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(54) **High-comfort footwear bottom**

(57) The present invention relates to a high-comfort footwear bottom with monolithic structure made of rubber or thermoplastic materials, wherein the walking surface is formed of a transversal series of tubular profiles and wherein the upper surface, which is designed to support the user's foot, is formed from the regular alternation of two series of horizontal fins separated by intermediate slots.

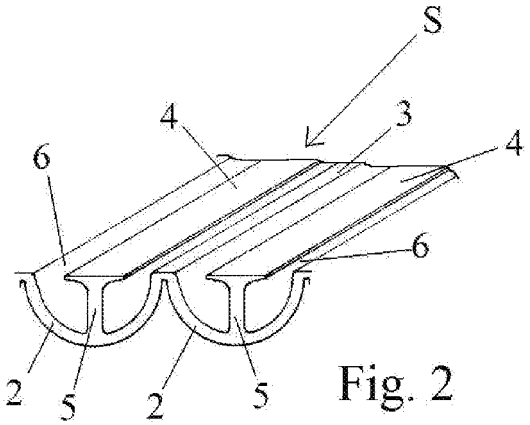

Fig. 2

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Description

[0001] The present patent application for industrial invention relates to a high-comfort footwear bottom molded from rubber or thermoplastic materials.

[0002] All experts of the footwear sector are aware of the fact that authoritative studies have warned about the risks for the foot's health arising from incorrect gait. In view of the above, special attention has been paid to designing footwear bottoms molded from rubber or thermoplastic materials, in the attempt to ensure, first of all, the capability of providing anatomically correct support for the user's foot, meaning the capability of the foot of not being deformed or compressed in an uncontrolled, not uniform way in different areas every time the user's weight is discharged on it.

[0003] Otherwise, at every step the foot would lose perfect planarity with respect to the ground, being forced to assume incorrect positions, with undue "deviations" towards the inside or outside, which with the passing of time might be harmful for the anatomically delicate "foot-ankle" structure.

[0004] In order to achieve such a purpose, traditional footwear bottoms incorporate in their thickness profiles with special resistance to compression, which are sometimes obtained as inserts made of different materials and co-molded with the molding material of the bottoms.

[0005] At the same time, an additional purpose was to prevent the damage suffered by the foot during walking due to repeated shocks against the ground. For this reason, the so-called "anti-shock" bottoms have been designed, which are generally characterized in that they are provided with different shock-absorbing areas according to the anatomy and physiology of the user's foot. More precisely, the structure of similar footwear bottoms is provided with areas with higher compressibility and ultimately higher softness in correspondence of the points that are designed to directly support the impact against the ground during walking. Generally, said highly shock-absorbing areas are situated, at least, at the height of the first metatarsal head behind the hallux and in correspondence of the heel.

[0006] Based on said premises, however, it can be easily understood that said traditional technologies may not be sufficiently satisfactory, especially with reference to the complicated procedures required to obtain, in the same footwear bottom, areas with higher supporting capabilities that are selectively alternated with areas with higher shock-absorbing capabilities.

[0007] DE 931 819 discloses a footwear bottom with series of solid transversal ribs. A transversal groove with a central rib is provided between the series of ribs. Such a bottom is not provided with any internally empty, tubular element, designed to rest on the ground.

[0008] US 7,219,449 discloses a cooling system for footwear bottoms, which is provided with longitudinal conduits for the passage of cooling fluid. Said conduits are closed towards the outside to prevent cooling fluid from leaking. EP 0 875 163 discloses a footwear bottom provided with igloo-shaped hemispherical air chambers with upper hole for air outlet. The air chamber comprises a truncated-conical protuberance adapted to close the outlet hole further to bottom compression.

[0009] W02009/136700 discloses a footwear bottom provided with one central longitudinal element with semi-cylindrical shape, provided with a central rib that extends longitudinally.

[0010] It must be noted that the central ribs illustrated in the prior US 7,219,449, EP 0 875 163 and W02009/136700 documents do not have a suitable shape for a structural support element.

[0011] The footwear bottom of the invention has been designed to overcome such a drawback of the prior art and, more precisely, with the intention to create an anatomically and ergonomically efficient artefact, characterized by high practicality and convenient realization.

[0012] As a matter of fact, the footwear bottom of the invention ensures suitable support for the user's foot, as well as excellent shock-absorbing capacity, while being provided with homogeneous structure from heel to toe, which does not require the presence of the differentiated profiles and areas that are sometimes provided in the previous artefacts of the same type.

[0013] Within such an inventive principle, such a footwear bottom is provided with tread formed of a series of internally empty tubular transversal profiles and the upper surface (which is designed to support a traditional hygienic insole) has a discontinuous structure, being formed of a sequence of transversal fins alternated with intermediate transversal slots.

[0014] Fins of two types, with different structural and functional features, are alternated in said upper surface.

[0015] Fins of a first series are designed to provide upper connection between said tubular profiles forming the tread of the footwear bottom of the invention. Moreover, said fins of the first series are characterized by high elastic deformability, meaning the capability of being selectively compressed according to the higher or lower force discharged on them by the user's foot. So they are able to ensure soft, comfortable support for the user's foot, while providing the entire footwear bottom with sufficient flexibility to favor bending-articulation of the forefoot at each step.

[0016] As mentioned above, said fins of the first series are alternated with fins of a second series, characterized in that they are provided with much higher capability to withstand, without being compressed, the vertical forces due to the weight of the user's foot.

[0017] The function of the fins of said second series is to ensure appropriate foot support, preventing said bottom from "collapsing" completely under the weight of the foot (meaning uncontrolled compression) and preventing the foot from being exposed to harmful pathologies related with an anatomically inappropriate position.

[0018] In view of the above, the alternation of transversal fins is the feature that allows the footwear bottom

of the invention to achieve two apparently irreconcilable results.

[0019] On one hand, reference is made to the capability of providing the user's foot with soft, comfortable and "self-modeling" support, and on the other hand to the additional capability of exerting beneficial support for the foot.

[0020] For purposes of clarity, the description of the invention continues with reference to the enclosed drawing, which is intended for purposes of illustration only and not in a limiting sense, wherein:

- Figure 1 is a top view of the walking surface of the footwear bottom of the invention;
- Figure 2 is a sectional view of the structure of the footwear bottom along its longitudinal axis.

[0021] Referring to the above figures, the bottom of the invention (1), which is provided with monolithic structure obtained from molding rubber or thermoplastic materials, has a walking surface formed of a regularly spaced series of convex profiles (2), disposed orthogonally to the longitudinal axis of the bottom in order to act as traditional tread.

[0022] Said transversal profiles (2) - which can have a square, rectangular or semicircular section - are provided with an internally empty tubular structure. As shown in Fig. 2, said internally empty tubular profiles (2) have a semicylindrical shape, with semicircular section, wherein the convex part is directed downwards to get in contact with the ground and the concave part is directed upwards, that is to say towards the inside of the shoe.

[0023] The upper surface (S) of the bottom (1) corresponds with the support surface of the user's foot. In correspondence of the upper surface (S) of the bottom, each of said tubular profiles (2) is joined with the immediately adjacent profile by means of a first fin (3) disposed in orthogonal position with respect to the longitudinal axis of the bottom. The upper surface of the first fin (3) is basically plane and lies on a horizontal plane.

[0024] Said first fins (3) are alternated with second transversal fins (4) disposed at a slightly lower height than the first fins (3).

[0025] The difference in height between the two series of fins (3, 4) favors the compression dynamics arising from natural gait movement, increasing the aforementioned benefits, especially when said bottom (1) is not used with insole.

[0026] Moreover, each of said second fins (4) is supported by a lower vertical partition (5) that protrudes in central position from the bottom of a corresponding traversal tubular profile (2) for its entire length. The second fin (4) lies on a horizontal plane. So, the second fin (4) and the vertical partition (5) have a T-shaped section.

[0027] As shown in Fig. 2, each of said second fins (4) has a lower width than the upper opening of the corresponding tubular profile (2). This causes the formation, between each first fin (3) and the adjacent second fin (4), of a slot (6) having basically the same height as the depth of the tubular profile (2).

[0028] It is now easier to understand the specific function of each of said elements of the footwear bottom (1) of the invention.

[0029] The lower tubular profiles (2) of the bottom (1) are designed to act as tread. The first fins (3) are designed to provide upper connection between adjacent tubular profiles (2), guarantee soft, comfortable support for the user's foot, and act as articulation hinges between said tubular profiles (2).

[0030] In particular, the presence of similar "hinges" allows the bottom (1) to be in arched position in correspondence of the forefoot, thus favoring the rolling of the forefoot at every step.

[0031] Said second fins (4) are designed, in cooperation with corresponding vertical partitions (5), to withstand the vertical force discharged on them by the user's foot and avoid uncontrolled excessive compression of the bottom (1) of the invention.

[0032] Finally, it must be noted that, without leaving the scope of the present invention, an alternative embodiment can be realized, wherein said tubular convex profiles (2) acting as tread do not occupy the entire surface of said bottom (1), but form two different series in correspondence of the front of the foot and the heel, without affecting the arch area that, in such a case, is completely smooth both on the lower and upper side, renouncing the presence of said fins (3, 4).

[0033] Likewise, the tubular transversal profiles (2) of the bottom of the invention (1) can have, without altering their functionality, a different transversal section other than the semicircular section shown in the aforementioned figures, meaning a square, rectangular, etc. section.

Claims

1. High-comfort footwear bottom (1) with monolithic structure, obtained from molding rubber or thermoplastic materials, comprising:

   - a regularly spaced series of internally empty tubular convex profiles (2), with upward opening, wherein said tubular profiles (2) are disposed in transversal direction, identify the walking area and basically extend for the entire or partial length of the bottom;
   - a plurality of first transversal fins (3) wherein each of said fins provides upper connection between two adjacent tubular profiles (2);
   - a plurality of second transversal fins (4), wherein each second transversal fin (4) is supported by a corresponding vertical partition (5) protruding in central position from the bottom of a corresponding tubular profile (2), wherein the width of the second fin (4) is higher than the thickness

of the vertical partition (5), so that the second fin (4) and vertical partition (5) assembly generates a T-shaped section;

the upper horizontal surface (S) of the bottom (1) is formed of a regular alternation of first and second transversal fins (3, 4) separated by intermediate slots (6).

2. Footwear bottom as claimed in claim 1, **characterized in that** the upper surface of each first fin (3) and each second fin (4) is plane and lies on horizontal planes.

3. Footwear bottom as claimed in claim 1 or 2, **characterized in that** said second fins (4) lie at lower height than said adjacent first fins (3).

4. Footwear bottom as claimed in any one of said claims, **characterized in that** each of said vertical partitions (5) extends for the entire length of the corresponding tubular profile (2).

5. Footwear bottom as claimed in any one of the above claims, **characterized in that** each of said transversal tubular profiles (2) has a basically semicircular section.

6. Footwear bottom as claimed in one or more of claims 1 to 4, **characterized in that** each of said transversal tubular profiles (2) has a basically square section.

7. Footwear bottom as claimed in one or more of claims 1 to 4, **characterized in that** each of said transversal tubular profiles (2) has a basically rectangular section.

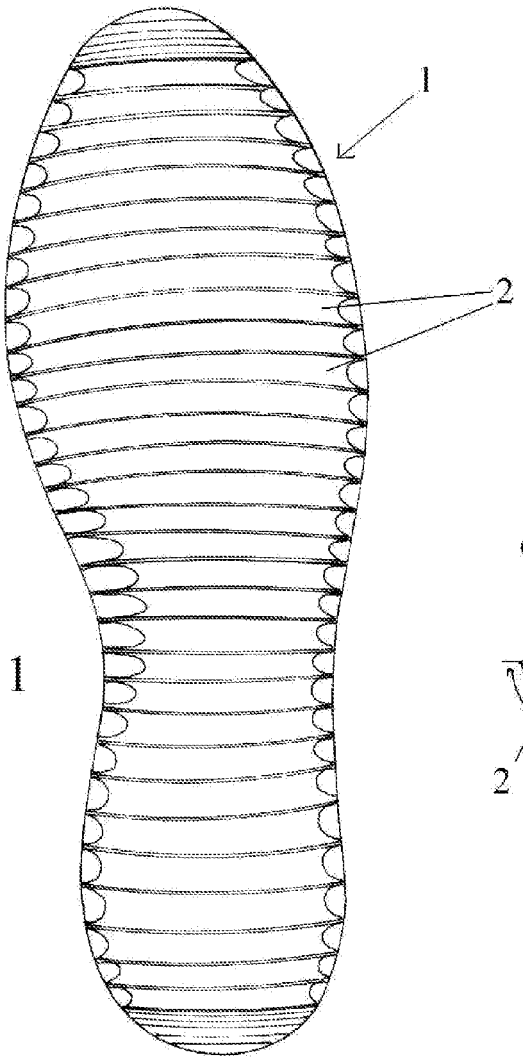

Fig. 1

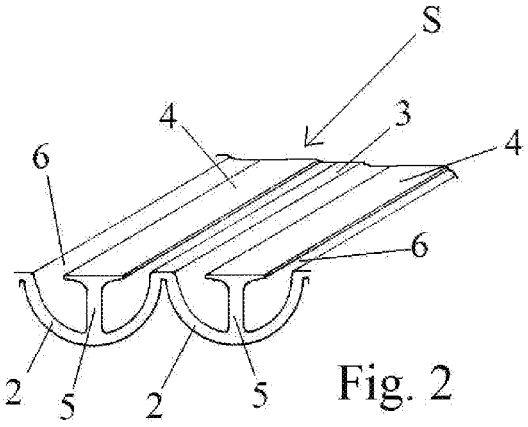

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 7735

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 871 261 C (CONTINENTAL GUMMI WERKE AG) 11 May 1953 (1953-05-11) * figures 2,3 * -----	1-7	INV. A43B17/02 A43B13/18 A43B13/22
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TECHNICAL FIELDS SEARCHED (IPC)

A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 June 2011	Tejada Biarge, Diego

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 15 7735

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08-06-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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