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(54) Insert for the customization of a sport or medical item, customizable sport or medical item and method for the customization of a sport or medical item

(57) The present invention relates to an insert (1) for the customization of a sport or medical item, of the type comprising a substantially soft inner element that in use is oriented towards the user's body, and to a method for the customization of a sport or medical item of the above-mentioned kind by using said insert (1). According to the invention, said insert (1) comprises at least one layer of thermoformable material (3) and a variable volume element (5) connected to said layer of thermoformable material. In the case of sport or medical items which, in addition to said substantially soft inner element, also include a substantially rigid outer element, the insert according to the invention preferably comprises two layers of thermoformable material (3, 9) and a variable volume element (5) interposed between said layers of thermoformable material.

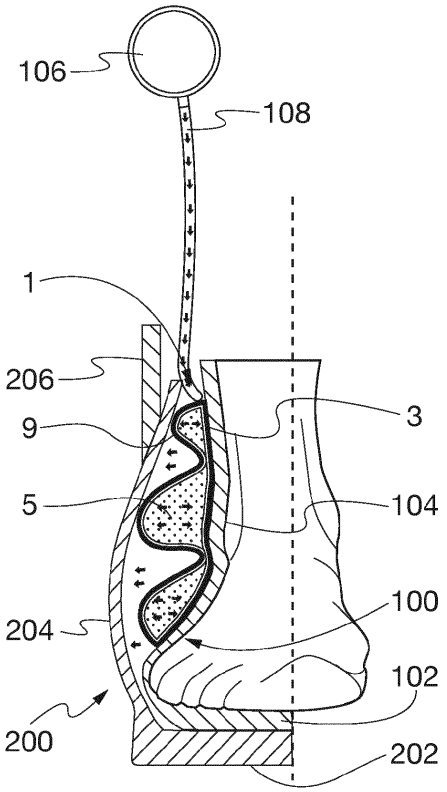


Fig. 3B

EP 2 801 275 A1

Description

Technical Field

[0001] The present invention relates to an insert for the customization of a sport or medical item, i.e. for the adaptation of said sport or medical item to the specific morphology of a single user.

[0002] More particularly, the present invention relates to an insert for the customization of a sport or medical item which comprises at least one layer of thermoformable material.

[0003] More particularly, yet not exclusively, the invention relates to an insert for the customization of a sport or medical item of the kind comprising a substantially soft inner element, oriented towards the user's body, and a substantially rigid outer element. Non-limiting examples of such sport items that may employ the insert according to the invention include sport footwear, such as ski boots, and protective clothing, such as protective helmets.

[0004] Non-limiting examples of medical items that may employ the insert according to the invention include guards, such as guards used during convalescence and rehabilitation in case of traumas.

[0005] The present invention also relates to a sport or medical item that can be customized by means of the above-mentioned insert, as well as to a method for the customization of a sport or medical item making use of the above-mentioned insert.

Prior Art

[0006] It is known that, both in the sporting goods industry and in the industry of medical articles or aids, comfort, performance and effectiveness of these items are closely related to the compliance of such items with the specific morphology of the single user.

[0007] Sport footwear, in particular ski boots, can be taken as an example. In the case of ski boots, compliance of the footwear with the morphology of the foot of the single user not only significantly increases the user's comfort, but also improves the maneuverability of the ski, as even minimal movements of the user's foot are effectively transmitted to the ski boot and hence to the ski. Similar improvements in terms of both user's comfort and performances can be obtained in the case, for instance, of roller skates or ice skates.

[0008] Still by way of example, in the case of protective helmets for use in sports practice, such as skiing, the compliance of the helmet to the morphology of the head of the single user is critical to the effectiveness of the helmet itself.

[0009] Analogous examples can be made in the medical field, in particular with reference to medical aids to be used during convalescence and rehabilitation further to traumas, such as guards to be used in case of fractures.

[0010] It is evident that the production of tailor-made individual items, although allowing an effective customization of sport and medical items of the above-mentioned type, would involve considerable manufacturing costs and, consequently, very high and non-competitive prices on the market.

[0011] Therefore, products and methods have been developed in the past for customizing sport and medical item starting from a non-customized, standard item, therefore suitable for mass production.

[0012] More particularly, products and methods for the customization of ski boots have been developed which involve the use of one or more thermoformable inserts between the soft inner shoe and the outer rigid shell of the ski boot.

[0013] According to prior art, once the user has put on the inner shoe of the ski boot, the thermoformable insert is heated up above its thermoforming temperature, and then a pressure is applied from the outside to said insert so that it perfectly fits the morphology of the foot of the user; finally, the insert is cooled down below its thermoforming temperature, so that it stiffens to the desired configuration.

[0014] The method described above, although allowing to adapt the shape of the inner shoe of the ski boot to the user's foot, requires the use of complex and cumbersome devices; moreover it does not allow to adapt at the same time the shape of the inner shoe to the outer shell of the ski boot.

[0015] According to an alternative method for the customization of ski boots according to prior art, once the user has put on the ski boot, a thermoformable material is injected into the cavity defined between the inner shoe and the outer shell of said ski boot.

[0016] This method, however, also involves some drawbacks, one of which being that it is not possible to exert any control over the distribution of the thermoformable material during injection.

[0017] Moreover, in general, the methods of prior art are not flexible and they do not allow to easily modify the shape of a ski boot in case of need due to a variation in the morphology of the user's foot.

[0018] An object of the present invention is therefore to overcome the drawbacks of prior art by providing an insert which allows to customize a sport or medical item with precision, and in a way that can be controlled and easily modified over time in case of need.

[0019] Another object of the present invention is to provide a sport or medical item which can be customized with precision, and in a way that can be controlled and easily modified over time for meeting changes in the user's morphology.

[0020] A further object of the present invention is to provide a method that - by using the above-mentioned insert - allows to customize a sport or medical item with precision, and in a way that can be controlled and easily modified over time in case of need.

[0021] These and other objects are achieved by means of the insert, the sport or medical item and the method

as claimed in the appended claims.

Summary of the Invention

[0022] Thanks to the fact that a variable volume element is connected, either removably or non-removably, to the layer of thermoformable material of the insert according to the invention, it is possible to obtain a precise and accurate customization of the sport or medical item to which the insert is connected by varying the volume of said variable volume element during the thermoforming of said thermoformable layer.

[0023] Depending on the intended applications, the shape and structure of the insert according to the invention, as well as its arrangement relative to the sport or medical item, can be chosen in each case so as to ensure optimum customization of said item at the most critical regions.

[0024] Advantageously, according to a preferred embodiment of the invention, said variable volume element comprises a pair of walls joined to each other along their perimeter so as to define therebetween an airtight housing and preferably one or more contact points between said walls are provided inside said perimeter.

[0025] More particularly, said airtight housing can include a plurality of separate and possibly independent pockets; thanks to this arrangement, the customization of the sport or medical item can be accurately controlled.

[0026] The insert according to the invention can be advantageously applied to a wide variety of sport and medical items, and more particularly to sport and medical items including a substantially soft inner element, oriented towards the user's body, and a substantially rigid outer element.

[0027] Ski boots, skates, helmets and other protective clothing - among sport items - as well as guards, corsets and similar aids for rehabilitation - among medical articles - can be mentioned by way of example.

[0028] However, the insert according to the invention can also be applied to sport and medical items having a different structure, and namely to sport and medical items that do not include any rigid outer structure, such as trekking shoes and other footwear.

[0029] In this case a rigid outer casing may be provided, which will be temporarily associated to the sport and medical item in a dedicated way during its process of customization.

[0030] If the sport or medical item in question includes a rigid outer element, the insert according to the invention can advantageously comprise a second layer of thermoformable material, the variable volume element being interposed between said first and said second layer of thermoformable material.

[0031] Thanks to this configuration, the insert according to the invention can be adapted with precision and accuracy not only to the user's morphology, but also, at the same time, to the contour of said rigid outer element.

Brief Description of the Drawings

[0032] Further features and advantages of the invention will become evident from the following detailed description of some preferred embodiments thereof, given by way of non-limiting example with reference to the accompanying drawings in which:

- Figure 1 is a side view of an insert according to a preferred embodiment of the present invention, joined to the inner shoe of a ski boot;
- Figure 1A is an enlarged cross-sectional view of the particular A-A of Figure 1;
- Figure 2 is a side view of an insert according to a further preferred embodiment of the present invention, joined to the inner shoe of a ski boot;
- Figure 2A is an enlarged cross-sectional view of the particular A-A of Figure 2;
- Figure 3A is a cross-sectional view of the inner shoe and corresponding insert of Figure 2, inserted in the rigid shell of a ski boot and shown in a first configuration;
- Figure 3B is a cross-sectional view of the inner shoe and corresponding insert of Figure 2 inserted in the rigid shell of a ski boot and shown in a second configuration.

Detailed Description of Preferred Embodiments of the Invention

[0033] The preferred embodiments of the invention described in detail below refer to the application of the invention to a ski boot.

[0034] These embodiments shall not be considered in any way as limiting the scope of the invention and the invention may be applied to any sport or medical item in which it is considered necessary or appropriate to customize the shape of the item to the specific morphology of the single user.

[0035] With reference to Figure 1, the inner shoe 100 of a ski boot is schematically illustrated. The inner shoe 100 is made of a soft material and comprises a sole 102 and an upper 104, said upper comprising a first portion 104a intended to accommodate the user's foot and a second portion 104b intended to accommodate the user's ankle.

[0036] The inner shoe 100 is manufactured as a non-customized item, with standard dimensions for all the inner shoes of the same size.

[0037] As shown in Figure 1, an insert 1 according to the invention is joined to the inner shoe 100 for the customization of said inner shoe to the user's morphology.

[0038] It is evident that, depending on the application, the insert 1 may be sized and shaped so as to be located at the zones of the user's body which are more sensitive and relevant in view of the specific use.

[0039] Specifically, in the illustrated example the insert 1 is sized and shaped so as to be substantially located

at the malleolar region 104c of the upper 104 of the inner shoe 100, on both sides of said shoe.

[0040] Said insert 1 is shown in detail in Figure 1A. According to the invention, the insert 1 comprises at least one layer of thermoformable material 3 and a variable volume element 5 connected to said layer of thermoformable material 3.

[0041] The variable volume element 5 can be connected to said layer of thermoformable material 3 either in a removable, detachable way or in a non-removable, permanent way. More particularly, said variable volume element 5 is formed by a pair of walls 5a, 5b, made for example of plastic material, joined to each other at least along their outer perimeter so as to form an airtight body 5c, the inner volume of which can be varied by injecting inside it a predetermined amount of gas - for instance, air - or fluid - for instance, foam.

[0042] With reference to the example illustrated in Figures 1 and 1A, the variable volume element 5 is an inflatable element and for this purpose the airtight body 5c is connected through a suitable duct 108 to a pump 106 which is able to blow air inside it.

[0043] Still with reference to the example illustrated in Figures 1 and 1A, according to a preferred embodiment, the airtight body 5c does not evenly extend over the whole extension of the insert 1; on the contrary, one or more points inside the outer perimeter of the walls 5a, 5b are provided, at which points said walls are brought into contact with each other so as to form corresponding contact points 7.

[0044] The function of these contact points 7, which are suitably positioned with respect to the inner shoe and to the user's foot, is to create points of rigid contact between the upper 104 of the inner shoe 100 and the outside, without the interposition of any elastic element, so as to guarantee a correct transmission of the forces from the user's foot to the outside.

[0045] It is evident that, in an alternative embodiment of the invention, instead of providing separate and discrete contact points between the walls 5a, 5b, it is possible to provide contact lines extending along the surface of the insert 1 and defining distinct areas or "pockets".

[0046] Said pockets may be in communication with one another (if the contact lines are interrupted) or separate from one another (if the contact lines are continuous). In the latter case, it is possible to envisage to connect the different pockets to the pump 106 either via a common connection means or via separate connection means, so as to blow air into different pockets in an independent and separate way.

[0047] Turning now to Figures 2 and 2A, an alternative embodiment of the invention is shown, the insert 1 according to the invention being joined, also in this case, to the inner shoe 100 of a ski boot.

[0048] In this case, too, the insert 1 is sized and shaped so as to be substantially located at the malleolar region 104c of the upper 104 of the inner shoe 100, on both sides of said inner shoe.

[0049] Said insert 1 is shown in detail in Figure 2A. According to this embodiment of the invention, the insert 1 comprises a first layer of thermoformable material 3, a second layer of thermoformable material 9 and a variable volume element 5 interposed between said first and said second layers of thermoformable material 3, 9.

[0050] In this case, too, the variable volume element 5 can be connected to said layers of thermoformable material 3, 9 either in a removable and detachable way or in a non-removable and permanent way.

[0051] The variable volume element 5 substantially has the same structure as illustrated with reference to the previous embodiment and, more particularly, it is formed by a pair of walls 5a, 5b, which define therebetween an airtight housing 5c that can be connected to means 106,108 for blowing inside it air or another fluid. Moreover, also in this embodiment, the variable volume element 5 includes one or more contact points 7 inside the outer perimeter of the walls 5a, 5b, at which points said walls are brought into contact with each other.

[0052] In this respect it is advantageously preferable that the layers of thermoformable material 3, 9 perfectly adhere to the variable volume element 5 interposed between them, so that at the contact points 7 also said layers of thermoformable material are almost brought into contact with each other, being separated from each other only by the thickness of the variable volume element 5.

[0053] The main peculiarity of this embodiment is the presence of a second layer of thermoformable material 9 arranged at the outer side of the variable volume element 5 and therefore directed towards the outer shell of the ski boot.

[0054] Thanks to said second layer of thermoformable material 9, the insert 1 according to the invention can be adapted not only to the morphology of the user's foot but also, at the same time, to the contour of the outer shell of the ski boot.

[0055] This is evident from Figures 3A and 3B which show a ski boot provided with the insert 1 according to the invention, respectively before and after the thermoforming of the layers of thermoformable material of said insert 1.

[0056] With reference to Figure 3A, the inner shoe 100, to which the insert 1 according to the invention is joined, is inserted into the rigid outer shell 200, which includes a sole 202, an upper 204 and a cuff 206.

[0057] Both the inner shoe 100 and the shell 200 are non-customized, standard items. Accordingly, the inner shoe 100 is not adapted to the morphology of the user's foot; on the contrary, there is a gap 302 between the user's foot and the inner wall of the upper 104 of the inner shoe 100. Similarly, there is a gap 304 between the insert 1 joined to the outer wall of the upper 104 of the inner shoe 100 and the inner wall of the shell 200.

[0058] The presence of said gaps 302, 304 negatively affects the comfort of the user, whose foot will be subject to unpleasant movements and frictions within the ski boot.

[0059] The technical performance of the skier will also be negatively affected by the presence of gaps 302, 304, as the movements of the user's foot will not be easily and properly transmitted to the ski boot and hence to the ski.

[0060] The presence of the insert 1 according to the invention, interposed between the inner shoe 100 and the rigid shell 200 at the most sensitive regions, such as the region of the malleoli, allows to overcome these drawbacks and to customize the ski boot.

[0061] In general, the customization of the ski boot comprises the following steps:

- heating at least the layer of thermoformable material 3 - and the second layer of thermoformable material 9, if provided - of the insert 1 according to the invention up to a temperature higher than the thermoforming temperature of said layer(s);
- while said layer(s) of thermoformable material 3, 9 is / are connected to the variable volume element 5 so as to form the insert 1, while the insert 1 is interposed between the inner shoe 100 and the outer shell 200 and while the user's foot is inserted in said inner shoe 100, blowing air into the airtight body 5c of the variable volume 5 element (by means of the pump 106 and through the conduit 108), thereby exerting - thanks to the rigid outer shell 200 - an increasing pressure on the layer of thermoformable material 3 until said layer is adapted to the morphology of the user and, if provided, on the second layer of thermoformable material 9 until said second layer is adapted to the inner wall of the rigid shell;
- allowing the layer of thermoformable material 3 - and the second layer of thermoformable material 9, if provided - to cool down below the thermoforming temperature of said layer(s).

[0062] It is evident from the above description that the insert according to the invention allows to customize the inner shoe 100 of a ski boot in a precise, accurate and controllable way. The ski boot after thermoforming of the insert 1 is shown in Figure 3B.

[0063] In this configuration, the volume of the variable volume element 5 is increased, thus pressing and deforming the first layer of thermoformable material 3 towards the inside; as a consequence, the upper 104 of the inner shoe 100 is pressed inward as well, until it adheres against the user's foot.

[0064] At the same time, the increase in the volume of the variable volume element 5 has pressed and deformed the second layer of thermoformable material 9 towards the outside until it comes into contact with the inner surface of the upper 204 of the shell 200.

[0065] In this way, gaps 302, 304 are eliminated, as well as the drawbacks associated with their presence.

[0066] In this embodiment, too, thanks to the fact that the variable volume element 5 is integrated in the insert 1, the configuration of the layers of thermoformable material 3, 9 can be modified over time in case of changes in the morphology of the user.

[0067] Moreover, in case of need to replace the ski boot, it is possible to envisage to replace the outer shell only, while maintaining the same inner shoe 100. Even in this case, it will be sufficient to modify the configuration of the insert 1 so as to take into account the different structure of the new outer shell.

[0068] Moreover, thanks to the fact that the variable volume element 5 is connected to the layers of thermoformable material 3, 9 and can therefore be kept connected with the sport or medical item over time, the shape of said layers can be modified over time if necessary, for example in case of changes in the morphology of the user. It will be sufficient to heat again the insert 1 to bring it to a temperature higher than the thermoforming temperature of the layers of thermoformable material 3, 9 and appropriately blowing / sucking air into / from the airtight body 5c of the variable volume element 5 so as to adapt the layers of thermoformable material 3, 9 to the new, modified morphology of the user.

[0069] It is evident that the same considerations are also valid when the insert 1 comprises a single layer of thermoformable material 3.

[0070] In this respect it can be noted that in the example shown in Figures 1 and 1A, the insert 1 is joined to the outer surface of the inner shoe of a ski boot, for example by sewing.

[0071] Still with reference to applications to ski boots, it is also possible to alternatively envisage to join said insert 1 to the inner surface of the rigid outer shell of the ski boot, for example by riveting.

[0072] It will also be possible to envisage that one of the components of the insert - for example the layer of thermoformable material - is joined to the outer surface of the inner shoe of the ski boot and the other component - for example, the variable volume element - is joined to the inner surface of the outer shell of the ski boot, provided that such components are connected to each other once the ski boot is assembled, and namely during the customization of the same.

[0073] It is evident from the foregoing description that the insert according to the invention achieves the objects indicated above, allowing the customization of sport or medical items in a way that is accurate, repeatable and easily modifiable over time.

[0074] It is also evident that the embodiments described above are not to be intended as limiting in any way and that several variations and modifications are possible without departing from the scope of the invention as defined by the appended claims.

[0075] In particular, although the invention has been described with reference to a ski boot, it can be implemented in a large number of different sport and medical items as well.

[0076] More particularly, it can be advantageously applied to sport or medical items comprising a substantially soft inner element and a substantially rigid outer element, such as a protective helmet comprising a substantially

rigid outer shell and a substantially soft inner shell.

[0077] However, it can even be applied as well to sport and medical items that do not comprise any rigid outer structure, such as trekking shoes.

[0078] In this respect, in the case of a sport or medical item comprising a substantially rigid outer element, the step of thermoforming and contextually changing the volume of the insert according to the invention may be carried out directly on the sport or medical item.

[0079] On the contrary, in the case of a sport or medical item that does not comprise any substantially rigid outer element, it will be necessary to provide for a suitable rigid casing inside which the sport or medical item is temporarily inserted in order to be able to proceed to the step of thermoforming and contextually changing the volume of the insert according to the invention.

Claims

1. Insert (1) for the customization of a sport or medical item (100,200) of the kind comprising at least one element made of a substantially soft material which, in use, is oriented towards the user's body, wherein said insert (1) comprises at least a first layer of thermoformable material (3), **characterized in that** a variable volume element (5) is connected, either removably or non-removably, to said layer of thermoformable material (3).

2. Insert (1) according to claim 1, wherein said variable volume element (5) comprises a pair of opposite walls (5a,5b) that are joined together along their outer perimeter so as to define therebetween an airtight body (5c), into which a gas or a fluid can be injected.

3. Insert (1) according to claim 2, wherein said variable volume element (5) has one or more points (7) located inside the outer perimeter of said opposite walls (5a, 5b), at which point(s) said walls (5a, 5b) are brought into contact with each other.

4. Insert (1) according to claim 3, wherein said variable volume insert comprises a plurality of separate variable volume pockets, which are in communication with one another.

5. Insert (1) according to claim 3, wherein said variable volume insert comprises a plurality of separate variable volume pockets, which are independent from one another.

6. Insert (1) according to any of claims 1 to 5, wherein said insert comprises a second layer of thermoformable material (9), said variable volume element (5) being sandwiched, either removably or non-removably, between said first and said second layers of thermoformable material (3, 9).

7. Sport or medical item of the kind comprising at least an element made of a substantially soft material (100) which, in use, is oriented towards the user's body, **characterized in that** it comprises an insert (1) according to any of claims 1 to 6.

8. Sport or medical item according to claim 7, wherein said item further comprises a substantially rigid element (200) arranged externally to said element made of a substantially soft material (100) with respect to the user's body and wherein said substantially rigid element (200) forms a substantially rigid casing, said insert (1) being sandwiched between said element made of a substantially soft material (100) and said substantially rigid element (200).

9. Sport or medical item according to claim 7, wherein said element made of a substantially soft material can be temporarily and removably associated to a substantially rigid casing arranged externally to said element made of a substantially soft material (100) with respect to the user's body, said insert (1) being sandwiched between said element made of a substantially soft material (100) and said substantially rigid casing.

10. Sport or medical item according to claim 8 or 9, wherein said insert (1) is joined to said element of substantially soft material (100).

11. Sport or medical item according to claim 8, wherein said insert (1) is joined to said substantially rigid element (200).

12. Sport or medical item according to claim 8 or 9, wherein at least one of the components (3,5; 3,5,9) of said insert (1) is joined to said element of substantially soft material (100) and at least another one of the components of said insert is joined to said substantially rigid element (200).

13. Sport or medical item according to any of claims 7 to 12, wherein said item is a sport footwear, a protective article of clothing for sports practice or an orthopedic guard.

14. Method for the customization of a sport or medical item of the kind comprising at least one element made of a substantially soft material (100) which, in use, is oriented towards the user's body, **characterized in that** it comprises the steps of:

    - providing said sport or medical item, said sport or medical item further comprising a substantially rigid casing (200) adapted to receive said element made of a substantially soft material (100);
    - providing an insert (1), comprising at least one

layer of thermoformable material (3) and a variable volume element (5) which is connected, either removably or non-removably, to said at least one layer of thermoformable material (3);
- heating said at least one layer of thermoformable material (3) of said insert (1) so as to bring the temperature of said layer to a temperature higher than its thermoforming temperature;
- while said at least one layer of thermoformable material (3) is associated to said variable volume element (5) so as to form said insert (1), while said element of substantially soft material (100) of said item is fitted into a substantially rigid casing, while said insert (1) is sandwiched between said element of substantially soft material (100) and said substantially rigid casing, while said sport or medical item is worn by a user, varying the volume of said variable volume element (5) so as to apply to said at least one layer of thermoformable material (3) a pressure that is high enough to adapt said layer of thermoformable material (3) to the user's morphology;
- allowing said at least one layer of thermoformable material to cool down below its thermoforming temperature.

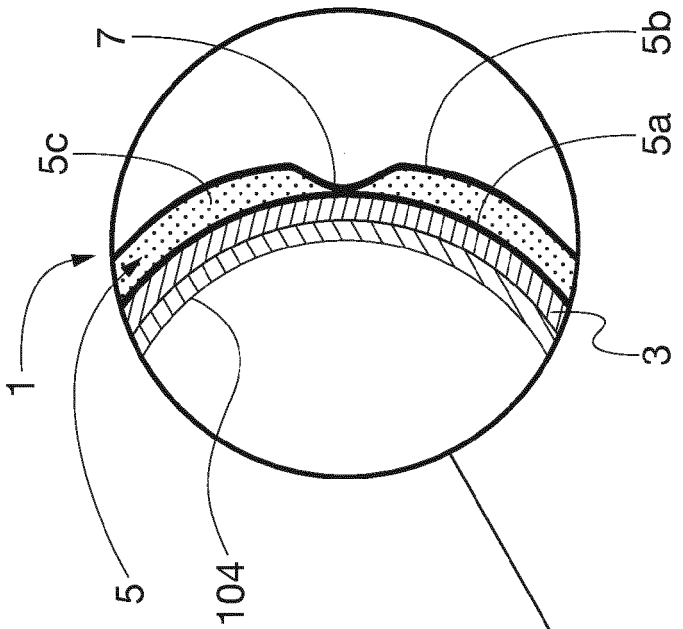


Fig. 1A

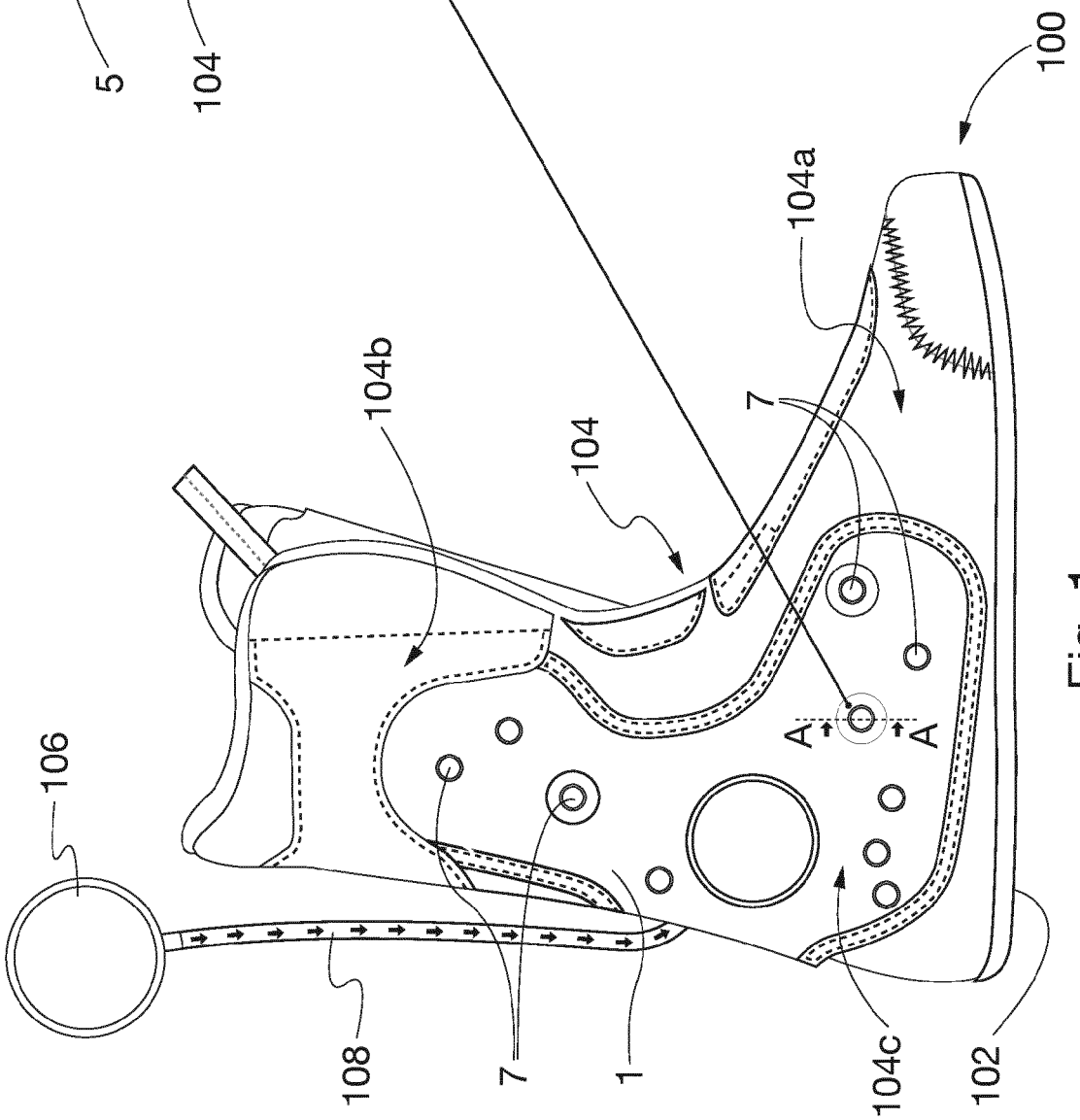


Fig. 1

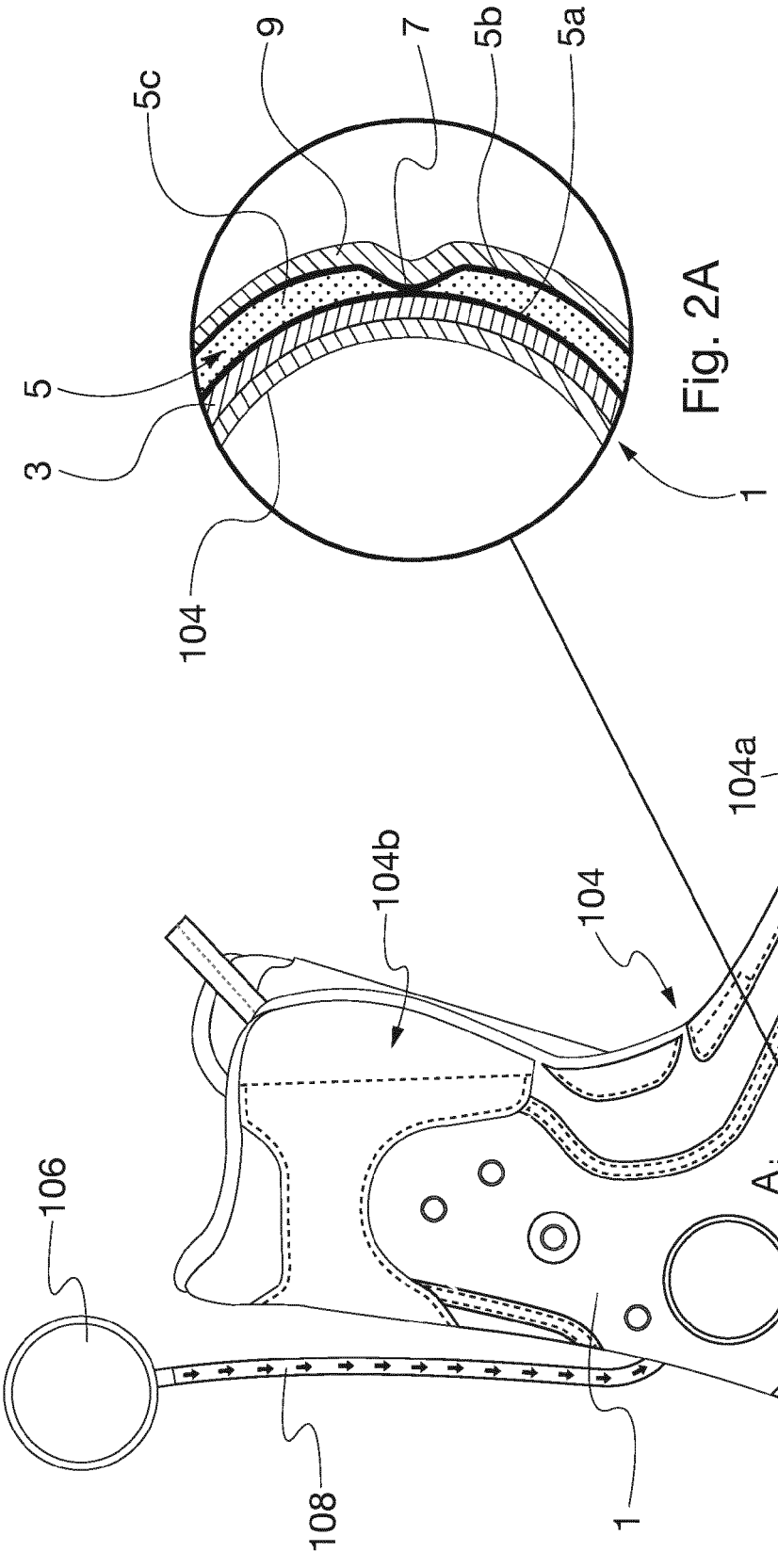
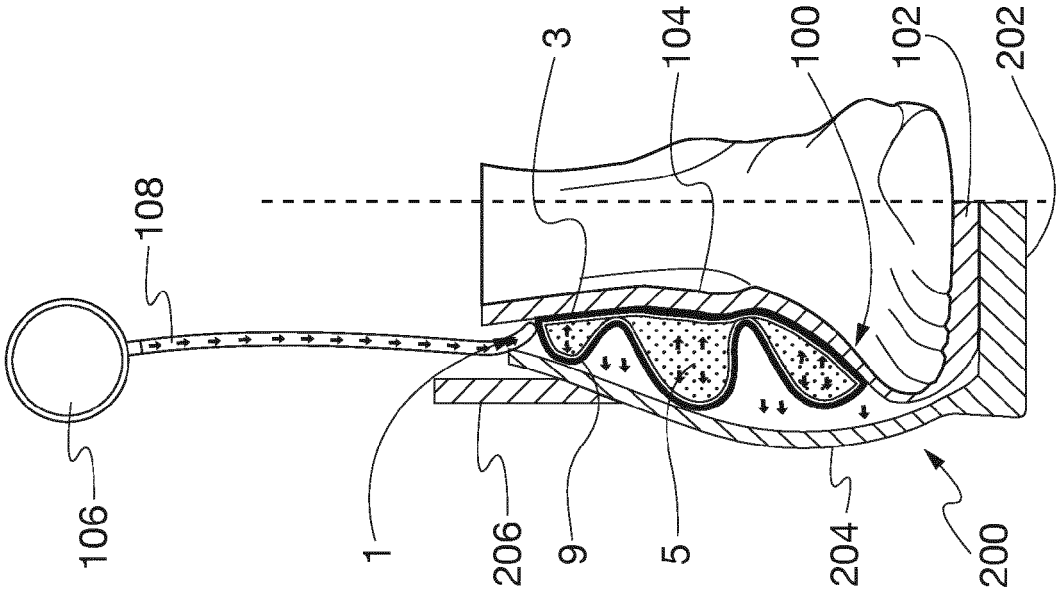


Fig. 2A

Fig. 2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104
100
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202
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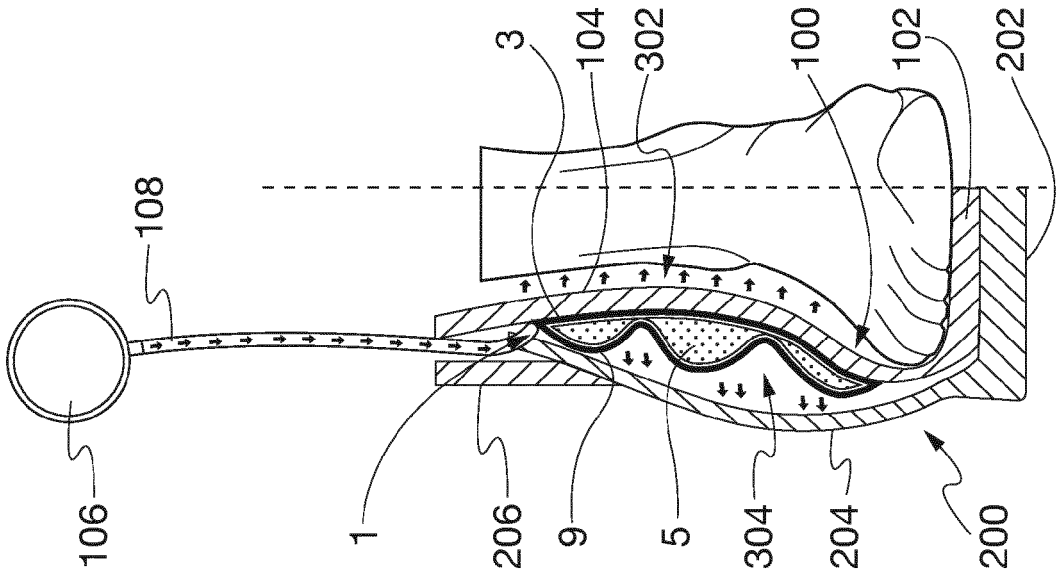
200

Fig. 3B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108
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304
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200

Fig. 3A

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 16 7673

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 983 733 A1 (PODO-CONCEPT) 8 March 2000 (2000-03-08) * paragraphs [0025] - [0043]; figures 1-5 * -----	1-14	INV. A43B5/04 A43B7/14 A43B7/28
X	US 2011/265347 A1 (LEARY ET AL.) 3 November 2011 (2011-11-03) * paragraphs [0033] - [0068]; figures 1-10 * -----	1-14	
X A	US 2003/056399 A1 (BAEK) 27 March 2003 (2003-03-27) * paragraphs [0010] - [0044]; claim 1; figures 1-3 * -----	1-13 14	
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X	US 2001/054240 A1 (BORDIN ET AL.) 27 December 2001 (2001-12-27) * paragraphs [0020] - [0043]; figures 1-4 * -----	1,6-14	

TECHNICAL FIELDS SEARCHED (IPC)

A43B
A42B
A42C
A61F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 August 2014	Williams, Mark

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