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(54) FOOTWEAR BOTTOM WITH COMPOSITE STRUCTURE AND PROCESS FOR THE MANUFACTURING OF SAID BOTTOM

(57) Footwear bottom with composite structure comprising a supporting body molded from PVC or rubber, which accommodates an insert molded from elastically compressible material, whose anatomical upper surface emerges on top of said body; wherein such an insert adopts a variable thickness, namely a higher thickness in correspondence of the heel area, suitable for ensuring a particularly comfortable support for the foot of the user.

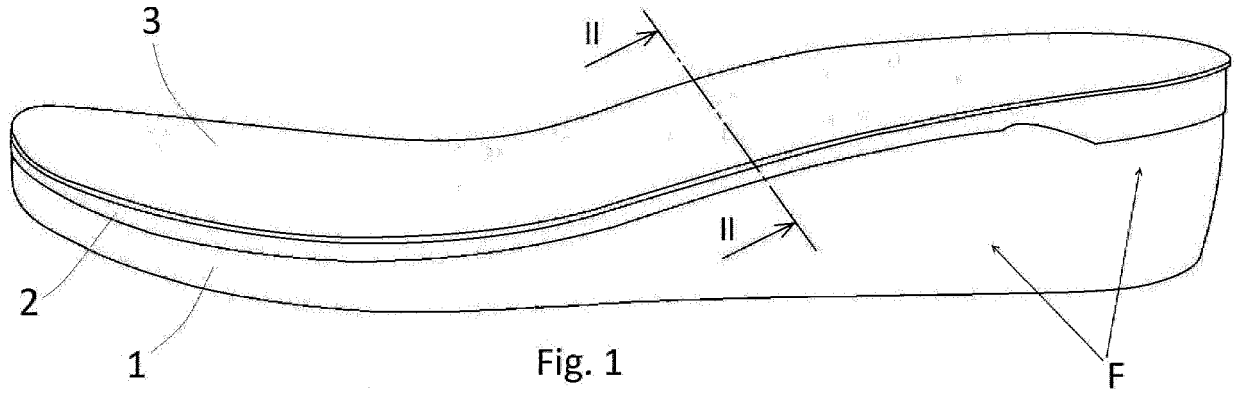

Fig. 1

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Description

[0001] The present patent application for industrial invention relates to a footwear bottom with composite structure and to the manufacturing process of said bottom.

[0002] For a long time now, footwear bottoms made of synthetic materials, that is to say obtained from molding thermoplastic or similar materials, have been widely used.

[0003] Today such a technology is still widely appreciated because it allows the mass production of said bottoms of synthetic materials in an easy, convenient way and also because it can be used with practically all kinds of footwear.

[0004] Nevertheless, a careful evaluation of such a technology has shown some margins of improvement, especially in the perspective of increasing the level of comfort for the foot of a user who is wearing a footwear provided with such a synthetic bottom.

[0005] A typical problem of the prior art is related to the fact that the traditional bottoms made of synthetic materials have a degree of compressibility - and consequently a degree of absorption under load - that is substantially homogeneous throughout the entire surface of the foot, despite that it is scientifically demonstrated that the sole of the user's foot could benefit from the provision of areas with a higher or a lower level of compressibility.

[0006] In fact, it is evident that less compressible areas should be preferred for their ability to offer a greater support to the foot (as it would be the case of the forefoot), whereas the more compressible areas should be preferred for their higher cushioning capacity and therefore for a more comfortable support of the foot (as it would be the case of the heel).

[0007] The purpose of the present invention is to realize a footwear bottom provided with a composite structure - that is to say formed of components made of different materials - which is actually capable of having areas with different compressibility coefficients and, most of all, of offering a particularly comfortable support for the heel of the user's foot.

[0008] A further purpose of the present invention is to devise a manufacturing process suitable for being preferably used for realizing said footwear bottom with a composite structure.

[0009] In particular, the bottom according to the invention is formed of:

- a bearing body made of semi-rigid material and shaped like the sole of a human foot;
- an insert made of elastically compressible material, suitable for being exactly fitted inside said body, in such a way to act as a support surface for the user's foot;
- an insole, preferably made of leather, suitable for being applied on said insert;
- an optional sole made of microporous material and/or rubber, which is suitable for being applied under said body.

[0010] As illustrated in detail in the following description, the main peculiarity of the bottom according to the present invention consists in the fact that it adopts a particular cooperation mode between said supporting body and the respective insert made of soft material, according to which the bottom has a differentiated cushioning capacity in correspondence of the various points of the support surface for the foot.

[0011] In such a context, in particular, the maximum cushioning capacity, and consequently the maximum comfort, is provided in correspondence of the area of the user's heel.

[0012] For the sake of clarity, the description of the invention continues with reference to the attached drawings, which only have an illustrative and not limiting value, wherein:

- Fig. 1 is a three-dimensional side view of the new bottom according to the present invention;
- Fig. 2 is a sectional view along the plane II-II of Fig. 1;
- Fig. 3 is an exploded view of the bottom of Fig. 1;
- Fig. 4 is a three-dimensional side view of the bottom of Fig. 1, in semi-finished state, after the co-molding process and before undergoing the perimeter finishing and the application of the respective walking sole;
- Fig. 5 is a section view along the plane V-V of Fig. 4;
- Fig. 6 is similar to Fig. 5, except for it shows the scrap resulting from said finishing operation of the semi-finished product of Fig. 4;
- Fig. 7 is an exploded view of the bottom of Fig. 4;
- Fig. 8 shows the body comprised in the semi-finished product of Fig. 4;
- Fig. 9 is a sectional view with the plane IX-IX of Fig. 8;
- Figs. 10 and 11 are a sequence of sectional drawings, which show the modes that are adopted in order to internally provide said body with a coating film, during molding;
- Fig. 12 is a view of the bottom of Fig. 1, together with the respective walking sole, made of rubber or similar materials, not yet mounted;
- Fig. 13 shows the bottom according to the invention in its final operational arrangement, already associated with an open upper in order to originate a sandal.

[0013] With reference to Figs. 1, 2 and 3, the bottom according to the invention (F) comprises the following two main components:

- a wedge-like rigid supporting body (1), preferably made of a mixture of PVC and cork;
- an insert (2) preferably made of polyether, which is elastically compressible and therefore endowed with shock-absorbing capacities, suitable for being exactly and firmly fitted inside said body (1), in such a

way that its upper surface (22), which is preferably anatomical, emerges at the top of said body (1) to ensure a comfortable and ergonomic support for the foot of the user of the bottom (F).

[0014] The other components of said bottom (1) consist of:

- an insole (3) made of leather or equivalent materials, suitable for exactly coating said upper surface (22) of the insert (2), in such a way to offer a comfortable support to the user's foot;
- a walking sole (4) made of microporous material and/or rubber, suitable for being mounted in correspondence of the lower surface of said body (1), as shown in Fig. 10.

[0015] Starting from this general configuration, the description continues by illustrating the specific configuration attributed to the two aforesaid main components (1, 2), which is decisive to ensure that the bottom according to the present invention (F) is provided with the desired differentiated cushioning capacity of the different points of the sole of the user's foot.

[0016] With reference to Fig. 3, it must be noted that said supporting body (1) is inferiorly defined by a horizontal bottom wall (10) which is shaped like the sole of the human foot and is circumscribed by a perimeter edge (S) suitable for defining a compartment (V) inside said body (1); it being also provided that said perimeter edge (S) has an upper flat edge (BS).

[0017] In particular, said edge (S) has a minimum height - in the order of a few millimeters - in correspondence of the tip of said body (1), and a higher height towards the rear area of said body (1).

[0018] As shown in Fig. 3, in fact, the edge (S) comprises two identical rectilinear sides (11a), which are symmetrically opposite and have an ascending direction from the front towards the back and are posteriorly connected - starting from the point of maximum height (11a') - by means of a semicircular wall (11b) with a substantially "U" shape, which has a lower height than the maximum height reached by said two rectilinear sides (11a).

[0019] For such a reason, the connection between said point of maximum height (11a') of each one of said rectilinear sides (11a) and the respective end of the semicircular wall (11b) is ensured by means of a tooth (11c) inclined in the direction of the semicircular wall (11b).

[0020] With reference to Fig. 3, said insert (2) comprises:

- a central supporting body (20) suitable for being exactly fitted inside the compartment (V) circumscribed by said perimeter edge (S) of the body (1);
- an upper horizontal wall (22) with anatomical profile, suitable for being disposed on top of the body (1), in such a way to act as support surface for the user's foot during use; wherein said upper wall (22) has a higher width than said central body (20), in such a way that the perimeter edge (23) is overlapped in step-like configuration to said upper flat edge (BS) provided on top of the perimeter edge (S) of the body (1).

[0021] In this regard it must be underlined that said perimeter edge (23) of the insert (2) comprises a first section (23a) with constant thickness, which extends from the tip of the body (1) until said two points of maximum height (11a') of the rectilinear sides (11a) of the body (1), and a second section with significantly higher thickness (23b), which extends from said two points of maximum height (11a') of the rectilinear sides (11a) of the body (1) until said semicircular wall (11b) of the body (1).

[0022] The higher thickness adopted by the second section (23b) of said perimeter edge (23) of the insert (2) is a necessary consequence of the difference in height that is recorded, within the body (1), between the two points of maximum height (11a') of said rectilinear sides (11a) and the semicircular wall (11b), even if with the connection of said two inclined teeth (11c).

[0023] It is precisely the higher thickness of the second section (23b) of the perimeter edge (23) of the insert (2) that converts the second section (23b) into the point with the highest cushioning capacity of the insert (2), to the full advantage of the lateral edge of the heel of the user that is intended to rest on said second section (23b) of the perimeter edge (23).

[0024] Moreover, it should be noted that the different performance in terms of cushioning capacity of the various sections of the insert (2) can also be determined by appropriately adjusting the density of said polyether material used for the insert (2).

[0025] As mentioned earlier, within the scope of the present invention, a specific manufacturing process has been developed, which represents the most advantageous technology, even if it is not the only feasible one, for the purposes of manufacturing the bottom according to the invention (F).

[0026] In particular, reference is made to a co-molding process performed using thermoplastic materials, which comprises the following steps, as described with reference to Figs. 4 to 9.

[0027] The first step - or step A - of said process consists in the provision of a first mold (100) comprising a die (101) and a respective lid (102), suitable for defining the cavity (103) for the molding of a first semi-finished product (SL1), which is subsequently used to obtain the supporting body of the bottom according to the invention (F).

[0028] In particular, the first mold (100) is shown in Figs. 10 and 11.

[0029] In fact, generally speaking, said first semi-finished product (SL1) adopts a structure that is identical to that one of the body (1), which is shown in detail in Fig. 3.

[0030] For such a reason, Fig. 8, which is expressly dedicated to said first semi-finished product (SL1), adopts the same reference numbers used in Fig. 3 for the common components in order to describe said supporting body (1).

[0031] However, it must be considered that, with respect to the body (1), said first semi-finished product (SL1) adopts a specific additional provision, which is shown in Fig. 8, obtained by appropriately arranging the cavity of said first mold.

[0032] Reference is made to the fact that a horizontal wing (12) protrudes outwardly from the top of the perimeter edge (S), said horizontal wing (12) comprising:

- a first section (12a) that circumscribes the front half of said body (1)
- two second sections (12b) provided in correspondence of said two rectilinear sides (11a) with ascending direction
- two third sections (12c) provided in correspondence of said two inclined teeth (11c)
- a fourth section (12d) provided in correspondence of said semicircular wall (11b).

[0033] Moreover, it is provided that said horizontal wing (12) inferiorly comprises a perimeter rib (N), facing said bottom wall (10) of said first semi-finished product (SL1), as shown in Fig. 9.

[0034] The second step - or step B - of the process consists in injecting a jet of PVC mixed with cork inside said first mold.

[0035] The third step - or step C - of the process consists in the extraction of the first semi-finished product (SL1) of Fig. 8, which has hardened, from said first mold (100).

[0036] The fourth step - or step D - of the process consists in loading said first semi-finished product (SL1) into a second mold (not shown in the appended figures), suitably equipped with a cavity capable of exactly containing said first semi-finished product (SL1); it being also provided that the opening of said cavity is circumscribed by a perimeter groove suitable for exactly accommodating said perimeter rib (N) provided in said first semi-finished product (SL1).

[0037] In particular, the positioning of the perimeter rib (N) of the first semi-finished product (SL1) inside the corresponding groove provided on said second mold ensures that said first semi-finished product (SL1) can firmly maintain its position inside said second mold.

[0038] In fact, it is understood that if the first semi-finished product (SL1) were subject to some undesired displacement inside the second mold, the precision with which said first semi-finished product (SL1) will receive and support the respective insert (2) made of polystyrene would be jeopardized.

[0039] This is because the fifth step - or step E - of the process consists in injecting a jet of polyether inside said second mold - after closing it with the respective lid - to generate the formation of a respective cushioning insert (2), in correspondence of the compartment (V) of the first semi-finished product (SL1), in such a condition that the supporting body (20) of said insert (2) exactly fills said compartment (V) of the first semi-finished product (SL1), whereas the perimeter edge (23) of said anatomical surface (22) of the insert (2) is exactly disposed above said upper flat edge (BS) of the first semi-finished product (SL1).

[0040] With reference to Fig. 4, a second semi-finished product (SL2) is obtained, which comprises the first semi-finished product (SL1) and the respective insert (2) made of polyether, which are now irreversibly embedded.

[0041] As shown in Fig. 4, the second semi-finished product (SL2) is already provided with the insole (3) which is suitable for coating the anatomical surface (22) of the insert (2), even if such a preferred provision requires the execution of an additional operational step, as illustrated below.

[0042] The sixth step - or step F - of the process consists in extracting the second semi-finished product (SL2), from said second mold.

[0043] The seventh step - or step G - of the process consists in finishing the perimeter edges of said second semi-finished product (SL2) in order to remove said perimeter wing (12) provided in the first semi-finished product (SL1) together with the rib (N), as shown in a sequence in Figs. 5 and 6, obtaining the bottom (F) of the invention, which comprises the supporting body (1), the cushioning insert (2) and the insole (3).

[0044] An additional step, which is conventionally called A2, may be introduced in the process, in order to be performed after the execution of step A and before the execution of step B.

[0045] As shown in Figs. 10 and 11, in such an additional step, during the insertion inside the respective die (101), said lid (102) of the first mold (100) is coated with a film formed of two layers (13), of which the first lower layer (13a) consists in a thermo-adhesive film and the second upper layer (13b) consists in a film that simply protects the first lower layer (13a).

[0046] When the insertion of the lid (102) inside the respective die (101) is completed, said film (13) is positioned above said cavity (103), in such a condition that the filling of said cavity (103) with the PCV mixed with cork causes said thermo-adhesive layer (13a) of the film (13) to be embedded in said material, coating the surface of the compartment (V) of said first semi-finished product (SL1).

[0047] After extracting the first semi-finished product (SL1) from the first mold (100), it will be necessary to manually remove said second layer (13b) of the film (13), so that, during the subsequent injection of the polyether into the compartment (V) of said first semi-finished product (SL1), the polyether can efficaciously adhere on said thermo-adhesive layer (13a) of the film (13).

[0048] Otherwise said, the advantage of positioning said first layer (13a) of the film (13) in correspondence

of the compartment (V) of the first semi-finished product (SL1) consists in the fact that the provision of the first layer (13a) ultimately allows the insert (2) made of polyether to be better adhered and held inside the body (1) of the bottom according to the invention (F).

[0049] It should be noted that said step B could be alternatively performed by providing that the body (1) is obtained from vulcanizing a rough piece of rubber mixed with cork, using a system and a respective first mold that are suitable for such a vulcanization process.

[0050] It should be noted, however, that such an alternative embodiment of the process is not compatible with the provision of the film (13) made of two layers because the high temperatures required for said vulcanization process would destroy the film (13).

[0051] Moreover, it should also be pointed out that the aforementioned process preferably envisages an additional intermediate step - or step D2 - to be performed after the execution of step D and before the execution of step E; wherein said additional step allows for disposing said insole (3) in correspondence with the anatomical surface (22) of the insert (2).

[0052] With reference to Fig. 7, said step D2 provides for fixing a sample of said insole (3) in correspondence of the internal wall of the lid of said second mold; it being provided that said insole (3) is appropriately provided with holes (3a) suitable for being coupled with respective fixing pins that protrude from said lid of the second mold.

[0053] In such a case, it is understood that the execution of the subsequent step E and, more precisely, the injection of said jet of polyether inside said first semi-finished product (SL1) produces the additional effect of embedding also the insole (3), making it adhere irreversibly to said anatomical upper wall (22) of the insert (2).

[0054] It goes without saying that, in such a context, said final finishing operation of the second semi-finished product (SL2) also produces the effect of trimming the edges of the insole (3).

[0055] Fig. 10 shows the footwear obtained with the bottom according to the invention (1), after assembling a traditional upper (T), namely a strap-like upper, and the sole (4) on said bottom.

[0056] In this regard, it must be pointed out that the preferred choice of realizing the body (1) with PVC mixed with cork is particularly appreciable because it allows for fixing said walking sole (4) under such a body (1) using a simple polyurethane glue, whose advantageous application does not require the previous washing of the body (1) with a halogen.

[0057] Finally, it should be noted that the bottom (F) according to the invention is suitable for being used as an insert that is introduced in an assembled footwear, just like an ordinary insole; it being evident that, in such a way of use, the bottom (F) of the invention will not be provided with the walking sole (4).

Claims

1. Footwear bottom with composite structure comprising:

   - a wedge-like rigid supporting body (1) comprising a horizontal wall (10) circumscribed by a perimeter edge (S), having an upper flat edge (BS), suitable to define a compartment (V) inside said body (1); wherein said perimeter edge (S) has a minimum height in correspondence of the tip of the body (1) and an increasing height in the direction of the heel, since it comprises two rectilinear side walls (11a) with ascending direction, which are connected at the back, starting from the point of maximum height (11a), by a substantially semicircular wall (11b) having a lower height; wherein the connection between said point of maximum height (11a') of each one of said side walls (11a) and the respective end of said semicircular wall (11b) is ensured by means of a tooth (11c) that is inclined in the direction of said semicircular wall (11b);
   - an insert (2) made of elastically compressible material, comprising

     • a central supporting body (20) suitable for being exactly fitted inside the compartment (V) circumscribed by said perimeter edge (S) of the body (1);
     • an upper horizontal wall (22) with anatomical profile, suitable for being disposed on top of the body (1), in such a way to act as support surface for the user's foot during use; wherein said upper wall (22) has a higher width than said central body (20), in such a way that the perimeter edge (23) is overlapped in step-like configuration to said upper flat edge (BS) provided on top of the perimeter edge (S) of the body (1); and wherein said perimeter edge (23) of said insert (2) comprises a first section (23a) with constant thickness, which substantially extends from the tip of the body (1) until said two points of maximum height (11a') of the rectilinear sides (11a) of the body (1), and a second section with higher thickness (23b), which extends from said points of maximum height (11a') of the rectilinear sides (11a) of the body (1) until said semicircular wall (11c) of the body (1).

2. The footwear bottom according to claim 1, wherein said upper wall (22) of the insert (2) is covered by an insole (3) made of leather or equivalent materials.

3. The footwear bottom according to any one of the preceding claims, comprising a walking sole (4)

made of microporous material and/or rubber applied inferiorly to said horizontal wall (10) of the body (1).

4. The footwear bottom according to any one of claims 1 to 3, wherein said body (1) is made of PVC mixed with cork.

5. The footwear bottom according to any one of claims 1 to 3, wherein said body (1) is made of rubber mixed with cork.

6. The footwear bottom according to any one of the preceding claims, wherein said insert (2) is made of polyether.

7. The footwear bottom according to claim 1, wherein a thermo-adhesive film (13a) is provided in an intermediate position between said body (1) and said insert (2).

8. A process for the manufacturing of the footwear bottom according to any of the preceding claims, wherein said process comprises the following operational steps:

A) provision of a first mold (100) comprising a die (101) and a respective lid (102) suitable for defining a cavity (103) for the molding of a first semi-finished product (SL1), which is structurally identical to said body (1); wherein it is further provided that a horizontal wing (12) protrudes outwardly from the upper flat edge (BS) of said perimeter edge (S) of said first semi-finished product (SL1), said horizontal wing (12) comprising:

- a first section (12a) that circumscribes the front half of said body (1)
- two second sections (12b) provided in correspondence of said two rectilinear sides (11a) with ascending direction
- two third sections (12c) provided in correspondence of said two inclined teeth (11c)
- a fourth section (12d) provided in correspondence of said semicircular wall (11b);

wherein said horizontal wing (12) inferiorly comprises a perimeter rib (N);
B) injection of a jet of PVC mixed with cork inside said first mold;
C) extraction of said first semi-finished product (SL1), which has hardened, from said first mold;
D) loading of the said first semi-finished product (SL1) into a second mold, wherein said second mold adopts a cavity suitable for exactly containing the first semi-finished product (SL1); wherein the opening of said cavity is circumscribed by a perimeter groove suitable for exactly accommodating said perimeter rib (N) provided in the wing (12) of said first semi-finished product (SL1);
E) injection of a jet of polyether inside said second mold, in order to fill said first semi-finished product (SL1) and form said substantially anatomical upper wall (22) of the insert (2) on top of said first semi-finished product (SL1), so that said perimeter edge (23) of said upper wall (22) is disposed above said upper flat edge (BS) of the perimeter edge (S) of the first semi-finished product (SL1);
F) extraction of a second semi-finished product (SL2) from said second mold, which comprises said first semi-finished product (SL1) and the respective polyether insert (S), which are now irreversibly embedded, as illustrated above;
G) finishing of the perimeter edges of said second semi-finished product (SL2) in order to remove said perimeter wing (12) provided in the first semi-finished product (SL1), together with the rib (N).

9. The process according to claim 8, wherein an additional step A1 is performed after the execution of said step A, said additional step A1 consisting in the laying of a film (13) formed by a first thermo-adhesive layer (13a) and a second coating layer (13b) inside said cavity (103) of the first mold (100); wherein, following the execution of the subsequent step B, the first layer (13a) is suitable for exactly and irreversibly coating said compartment (V) of the first semi-finished product (SL1), whereas the second layer (13b), which protects the first layer (13a), is suitable for being removed before the execution of said step D).

10. The process according to claim 8, wherein an additional step D2 is provided, following the execution of said step D, said step D2 consisting in reversibly fixing an insole (3) made of leather or the like in correspondence to the internal surface of the lid of said second mold, in such a way that, during the subsequent step E, said insole (3) is embedded in the jet of said polyether and coats said upper wall (22) of the insert (2).

11. The process according to claim 8, wherein said step B is replaced by a step B1, wherein said first semi-finished product (SL1) is obtained from vulcanizing a rough piece of rubber mixed with cork, using a system and a respective first mold that are suitable for such a vulcanization process.

12. Footwear comprising a bottom (1), an upper (T) and a walking sole (4), wherein said bottom (1) is obtained according to one or more of the preceding claims.

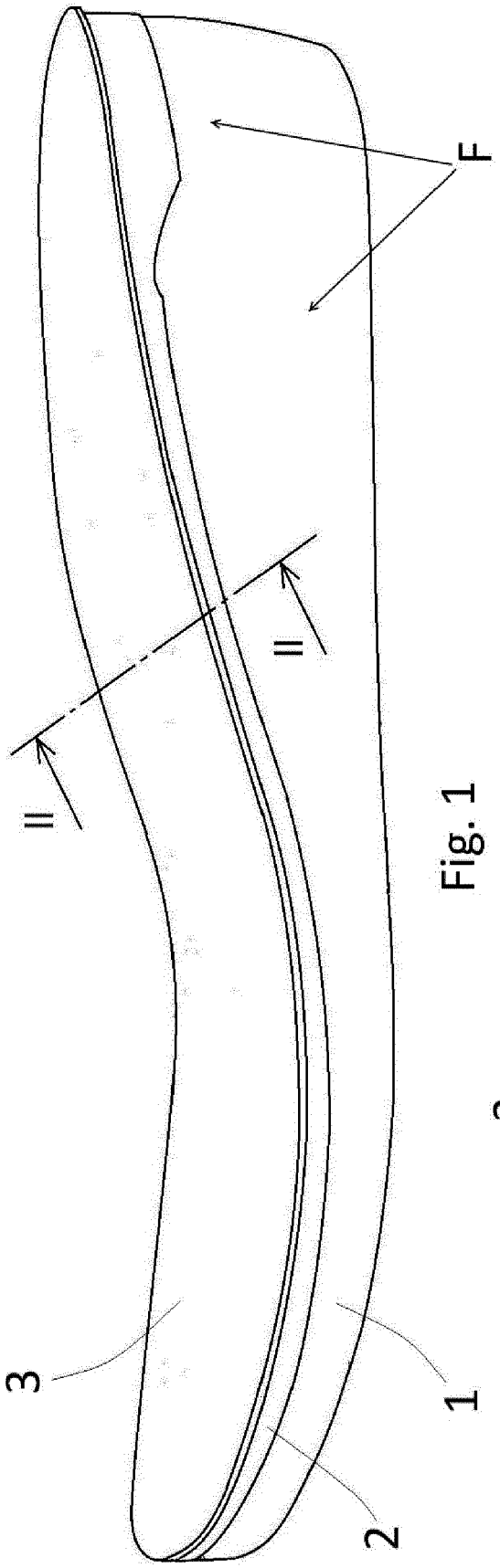

Fig. 1

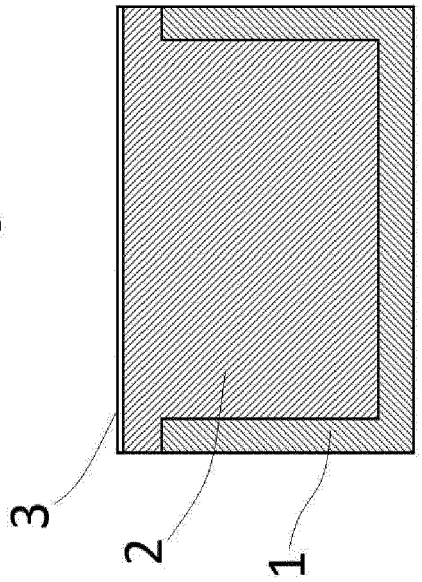

Fig. 2

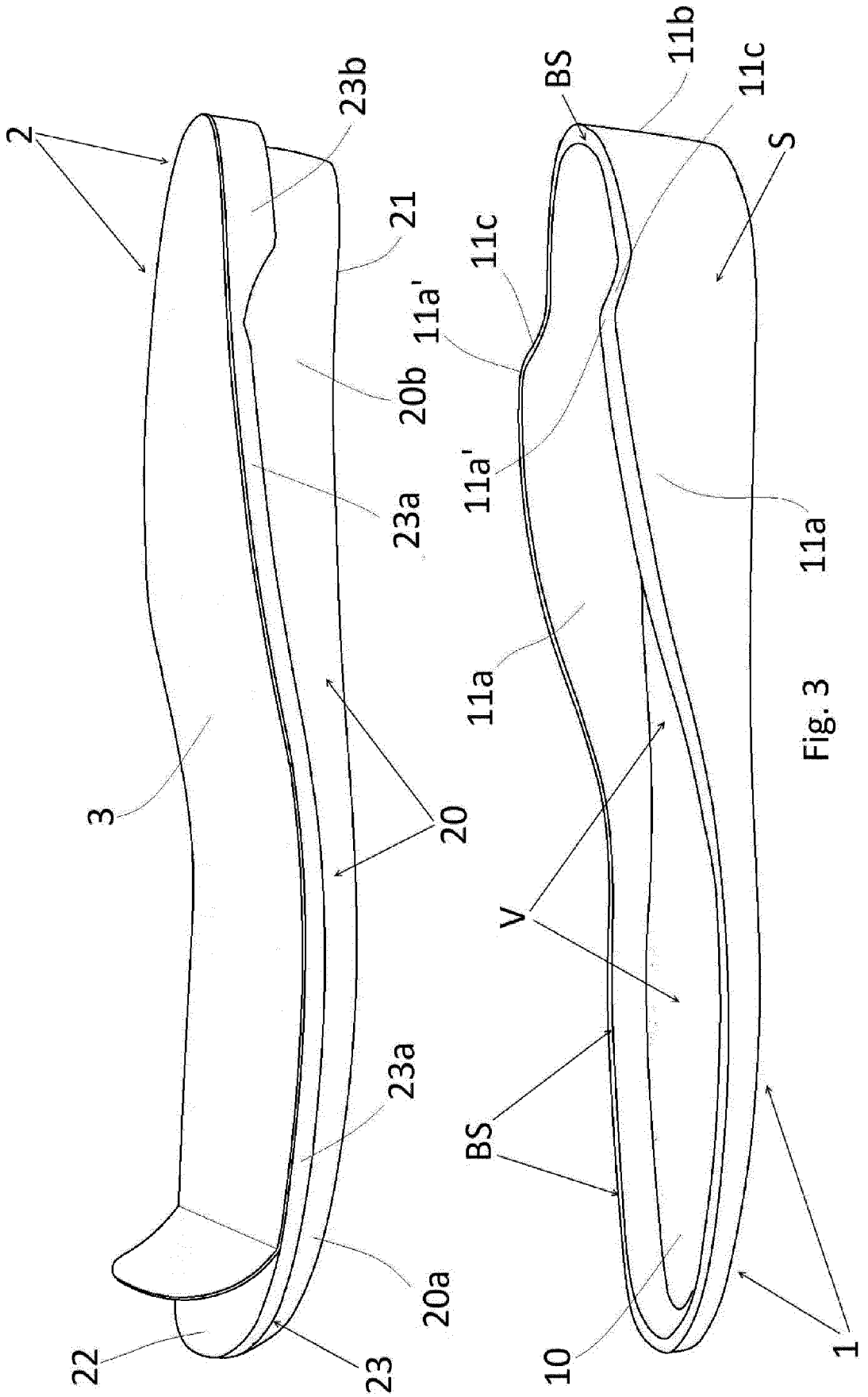
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Fig. 3

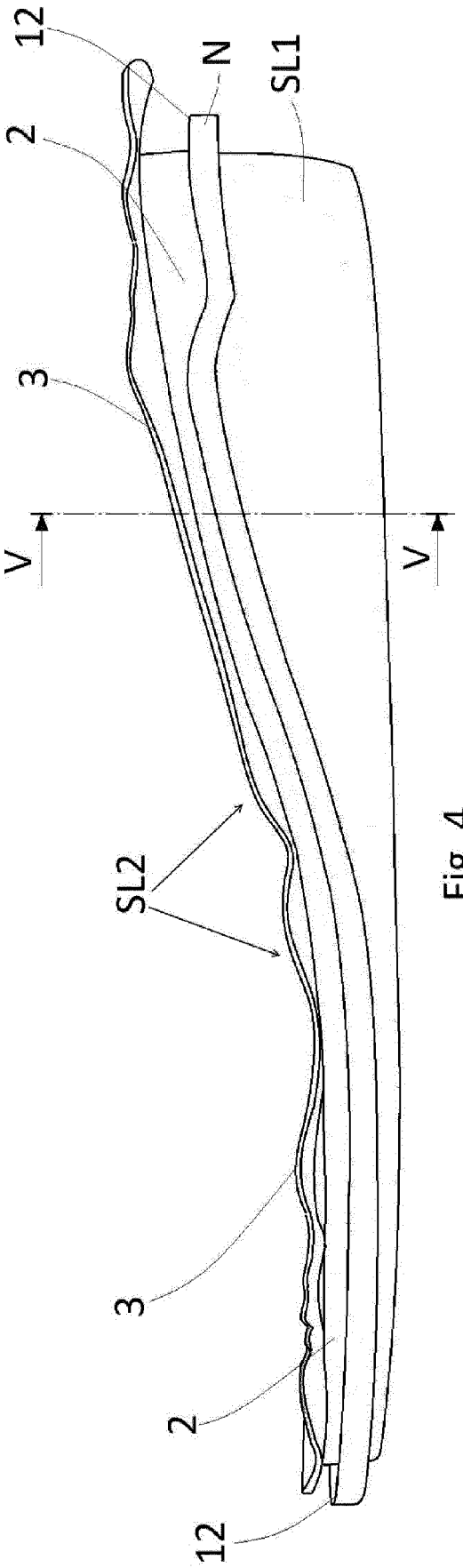

Fig. 4

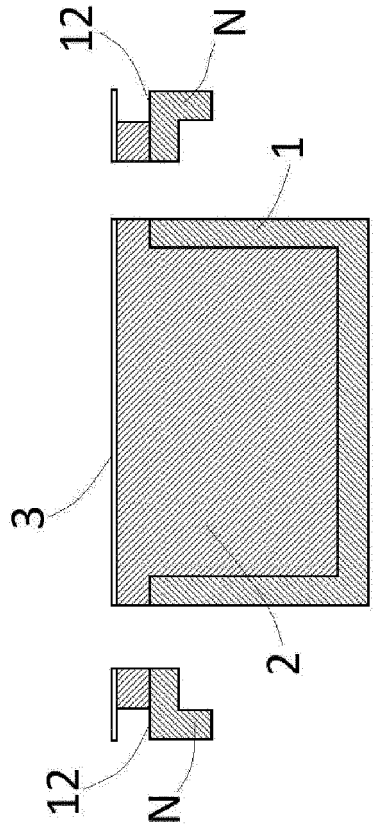

Fig. 6

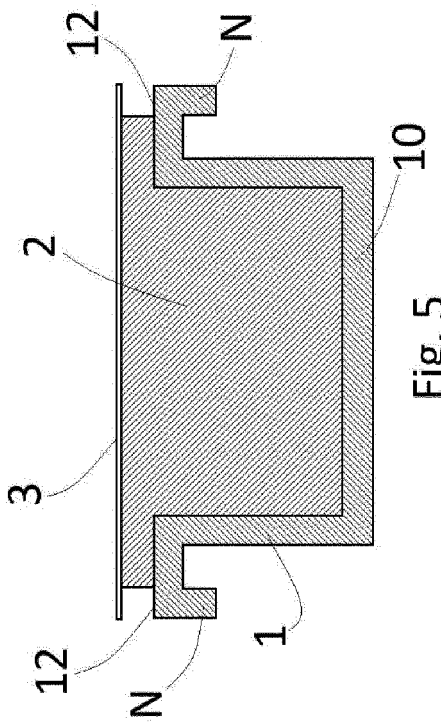

Fig. 5

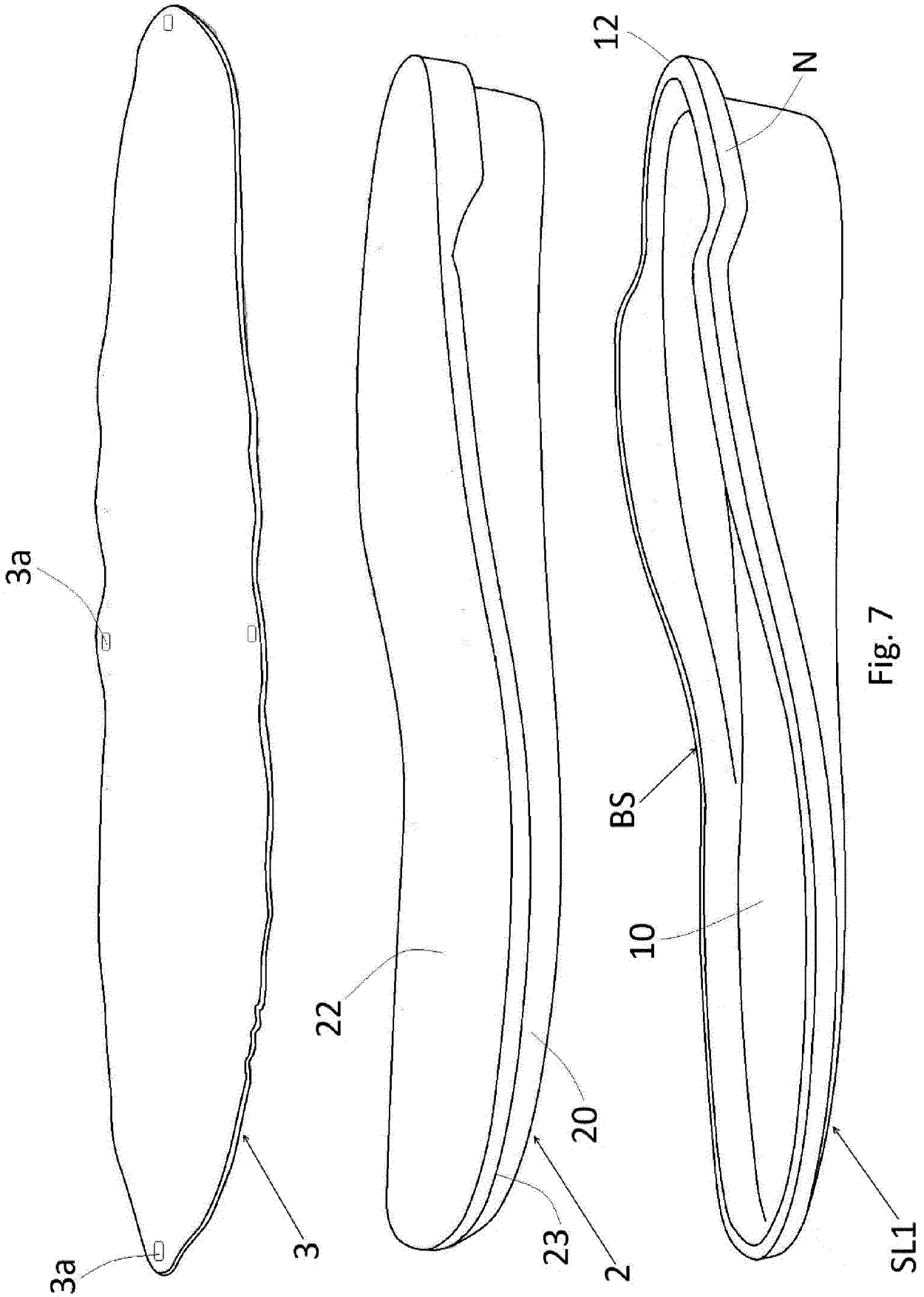

Fig. 7

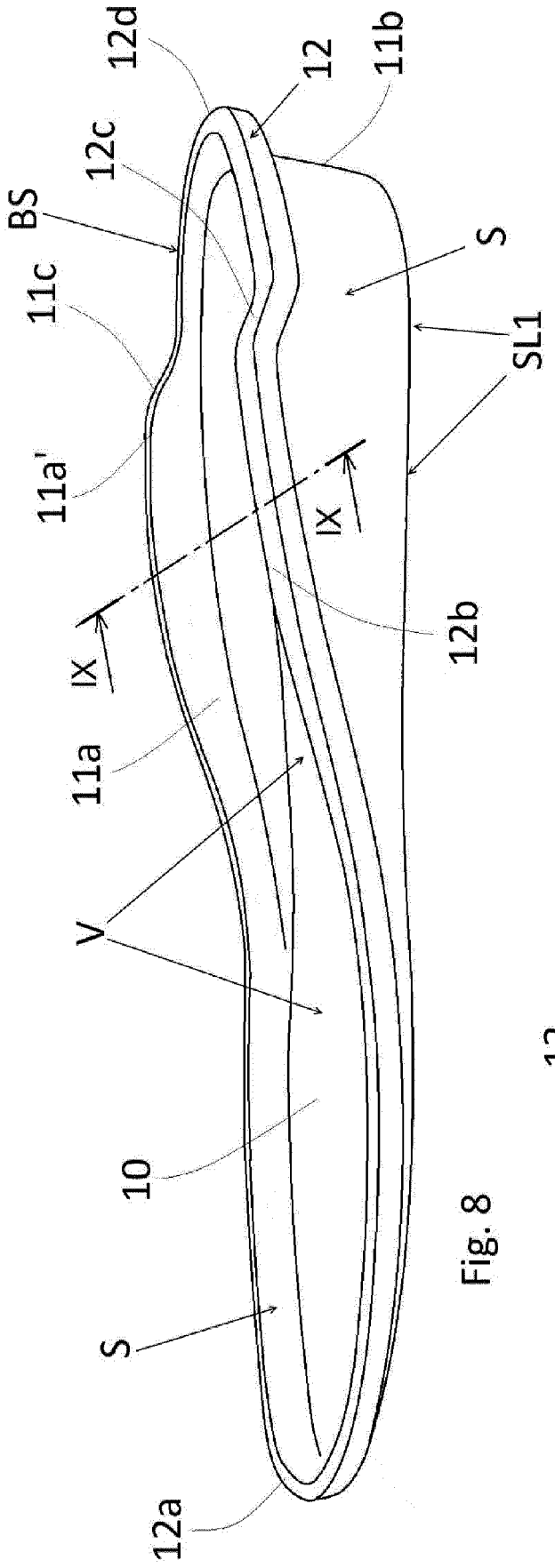

Fig. 8

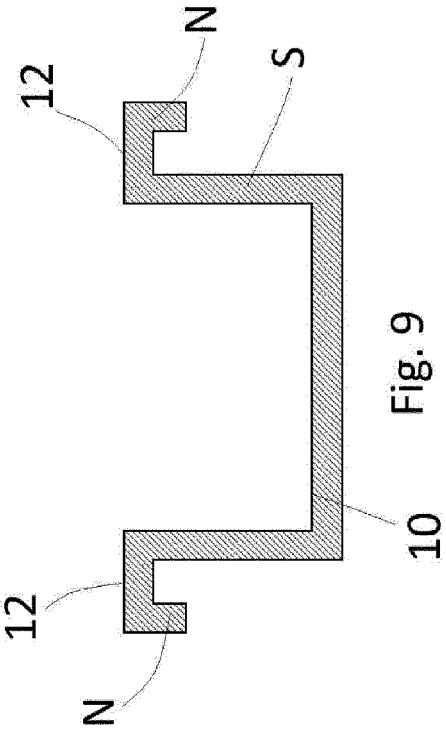

Fig. 9

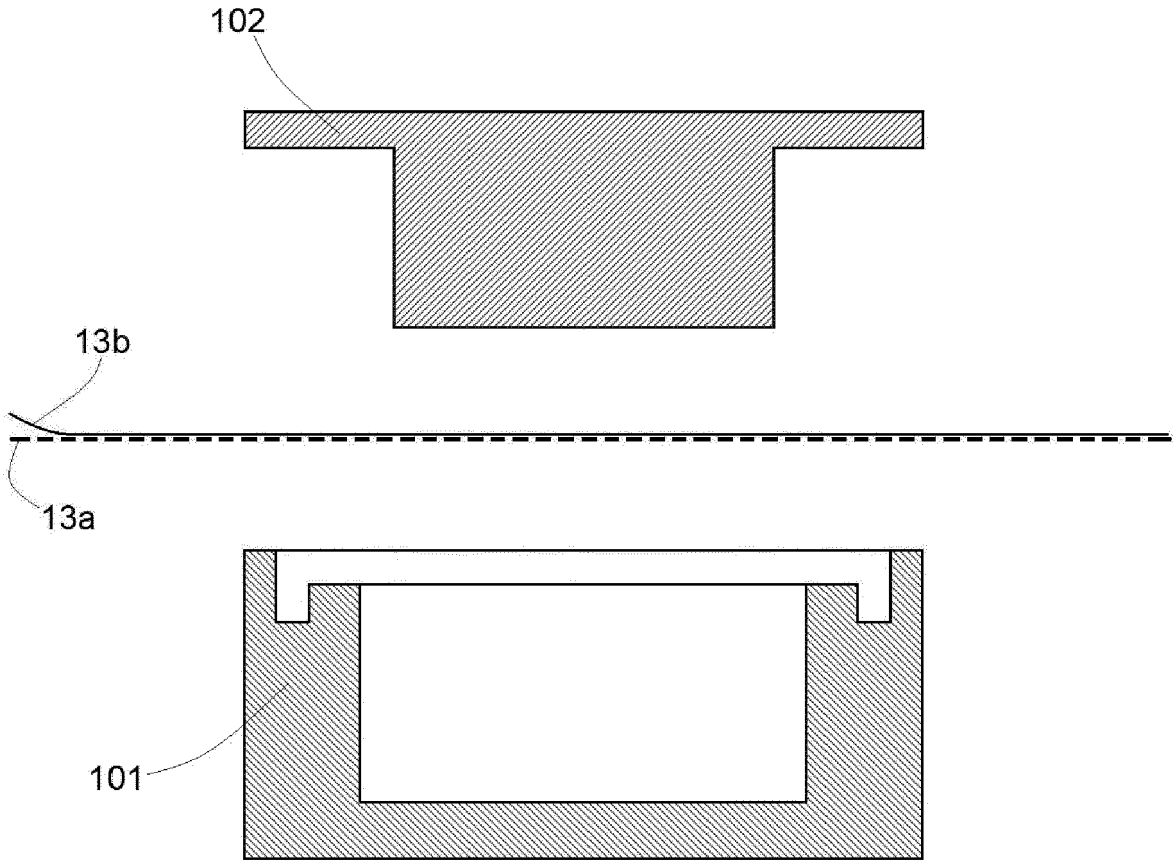

Fig. 10

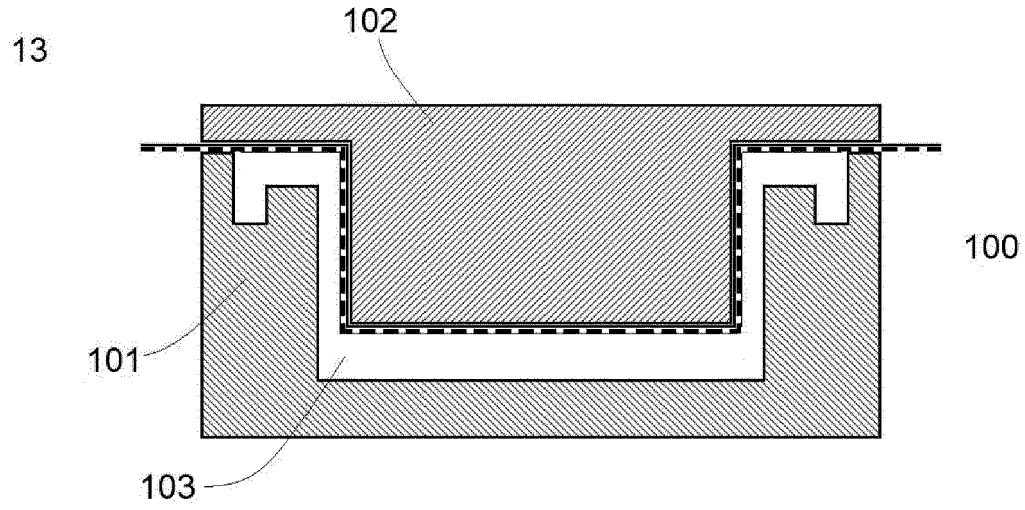

Fig. 11

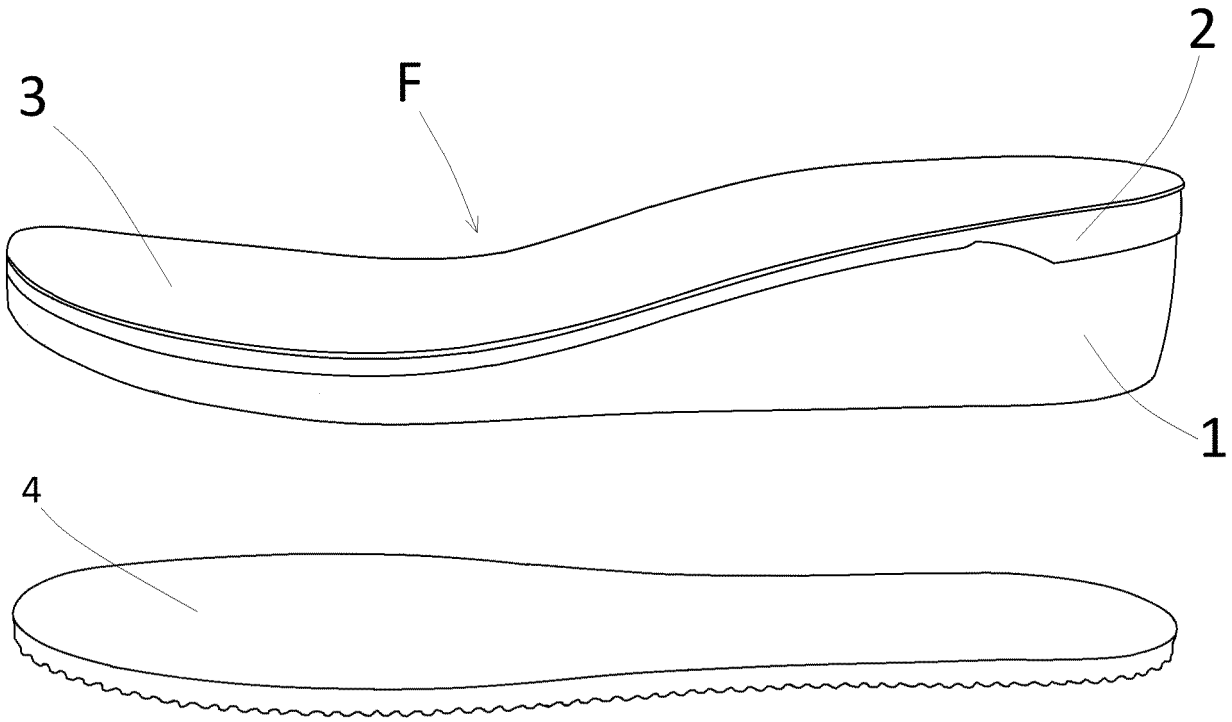

Fig. 12

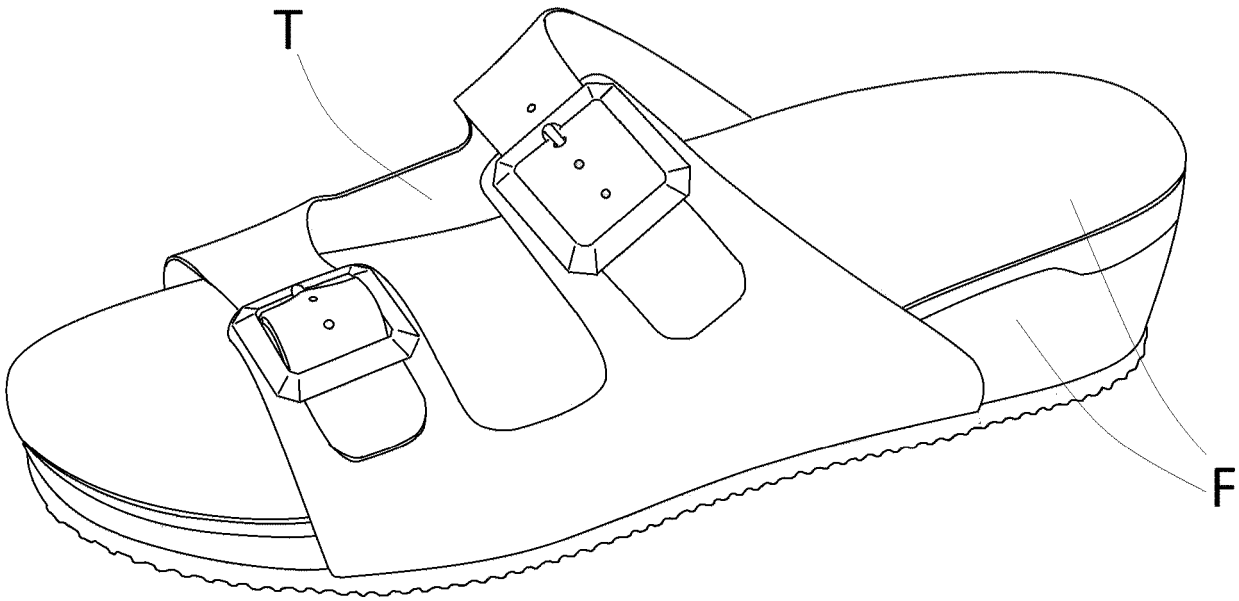

Fig. 13

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EUROPEAN SEARCH REPORT

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EP 22 15 4358

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 844 672 A1 (IDEASLAB SNC [IT]) 17 October 2007 (2007-10-17) * the whole document *	1-12	INV. A43B13/18 A43B13/12 A43B13/42 A43B9/10 A43B13/04
A	EP 1 103 197 A2 (TESTONI A SPA [IT]) 30 May 2001 (2001-05-30) * the whole document *	1-12	
A	DE 299 08 019 U1 (BARRY R G CORP [US]) 9 March 2000 (2000-03-09) * paragraphs [0049] - [0108]; figures *	1-12	
A	US 2011/232128 A1 (PROPET ROBERT [US]) 29 September 2011 (2011-09-29) * the whole document *	1-12	
A	EP 2 574 251 A2 (CLARK C & J INT LTD [GB]) 3 April 2013 (2013-04-03) * the whole document *	1-12	
			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
The Hague	8 June 2022	Cianci, Sabino

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08-06-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1844672 A1	17-10-2007	EP 1844672 A1	17-10-2007
		US 2007240338 A1	18-10-2007
EP 1103197 A2	30-05-2001	CN 1296794 A	30-05-2001
		EP 1103197 A2	30-05-2001
		IT BO990631 A1	23-05-2001
		JP 2001149114 A	05-06-2001
		KR 20010049701 A	15-06-2001
		TW 490294 B	11-06-2002
		US 6438868 B1	27-08-2002
DE 29908019 U1	09-03-2000	CA 2262809 A1	11-11-1999
		DE 29908019 U1	09-03-2000
		US 6226894 B1	08-05-2001
		US 2001010128 A1	02-08-2001
US 2011232128 A1	29-09-2011	CN 201278864 Y	29-07-2009
		US 2011232128 A1	29-09-2011
		WO 2010037258 A1	08-04-2010
EP 2574251 A2	03-04-2013	EP 2574251 A2	03-04-2013
		US 2013081305 A1	04-04-2013
		US 2014053434 A1	27-02-2014

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