un dessus de chaussure (11) et une semelle (17—19) assemblée au dessus de chaussure (11),

une semelle extérieure (17) présentant un dessin de sculpture prédéterminé (18) sur sa face inférieure,

une face supérieure (27) de ladite semelle extérieure (17), face supérieure (27) dans laquelle sont pratiquées des rainures (29, 35, 36, 37), caractérisée par

au moins une paire de rainures longitudinales (29) dans ladite face supérieure (27), s'étendant d'une position située à l'intérieur de la partie de talon (32) de ladite semelle (17) à une position située à l'intérieur de la partie de pointe (33) de ladite semelle (17),

une multiplicité de rainures latérales (35, 36, 37) dans ladite face supérieure (27), croisant lesdites rainures longitudinales (29) afin de diviser ladite face supérieure (27) en une multiplicité de sections individuelles (28, 38), chaque section (28, 38) étant au moins partiellement entourée par des rainures (29, 35, 36), au moins une desdites rainures latérales (35) se trouvant dans ladite

partie de talon (32), un certain nombre desdites rainures (36) se trouvant dans la partie de pointe (33), et au moins une desdites rainures (37) se trouvant dans la partie de cou-de-pied (31) de ladite semelle (17), afin de fournir un réseau intercommuniquant de rainures (29, 35, 36, 37) comme passage d'air vers les différentes rainures longitudinales et latérales (29, 35, 36, 37) sur une majeure partie de la surface de ladite semelle (17), la rainure (37) prévue dans ladite partie de cou-de-pied (31) partant dudit réseau intercommuniquant de rainures et se terminant dans une embouchure externe élargie (39) située à l'endroit dudit cou-de-pied (31), et

ladite embouchure (39) présentant une face de fond en pente descendante depuis ladite rainure (37) jusqu'à une extrémité ouverte au bord de ladite semelle (17).

2. Chaussure selon la revendication 1, caractérisée en outre par une semelle intérieure (23) placée sur la face supérieure (27) de ladite semelle (17) et s'étendant au-delà des bords de la face supérieure (27) de ladite semelle (17), assurant l'assemblage entre ladite semelle (17) et ledit dessus de chaussure (11).

3. Chaussure selon la revendication 1, caractérisée en outre par le fait qu'une pluralité desdites rainures latérales (66) s'étendent jusqu'au bord de ladite semelle (17) afin de communiquer avec l'atmosphère ambiante extérieure.

4. Chaussure selon la revendication 1, caractérisée en outre par une semelle intérieure amovible (25) comprenant une couche supérieure de mousse (46) conçue pour le contact avec le pied de l'utilisateur, et une couche inférieure en treillis (47),

un bâti extérieur (45) prévu sur ladite semelle amovible (25) et fixé au dessus de chaussure (11) afin d'assurer le montage sur ce dernier et sur la couche inférieure en treillis (47),

le réseau communiquant de rainures (29, 35, 36, 37) et la couche de mousse (46) de la semelle amovible (25) étant conçus de manière à fournir un écoulement d'air sur quasiment toute la surface du pied.

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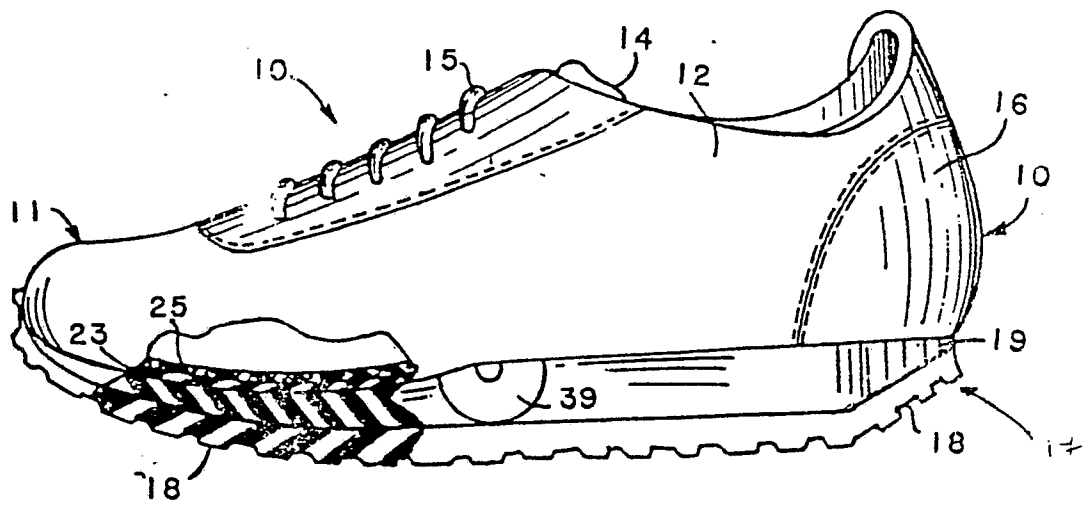


FIG. 1

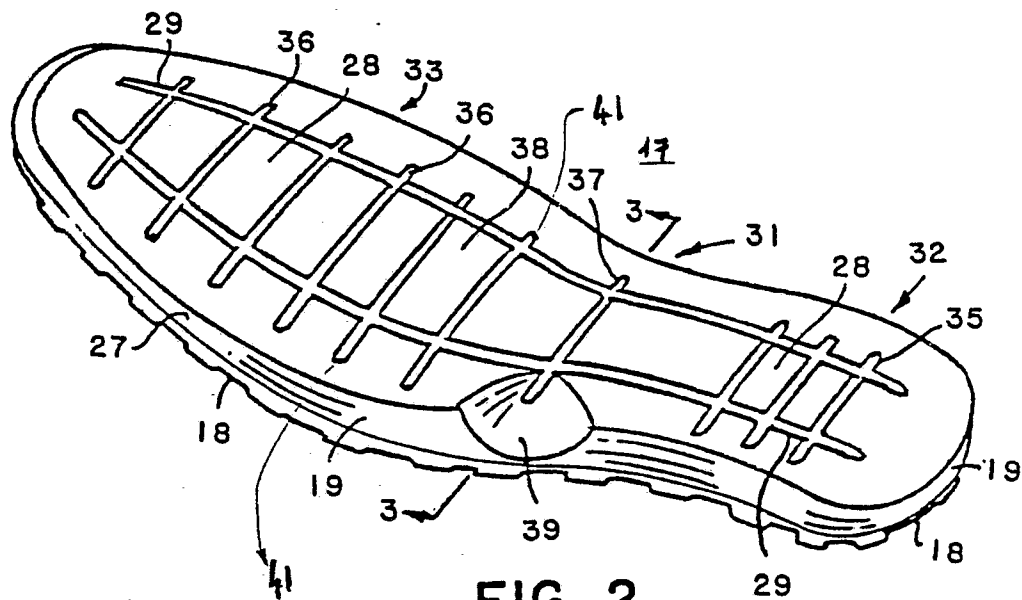


FIG. 2

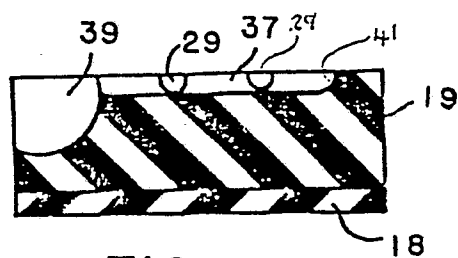


FIG. 3

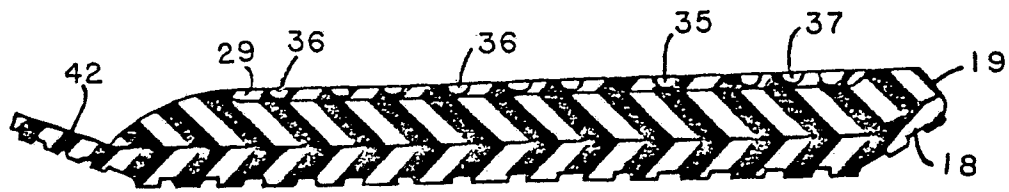


FIG. 4

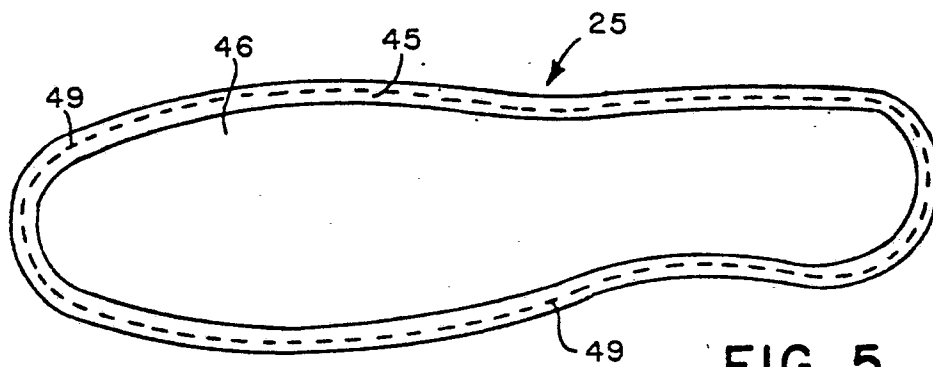


FIG. 5

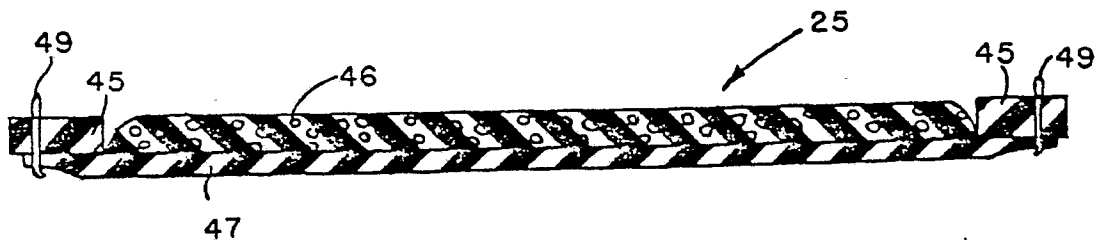


FIG. 6

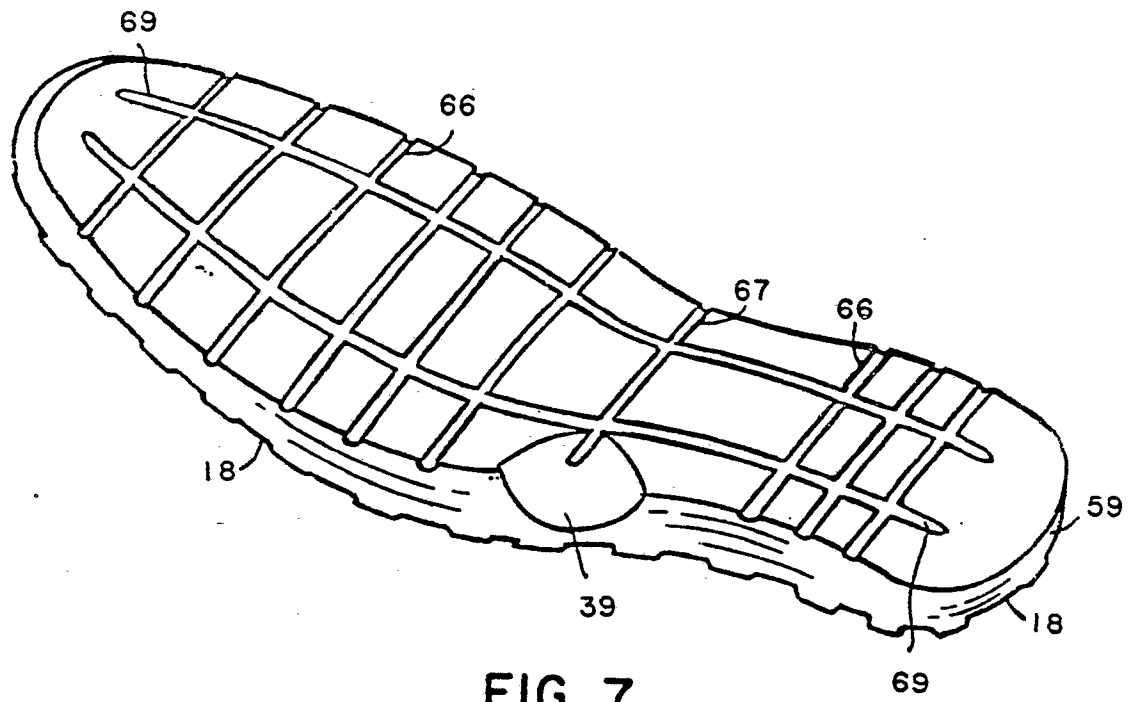


FIG. 7

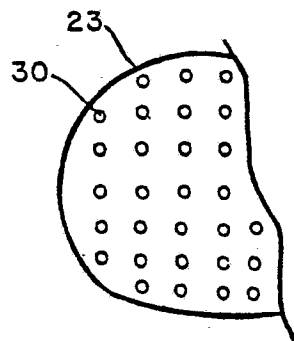


FIG. 8