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(54) Footwear with high comfort

(57) Shoe with high level of comfort, comprising an upper (3) and a sole element (2), characterised in that it comprises a lining (4) constituted by a succession of parallel hollow channels (5), an extractable insole (6) made of material with high shape memory, a first set of elements superposed to the sole constituted by the succession of a holed insole (7), of a first series of appropriately distanced partition spacer elements (8), and with a lower insole (9); a rigid tip element (10); a second set of superposed elements constituted by a protective layer (11) and a second series of partition spacer elements (8').

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Description

[0001] The present invention relates to a shoe with a high level of comfort. More in particular, the invention relates to a shoe in which a high level of comfort is linked to the use of materials and devices that facilitate internal ventilation and hence the exchange of air between the interior and the exterior in predetermined points thereof.

[0002] It is well known that shoes prevent feet from correctly perspiring because they alter the natural mechanism that performs this function.

[0003] Therefore, greater comfort is linked with the ability to replace the warm, humid air present inside the shoe with fresh, dry air from outside.

[0004] In the prior art, there are numerous examples of shoes that, thanks to various devices, both dynamic and static, attempt to make them more pleasant to wear. Dynamic examples are based on the introduction of mechanical systems with valves which, using the pressure of the wearer's heel on the heel of the shoe, force the entry of air from the exterior to the interior through one or more holes normally drilled in the heel region. Air distribution is thus limited to the region underlying the sole of the foot and there are no means for distributing it over the entire surface of the shoe; moreover, the valve hole tends to become obstructed, totally voiding the desired effect.

[0005] Other known devices adopt static systems of the type with holes drilled in the sole, hence lacking forced pressure and based on the simple passage of air by slow convection: such systems, in addition to failing to distribute the effect inside the shoe, are also very slow in promoting the exchange of air from the interior towards the exterior, because there is no pressure differential.

[0006] In this case too, no materials being provided to promote distribution over the entire surface of the shoe, the effect tends to take place only in the region of the sole of the foot, thereby reducing its benefits.

[0007] To overcome the drawbacks of the items already known in the state of the art, the present invention proposes the adoption of a show within which can be created, because they are brought about by the combination of mechanical action and by the use of particular materials, air currents in all regions of the shoe, in which therefore the exchange process between the exterior and interior of the shoe is uniform and continuous because it is linked to the deformations caused on the shoe by the act of walking.

[0008] The object of the invention, therefore, is to create a continuous ventilation system inside the shoe and to cause the exchange of air to involve most of the regions of the foot contained therein.

[0009] To meet this requirement, the invention proposes the adoption of a shoe in which the inner part of the whole upper is coated by a special lining constituted by a series of small parallel channels in succession which allow the air coming from the exterior to be conveyed and uniformly distributed inside, and subsequently ejected in specific regions of the shoe; by an extractable insole made of a material with high shape memory with the function of preventing air and vapour from condensing in the bottom part of the shoe, and of promoting also the lateral ventilation of the shoe; a first multi-layer element constituted by a holed upper insole, a series of spacer elements of the partition type, made of crush-proof material with support functions, which contribute to the circulation of air inside the shoe, a lower base layer set down on the mounting arch support and separated from the sole; a tip element with stiffening function; a second multi-layer element comprising substantially a protective upper layer and a series of spacer elements of the partition type made of crush-proof material positioned at the upper part of said front portion of the shoe between the upper and said rigid tip.

[0010] According to the invention, it is advantageously proposed to obtain said lining from textile material, preferably from synthetic fibres like polyamide, polyester, polypropylene, but also from natural fibres such as wool, cotton, linen, viscose silk. According to the invention, the denier value of the yarn destined to constitute said lining will be appropriately calibrated, in order to obtain an extremely low value of resistance to crushing of the channel thus produced.

[0011] Moreover, said channels are arranged in a continuous sequence, appropriately spaced, so that air circulates, not only inside the channels but also between the spaces provided between one channel and the next.

[0012] A further advantage of the invention is that said lining with channels for the circulation of air inside the shoe is positioned at the inner part of the entire upper, thereby promoting ventilation in continuous and uniform fashion.

[0013] An additional advantage of the present invention is that said spacer elements of the partition type are arranged in appropriate regions of the shoe, preferably in two points on the sole and at the tip, thereby exploiting the effect produced by the deformations caused in the shoe by the walking action and the consequent differences in pressure between the air present in the various regions inside the shoe and the air outside the shoe and hence promoting its circulation and exchange.

[0014] To assure this effect, according to the invention said partition spacer elements are made from highly elastic material with pronounced return memory, e.g. polyurethane, polypropylene, polyethylene foams, with closed and open cell composition, non compressible high density felts both with single fibre and multi-fibre.

[0015] Another advantage of the invention is that said insole is made of a material with high shape memory that assures that the air layer within is not eliminated by the crushing caused by the pressure exerted by the foot. In particular, the composition of the yarn making up said insole is obtained from polyamide single filament (nylon) with special spinning to make the entire structure non compressible while maintaining highly transpiring, and said structure may also be provided with anti-static de-

vices appropriately inserted during the spinning operation.

[0016] Moreover, according to the invention said partition spacer elements define, also at the sole, channels for the passage of air which join said channels provided on the lining.

[0017] The present invention will now be described by way of non limiting example with reference to the accompanying drawings:

Fig. 1 is a schematic external view of a shoe according to the method described herein

Fig. 2 is a schematic vertical section view along the longitudinal axis of the shoe Fig. 3 is a vertical section view along the transverse axis of the shoe

Fig. 4 is a schematic view of a detail of the lining and of the insole provided inside the shoe

Fig. 5 is a vertical longitudinal section view of the tip part of the shoe

Fig. 6 shows the tip position shown in Fig. 5 in bent position.

Fig. 7 is a detail view of the holed edge positioned at the collar

Fig. 8 shows the succession of positions assumed by the shoe during the walking action and the corresponding directions of the air flows within the shoe.

[0018] As shown in Fig. 1, the object of the invention is a shoe 1 of a more or less sporty type, substantially constituted by sole (2) and upper (3) in which the sole can be of a known type, obtained through different constructive technologies, such as needle working (gluing between sole and upper) or with stitching in the various versions.

[0019] Through the particular structure and composition of the inner part of the shoe (1) and the mechanical effects on the shoe, the walking action allows to obtain a continuous ventilation of the inner part of the shoe (1) itself, a constant exchange between external air and internal air and hence considerable comfort for the foot.

[0020] As is more readily apparent in Fig. 2 the inner part of the upper (3) is coated by a lining (4) which, thanks to its particular structure, assures that the foot will not continuously adhere to the lining but only at points, at channels (5) provided for the passage of air. Said channels (5) arranged in continuous and alternating succession have a continuity throughout the inner structure of the shoe (1) so that the air can be conveyed and uniformly distributed inside it and, under the pumping action produced by the different position of the foot while walking, circulatory motions of the air can be created. The lining (4) provided with channels (5), as better shown in Fig. 3, covers the inner surface of the upper (3). At the sole (2), instead, in the inner part thereof and regardless of the constructive solution adopted for its manufacture, two different types of elements are provided: an extractable insole (6) made of a material with high shape memory, preferably made of continuous polyamide yarn with high resistance to abrasion, provided with a layer of air inside it and so structured as to prevent the layer of air present within it from being eliminated by the crushing caused by the pressure of the foot set down on to it, a second layer positioned between said extractable insole (6) and the sole (2), constituted by at least one holed insole (7), a series of partition spacer elements (8) and a lower insole 9 in contact with the sole, normally called arch support. According to a preferred embodiment of the invention, said extractable insole (6) by virtue of the structure of the material whereof it is made, allows to expel air also laterally, thereby further contributing to the diffusion of air inside the shoe. Moreover, said layer positioned under the extractable insole (6) comprises, in addition to the holed insole (7), the partition spacer elements (8) which, according to a preferred embodiment, are distributed and fastened with an appropriate combination both in longitudinal and transverse direction, and are preferably made of material with high elasticity, such as polyurethane foams with open cells with different degrees of resistance against crushing and strong return memory. Said layer and, in particular said elements (8), as the wearer walks, by virtue of the characteristics of elasticity of the material, cause a natural pumping effect which allows a continuous circulation of air between the exterior and the interior. In order to make the humidity-laden air flow out correctly from the interior of the shoe through the channels of the lining 4 without inconveniencing the user or damaging the shoe itself, according to the invention the upper peripheral portion of the shoe (collar) is advantageously provided with an edge (12) shown in Fig. 7, having slots positioned at the exits of the channels (5) of the lining (4). Figures 5 and 6 show another advantageous solution of the present patent application provided in the region of the shoe identified as the "tip", fitted with a rigid metal element (10) below the upper (3), which consists of the introduction of a second multi-layer element similar to the one provided on the sole (2), constituted by a protective layer (11) constituted by partition spacer materials (8') with characteristics of elasticity and with strong elastic memory, prevalently composed of polyurethane foams with open cells with different degrees of resistance against crushing, preferably inserted between the rigid tip (10) and the lining (5) of the shoe (1). When the wearer walks, this element too will further promote air distribution inside the shoe thanks to the natural pumping effect produced on the elastic material.

[0021] Thanks to the insertion of the two multi-layer elements (8 and 8') with partition spacer elements with high elastic memory on the sole (2) both at the heel and at the front area of the foot, as well as at a third region in proximity to the tip (10), a continuous air circulation system is created inside the shoe, assuring the desired level of comfort. Fig. 8 schematically shows the distribution of the air flow according to the position of the foot.

[0022] The mounting arch support, not visible, which also has the characteristics of high shape memory, and which allows air to remain inside it, bears directly on a

drawing obtained directly from the mould. Said drawing allows a partial controlled crushing given by the type of material whereof the sole is made and by the particular drawing with which the inner part of the sole is provided, which promotes an effect of pumping air from the bottom upwards, and since the arch support is directly in communication with the channelled lining (4) with which the shoe (1) is provided, it assures the distribution of air throughout the show.

[0023] The present invention has been described by way of non limiting explanation but it is understood that variants and modifications may be made without thereby departing from its scope of protection.

Claims

1. Shoe with high level of comfort, comprising an upper (3) and a sole element (2), **characterised in that** it comprises a lining (4) constituted by a succession of parallel hollow channels (5), an extractable insole (6) made of material with high shape memory, a first set of elements superposed to the sole constituted by the succession of a holed insole (7), of a first series of appropriately distanced partition spacer elements (8), and with a lower insole (9); a rigid tip element (10); a second set of superposed elements constituted by a protective layer (11) and a second series of partition spacer elements (8').

2. Shoe with high comfort level as claimed in claim 1, **characterised in that** said lining (4) is constituted of textile material, preferably obtained from synthetic fibre such as polyamide, polyester, polypropylene.

3. Shoe with high comfort level as claimed in claim 1, **characterised in that** said lining is made of a natural material.

4. Shoe with high comfort level as claimed in claim 1, 2, 3, **characterised in that** said lining (4) adheres continuously to the inner part of the entire upper (3).

5. Shoe with high comfort level as claimed in claim 1, 2, 3, 4, **characterised in that** the channels (5) of said lining (4) are hollow elements positioned parallel through which air flows, and distanced in constant fashion.

6. Shoe with high comfort level as claimed in claim 1, **characterised in that** said partition spacer elements (8 and 8') are positioned in an appropriate region of the shoe (1), preferably at the sole (2), and of the tip (10).

7. Shoe with high comfort level as claimed in claim 1, 6, **characterised in that** said partition spacer elements (8 and 8') are made of material with high elasticity with strong return memory.

8. Shoe with high comfort level as claimed in claim 1, 5, 6, 7, **characterised in that** said partition spacer elements (8 and 8') are made of polyurethane, polypropylene, polyethylene foams with both closed cell and open cell composition.

9. Shoe with high comfort level as claimed in claim 1, 5, 6, 7, 8, **characterised in that** said partition spacer elements (8 and 8') are made of felt or other densities.

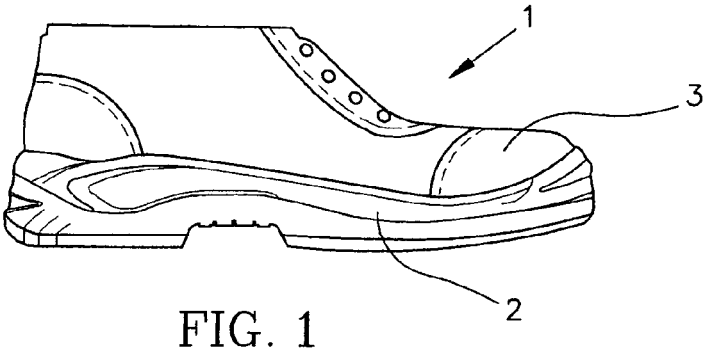

FIG. 1

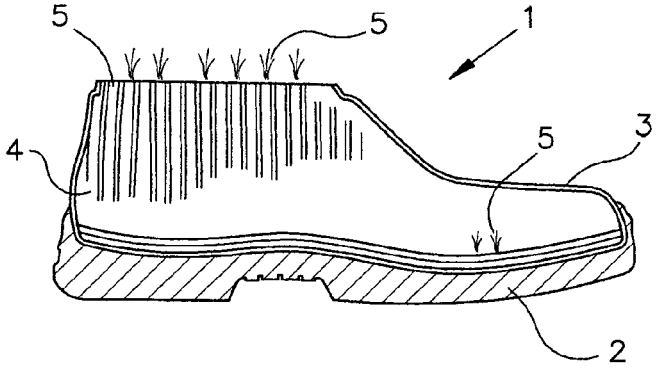

FIG. 2

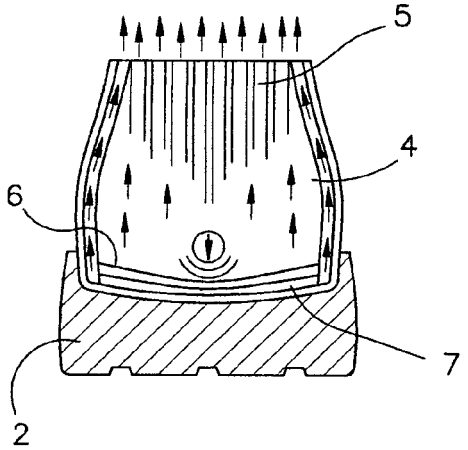

FIG. 3

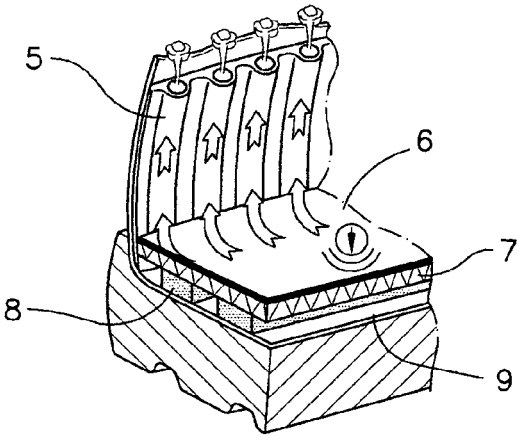

FIG. 4

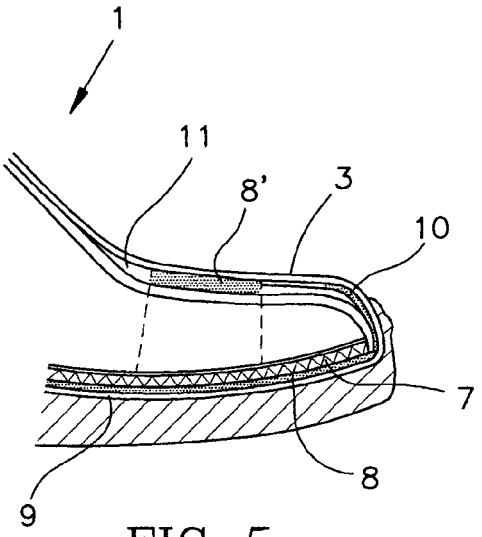

FIG. 5

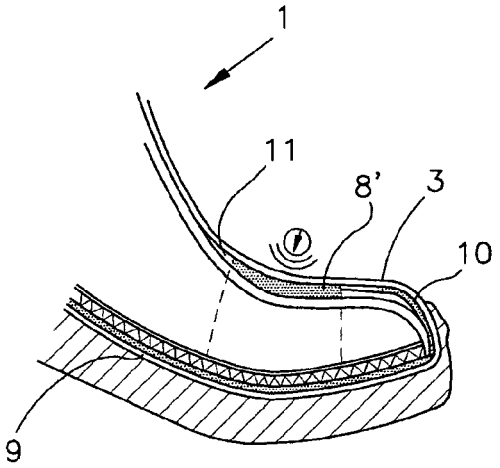

FIG. 6

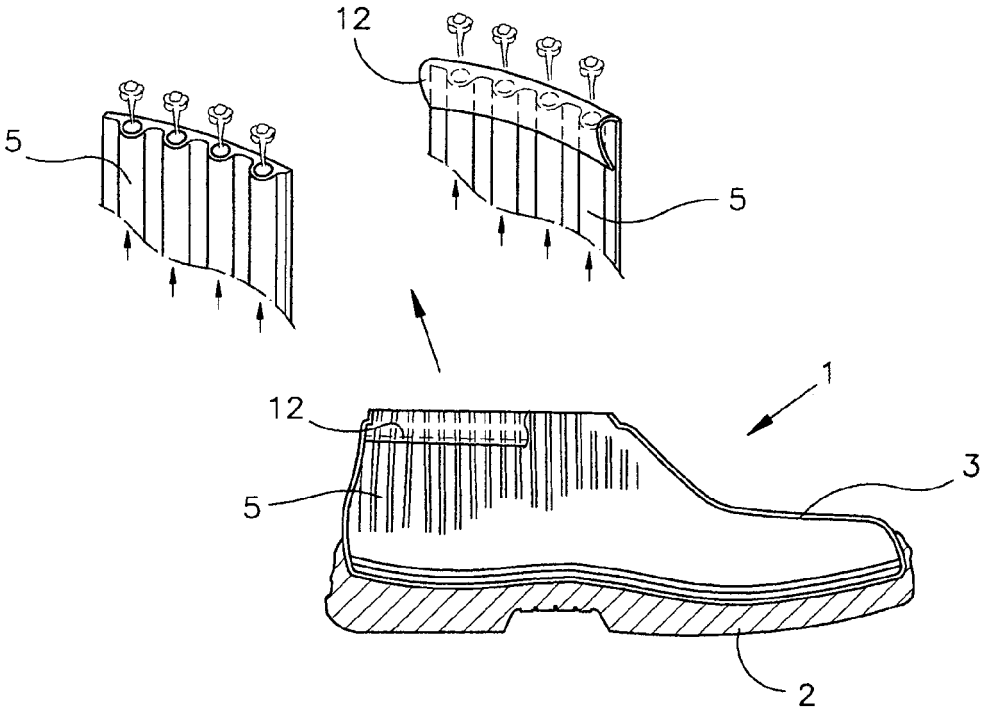

FIG. 7

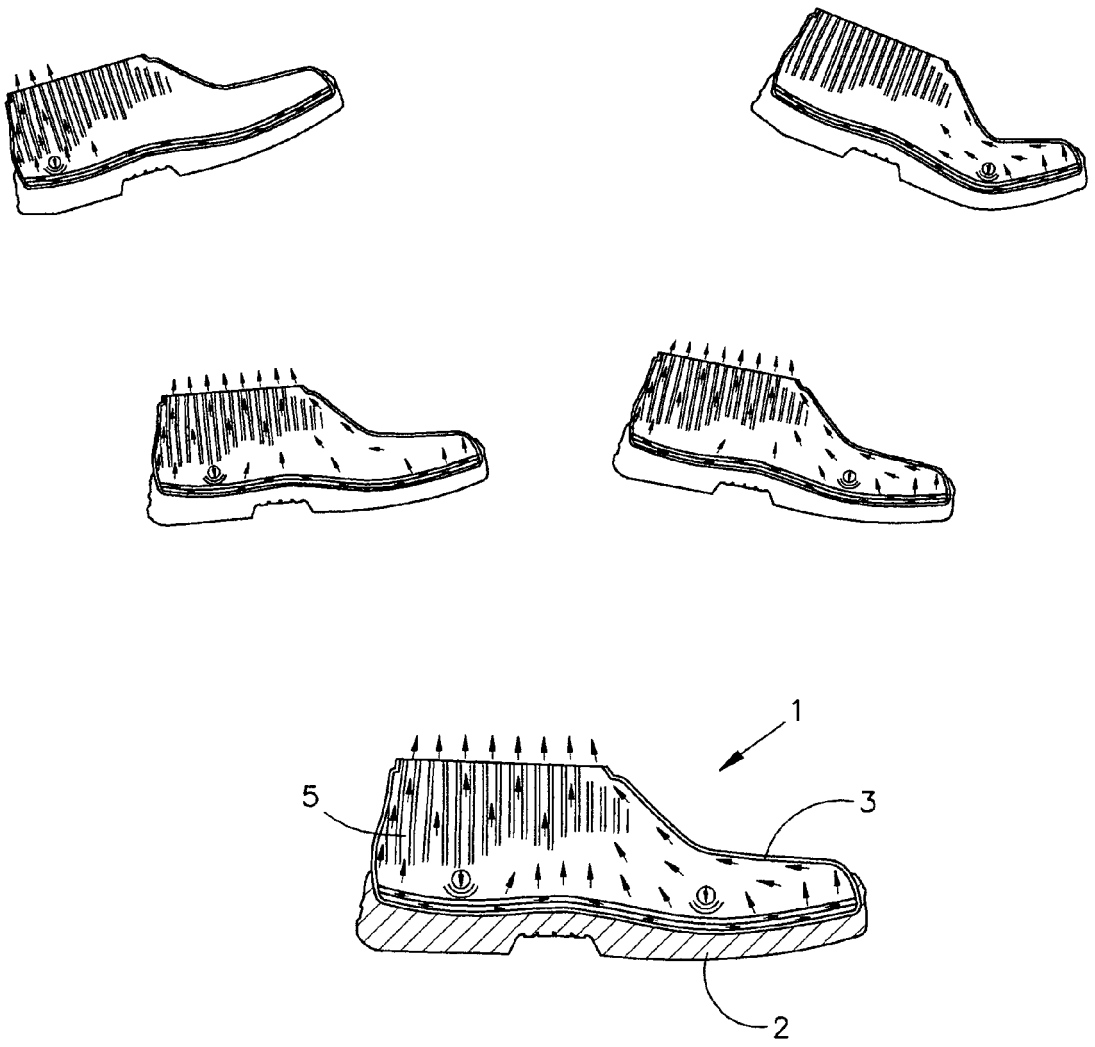

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5346

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 220 791 A (BULZOMI ET AL) 22 June 1993 (1993-06-22) * column 2, line 44 - column 4, line 11; figures *	1-9	A43B7/08 A43B23/07
A	EP 0 437 869 A (LEE, KYUN CHEOL) 24 July 1991 (1991-07-24) * column 3, line 38 - column 5, line 39; figures *	1-9	
A	GB 512 046 A (GIOVANNI ROSELLI; TEODOSIO BRANDIGI) 28 August 1939 (1939-08-28) * page 1, line 80 - page 2, line 77; figures *	1-9	
A	US 757 424 A (LOUIS VOHL) 12 April 1904 (1904-04-12) * the whole document *	1-9	
A	AU 50650 69 A (JOHN E. GUEST) 20 August 1970 (1970-08-20) * the whole document *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 October 2005	Herry, M

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19-10-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5220791 A	22-06-1993	NONE	
EP 0437869 A	24-07-1991	AT 126024 T	15-08-1995
		DE 69021540 D1	14-09-1995
		JP 3044405 U	25-04-1991
		JP 5013204 Y2	07-04-1993
		US 5086572 A	11-02-1992
GB 512046 A	28-08-1939	NONE	
US 757424 A		NONE	
AU 5065069 A	20-08-1970	NONE	

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