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(54) Ventilating bottom and insole and related item of ventilated footwear
Belüftende Unterseite und Innensohle sowie zugehöriger belüfteter Schuhartikel
Fond et semelle première de ventilation ainsi qu’article correspondant de chaussure ventilée

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(73) Proprietor: Mondial Plast S.p.A.
62017 Porto Recanati (Macerata) (IT)

(72) Inventors:
• DORIA, Gianfranco
  60026 Numana (Ancona) (IT)

• FORTUNA, Maurizio
  63812 Montegranaro (Fermo) (IT)

(74) Representative: Firmati, Leonardo
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

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Description

[0001] This invention addresses footwear manufacturing technology and, more specifically, relates to a bottom that integrates a ventilating insole and an item of ventilated footwear which in turn integrates the bottom and the insole.

[0002] In the manufacture of footwear, the use of footwear bottoms is known which are designed to allow aeration of the foot by forced ventilation of the foot space activated by the walking movements of the wearer.

[0003] As is known, the purpose of ventilation is to improve wearing comfort under conditions typically favourable to overheating and sweating of the foot. One prior art footwear bottom of this kind comprises an outsole having a plurality of through holes in it, made in a plantar zone of it. The inside surface of the outsole is equipped with an insole which is made of a microperforated material with osmotic properties and which faces the holes in the plantar zone, being interposed between the outsole and the foot space which accommodates the wearer’s foot.

[0004] Thanks to the holes in the outsole and the microperforations in the structure of the material the insole is made of, the foot space is in communication with the outside of the footwear, allowing gases, and only gases, to flow from the inside to the outside of the footwear and vice versa, whilst liquids and solids are permanently prevented from passing through the footwear bottom. One disadvantage of this type of footwear is that the material the microperforated insole is made of is rigid, which does not provide comfortable support for the foot.

[0005] For this reason, in the case of winter footwear, it is common practice, in manufacturing the footwear, to place a soft liner under foot inside the foot space but physically separate from the breathable insole which, instead, by the very nature of the footwear design, is housed inside the footwear bottom underneath.

[0006] This solution cannot, however, be applied to summer shoes. In effect, in summer shoes, as is the case with certain Venetian style mocassins, for example, the volume of the foot space is quite limited in geometrical and dimensional terms.

[0007] As a result, a soft liner placed inside the foot space would further limit the latter’s containment capacity. For this reason, all prior art summer shoes are, in practice, made without the soft liner, which obliges users to accept a rigid plantar support which is much less comfortable for walking. The features of the preamble of claim 1 are known from document US 2009/0188134.

[0008] The aim of this invention is to overcome the above mentioned disadvantages by providing a solution capable of conferring both breathability and soft support on any type of footwear, whether designed for summer or winter use.

[0009] According to the invention, this aim is achieved by a solution which essentially comprises a multilayer insole combining, in a single physical entity, properties of breathability and soft, compliant support; and which can be entirely incorporated as one into the bottom of the item of footwear without reducing the containment volume of the foot space and thus being applicable without distinction and without limitations of any kind to both winter and summer footwear.

[0010] The technical features of the invention, with reference to the above aims, are set out in one or more of the accompanying claims below and are more apparent, together with its advantages, from the detailed description which follows of a preferred non-limiting example embodiment of it, with reference to the accompanying drawings, in which:

- Figure 1 shows a footwear bottom according to the invention, as viewed from the tread side;
- Figure 2 shows the footwear bottom of Figure 1 as viewed from the foot space side and shown with some parts cut away in order to better illustrate others;
- Figure 3 is an assembly view of an insole according to the invention as viewed from the tread side;
- Figure 4 is an assembly view of the insole of Figure 3 as viewed from the foot space side;
- Figures 5 and 6 are cross sections of the insole, through a cutting plane labelled V-V in Figure 3 and through a plane labelled VI-VI in Figure 4, respectively;
- Figure 7 is a partial view of an item of footwear according to the invention, equipped with an outsole as shown in Figures 1 and 2 and with an insole as shown in Figures 3 to 6.

[0011] With reference to the accompanying drawings, the numeral 2 in Figures 1 and 2 denotes a footwear bottom comprising an outsole 3 provided with a tread face 11 having a zone with a multiplicity of through holes 4 and a groove 12 made on the inside surface of the bottom 2, located at the perforated zone of the tread face 11 and designed to accommodate a breathable, impermeable and elastically compliant composite insole 1.

[0012] The insole 1, illustrated in Figures 3 and 4, has an essentially multi-layer structure and comprises a first layer 5 microperforated, semirigid and made up of osmotic material, and a second layer 6 of macroperforated, soft impermeable material, the layers 5 and 6 being made to adhere monolithically, superposed over each other.

[0013] The expression “first semirigid layer 5” means that the layer 5 has elasticity modulus and thickness combined such that to guarantee structural support for the wearer while at the same time to allow predetermined compliance / deformability (in order to improve the comfort of the wearer of the item of footwear 18).

[0014] In other words, the first layer 5 serves a function of structural support but is not totally “rigid” (which would cause discomfort to the wearer) but is only partially rigid, having a certain amount of compliance which allows limited deformation. For this reason, the first layer 5 is de-
Thus, the first semirigid layer 5 defines a structural support which allows a certain amount of compliance.

The expression "soft material", on the other hand, means that the material (which the second layer 6 is made of) is compliant / deformable to the touch (for example, in a preferred embodiment, the soft material consists of a foam).

The "soft material" the second layer 6 is made of is in direct contact with the sole of the footwear wearer’s foot.

The "soft material", being compliant to the touch, adapts anatomically to the footwear wearer’s foot and thus guarantees greater comfort for the wearer. More generally speaking, it should be noted that the elasticity modulus of the second layer 6 is lower than that of the first layer 5.

More specifically, the structure of the first layer 5 is microperforated throughout its mass and is permeable to gases and impermeable to liquids.

The second layer 6, which is made of impermeable polyurethane foam, has a multiplicity of macro holes 9 which are a few millimetres in diameter and which run through a central section of the second layer 6 surrounded by a continuous lip 16 of the soft material, without macro holes 9 running through its thickness.

As shown also in Figures 5 and 6, the second layer 6 has a surface area that is larger than the corresponding surface area of the first layer 5 and forms, in combination with the latter, a continuous border 7 which extends past the edge of the first layer 5 and which peripherally surrounds the whole of the first layer 5 itself.

Between the first layer 5 and the continuous border 7 of the second layer 6, extending past the edge of the first layer 5, there is formed a channel 8 which also runs right round the edge of the first layer 5.

The insole 1 is designed to be housed, through a monolithic impermeable joint, inside the groove 12 of the footwear bottom 2.

Said housing is obtained with the insole oriented in such a way that the first microperforated layer 5 faces towards the tread face 11 and the second macroperforated layer 6 accordingly faces in the opposite direction, that is to say, oriented towards the foot space 13 of the item of footwear (18) located above the bottom 2.

The joining means that embody this monolithic connection preferably include a layer 17 of adhesive material located between the continuous border 7 of the second layer 6 and, opposite it, a matching inside surface 12a of the tread face 11. Further, as may be seen in Figure 2 or, better still, in Figure 7, the connection means also include a continuous lip 16 formed on the inside of the tread face 11 and projecting from the tread face 11 towards the inside of the insole channel 8 which surrounds the first layer 5.

The lip 16 and the channel 8 together form a labyrinth seal which runs round the perforated zone of the tread face 11 of the bottom 2 and which increases the tightness of the seal, preventing liquids and dust on the ground surface from making their way round the insole 1 and reaching the wearer’s foot inside the foot space 13.

In the context of footwear manufacturing technology, the solution described above offers numerous advantages, including the production-related one inherent in the fact that the manufacture of the insoles 1, of the footwear bottoms 2 and of the items of footwear the footwear bottoms 2 are applied to can be made modular and independent of each other.

Furthermore, the insole, since it is integrated in the structure of the footwear bottom, makes the latter applicable by the footwear manufacturer using a single manufacturing method for both ventilated and conventional footwear, without distinction. From this derives the possibility of simplifying and standardizing production processes, with obvious advantages in terms of economy of production.

At a strictly functional level, the integration of the insole 1 into the footwear bottom 2 and, as clearly shown in Figure 7, outside the foot space 13 - symbolically delimited by an upper 14 and by a slim liner 15 under foot - offers the advantage of giving any type of shoe or item of footwear 18 the comfort of ventilation and soft support simultaneously, irrespective of whether the footwear is designed for summer or winter use.

The method of manufacturing the footwear bottom can be summarized in the following basic steps which relate to preparing - for example by injection moulding - a semifinished body for a footwear bottom 2 having a tread face 11 with a plurality of holes 4 running through it; preparing a breathable, impermeable and elastically compliant composite insole 1 by adhesion of a first microperforated layer 5 of semirigid, osmotic material, and a second macroperforated layer 6 of soft, impermeable material superposed over each other, the first and second layers 5, 6 being of shape and size such that, in combination with each other, they form on the second layer 6, a projecting border 7 surrounding the first layer 5, and connecting the composite insole 1 and the body of the footwear bottom 2 along the border 7.

The connection may be made by gluing or any of several equivalent means such as, for example, ultrasound sealing.

Regarding the connection, it should be noted that the lip 16 protruding from the inside surface 12a of the tread face 11 and projecting towards the front channel 8 of the insole 1 has - besides the purpose of providing a tight seal - the important purpose of centring the insole 1 on the body of the footwear bottom 2, this centring action making it possible to correctly guide the assembly between the insole 1 and the bottom 2 when these two parts are made at different times, at different places and by different operators.

The invention described has evident industrial applications and can be modified and adapted in several
ways without thereby departing from the scope of the inventive concept as defined by the appended claims.

Claims

1. A bottom for an item of footwear (18), comprising: an outsole (3) provided with a tread face (11) having a zone with a multiplicity of through holes (4) and a groove (12) made on the perforated zone of the tread face (11), the bottom further comprising an insole (1) with a multilayer structure comprising a first layer (5) of osmotic material, microperforated and semirigid, and a second layer (6) of macroperforated, soft impermeable material superposed over each other and made to adhere to each other, the second layer (6) being larger in surface area than the first layer (5) and forming, in combination with the latter, a continuous border (7) which extends past the edge of the first layer (5), peripherally surrounding the first layer (5) itself, the insole (1), with a composite structure, being housed inside the groove (12) with the first, microperforated layer (5) facing towards the tread face (11) and with the second, macroperforated layer (6) accordingly facing towards the opposite direction, and being characterized in that the continuous border delimits with the first layer (5) an interposed channel (8) that surrounds the first layer (5).

2. The bottom according to claim 1, characterized in that it comprises connection means for obtaining a tight sealed monolithic joint between the insole (1) and the bottom (2).

3. The bottom according to claim 2, characterized in that the connection means include a layer (17) of adhesive material located between the continuous border (7) of the second layer (6) and, opposite it, a matching inside surface (12a) of the tread face (11).

4. The bottom according to claim 2 or 3, characterized in that the connection means include a continuous lip (16) projecting from the tread face (11) towards the inside of the insole (1) channel (8) which surrounds the first layer (5), the lip (16) and the channel (8) forming, in combination with each other, a labyrinth seal which runs round the perforated zone of the tread face (11) of the bottom (2).

5. The bottom according to any of the foregoing claims, characterized in that the structure of the first layer (5) is microperforated throughout its mass and is permeable to gases and impermeable to liquids.

6. The bottom according to any of the foregoing claims, characterized in that the second layer (6) has a multiplicity of macro holes (9) running through it, which are a few millimetres in diameter and which run through a section of the second layer (6) surrounded by a continuous impermeable edge (10) of the soft material.

7. The bottom according to any of the foregoing claims, characterized in that the second layer (6) is made of polyurethane foam.

8. An item of footwear with ventilated foot space, characterized in that it comprises a bottom (2) according to any of the foregoing claims.

9. A method for manufacturing a bottom (2) of an item of footwear (18), which is breathable, impermeable and provides soft foot support, wherein it comprises the steps of:

- preparing a semifinished body of a footwear (18) bottom (2) having a tread face (11) with a plurality of holes (4) running through it;
- preparing a breathable, impermeable and elastically compliant composite insole (1) by adhesion of a first semirigid microperforated layer (5) of osmotic material, and a second macroperforated layer (6) of soft impermeable material superposed over each other, the first and second layers (5, 6) being of shape and size such that, in combination with each other, they form on the second layer (6), a projecting border (7) surrounding the first layer (5) and delimiting with the first layer (5) a channel (8);
- and connecting, along the projecting border (7), the composite insole (1) to a groove (12) made in the body of footwear (18) bottom (2), with the first, microperforated layer (5) facing towards the tread face (11) and with the second, macroperforated layer (6) accordingly facing towards the opposite direction.

10. The method according to claim 9, wherein the step of connecting the insole (1) to the bottom (2) of the footwear (18) is accomplished by gluing the border (7).

11. The method according to claim 10, wherein the step of connecting the insole (1) to the body of the bottom (2) is preceded by a step of centring the insole (1) on the body of the footwear bottom (2) so as to guide it by inserting into the front channel (8) of the insole (1) a protruding lip (16) projecting from the opposite inside surface (12a) of the tread face (11) of the footwear (18) bottom (2).

Patentansprüche

1. Unterseite für einen Schuhartikel (18), umfassend:
6. Unterseite nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die zweite Schicht (6) eine Vielzahl an durch sie durchführenden Makrolöchern (9) aufweist, die einen Durchmesser von wenigen Millimetern aufweisen und die durch einen Abschnitt der zweiten Schicht (6) führen, umgeben von einer durchgehenden undurchlässigen Kante (10) des weichen Materials.

7. Unterseite nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die zweite Schicht (6) aus Polyurethanschaum besteht.

8. Schuhartikel mit belüftetem Fußbereich, **dadurch gekennzeichnet, dass** er eine Unterseite (2) nach einem der vorhergehenden Ansprüche umfasst.

9. Verfahren zur Herstellung einer Unterseite (2) eines Schuhartikels (18) der atmungsaktiv, durchlässig ist und weichen Fußkomfort bietet, wobei es folgende Schritte umfasst:

- Vorbereiten eines halbfertigen Körpers einer Unterseite (2) eines Schuhartikels (18), aufweisend eine Trittschicht (11) einer Vielzahl an durch sie durchgehenden Löchern (4);
- Vorbereiten einer atmungsaktiven, undurchlässigen und elastisch nachgebenden Verbundinnenschicht (1) durch Haftung einer ersten halbstoffen mikroperforierten Schicht (5) eines osmotischen Materials und einer zweiten mikroperforierten Schicht (6) eines weichen undurchlässigen Materials, die übereinandergelegt sind, wobei die erste und die zweite Schicht (5, 6) in der Form und Größe so ausgestaltet sind, dass sie in Kombination miteinander auf der zweiten Schicht (6) einen hervorspringenden Rand (7) bilden, der die erste Schicht (5) umgibt und mit der ersten Schicht (5) einen Kanal (8) abgrenzt;
- und Verbinden entlang des hervorspringenden Rands (7) der Verbundinnenschicht (1) mit einer Rille (12), die im Körper der Unterseite (2) des Schuhartikels (18) ausgebildet ist, wobei die erste mikroperforierte Schicht (5) der Trittschicht (11) zugewendet ist und die zweite mikroperforierte Schicht (6) entsprechend der anderen Richtung zugewendet ist.

10. Verfahren nach Anspruch 9, wobei der Schritt des Verbindens der Innenschicht (1) mit der Unterseite (2) des Schuhartikels (18) durch Kleben des Rands (7) erfolgt.

11. Verfahren nach Anspruch 10, wobei vor dem Schritt des Verbindens der Innenschicht (1) mit dem Körper der Unterseite (2) ein Schritt zum Zentrieren der Innenschicht (1) auf dem Körper der Schuhartikelunter-
seite (2) stattfindet, sodass diese geführt wird, indem eine hervortretende Lippe (16), die aus der entgegengesetzten Innenfläche (12a) der Trittssohlenfläche (11) der Unterseite (2) des Schuhartikels (18) hervorspringt, in den frontseitigen Kanal (8) der Innensohle (1) eingesetzt wird.

**Revendications**

1. Fond pour un article de chaussure (18), comprenant :
   
   une semelle d’usure (3) pourvue d’un côté de semelle (11) ayant une zone composée d’une multiplicité d’orifices de passage (4) et une rainure (12) réalisée sur la zone perforée du côté de semelle (11), le fond comprenant de plus une semelle première (1) ayant une structure multicouche comprenant une première couche (5) en matière osmotique, micro-perforée et semi-rigide, et une seconde couche (6) en matière macro-perforée, douce imperméable superposées l’une sur l’autre et faites pour adhérer l’une à l’autre, la seconde couche (6) ayant une surface plus large que la première couche (5) et formant, en combinaison avec la dernière, un bord continu (7) qui déborde de la lisse de la première couche (5) et entourant la première couche (5) elle-même, la semelle première (1), ayant une structure composite, étant logée à l’intérieur de la rainure (12) avec la première couche micro-perforée (5) orientée vers le côté de semelle (11) et avec la seconde couche macro-perforée (6) orientée, par conséquent, dans la direction opposée, et caractérisé en ce que le bord continu délimite avec la première couche (5) un canal interposé (8) entourant la première couche (5).

2. Fond selon la revendication 1, caractérisé en ce qu’il comprend des moyens de fixation pour obtenir une jonction monolithique étanche entre la semelle première (1) et le fond (2).

3. Fond selon la revendication 2, caractérisé en ce que les moyens de fixation incluent une couche (17) de matière adhésive située entre le bord continu (7) de la seconde couche (6) et, à l’opposé, une surface interne correspondante (12a) du côté de semelle (11).

4. Fond selon les revendications 2 ou 3, caractérisé en ce que les moyens de fixation incluent une lèvre continue (16) dépassant du côté de semelle (11) vers l’intérieur du canal (8) de la semelle première (1) qui entoure la première couche (5), la lèvre (16) et le canal (8) formant, combinés réciproquement, un joint à labyrinthine qui s’étend autour de la zone perforée du côté de semelle (11) du fond (2).

5. Fond selon l’une quelconque des revendications précédentes, caractérisé en ce que la structure de la première couche (5) est micro-perforée sur toute sa masse et est perméable aux gaz et imperméable aux liquides.

6. Fond selon l’une quelconque des revendications précédentes, caractérisé en ce que la seconde couche (6) est traversée par une multiplicité de macro orifices (9) ayant un diamètre de quelques millimètres et qui s’étendent à travers une section de la seconde couche (6) entourée par une lisse continue imperméable (10) en matière douce.

7. Fond selon l’une quelconque des revendications précédentes, caractérisé en ce que les moyens de fixation incluent une couche (17) de matière adhésive située entre le bord continu (7) de la première couche (5) et la seconde couche (6) orientée dans la direction opposée.

8. Article de chaussure composé d’un espace ventilé pour le pied, caractérisé en ce qu’il comprend un fond (2) selon l’une quelconque des revendications précédentes.

9. Procédé de fabrication d’un fond (2) d’un article de chaussure (18) étant respirant, imperméable et proposant un appui doux pour le pied, dans lequel il comprend les étapes suivantes :

   - préparer un corps semi-fin d’un fond (2) de chaussure (18) ayant un côté de semelle (11) composé d’une pluralité d’orifices (4) le traversant ;
   
   - préparer une semelle première (1) composite respirante, imperméable et élastiquement souple par adhésion d’une première couche micro-perforée semi-rigide (5) en matière osmotique et une seconde couche macro-perforée (6) en matière douce imperméable superposées l’une sur l’autre, la première et la seconde couche (5, 6) ayant une forme et une dimension de sorte que, combinées réciproquement, elles forment sur la seconde couche (6) un bord en saillie (7) entourant la première couche (5) et délimitant un canal (8) avec la première couche (5) ;

   - et fixer, le long du bord en saillie (7), la semelle première composite (1) à une rainure (12) réalisée dans le corps du fond (2) de la chaussure (18) avec la première couche micro-perforée (5) orientée vers le côté de semelle (11) et avec la seconde couche macro-perforée (6) orientée, par conséquent, vers la direction opposée.

10. Procédé selon la revendication 9, dans lequel l’étape de fixation de la semelle première (1) au fond (2) de
la chaussure (18) est accomplie en collant le bord (7).

11. Procédé selon la revendication 10, dans lequel l’étape de fixation de la semelle première (1) au corps du fond (2) est précédée par une étape de centrage de la semelle première (1) sur le corps du fond de la chaussure (2) de manière à la guider en insérant dans le canal frontal (8) de la semelle première (1) une lèvre en saillie (16) dépassant de la surface interne opposée (12a) du côté de semelle (11) du fond (2) de la chaussure (18).
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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