(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 558 047 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
30.11.2022 Bulletin 2022/48

(21) Application number: **17835498.1**

(22) Date of filing: **20.12.2017**

(51) International Patent Classification (IPC):
A43B 23/02 *(2006.01)* ***A43B 13/12*** *(2006.01)*
A43B 13/20 *(2006.01)* ***A43B 13/36*** *(2006.01)*
A43B 9/00 *(2006.01)* ***A43B 13/14*** *(2006.01)*
A43B 13/18 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A43B 23/021; A43B 9/00; A43B 13/125; A43B 13/14; A43B 13/181; A43B 13/206; A43B 13/36

(86) International application number:
PCT/IB2017/058222

(87) International publication number:
WO 2018/116213 (28.06.2018 Gazette 2018/26)

(54) **SHOE COMPRISING A MIDSOLE**

SCHUH MIT EINER ZWISCHENSOHLE

CHAUSSURE COMPRENANT UNE SEMELLE INTERCALAIRE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **23.12.2016 IT 201600130908**

(43) Date of publication of application:
30.10.2019 Bulletin 2019/44

(73) Proprietor: **Alberto del Biondi S.p.A.**
35027 Noventa Padovana (PD) (IT)

(72) Inventors:
- **RIZZI, Alessio Ivan**
  30036 Caselle Di Santa Maria Di Sala (VE) (IT)
- **DEL BIONDI, Alberto**
  35121 Padova (IT)

(74) Representative: **Locas, Davide et al**
Cantaluppi & Partners S.r.l.
Piazzetta Cappellato Pedrocchi, 18
35122 Padova (IT)

(56) References cited:
WO-A1-2016/115156
US-A1- 2012 144 695
US-A1- 2014 130 269
US-A1- 2015 196 082
US-A1- 2016 324 264

EP 3 558 047 B1

Description

[0001] The invention relates to a shoe comprising a sole and a midsole having a series of projections that can be housed in corresponding recesses made in the sole.

[0002] Various solutions for inserting a midsole inside a shoe, in particular so that it is coupled to the sole, are known.

[0003] For example, US patent 7793428 describes a shoe comprising an upper and an upper plate made of a relatively rigid material, which plate is secured to the upper and in which a plurality of openings are made. The removable midsole comprises a plurality of projections that extend from a lower surface, with each projection extending through one of the openings in the upper plate.

[0004] A plurality of hollow column-shaped structures are provided in the heel portion, inside which structures the above-mentioned projections are housed.

[0005] The column-shaped structures may be made of a transparent material such that the projections housed therein are visible.

[0006] In this way, when the midsole is replaced with a different midsole having projections of different colours, the wearer is able to visibly see that the midsole has been replaced.

[0007] However, the presence of the upper plate and of the column-shaped structures fixed thereto makes it difficult to produce a shoe in which the flexibility characteristics are changed in the various regions of the sole.

[0008] Additional documents that describe similar solutions include patent applications US 2016/324264 and WO 2016/115156.

[0009] However, the need has arisen to produce a shoe in which the various regions of the sole can have a different degree of flexibility or, more generally, a different response in the course of a walking movement.

[0010] The technical problem that forms the basis of the present invention is that of providing a shoe, the structure and function of which are designed to overcome one or more of the limiting factors set out above with reference to the cited prior art.

[0011] Within the context of the above-mentioned problem, the main object of the invention is to develop a shoe having an interchangeable midsole, in which it is possible to change the characteristics of the sole in the various regions of the sole, and which object simultaneously makes it possible to effectively couple the midsole to the sole.

[0012] This problem is solved and these objects are achieved by the present invention by means of a shoe formed according to claim 1.

[0013] Preferred features of the invention are defined in the dependent claims.

[0014] The sole according to the present invention makes it possible to use the projections provided on the midsole both to couple it to the sole and to change the characteristics of the shoe in the various regions of the sole. In addition, the midsole can be positioned both stably and accurately, thus ensuring that it is simple to replace.

[0015] According to preferred aspects, the invention also makes it possible to elastically recover the energy that is transferred to the shoe in the course of a walking movement.

[0016] According to additional aspects, the present invention also makes it possible to facilitate the helical motion of the foot caused during the various phases of walking.

[0017] According to other aspects, the invention also makes it possible to use high-quality materials to produce the upper, it thus being possible to produce the sole of the shoe using modern technology, such as injection-moulding. In this way, the need to produce a high-quality shoe that is producible on an industrial scale can be met.

[0018] According to even more aspects, the present invention makes it possible to provide a shoe that is particularly stable during oscillatory movements when walking.

[0019] The features and advantages of the invention will become clearer from the detailed description of two embodiments thereof, which are illustrated by way of non-limiting example, and with reference to the accompanying drawings, in which:

Fig. 1 is a side view of a shoe according to the present invention;
Fig. 2 is a view from below of the shoe in Fig. 1;
Fig. 3 is a lateral, partially exploded view of the shoe in Fig. 1;
Fig. 4 is a partial view from above of the shoe according to the present invention, from which a relative midsole has been removed;
Fig. 5 to 7 are a view from above, a view from the side and a view from below, respectively, of the midsole of the shoe according to the present invention;
Fig. 8 is a view from below of the midsole, in which first and second projections are identified;
Fig. 8A and 8B are schematic lateral sectional views of the first and the second projections of the midsole, respectively, which are housed in corresponding recesses in the sole;
Fig. 9 is a view from above that shows another aspect of the midsole according to the present invention;
Fig. 9A is a schematic illustration showing the effect of the aspect illustrated in Fig. 9; and
Fig. 10A and 10B are perspective views showing the upper of the shoe according to the present invention.

[0020] With reference to Fig. 1 first of all, reference numeral 100 indicates a shoe as a whole, which is produced in accordance with the present invention.

[0021] The shoe 100 extends longitudinally in a toe-to-heel direction indicated by the letter X in Fig. 2.

[0022] The shoe comprises an upper 1 and a sole 2, in which a forefoot region 11, a midfoot region 12 and a

rearfoot region 13 are defined, which are adjacent to one another in the toe-to-heel direction X.

[0023] A tread surface 20 is defined on the sole 2 and comes into contact with the ground when the shoe 100 is being used.

[0024] A midsole 3 is also removably housed inside the shoe 100.

[0025] Although the characteristics of the midsole are specified in detail below, it should be noted that, according to one aspect of the present invention, the midsole 3 advantageously also functions as an anatomical footbed. In this regard, the midsole is made of a material having a relatively high degree of flexibility, such as polyurethane (PU). The midsole 3 preferably also comprises a cover that can absorb sweat and may have antibacterial characteristics.

[0026] The midsole 3 can be inserted into the shoe 100 so as to be situated above the sole, thereby defining a surface on which the foot of the wearer rests.

[0027] On the opposite side, the midsole 3 comprises a contact surface 30 which, in contrast, faces the sole 2. The midsole 3 and the sole 2 can bear against one another either directly or by means of the interposition of additional layers.

[0028] According to a preferred embodiment shown in Fig. 10A and 10B, the upper 1 comprises a base surface 16 for this purpose, which is preferably formed by a layer made of leather or of another material, possibly a synthetic material, which is used to make the upper.

[0029] As can be seen from Fig. 10A and 10B, in one embodiment the base surface has through-openings 17, 18, the function of which will be illustrated below. The through-openings 17, 18 are preferably in a central region of the forefoot and rearfoot regions such that the base surface extends along the entire contour of the upper 1 and into the midfoot region.

[0030] In this way, the base surface 16 can be fixed along the contour, preferably the entire contour, of the upper 1, with the central part extending in the form of a bridge between opposing lateral sides thereof.

[0031] It should therefore be noted that this increases the stability of the structure of the upper, and therefore of the shoe as a whole, thus allowing the midsole 3 to be housed as per the embodiments that will be described below.

[0032] In one embodiment, the base surface 16 is sewn to the upper 1 along its contour.

[0033] In fact, the features of the upper are similar to those obtained using classic Strobel workmanship. In this way, the shoe according to the present invention is also particularly suitable for producing classic and elegant models.

[0034] With reference now to Fig. 4, the sole 1 comprises a plurality of recesses 26, 27, which are preferably made in the forefoot region 11 and the rearfoot region 13. As can be seen in the figure, the openings 17 and 18 in the base surface 16 advantageously allow access to the recesses 26 and 27, respectively.

[0035] With reference to Fig. 6, too, the midsole 3 in turn comprises a plurality of projections 31, 32, which are received in the recesses 26 and 27, respectively, in the sole 2 and which extend from a contact surface 30 of the midsole 3, against which the foot of the wearer rests.

[0036] Therefore, corresponding projections and recesses are positively coupled, making it possible to accurately position the midsole inside the shoe 100.

[0037] In order to facilitate the insertion of the projections, said projections can be substantially cylindrical or, even more preferably, truncated cone-shaped.

[0038] As can be seen from Fig. 8A and 8B in particular, the recesses 26 in the forefoot region are blind at a relative bottom surface 28. The recesses 27 in the rearfoot region are preferably also blind.

[0039] As shown in the figures, the length d, which extends away from the contact surface 30, of at least the forefoot region is of such a size that one end 34 of the projections 31 is in contact with the bottom surface 28 of the recesses 26.

[0040] The above-mentioned length d is preferably greater than the depth of the corresponding recess.
In one embodiment, the recess 26 is spaced apart from the projection 31 in a region that is adjacent to an inlet mouth thereof so as to define a gap in said region. In one embodiment, the gap is defined between the projection 31 and a lateral wall 22 of the corresponding recess 26.

[0041] The gap preferably runs around the outer edge of the projection 31 in the region in which the projection 31 connects to the contact surface 30. More generally, the gaps are defined in the recess 26, at least in the toe-to-heel direction of the shoe 100.

[0042] In other words, the projection 31 rests against the bottom surface 28 by its end 34, but is spaced apart from the recess 26 in which it is housed and preferably also from the sole portion 2 that surrounds the recess 26 itself at the opposite end. The contact surface 30, or more generally the midsole 3, is therefore spaced apart from the sole 2 in regions adjacent to the inlet mouth of the recesses 26. The above-mentioned configuration therefore allows the projection 31 to compress and consequently expand when the wearer exerts pressure on the midsole 3 in the course of a walking movement.

[0043] It should be noted that the projections 31 can be compressed, as a result of the walking movement, at the point when the ends 34 are in contact with the bottom surface 28 as a result of the presence of the gap described above and/or as a result of a greater length of the projection 31 with respect to the depth of the recess, and/or as a result of the intrinsic characteristics of the material used to make the midsole 3. In this regard, the projections 31 are preferably made of the same material as the midsole 3. In one embodiment, the projections are made of a material having a Shore hardness of between 18 and 25.

[0044] However, the above-mentioned features are preferably combined.

[0045] It should also be noted that the ability of the

projections 31 to compress is associated with the dimensions and the shape of the gap that remains defined. The greater the dimensions of the gap and provided that the gap runs around the projection in a uniform manner, the greater its ability to deform.

[0046] By using a sufficiently resilient material, it is possible to produce a cushioning effect that is linked to the compression of the projections when the foot rests against the ground, and elastic return of the material, with a consequent release of energy, when the foot is raised again.

[0047] This feature is particularly useful for facilitating the walking movement.

[0048] In one embodiment, the projections and the corresponding recesses are designed such that the gaps widen in a longitudinal extent direction of the projection extending away from said end 34. On the one hand, this makes it possible to facilitate the insertion of the projections into the recesses and, on the other hand, allows for progressive deformation when walking.

[0049] In order to optimise the response of the projections during walking, the gap can also have characteristics on the side facing the toe of the shoe that differ from those on the side facing the heel.

[0050] For this reason, the lateral wall portion of the projection and/or of the corresponding recess that faces the toe is at a greater incline with respect to a vertical direction than the portion facing the heel.

[0051] In one embodiment, which may be combined with the embodiment described above, the end 34 of the projection 31 is substantially flat and is inclined with respect to a horizontal direction defined by the plane of contact between the sole 2 and the ground. The end is preferably inclined such that the portion of the end 34 that faces the toe of the shoe is closer to the ground than the portion facing the heel.

[0052] This can advantageously increase the compressive effect in the course of the walking movement, thus further contributing to improving the features of the shoe.

[0053] However, the present invention is also advantageous in that it makes it possible to change the behaviour of the midsole 3 between one zone of the sole and another.

[0054] In fact, as touched upon above, the characteristics of the gap determine the behaviour of the midsole in the course of the walking movement.

[0055] By choosing a suitable number of projections and changing the characteristics of the coupling between the projection and the corresponding recess, it will therefore be possible to produce different behaviours depending on the region of the sole.

[0056] In this regard, in one embodiment, a plurality of projections 31 can be provided in the forefoot region, which are preferably substantially uniformly distributed in this region.

[0057] As illustrated schematically in Fig. 8, 8A and 8B, in the shoe according to the present invention, gaps of different sizes may be provided.

[0058] For this purpose, in one embodiment, the projections 31 comprise first projections 31a, illustrated in Fig. 8A, and second projections 31B, illustrated in Fig. 8B.

[0059] The gap defined between the first projection 31a and the lateral wall 22 of the corresponding recess has a different size to the gap defined between the second projection 31b and the lateral wall 22 of the corresponding recess. It is clear that this feature can be achieved by varying the shape and/or dimensions of both the projections and the recesses.

[0060] As can be seen from Fig. 8A and 8B, the shape and/or dimensions of the gap between the first projections 31a and the lateral walls allow/allows for a greater degree of deformation than the gap between the second projections 31b and the lateral walls. By way of example, the maximum gap between the first projections 31a and the lateral walls can be approximately 0.5 mm, for example between 0.25 mm and 0.75 mm, while the maximum gap between the second projections 31b and the lateral walls can be approximately 1.5 mm, for example between 1 mm and 2 mm.

[0061] According to a preferred embodiment, the first and the second projections comprise respective graphic elements, for example the symbols "+" and "-", which make it clear which characteristics belong to which projection.

[0062] In one embodiment, the second projections 31b are arranged in a longitudinally and/or transversally central portion of the forefoot region.

[0063] In this way, more support can advantageously be given to the foot in the central part of the forefoot region of the shoe. With reference now to Fig. 9 and 9A, according to another aspect of the invention, the characteristics of the midsole 3 and, in particular, of the projections 31, are variable in a direction that is transverse to the toe-to-heel direction of the shoe 100. As shown in Fig. 9 and 9A, in one embodiment, the midsole has a greater ability to compress in the forefoot region on the side facing the outer side 15 of the shoe, which region is shown in the figure by a dotted line running therearound.

[0064] This feature can also be formed by changing the characteristics of the material, for example by using higher density polyurethane in the above-mentioned zone.

[0065] This different length advantageously makes it possible to facilitate the helical motion of the foot when walking.

[0066] It should be noted that the features described in relation to the projections 31 present in the forefoot region can also be adopted for the projections 32 in the rearfoot region. In the present embodiment, however, the rearfoot zone only comprises three projections 32, the length d of which can be varied individually in order to adapt the shoe to the different postures of the foot.

[0067] With reference now to Fig. 2, 8A and 8B once again, it will be noted that the sole of the shoe according to the present invention can be formed in a simple manner

using injection-moulding techniques.

[0068] In order to facilitate the production of the sole, the recesses 26 can be formed as through-recesses and subsequently closed by a sheet 4 that is fixed to said sole 2.

[0069] In this way, the bottom surface 28 is defined by the sheet 4 itself. In one embodiment, the sheet 4 is made of a material having a higher hardness (shore) than the sole 2, for example thermoplastic polyurethane (TPU). This combination of materials advantageously makes it possible to compensate for the presence of the recesses, maintaining optimum flexibility of the sole.

[0070] Non-slip elements 25 are preferably fixed to the sheet 4. In addition, according to a preferred embodiment, the sheet 4 is made of a transparent or semitransparent material such that it is also possible to observe the characteristics of the projections from the outside and to recognise the characteristics of the shoe without removing the midsole.

[0071] On account of the features of the invention, the shoe 100 can be effectively adapted to the different types of feet and postures using one solution that has a high visual impact and is also usable in classic shoe models.

Claims

1. Shoe (100) comprising an upper (1), a sole (2) which defines a substantially flat tread surface (20) that makes contact with the ground, and a midsole (3) that can be removably accommodated inside said upper (1) and can be placed on top of said sole (2), said midsole (3) comprising a plurality of projections (31, 33) at least in a forefoot region, which are received inside corresponding recesses (26, 27) made in said sole (2), said recesses (26, 27) being blind at a relative bottom surface (28) such that said projections (31, 33) do not project from said tread surface (20), wherein one end (34) of said plurality of projections (31, 33) is in contact with said bottom surface (28) of said recesses (26, 27) at least in said forefoot region (21) such that said projections (31, 33) are subjected to compression by the foot of the wearer during a walking movement, wherein said projections (31) are accommodated inside said recesses (26) such that a gap remains defined between the projection (31) and a lateral wall (22) of the corresponding recess (26).

2. Shoe (100) according to claim 1, wherein said gap has different characteristics on the side facing the toe of the shoe to those on the side facing the heel.

3. Shoe (100) according to either claim 1 or claim 2, wherein the lateral wall portion of the projection and/or of the corresponding recess that faces the toe is at a greater incline with respect to a vertical direction than the portion that faces the heel.

4. Shoe (100) according to any one of claims 1 to 3, wherein the end (34) of the projection (31) is substantially flat and is inclined with respect to a horizontal direction defined by a plane of contact between the sole (2) and the ground.

5. Shoe (100) according to claim 4, wherein said end (34) is inclined such that the portion of the end (34) that faces the toe of the shoe is closer to the ground than the portion facing the heel.

6. Shoe (100) according to any one of claims 1 to 5, wherein said projections (31) comprise first projections (31a) and second projections (31b), wherein the gap defined between a first projection (31a) and a lateral wall (22) of the corresponding recess has a different size to the gap defined between a second projection (31b) and a lateral wall (22) of the corresponding recess.

7. Shoe according to claim 6, wherein the gap between the first projections (31a) and the lateral walls is no greater than between 0.25 mm and 0.75 mm, and the gap between the second projections (31b) and the lateral walls is no greater than between 1 mm and 2 mm.

8. Shoe (100) according to any one of claims 1 to 7, wherein said gaps are defined in said recess (26) at least in the toe-to-heel direction of the shoe (100).

9. Shoe (100) according to any one of claims 1 to 8, wherein said gaps widen in a longitudinal extent direction of the projection extending away from said end (34).

10. Shoe (100) according to any one of the preceding claims, wherein said projections (31, 32) are cylindrical or truncated cone-shaped.

11. Shoe (100) according to any one of the preceding claims, wherein said upper (1) comprises a base surface (16) having through-openings (17, 18), through which said projections (31, 32) pass.

12. Shoe (100) according to claim 11, wherein said base surface (16) has a first through-opening (17) that occupies a central region of the forefoot region, and a second through-opening (18) that occupies a central region of the rearfoot region.

13. Shoe according to claim 12, comprising a plurality of forefoot projections (31) and a plurality of rearfoot projections (32), which pass through said first through-opening (17) and through said second through-opening (18), respectively.

14. Shoe (100) according to any one of the preceding

claims, wherein said bottom surface (28) is defined by a sheet (4) fixed to said sole (2), said sheet (4) being made of a material having higher hardness than said sole (2).

15. Shoe (100) according to any one of the preceding claims, wherein the midsole has a greater capability of compression in the forefoot region on the side facing an outer edge (15) of the shoe.

Patentansprüche

1. Schuh (100) mit einem Oberteil (1), einer Sohle (2), die eine im Wesentlichen flache Trittfläche (20) bildet, die mit dem Boden in Kontakt kommt, und einer Zwischensohle (3), die entfernbar innerhalb des Oberteils (1) aufgenommen werden und oben auf der Sohle (2) platziert werden kann, wobei die Zwischensohle (3) eine Mehrzahl von Vorsprüngen (31, 33) zumindest in einem Vorderfußbereich aufweist, die innerhalb entsprechender Aussparungen (26, 27) aufgenommen sind, die in der Sohle (2) ausgebildet sind, wobei die Aussparungen (26, 27) an einer relativen Bodenfläche (28) blind sind, so dass die Vorsprünge (31, 33) nicht von der Trittfläche (20) hervorstehen, wobei ein Ende (34) der Mehrzahl von Vorsprüngen (31, 33) in Kontakt mit der Bodenfläche (28) der Aussparungen (26, 27) zumindest im Vorderfußbereich (21) ist, so dass die Vorsprünge (31, 33) bei einer Gehbewegung durch den Fuß des Trägers auf Druck beansprucht werden, wobei die Vorsprünge (31) innerhalb der Aussparungen (26) aufgenommen sind, so dass ein Zwischenraum zwischen dem Vorsprung (31) und einer Seitenwand (22) der entsprechenden Aussparung (26) ausgebildet bleibt.

2. Schuh (100) nach Anspruch 1, wobei der Zwischenraum auf der der Schuhspitze zugewandten Seite andere Eigenschaften aufweist als auf der des Absatzes zugewandten Seite.

3. Schuh (100) nach Anspruch 1 oder Anspruch 2, wobei der seitliche Wandabschnitt des Vorsprungs und/oder der entsprechenden Aussparung, die dem Zeh zugewandt ist, bezüglich einer vertikalen Richtung stärker geneigt ist als der Abschnitt, der dem Absatz zugewandt ist.

4. Schuh (100) nach einem der Ansprüche 1 bis 3, wobei das Ende (34) des Vorsprungs (31) im Wesentlichen flach und bezüglich einer horizontalen Richtung geneigt ist, die durch eine Kontaktebene zwischen der Sohle (2) und dem Boden ausgebildet ist.

5. Schuh (100) nach Anspruch 4, wobei das Ende (34) geneigt ist, so dass der Abschnitt des Endes (34), der der Schuhspitze zugewandt ist, näher am Boden ist als der Abschnitt, der dem Absatz zugewandt ist.

6. Schuh (100) nach einem der Ansprüche 1 bis 5, wobei die Vorsprünge (31) erste Vorsprünge (31a) und zweite Vorsprünge (31b) aufweisen, wobei der zwischen einem ersten Vorsprung (31a) und einer Seitenwand (22) der entsprechenden Aussparung ausgebildete Zwischenraum eine andere Größe aufweist als der zwischen einem zweiten Vorsprung (31b) und einer Seitenwand (22) der entsprechenden Aussparung ausgebildete Zwischenraum.

7. Schuh nach Anspruch 6, wobei der Zwischenraum zwischen den ersten Vorsprüngen (31a) und den Seitenwänden nicht größer als zwischen 0,25 mm und 0,75 mm und der Zwischenraum zwischen den zweiten Vorsprüngen (31b) und den Seitenwänden nicht größer als zwischen 1 mm und 2 mm ist.

8. Schuh (100) nach einem der Ansprüche 1 bis 7, wobei die Zwischenräume in der Aussparung (26) zumindest in der Zehen-zu-Ferse-Richtung des Schuhs (100) ausgebildet sind.

9. Schuh (100) nach einem der Ansprüche 1 bis 8, wobei sich die Zwischenräume in einer Längserstreckungsrichtung des Vorsprungs erweitern, der sich vom Ende (34) aus erstreckt.

10. Schuh (100) nach einem der vorhergehenden Ansprüche, wobei die Vorsprünge (31, 32) zylindrisch oder kegelstumpfförmig sind.

11. Schuh (100) nach einem der vorhergehenden Ansprüche, wobei das Oberteil (1) eine Basisfläche (16) mit Durchgangsöffnungen (17, 18) aufweist, durch die die Vorsprünge (31, 32) hindurchgehen.

12. Schuh (100) nach Anspruch 11, wobei die Grundfläche (16) eine erste Durchgangsöffnung (17) aufweist, die einen zentralen Bereich des Vorderfußbereichs einnimmt, und eine zweite Durchgangsöffnung (18) aufweist, die einen mittleren Bereich des Hinterfußbereichs einnimmt.

13. Schuh nach Anspruch 12 mit einer Mehrzahl von Vorderfußvorsprüngen (31) und einer Mehrzahl von Hinterfußvorsprüngen (32), die durch die erste Durchgangsöffnung (17) bzw. durch die zweite Durchgangsöffnung (18) hindurchgehen.

14. Schuh (100) nach einem der vorhergehenden Ansprüche, wobei die Bodenfläche (28) durch eine an der Sohle (2) befestigte Schicht (4) ausgebildet ist, wobei die Schicht (4) aus einem Material hergestellt wird, das eine höhere Härte als die Sohle (2) aufweist.

15. Schuh (100) nach einem der vorhergehenden Ansprüche, wobei die Zwischensohle eine größere Kompressionsfähigkeit im Vorderfußbereich auf der Seite, die einer Außenkante (15) des Schuhs zugewandt ist, aufweist.

Revendications

1. Chaussure (100) comprenant une tige (1), une semelle (2) qui définit une surface de marche (20) sensiblement plate qui entre en contact avec le sol, et une semelle intercalaire (3) qui peut être logée de façon amovible à l'intérieur de ladite tige (1) et peut être placée au-dessus de ladite semelle (2), ladite semelle intercalaire (3) comprenant une pluralité de parties saillantes (31, 33) au moins dans une région d'avant-pied, qui sont accueillies à l'intérieur d'évidements (26, 27) correspondants faits dans ladite semelle (2), lesdits évidements (26, 27) étant borgnes au niveau d'une surface inférieure relative (28) de sorte que lesdites parties saillantes (31, 33) ne fassent pas saillie à partir de ladite surface de marche (20), dans laquelle une extrémité (34) de ladite pluralité de parties saillantes (31, 33) est en contact avec ladite surface inférieure (28) desdits évidements (26, 27) au moins dans ladite région d'avant-pied (21) de sorte que lesdites parties saillantes (31, 33) soient sujettes à une compression par le pied de l'utilisateur pendant un mouvement de marche, dans laquelle lesdites parties saillantes (31) sont logées à l'intérieur desdits évidements (26) de sorte qu'un espace reste défini entre la partie saillante (31) et une paroi latérale (22) de l'évidement (26) correspondant.

2. Chaussure (100) selon la revendication 1, dans laquelle ledit espace a des caractéristiques différentes, sur le côté faisant face au bout de la chaussure, de celles sur le côté faisant face au talon.

3. Chaussure (100) selon la revendication 1 ou 2, dans laquelle la portion de paroi latérale de la partie saillante et/ou de l'évidement correspondant qui fait face au bout a une plus grande inclinaison, par rapport à une direction verticale, que la portion qui fait face au talon.

4. Chaussure (100) selon l'une quelconque des revendications 1 à 3, dans laquelle l'extrémité (34) de la partie saillante (31) est sensiblement plate et est inclinée par rapport à une direction horizontale définie par un plan de contact entre la semelle (2) et le sol.

5. Chaussure (100) selon la revendication 4, dans laquelle ladite extrémité (34) est inclinée de sorte que la portion de l'extrémité (34) qui fait face au bout de la chaussure est plus proche du sol que la portion faisant face au talon.

6. Chaussure (100) selon l'une quelconque des revendications 1 à 5, dans laquelle lesdites parties saillantes (31) comprennent de premières parties saillantes (31a) et de secondes parties saillantes (31b), dans laquelle l'espace défini entre une première partie saillante (31a) et une paroi latérale (22) de l'évidement correspondant présente une taille différente de l'espace défini entre une seconde partie saillante (31b) et une paroi latérale (22) de l'évidement correspondant.

7. Chaussure selon la revendication 6, dans laquelle l'espace entre les premières parties saillantes (31a) et les parois latérales n'est pas supérieur à une valeur comprise entre 0,25 mm et 0,75 mm, et l'espace entre les secondes parties saillantes (31b) et les parois latérales n'est pas supérieur à une valeur comprise entre 1 mm et 2 mm.

8. Chaussure (100) selon l'une quelconque des revendications 1 à 7, dans laquelle lesdits espaces sont définis dans ledit évidement (26) au moins dans la direction du bout vers le talon de la chaussure (100).

9. Chaussure (100) selon l'une quelconque des revendications 1 à 8, dans laquelle lesdits espaces s'élargissent dans une direction d'extension longitudinale de la partie saillante qui s'étend à partir de ladite extrémité (34).

10. Chaussure (100) selon l'une quelconque des revendications précédentes, dans laquelle lesdites parties saillantes (31, 32) sont cylindriques ou en forme de cône tronqué.

11. Chaussure (100) selon l'une quelconque des revendications précédentes, dans laquelle ladite tige (1) comprend une surface de base (16) ayant des ouvertures traversantes (17, 18), à travers lesquelles lesdites parties saillantes (31, 32) passent.

12. Chaussure (100) selon la revendication 11, dans laquelle ladite surface de base (16) a une première ouverture traversante (17) qui occupe une région centrale de la région d'avant-pied, et une seconde ouverture traversante (18) qui occupe une région centrale de la région d'arrière-pied.

13. Chaussure selon la revendication 12, comprenant une pluralité de parties saillantes (31) d'avant-pied et une pluralité de parties saillantes (32) d'arrière-pied, qui passent à travers ladite première ouverture traversante (17) et à travers ladite seconde ouverture traversante (18), respectivement.

14. Chaussure (100) selon l'une quelconque des reven-

dications précédentes, dans laquelle ladite surface inférieure (28) est définie par une feuille (4) fixée à ladite semelle (2), ladite feuille (4) étant fabriquée en un matériau ayant une dureté plus élevée que ladite semelle (2).

15. Chaussure (100) selon l'une quelconque des revendications précédentes, dans laquelle la semelle intercalaire a une plus grande capacité de compression dans la région d'avant-pied sur le côté faisant face à un bord extérieur (15) de la chaussure.

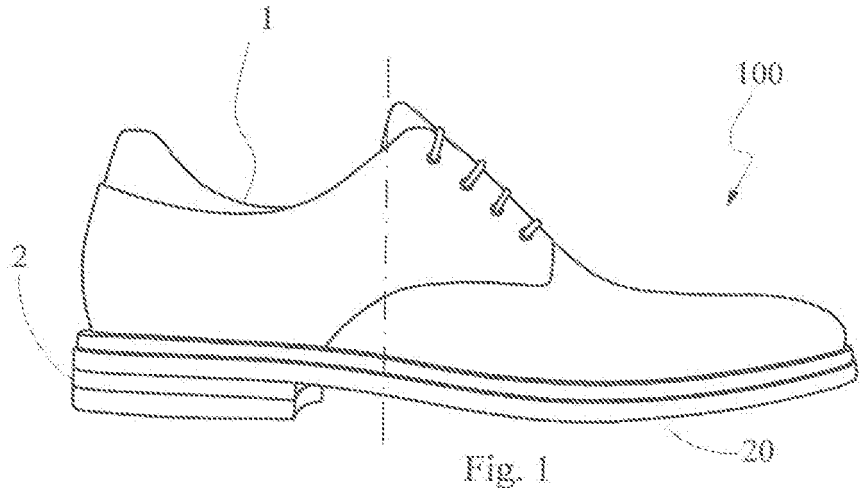

Fig. 1

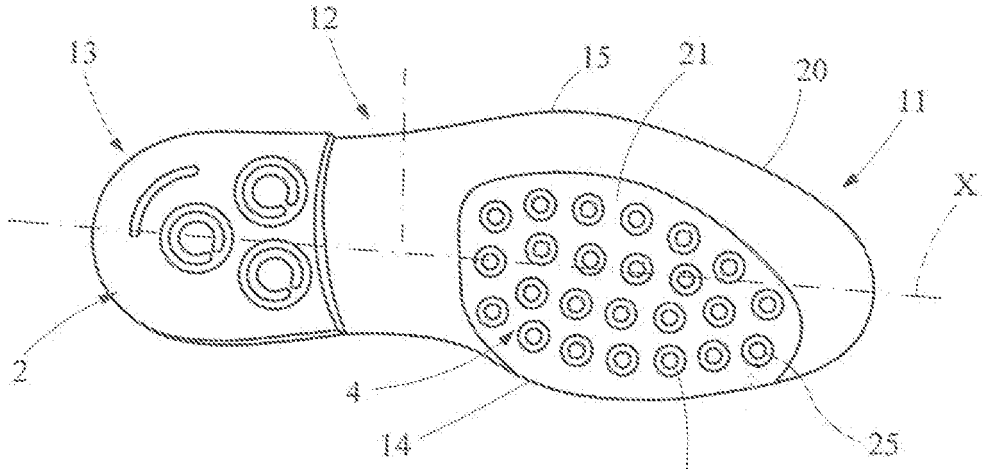

Fig. 2

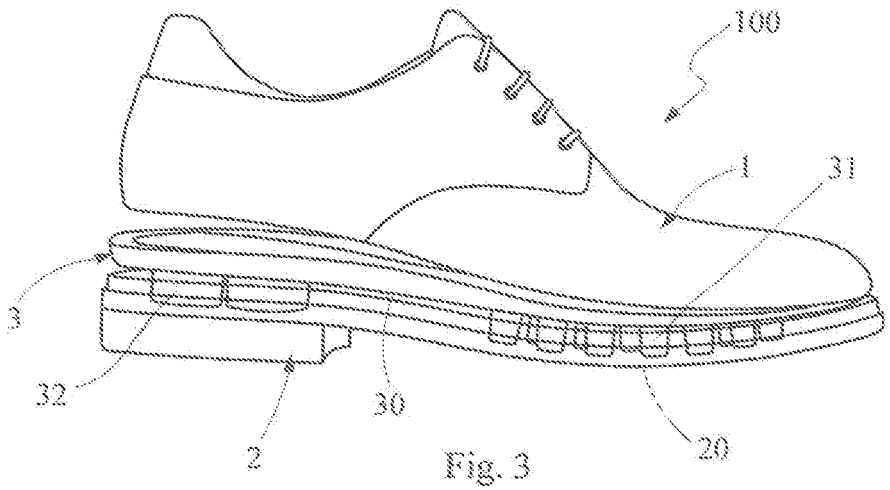

Fig. 3

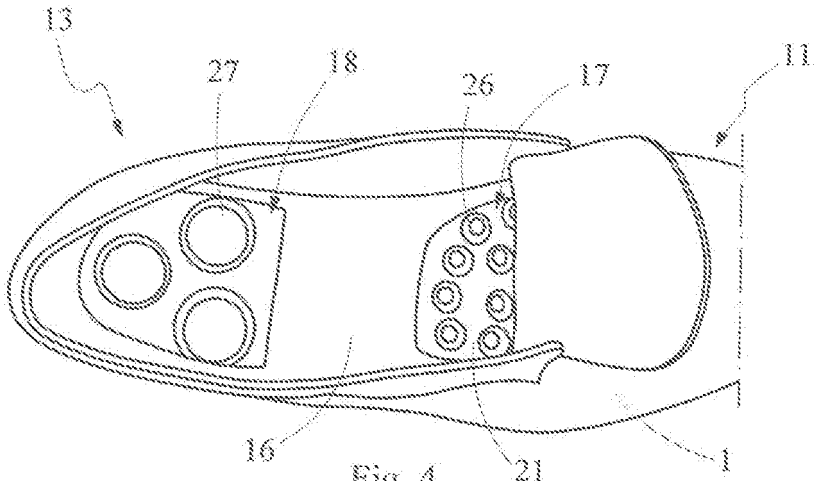

Fig. 4

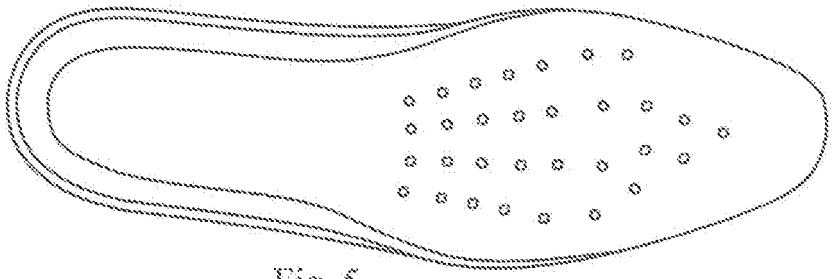

Fig. 5

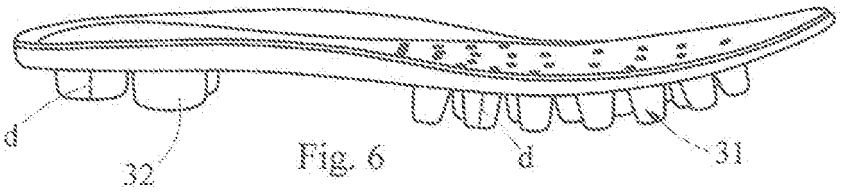

Fig. 6

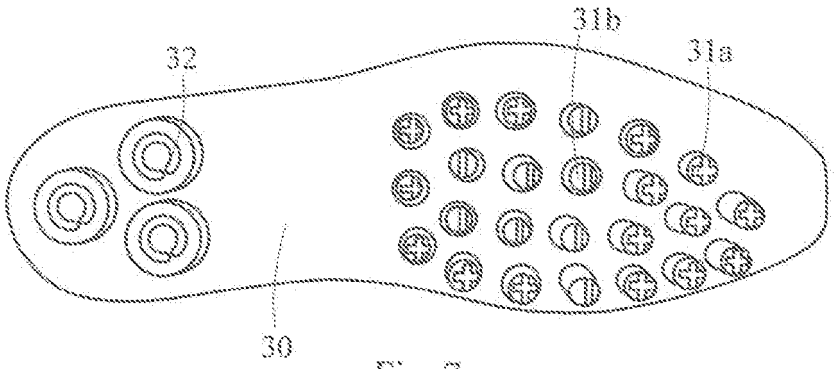

Fig. 7

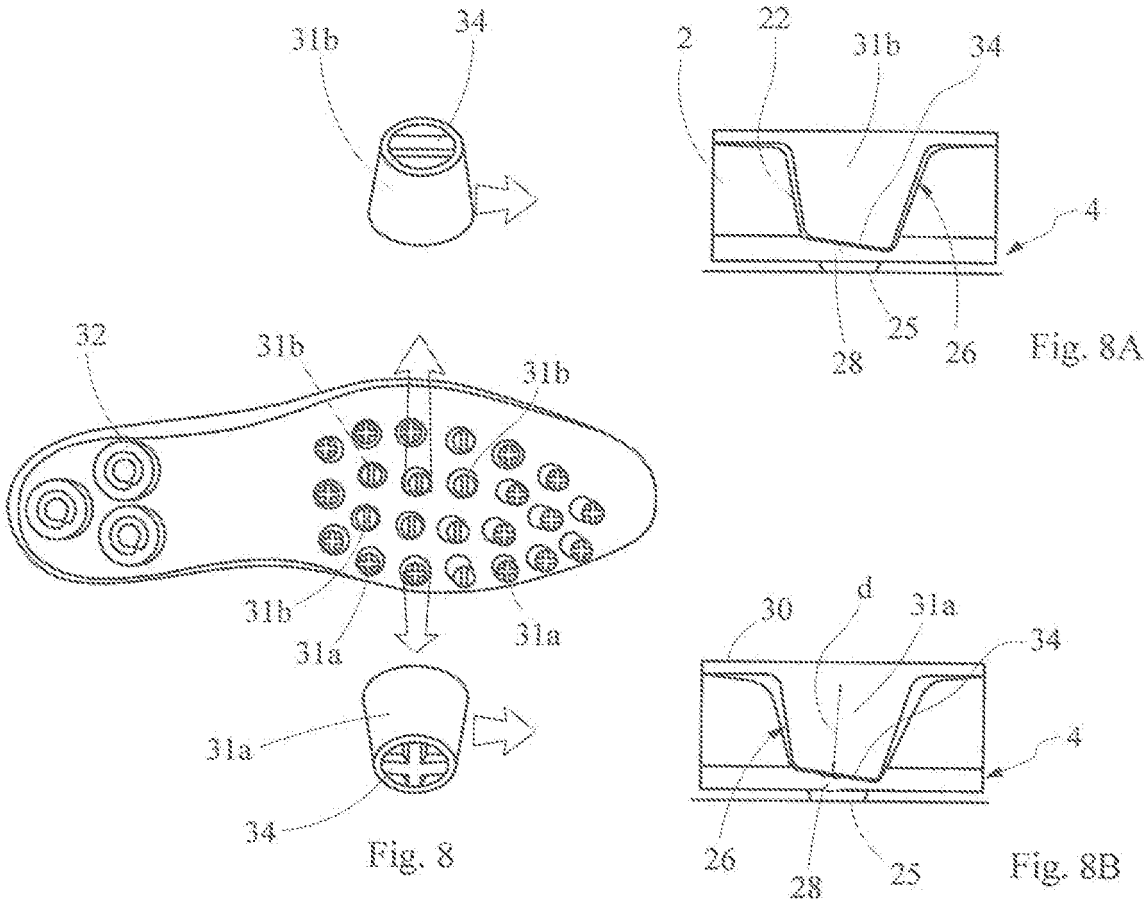

Fig. 8

Fig. 8A

Fig. 8B

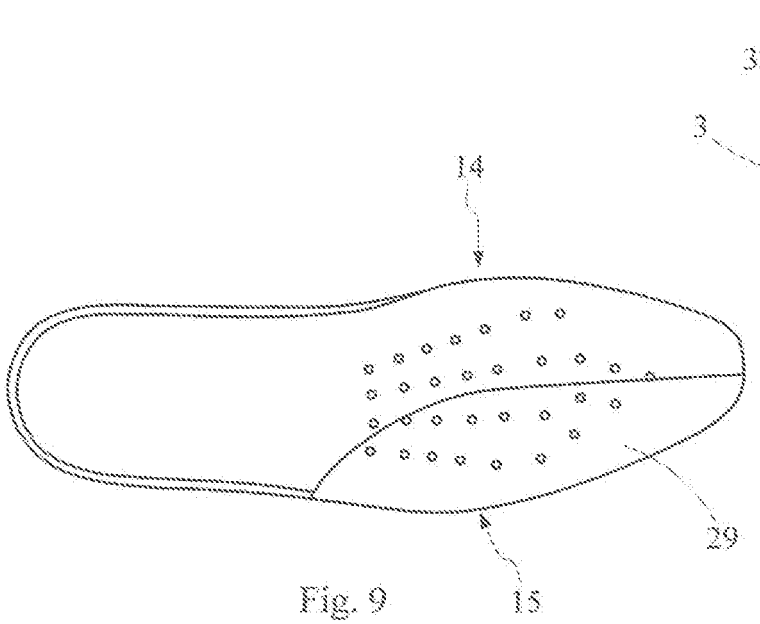

Fig. 9

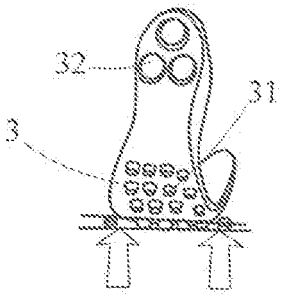

Fig. 9A

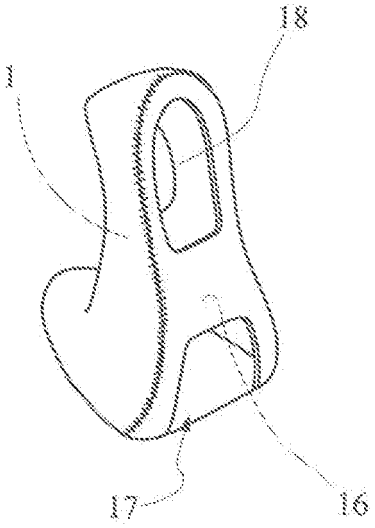

Fig. 10A

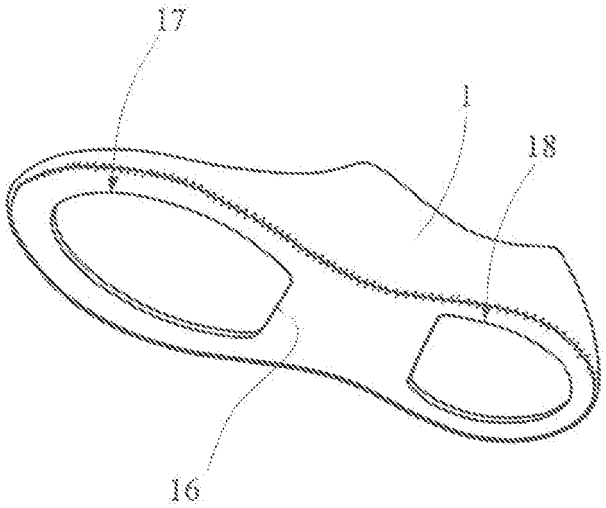

Fig. 10B

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 7793428 B **[0003]**
- US 2016324264 A **[0008]**
- WO 2016115156 A **[0008]**