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(54) **VENTILATED ARTICLE OF FOOTWEAR**

BELÜFTETER SCHUHARTIKEL

ARTICLE CHAUSSANT VENTILÉ

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Description

[0001] This disclosure relates to an article of footwear. More particularly, the disclosure relates to arranging air circulation within an article of footwear.

[0002] An article of footwear can comprise e.g. a shoe, a sandal, a boot or the like. Main components of an article of footwear comprise an upper and a sole bound together during manufacture. An upper can be made from materials such as leather, fabrics and/or synthetic materials. A sole is typically made from more hardwearing materials, e.g. rubber and/or hardwearing synthetic material. Regardless of the materials used, an article of footwear forms a space for receiving the foot. Ventilation of the internal parts of the footwear has been conventionally improved by ventilation holes in the upper.

[0003] Circulating air within an article of footwear by means of pumping air into the article of footwear has been suggested. Arrangements for pumping air into a shoe are disclosed, e.g., in EP patent 2082660 B1 and US patent 8,375,601 B2. US application publication 2011/138654A1 discloses a sole unit having a midsole section and an outsole section. The midsole incorporates a number of cavities which open at their top ends and which are wider at their bottom ends. The outsole section incorporates a number of diaphragm elements which close off the bottoms of the cavities. In some arrangements there is a footbed which has in its underside a number of recesses disposed above each of the cavities, the recesses being linked by channels and incorporating orifices leading to the inside of an article of footwear. Vented shoes are also suggested in KR20100122774A and CN202145956U, both showing sole units that are inlasted during manufacture of the shoe. Finally, US6751890 B1 discloses a structure of a ventilated shoe bottom, which includes an outsole of a shoe and a cushion provided on top of the outsole to be engaged with the outsole.

[0004] However, more convenient, user friendly, efficient and/or alternative arrangements for circulating air in an article of footwear may be desired.

[0005] The invention is defined by an article of footwear according to independent claim 1 and a method according to independent claim 14. Additional embodiments are defined in the dependent claims.

[0006] According to an aspect, not forming part of the claimed invention, there is provided a structure for an article of footwear, the structure comprising: an outsole component and a removable component, wherein the outsole component comprises resiliently deflecting diaphragm elements at the bottom thereof for generation of pumping action for forcing air towards the removable component, and the removable component comprises cavities facing the resiliently deflecting diaphragm elements and arranged to receive air from the resiliently deflecting diaphragm elements; air circulation channels extending substantially laterally from the cavities between the removable component and the outsole component for distributing air forced into the cavities by the resiliently deflecting diaphragm elements to the interior of the article of footwear via perforations extending from the air circulation channels through the removable component; a holding recess arranged to receive and hold the removable component on top of the outsole component; and sealing areas adjacent to the cavities and air circulation channels, the sealing areas being arranged to prevent air from escaping the cavities and air circulation channels when the removable component is inserted in the holding recess.

[0007] According to another aspect, not forming part of the claimed invention, there is provided a removable component for an article of footwear, the removable component being arranged for insertion in and removal from a holding recess on top of an outsole component of the article of footwear, the removable component comprising: cavities facing resiliently deflecting diaphragm elements of the outsole component for receiving air pumped by the diaphragm elements towards the cavities and distribution of air flows from the cavities within the removable component; air circulation channels on the side of the removable component facing the outsole component and extending substantially laterally from the cavities for distributing air flows from the resiliently deflecting diaphragm elements within the article of footwear via perforations extending from the air circulation channels through the removable component; and sealing areas adjacent to the cavities and air circulation channels, the sealing areas being arranged to prevent air from escaping the cavities and air circulation channels when the removable component is inserted in the holding recess above the outsole component.

[0008] According to an aspect there is provided an article of footwear according to claim 1. A strobel sock may be provided between the removable component and the outsole, the strobel sock being attached to the upper and perforated at locations aligned with the resiliently deflecting diaphragm for airflow from the resiliently deflecting diaphragm elements to the air circulation channels of the removable component.

[0009] According to another aspect there is provided a method of arranging circulation of air within an article of footwear, according to claim 14.

[0010] At least a part of the sides of the holding recess may be provided by upper material of an article of footwear. The air circulation channels may be provided on the underside of the removable component and/or on top of an outsole component. The removable component may comprise perforations and/or side grooves extending from the air circulation channels to the upper side of the removable component.

[0011] The removable component may comprise at least one an expanded perforated area for enhanced air circulation. The at least one expanded perforated area may be provided on the underside of the removable component and comprise a pattern of perforations for connecting the air circulation channel with the upper side of

the removable component.

[0012] The removable component may comprise perforations and/or side grooves connected to the air circulation channels and/or the cavities for distributing air only within the mid and front sections of the article of footwear while the heel section of the article of footwear is free of such perforations.

[0013] At least one further component may be provided between the removable component and the outsole. The at least one further component can be arranged for airflow from the resiliently deflecting diaphragm elements to the removable component. The further component can comprises a strobel sock attached to upper material of the article of footwear and perforated at locations aligned with the resiliently deflecting diaphragm elements. The strobel sock may be cemented and/or stitched to the outsole component and/or upper material. A shank and/or a heel element arranged to allow airflow from the resiliently deflecting diaphragm elements to the removable component may also be provided. The shank and/or the heel element may comprise openings tapering from the resiliently deflecting diaphragm elements towards the cavities at the removable component. The at least one further component may also be configured to provide at least one air circulation channel.

[0014] The outsole may also be configured to provide at least a part of the air circulation channels.

[0015] The cavities may be arranged to enhance circulation of air within the air circulation channels. Flow of air into the air circulation channels can be enhanced by compressing the cavities.

[0016] A removable component may comprise an integrated midsole and footbed structure.

[0017] Properties of the article of footwear can be changed by replacing a removable component with a different removable component.

[0018] An article of footwear comprising an upper and a sole structure as described herein may also be provided.

[0019] Various exemplifying embodiments of the invention are described below with reference to the attached drawings. Steps and elements explained herein may be reordered, omitted, and combined to form different embodiments and any step indicated as performed may be caused to be performed in another order. In the drawings:

Figure 1 is a view of an example of an article of footwear;

Figure 2 is a bottom view of the article of footwear of Figure 1;

Figures 3-7 show certain examples according to the invention;

Figures 8 - 10 show further examples;

Figures 11 -13 show yet further examples; and

Figure 14 is a flowchart in accordance with certain embodiments.

[0020] In the following certain detailed examples embodying the invention will be described with reference to the drawings.

[0021] Figure 1 shows an example of an article of footwear 1 comprising a sole structure 2 and the upper 4. Typically a sole structure can conventionally comprise various components, such as an outsole, a midsole, a footbed, a shank and other intermediate components. An outsole is the lowermost part of a footwear which contacts the ground. Conventionally a midsole would be placed above the outsole and a footbed (also known as sock liner) would be be on top of the midsole. The sole structure 2 can be attached to the upper 1 by various techniques. According to a possibility side stitching denoted by reference 5 can be used to attach the upper to the sole structure. Techniques such as cementing, corner stitching and the like may also be used for this,

[0022] Some examples of possible components of a structure of the current invention for arranging air circulation in an article of footwear will be explained in more detail below.

Figure 1 shows resiliently deflecting diaphragm elements 6, or "pumping pods", at the bottom of the outsole 3. The resiliently deflecting diaphragm elements 6 are arranged for generation of pumping action so that air is forced towards the interior of the footwear 1.

[0023] Figure 2 shows a bottom view of the outsole 3 and the resiliently deflecting diaphragm elements 6 of the sole structure. In the example seven diaphragm elements are shown to be provided in the sole structure. It is noted however that the number, sizing and/or positioning of the resiliently deflecting diaphragm elements can be different from the examples shown in the Figures.

[0024] A removable component will be described next with a particular reference to the structures shown in Figures 3 to 7. Figure 3 shows a bottom view of the removable component 10. Figures 4 and 6 show sectioned side views of two different structures with removable components 10. Figure 5 shows a removable component from the top. Figure 7 is a cross-sectional view from the forepart of a removable component 10.

[0025] In accordance with an embodiment the removable component 10 can be formed such that it provides functionalities of a conventional midsole and footbed. The removable component can be provided such that there is no need for a separate midsole to be fixed on top of the outsole.

[0026] In accordance with the invention the removable component 10 is placed in a holding recess 7 of an outsole component 3. As shown e.g. in Figure 7, the removable component is dimensioned according to the dimensions of the recess 7 to provide an accurate fit.

[0027] According to another possibility at least a part of the sides of the holding recess is provided by the upper material. An example of this will be explained on more detail later.

[0028] The removable component is arranged for easy insertion in and removal thereof from the holding recess.

This can be advantageous e.g. to be able to remove the removable component for drying and/or cleaning purposes. Also, this enables use of different removable components. For example, different sets of removable components can be used in running shoes depending on the type of exercise.

[0029] The structure can be such that there are no conventional elements such as a midsole between the removable component and the outsole. Lack of separate components such as a midsole can allow for an easy and quick alteration, even a substantial alteration, of properties and characteristics of a footwear. Also, a substantial part of the internal components can be removed for drying and/or cleaning by simply removing the removable component. Once the removable component is removed, all that is left is an empty "shell" formed by the sole unit and the upper, and possible leaner elements such as a strobel sock and/or a shank.

[0030] Cavities 11 are provided to receive air from cooperative resiliently deflecting diaphragm elements 6 of the outsole component 3 for generation of air flow within the removable component 10. Air circulation channels 12 extend substantially laterally from the cavities 11 for distributing air forced into the cavities by the pumping action of the diaphragm elements 6. Areas 14 adjacent to the cavities and air circulation channels are provided to seal the sole structure such that when the removable component is placed in the holding recess 7, air forced into the cavities and therefrom to the channels 12 of the removable component does not escape laterally from the channels 12 and the cavities 11.

[0031] In the example of Figures 3 to 7 the air circulation channels 12 are provided on the underside of the removable component 10. The removable component comprises perforations 13 extending from the air circulation channels 12 to the upper side of the removable component. The perforations may be e.g. punched, drilled, moulded, laser cut to the removable component material.

[0032] According to a possibility upwards extending apertures, or grooves connected to the channels 12 and cavities 11 can be provided at the sides of the removable component. By means of this air circulation at the sides of the upper can be enhanced.

[0033] Sealing areas 14 are also shown. When the resiliently deflecting diaphragm elements 6 generate pumping action forcing air towards the cavities 11 and further to the channels 12 of the removable component 10 in the holding recess 7, the sealing areas 14 provide sealing between the removable component and the outsole preventing air from escaping laterally from air circulation or distribution channels 12. Thus the air is guided along the channels 12 and through the openings or perforations 13 extending upwards from the channels 12 towards the interior of the footwear.

[0034] The removable component does not need to be fixedly attached to the outsole to retain the air in the channels. Instead, when the footwear is in use and the removable component 10 is placed in the holding recess 7, the weight of the user causes the sealing surface areas 14 be pressed against the surface of the outsole, thus sealing the channels. Materials of the removable component and the outsole components can be selected to optimise the sealing effect.

[0035] According to an example, the material and/or structure of the removable component is such that the cavities 11 also enhance the pumping effect. The cavities 11 of the removable component can be arranged to be of soft material such that the cavities compress as the user steps on the removable component, thus enhancing the pumping action forcing air into the channels 12.

[0036] Figures 3 and 7 show also how at least one of the air circulation channels 12 can comprise an expanded area 16 for enhanced air circulation in given areas. Figure 5 shows a top view of the perforations 13 and the expanded area on the upper side of the removable component 10. The expanded areas 16 can be provided on the underside of the removable component 10. The expanded areas can comprise an appropriate pattern of perforations 13 for connecting the air circulation channels 12 with the upper side of the removable component. In each expanded area 16 the channel can expand laterally such that more perforations 13 towards the interior of the footwear can be provided per length of the channel. In the example of Figures 3 and 5 five expanded areas 16 with varying shapes and number of perforations 13 are provided. However, any other appropriate number, sizing and shaping of expanded areas is possible. The size, shape and overall configuration of the perforated areas can be optimised based on the shoe type, size and/or any specific design requirement there might be.

[0037] A removable component can comprise a section providing characteristics of a footbed or sock. A section providing characteristics of a footbed or sock can be integrated on top of a section providing characteristics that would have conventionally been provided by a midsole fixed to the outsole. An example of this is illustrated in Figure 6. A footbed or sock part 20 covering at least a part of the midsole part of the removable component 10 can be provided with openings substantially matching the air circulation channels and openings extending from the air circulation channels.

[0038] The openings 13 may be produced to the footbed or sock, e.g. by punching, laser, drilling, water jet, or otherwise. The openings can be produced at the same time with producing the openings of the midsole part.

[0039] Distribution of the perforations guiding the air into the interior of the footwear through the expanded areas is advantageous, e.g., because the air can flow with less resistance further from the cavities. The air flow and even distribution thereof can be further assisted by upwards extending side grooves arranged on at least one side edge of the removable component. Also, when a user walks or runs the foot presses against the sole structure underneath and at least some opening on the top of the sole structure will become closed by the foot.

The larger number of openings spread on wider area and side grooves can be used to ensure that at least some of the openings are open all the times.

[0040] According to a possibility also shown in Figures 3 and 5 perforations connected to air circulation channels are arranged for distributing air only within the mid and front sections of the article of footwear while the heel section is free of such perforations. This can be provided to increase the amount of air forced into the front portion of the interior by the pods distributed on the entire bottom area of the outsole. Also, this leaves the heel section visible from outside free of any holes. In addition for aesthetic reasons, this allows better use of the heel section for, e.g., branding.

[0041] The outsole component may be side and/or corner stitched to upper material of an article of footwear.

[0042] A sole structure may also comprise at least one further component between the removable component and the outsole component. The at least one further component can be arranged such that it does not hinder airflow from the diaphragm elements to the removable component.

[0043] Figures 8, 9, 10A and 10B show examples of such an arrangement. More particularly, a strobel construction where strobel material or sock 30 is provided between an outsole component 3 and a removable component 10 is shown. A strobel sock can be made of fabric or non-woven material used to finish the bottom of an upper. A special machine can be used to make a strobel stitch to attach the strobel material to the upper. In a strobel shoe the upper material 4 can be sewn to the bottom material creating a "strobel sock" construction. The material may have at least some flexibility. The upper and strobel material can be strobel stitched together. After the upper has been lasted, the upper and strobel material can be cemented to the outsole component 3. The strobel material such as the sock 30 can be perforated at locations 31 matching the diaphragm elements 6 and the cavities 11. In addition, or as an alternative, other types of stitching can also be used for the joining.

[0044] Figure 10A shows a cross-sectional view where a removable component 10 is in place in a receiving recess whereas in Figure 10B the removable component is removed from the outsole. Figure 10B further illustrates an embodiment where stitching 33 extends through strobel material 30 and the outsole component 3.

[0045] In Figures 10A and 10B the sides of the receiving recess 7 are provided by upper material 4. The sides are further supported by upwards protruding parts 8 of the outsole 3. Thus the removable component 10 rests on the strobel sock 30 on top of the outsole 3 and is held in place sideways by upper material 4.

[0046] Figure 10C is a cross-sectioned view of an example where the sides of the receiving recess 7 are provided solely by the upper material 4.

[0047] A structure for an article of footwear may also comprise other internal components, for example an internal shank and/or a heel element. Examples of possible internal components are shown in Figures 11, 12 and 13. More particularly, a structure may comprise a shank 50 and/or a heel element 40. A function of the element 40 is to fill the volume in the heel section. The internal component are configured so that they do not hinder airflow from the diaphragm elements 6 to the removable component 10.

[0048] A shank 50 can comprise openings 51 aligned with diaphragm elements 6 of an outsole component 3 underneath and cavities 11 of a removable component 10 above the shank to allow air to flow through the structure. As shown in Figure 12, the shank 50 can extend underneath the air distribution channels 12 / expanded areas 16.

[0049] A shank piece can be designed such that no part thereof extends on top of one or more diaphragm elements 6.

[0050] According to a possibility at least a part of the air distribution channels in the area of the shank is provided in the shank. The air channels can be provided in the top and/or bottom of the shank, as appropriate.

[0051] A part of the air distribution channels may also be provided on the outsole. For example, a removable component may not be thick enough at the front part thereof to accommodate air distribution channels. To address this the air distribution channels can be provided on the top surface of the holding recess of the outsole in such areas.

[0052] The heel element 40 can also be provided with appropriate openings 41 aligned with the diaphragm elements 6. The sectioned view of Figure 13 shows the opening 41 to be conically shaped. This may be advantageous in enhancing the air flow towards the cavity 11. At the bottom of the heel element 40 the opening 41 can have large enough diameter to be slightly larger than the diaphragm element 6. However, as the shank 50 may not be strong enough to accommodate this large openings, smoothly tapering shape can be provided through the heel element 40 and shank 50 towards the cavity 11.

[0053] Figures 12 and 13 also illustrate an example of side stitching 5 between the outsole component 3 and the upper 4.

[0054] Figure 14 is a flowchart for a method of circulating air in an article of footwear comprising an upper, an outsole and a removable component inserted into a holding recess. Air is forced at 100 towards cavities in the removable component by resiliently deflecting diaphragm elements at the bottom of the outsole. Air forced towards the removable component by the diaphragm elements is distributed at 102 within the removable component by air circulation channels extending substantially laterally from the cavities between the removable component and the holding recess.

[0055] Pressure is applied at 104 to sealing areas of the removable component to maintain engagement of the sealing areas with the surface of the holding recess to prevent escaping of air forced into the removable component from the air circulation channels.

[0056] The foregoing description provides by way of exemplary and nonlimiting examples a full and informative description of exemplary embodiments of the invention. However, various modifications and adaptations may become apparent to those skilled in the relevant arts in view of the foregoing description, when read in conjunction with the accompanying drawings and the appended claims.

Claims

1. An article of footwear (1), comprising:

an upper (4), an outsole component (3) and a removable component (10), wherein the outsole component comprises resiliently deflecting diaphragm elements (6) at the bottom thereof for generation of pumping action for forcing air towards the removable component, and the removable component comprises cavities (11) facing the resiliently deflecting diaphragm elements and arranged to receive air from the resiliently deflecting diaphragm elements,
air circulation channels (12) extending substantially laterally from the cavities between the removable component and the outsole component for distributing air forced into the cavities by the resiliently deflecting diaphragm elements to the interior of the article of footwear (1) via perforations (13) extending from the air circulation channels through the removable component,
a holding recess (7) of the outsole component (3) arranged to receive and hold the removable component in place on top of the outsole component by accurate fit between the sides of the removable component (10) and the holding recess (7), and
sealing areas (14) adjacent to the cavities and air circulation channels, the sealing areas being arranged to prevent air from escaping the cavities and air circulation channels when the removable component is inserted in the holding recess.

2. An article of footwear according to claim 1, wherein at least a part of the sides of the holding recess (7) comprise upper material (4) of the article of footwear (1).

3. An article of footwear according to claim 1 or 2, wherein the outsole component (3) is side stitched and/or corner stitched to upper material (4) of the article of footwear (1).

4. An article of footwear according to any preceding claim, wherein the removable component comprises side grooves extending from the air circulation channels to the upper side of the removable component.

5. An article of footwear according to any preceding claim wherein at least one of:

the removable component (10) comprises at least one expanded perforated area (16) for enhanced air circulation;
the at least one expanded perforated area (16) is provided on the underside of the removable component and comprises a pattern of perforations (16) for connecting the respective air circulation channel (12) with the upper side of the removable component (10); and
the removable component comprises perforations and/or side grooves connected to the air circulation channels for distributing air within the mid and front sections of the article of footwear while the heel section of the article of footwear is free of such perforations.

6. An article of footwear according to any preceding claim, comprising at least one further element between the removable component (10) and the outsole component (3), the at least one further element being arranged for airflow from the resiliently deflecting diaphragm elements (6) to air circulation channels (12) provided on the underside of the removable component, wherein

the at least one further element is configured to provide at least one air circulation channel, and/or
the at least one further element comprises a shank (50) and/or a heel element (40) arranged to allow airflow from the resiliently deflecting diaphragm elements (6) to the air circulation channels (12) of the removable component (10).

7. An article of footwear according to claim 6, wherein the shank (50) and/or the heel element (40) comprises openings (51) tapering from the resiliently deflecting diaphragm elements towards the cavities at the removable component.

8. An article of footwear according to any preceding claim, comprising a strobel sock (30) attached to upper material (4) of the article of footwear and perforated (31) at locations aligned with the resiliently deflecting diaphragm elements (6) for airflow from the resiliently deflecting diaphragm elements (6) to air circulation channels (12) provided on the underside of the removable component.

9. An article of footwear according to claim 8, wherein the strobel sock (30) is cemented and/or stitched to the outsole component (3) and/or to the upper material (4).

10. An article of footwear according to any preceding claim, wherein the outsole component (3) is configured to provide at least a part of the air circulation channels.

11. An article of footwear according to any preceding claim, wherein the cavities (11) are arranged to cause pumping action of air into the air circulation channels (12).

12. An article of footwear according to any preceding claim, wherein the removable component comprises an integrated midsole and footbed structure.

13. An article of footwear (1) according to any preceding claim, wherein the removable component is arranged for insertion in and removal from the holding recess (7) on top of the outsole component (3) of the article of footwear, the removable component comprising air circulation channels (12) on the side of the removable component facing the outsole component and extending substantially laterally from the cavities for distributing air flows from the resiliently deflecting diaphragm elements within the article of footwear via perforations (13) extending from the air circulation channels through the removable component.

14. A method of arranging circulation of air within an article of footwear (1), the article of footwear comprising an upper (4), an outsole (3) and a removable component (10), the method comprising:
inserting the removable component (10) into a holding recess (7) of the outsole (3):

holding the removable component in place on top of the outsole by accurate fit provided between the sides of the removable component (10) and the holding recess (7);
forcing air towards cavities (11) in the removable component facing the outsole by pumping action of resiliently deflecting diaphragm elements at the bottom of the outsole;
distributing air from the diaphragm elements by air circulation channels (11) extending substantially laterally from the cavities between the removable component and the outsole to perforations (13) of the removable component extending from the air circulation channels through the removable component; and
applying pressure to sealing areas (14) of the removable component to maintain engagement of sealing areas of the removable component with the surface of the holding recess (7) to prevent escaping of the air forced into the cavities of the removable component when held in place on top of the outsole.

15. A method according to claim 14, comprising at least one of:

distributing air only within the mid and front sections of the article of footwear through perforations and/or side grooves arranged in said mid and front sections;
enhancing flow of air into the air circulation channels by compressing the cavities; and
changing properties of the article of footwear by replacing the removable component with a different removable component.

Patentansprüche

1. Schuhwerk (1), aufweisend:

ein Obermaterial (4), eine Außensohlenkomponente (3) und eine abnehmbare Komponente (10), wobei das Außensohlenkomponente an ihrer Unterseite elastisch auslenkende Membranelemente (6) zur Erzeugung einer Pumpwirkung zum Drücken von Luft in Richtung der abnehmbaren Komponente aufweist, und
die abnehmbare Komponente Hohlräume (11) aufweist, die den elastisch auslenkenden Membranelementen zugewandt sind und angeordnet sind, um Luft von den elastisch auslenkenden Membranelementen aufzunehmen,
Luftzirkulationskanäle (12), die sich im Wesentlichen seitlich von den Hohlräumen zwischen der abnehmbaren Komponente und der Außensohlenkomponente erstrecken, um die durch die elastisch auslenkenden Membranelemente in die Hohlräume gedrückte Luft über Perforationen (13), die sich von den Luftzirkulationskanälen durch die abnehmbare Komponente erstrecken, in das Innere des Schuhwerks (1) zu verteilen,
eine Halteaussparung (7) der Außensohlenkomponente (3), die angeordnet ist, um die abnehmbare Komponente auf der Oberseite der Außensohlenkomponente durch genaue Passung zwischen den Seiten der abnehmbaren Komponente (10) und der Halteaussparung (7) aufzunehmen und zu halten, und
Dichtungsbereiche (14) angrenzend an die Hohlräume und Luftzirkulationskanäle, wobei die Dichtungsbereiche angeordnet sind, um zu verhindern, dass Luft aus den Hohlräumen und Luftzirkulationskanälen entweicht, wenn die abnehmbare Komponente in die Halteaussparung eingesetzt wird.

2. Schuhwerk nach Anspruch 1, wobei wenigstens ein Teil der Seiten der Halteaussparung (7) das Obermaterial (4) des Schuhwerks (1) aufweist.

3. Schuhwerk nach Anspruch 1 oder 2, wobei die Außensohlenkomponente (3) mit dem Obermaterial (4) des Schuhwerks (1) seitlich und/oder über Ecke vernäht ist.

4. Schuhwerk nach einem der vorhergehenden Ansprüche, wobei die abnehmbare Komponente seitliche Rillen aufweist, die sich von den Luftzirkulationskanälen zur Oberseite der abnehmbaren Komponente erstrecken.

5. Schuhwerk nach einem der vorhergehenden Ansprüche mit wenigstens einem von:

das abnehmbare Komponente (10) weist wenigstens einen erweiterten perforierten Bereich (16) für eine verbesserte Luftzirkulation auf;
der wenigstens eine erweiterte perforierte Bereich (16) ist an der Unterseite der abnehmbaren Komponente vorgesehen und weist ein Muster von Perforationen (16) zum Verbinden des jeweiligen Luftzirkulationskanals (12) mit der Oberseite der abnehmbaren Komponente (10) auf; und
die abnehmbare Komponente weist Perforationen und/oder seitliche Rillen auf, die mit den Luftzirkulationskanälen verbunden sind zum Verteilen von Luft innerhalb der mittleren und vorderen Abschnitte des Schuhwerks, während der Fersenabschnitt des Schuhwerks frei von solchen Perforationen ist.

6. Schuhwerk nach einem der vorhergehenden Ansprüche, aufweisend wenigstens ein weiteres Element zwischen der abnehmbaren Komponente (10) und der Außensohlenkomponente (3), wobei das wenigstens eine weitere Element für einen Luftstrom von den elastisch auslenkenden Membranelementen (6) zu Luftzirkulationskanälen (12) angeordnet ist, die an der Unterseite der abnehmbaren Komponente vorgesehen sind, wobei

das wenigstens eine weitere Element ausgestaltet ist, um wenigstens einen Luftzirkulationskanal bereitzustellen, und/oder
das wenigstens eine weitere Element einen Schaft (50) und/oder ein Fersenelement (40) aufweist, die angeordnet sind, um einen Luftstrom von den elastisch auslenkenden Membranelementen (6) zu den Luftzirkulationskanälen (12) der abnehmbaren Komponente (10) zu ermöglichen.

7. Schuhwerk nach Anspruch 6, wobei der Schaft (50) und/oder das Fersenelement (40) Öffnungen (51) aufweist, die sich von den elastisch auslenkenden Membranelementen zu den Hohlräumen an der abnehmbaren Komponente hin verjüngen.

8. Schuhwerk nach einem der vorhergehenden Ansprüche, aufweisend eine Strobelsocke (30), die am Obermaterial (4) des Schuhwerks angebracht ist und an Stellen perforiert (31) ist, die mit den elastisch auslenkenden Membranelementen (6) für einen Luftstrom von den elastisch auslenkenden Membranelementen (6) zu Luftzirkulationskanälen (12), die an der Unterseite der abnehmbaren Komponente vorgesehen sind, ausgerichtet sind.

9. Schuhwerk nach Anspruch 8, wobei die Strobelsocke (30) mit der Außensohlenkomponente (3) und/oder mit dem Obermaterial (4) verklebt und/oder vernäht ist.

10. Schuhwerk nach einem der vorhergehenden Ansprüche, wobei die Außensohlenkomponente (3) ausgestaltet ist, um zumindest einen Teil der Luftzirkulationskanäle bereitzustellen.

11. Schuhwerk nach einem der vorhergehenden Ansprüche, wobei die Hohlräume (11) angeordnet sind, um eine Pumpwirkung von Luft in die Luftzirkulationskanäle (12) zu bewirken.

12. Schuhwerk nach einem der vorhergehenden Ansprüche, wobei die abnehmbare Komponente eine integrierte Zwischensohlen- und Fußbettstruktur aufweist.

13. Schuhwerk (1) nach einem der vorhergehenden Ansprüche, wobei die abnehmbare Komponente zum Einsetzen in und Entfernen aus der Halteaussparung (7) auf der Oberseite der Außensohlenkomponente (3) des Schuhwerks angeordnet ist, wobei die abnehmbare Komponente Luftzirkulationskanäle (12) auf der Seite der abnehmbaren Komponente aufweist, die der Außensohlenkomponente zugewandt ist und sich im Wesentlichen seitlich von den Hohlräumen erstreckt, um Luftströme von den elastisch auslenkenden Membranelementen innerhalb des Schuhwerks über Perforationen (13) zu verteilen, die sich von den Luftzirkulationskanälen durch die abnehmbare Komponente erstrecken.

14. Verfahren zum Anordnen der Luftzirkulation innerhalb eines Schuhwerks (1), wobei das Schuhwerk ein Obermaterial (4), eine Außensohle (3) und eine abnehmbare Komponente (10) aufweist, wobei das Verfahren aufweist:

Einsetzen der abnehmbaren Komponente (10) in eine Halteaussparung (7) der Außensohle (3);
Halten der abnehmbaren Komponente an der Oberseite der Außensohle durch genaue Passung, die zwischen den Seiten der abnehmbaren Komponente (10) und der Halteaussparung (7) vorgesehen ist;

Drücken von Luft in Richtung der Hohlräume (11) in der abnehmbaren Komponente, die der Außensohle zugewandt ist, durch Pumpwirkung von elastisch auslenkenden Membranelementen an der Unterseite der Außensohle;
Verteilen von Luft aus den Membranelementen durch Luftzirkulationskanäle (11), die sich im Wesentlichen seitlich von den Hohlräumen zwischen der abnehmbaren Komponente und der Außensohle zu Perforationen (13) der abnehmbaren Komponente erstrecken, die sich von den Luftzirkulationskanälen durch die abnehmbare Komponente erstrecken; und
Ausüben von Druck auf Dichtungsbereiche (14) der abnehmbaren Komponente, um den Eingriff von Dichtungsbereichen der abnehmbaren Komponente mit der Oberfläche der Halteaussparung (7) aufrechtzuerhalten, um ein Entweichen der in die Hohlräume der abnehmbaren Komponente gedrückten Luft zu verhindern, wenn sie an ihrem Platz an der Oberseite der Außensohle gehalten wird.

15. Verfahren nach Anspruch 14, aufweisend wenigstens eines von:

Verteilen von Luft nur innerhalb der mittleren und vorderen Abschnitte des Schuhwerks durch Perforationen und/oder seitliche Rillen, die in den mittleren und vorderen Abschnitten angeordnet sind;
Erhöhen des Luftstroms in die Luftzirkulationskanäle durch Komprimieren der Hohlräume; und Ändern der Eigenschaften des Schuhwerks durch Ersetzen der abnehmbaren Komponente durch eine andere abnehmbare Komponente.

Revendications

1. Article chaussant (1), comprenant :

une tige (4), un composant de semelle extérieure (3) et un composant amovible (10), dans lequel le composant de semelle extérieure comprend des éléments de diaphragme à déviation élastique (6) sur le bas de celui-ci pour générer une action de pompage destinée à forcer de l'air vers le composant amovible, et dans lequel le composant amovible comprend des cavités (11) faisant face aux éléments de diaphragme à déviation élastique et agencées pour recevoir de l'air issu des éléments de diaphragme à déviation élastique ;
des canaux de circulation d'air (12) qui s'étendent sensiblement latéralement depuis des cavités entre le composant amovible et le composant de semelle extérieure afin de distribuer l'air forcé dans les cavités par les éléments de diaphragme à déviation élastique vers l'intérieur de l'article chaussant (1) via des perforations (13) qui s'étendent depuis les canaux de circulation d'air à travers le composant amovible ;
un évidement de maintien (7) du composant de semelle extérieure (3) qui est agencé pour recevoir et maintenir le composant amovible en place sur le dessus du composant de semelle extérieure par un ajustement précis entre les côtés du composant amovible (10) et l'évidement de maintien (7) ; et
des zones d'étanchéité (14) adjacentes aux cavités et aux canaux de circulation d'air, les zones d'étanchéité étant agencées pour empêcher l'air de s'échapper des cavités et des canaux de circulation d'air lorsque le composant amovible est inséré dans l'évidement de maintien.

2. Article chaussant selon la revendication 1, dans lequel au moins une partie des côtés de l'évidement de maintien (7) comprend un matériau de tige (4) de l'article chaussant (1).

3. Article chaussant selon la revendication 1 ou 2, dans lequel le composant de semelle extérieure (3) est cousu au matériau de tige (4) de l'article chaussant (1) sur le côté et/ou en coin.

4. Article chaussant selon l'une quelconque des revendications précédentes, dans lequel le composant amovible comprend des rainures latérales qui s'étendent depuis les canaux de circulation d'air jusqu'au côté supérieur du composant amovible.

5. Article chaussant selon l'une quelconque des revendications précédentes, dans lequel :

le composant amovible (10) comprend au moins une zone perforée élargie (16) destinée à une circulation d'air améliorée ; et/ou
ladite au moins une zone perforée élargie (16) est prévue sur le côté inférieur du composant amovible et comprend un motif de perforations (16) destiné à relier le canal de circulation d'air respectif (12) au côté supérieur du composant amovible (10) ; et/ou
le composant amovible comprend des perforations et/ou des rainures latérales reliées aux canaux de circulation d'air afin de distribuer l'air dans les sections centrale et avant de l'article chaussant tandis que la section talon de l'article chaussant est exempte de telles perforations.

6. Article chaussant selon l'une quelconque des revendications précédentes, comprenant au moins un autre élément entre le composant amovible (10) et le composant de semelle extérieure (3), ledit au

moins un autre élément étant agencé pour permettre un écoulement d'air depuis les éléments de diaphragme à déviation élastique (6) jusqu'à des canaux de circulation d'air (12) prévus sur le côté inférieur du composant amovible,
dans lequel :

ledit au moins un autre élément est configuré pour fournir au moins un canal de circulation d'air ; et/ou
ledit au moins un autre élément comprend un cambrion (50) et/ou un élément de talon (40) agencés pour permettre l'écoulement d'air depuis les éléments de diaphragme à déviation élastique (6) jusqu'aux canaux de circulation d'air (12) du composant amovible (10).

7. Article chaussant selon la revendication 6, dans lequel le cambrion (50) et/ou l'élément de talon (40) comprennent des ouvertures (51) qui s'effilent depuis les éléments de diaphragme à déviation élastique jusqu'aux cavités au niveau du composant amovible.

8. Article chaussant selon l'une quelconque des revendications précédentes, comprenant une semelle Strobel (30) fixée au matériau de tige (4) de l'article chaussant et perforée (31) à des emplacements alignés sur les éléments de diaphragme à déviation élastique (6) pour permettre l'écoulement d'air depuis les éléments de diaphragme à déviation élastique (6) jusqu'aux canaux de circulation d'air (12) prévus sur le côté inférieur du composant amovible.

9. Article chaussant selon la revendication 8, dans lequel la semelle Strobel (30) est collée et/ou cousue au composant de semelle extérieure (3) et/ou au matériau de tige (4).

10. Article chaussant selon l'une quelconque des revendications précédentes, dans lequel le composant de semelle extérieure (3) est configuré pour fournir au moins une partie des canaux de circulation d'air.

11. Article chaussant selon l'une quelconque des revendications précédentes, dans lequel les cavités (11) sont agencées pour provoquer une action de pompage d'air dans les canaux de circulation d'air (12).

12. Article chaussant selon l'une quelconque des revendications précédentes, dans lequel le composant amovible comprend une structure intégrée de semelle intercalaire et d'assise plantaire.

13. Article chaussant (1) selon l'une quelconque des revendications précédentes, dans lequel le composant amovible est agencé pour être inséré dans, et retiré de, l'évidement de maintien (7) sur le dessus du composant de semelle extérieure (3) de l'article chaussant, le composant amovible comprenant des canaux de circulation d'air (12) sur le côté du composant amovible faisant face au composant de semelle extérieure et s'étendant sensiblement latéralement depuis les cavités pour distribuer des flux d'air issus des éléments de diaphragme de déviation élastique à l'intérieur de l'article chaussant via des perforations (13) qui s'étendent depuis les canaux de circulation d'air à travers le composant amovible.

14. Procédé d'agencement de circulation d'air à l'intérieur d'un article chaussant (1), l'article chaussant comprenant une tige (4), une semelle extérieure (3) et un composant amovible (10), le procédé consistant à :

insérer le composant amovible (10) dans un évidement de maintien (7) de la semelle extérieure (3) ;
maintenir le composant amovible en place sur le dessus de la semelle extérieure par un ajustement précis prévu entre les côtés du composant amovible (10) et l'évidement de maintien (7);
forcer l'air vers des cavités (11) dans le composant amovible faisant face à la semelle extérieure par une action de pompage réalisée par des éléments de diaphragme de déviation élastique sur le bas de la semelle extérieure ;
distribuer l'air depuis les éléments de diaphragmes par des canaux de circulation d'air (11) qui s'étendent sensiblement latéralement depuis les cavités entre le composant amovible et la semelle extérieure jusqu'à des perforations (13) du composant amovible qui s'étendent depuis les canaux de circulation d'air à travers le composant amovible ; et
appliquer une pression sur des zones d'étanchéité (14) du composant amovible pour maintenir un engagement des zones d'étanchéité du composant amovible avec la surface de l'évidemment de maintien (7) pour empêcher l'échappement de l'air forcé dans les cavités du composant amovible lorsqu'il est maintenu en place sur le dessus de la semelle extérieure.

15. Procédé selon la revendication 14, consistant au moins en l'une des étapes suivantes :

distribuer l'air uniquement dans les sections centrale et avant de l'article chaussant à travers des perforations et/ou des rainures latérales agencées dans lesdites sections centrale et avant ;
améliorer l'écoulement d'air dans les canaux de circulation d'air en comprimant les cavités ; et
modifier des propriétés de l'article chaussant en

remplaçant le composant amovible par un composant amovible différent.

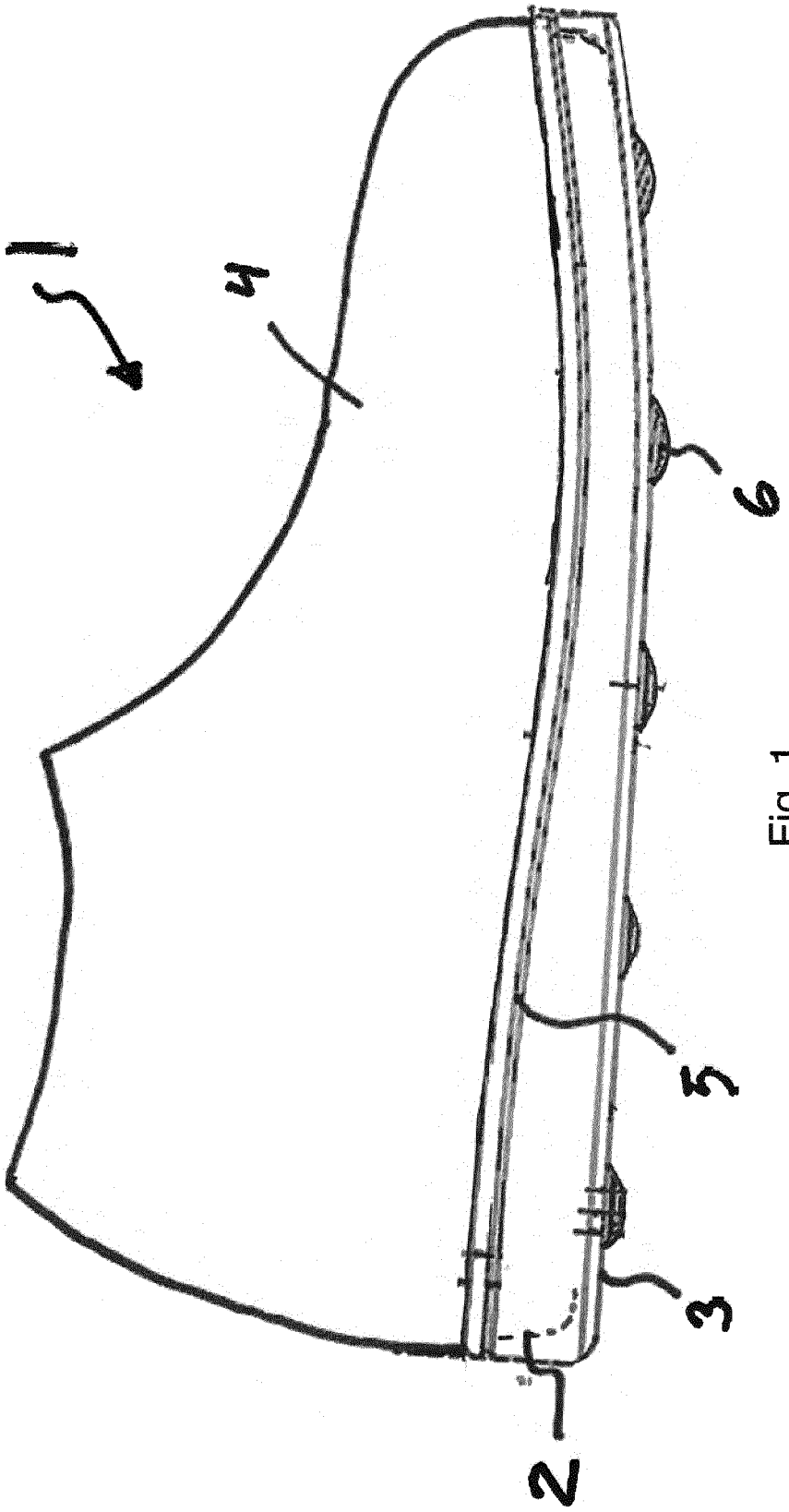

Fig. 1

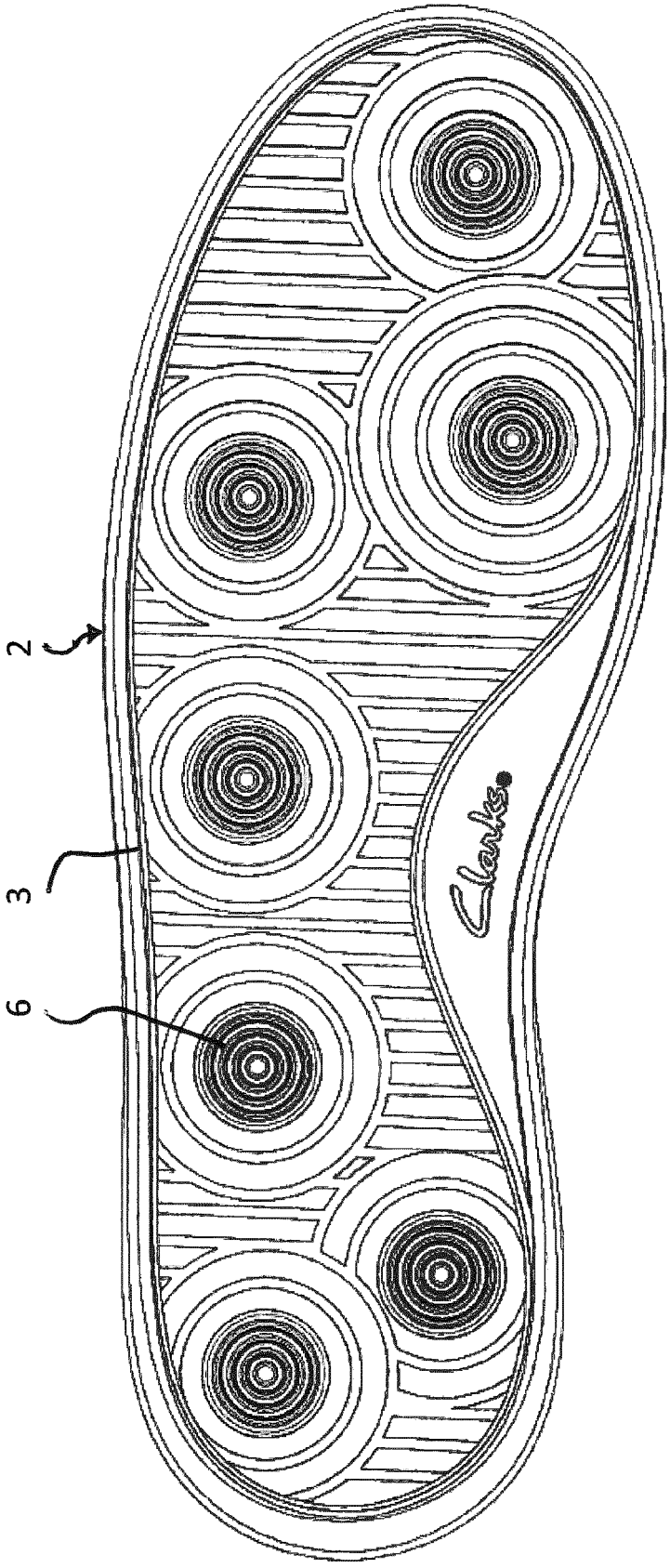

Fig. 2

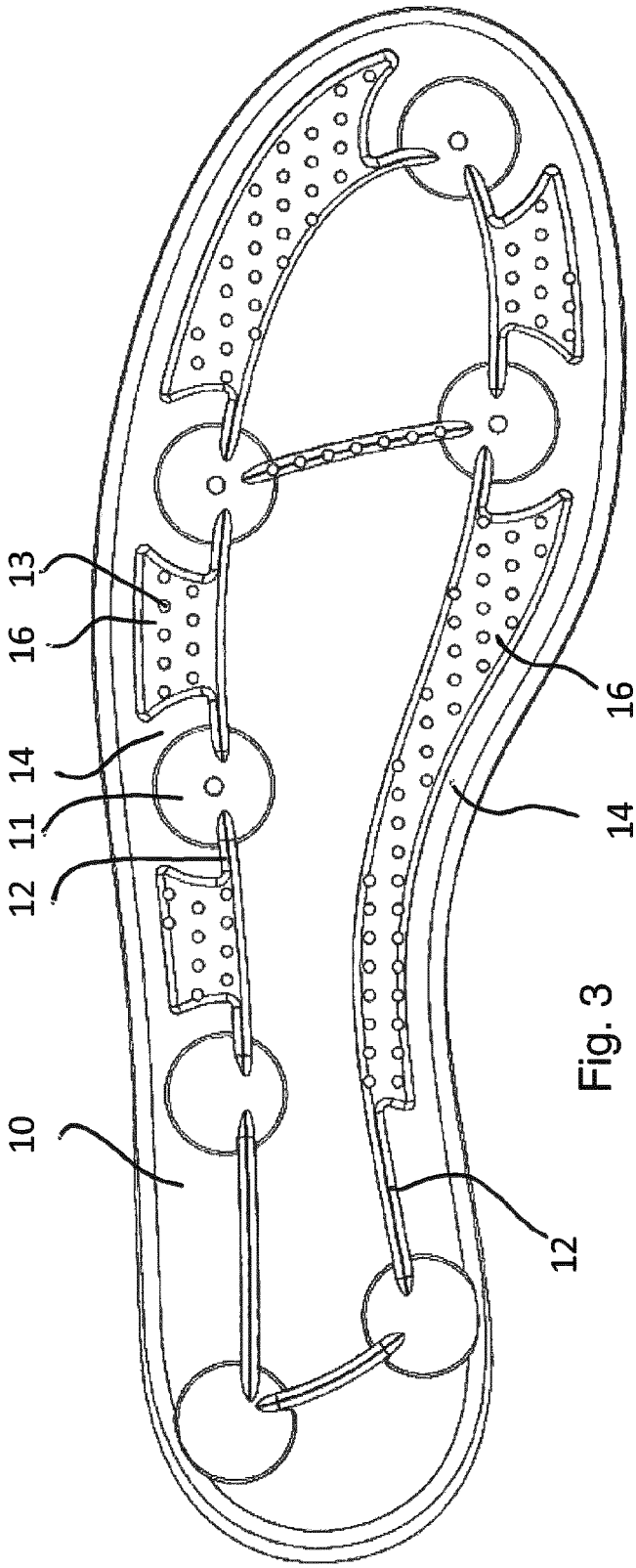

Fig. 3

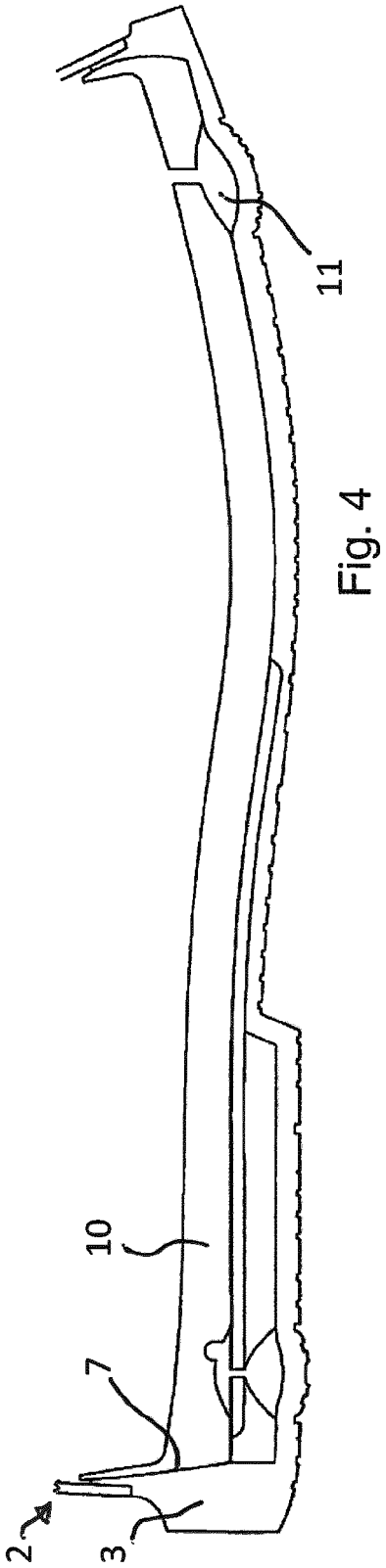

Fig. 4

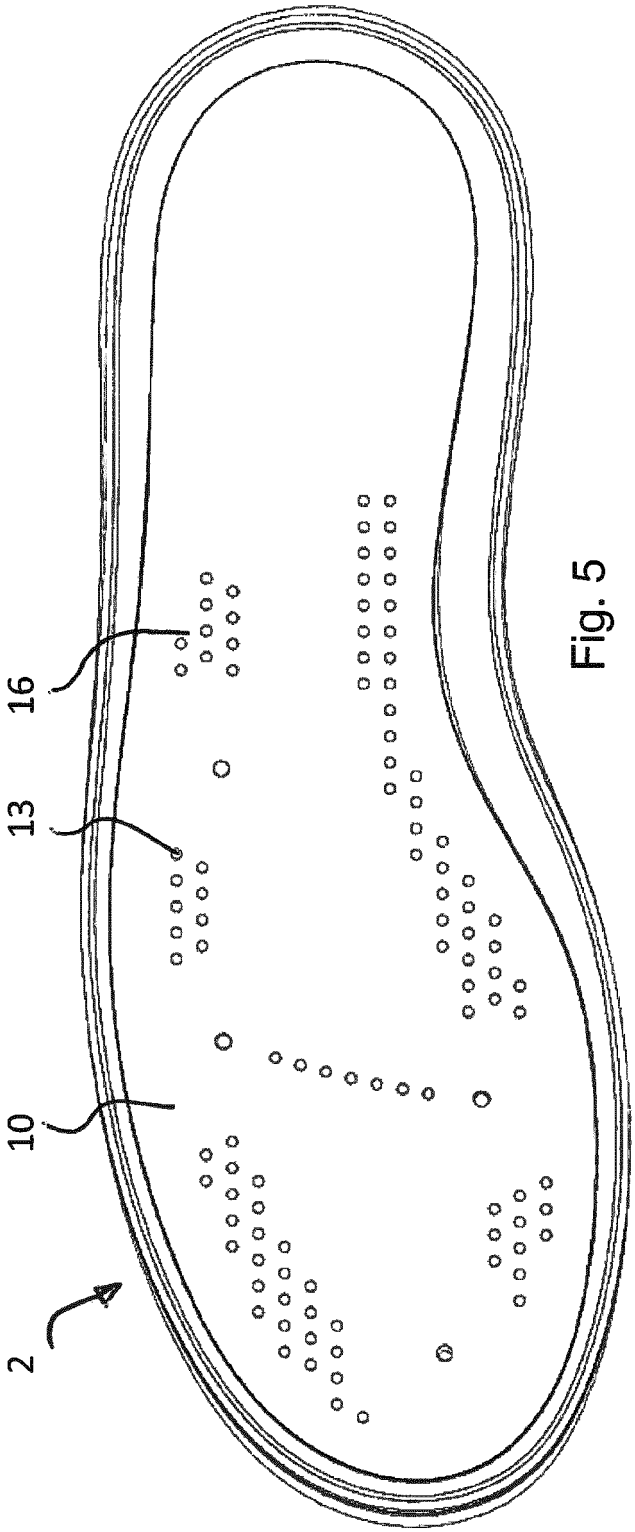

Fig. 5

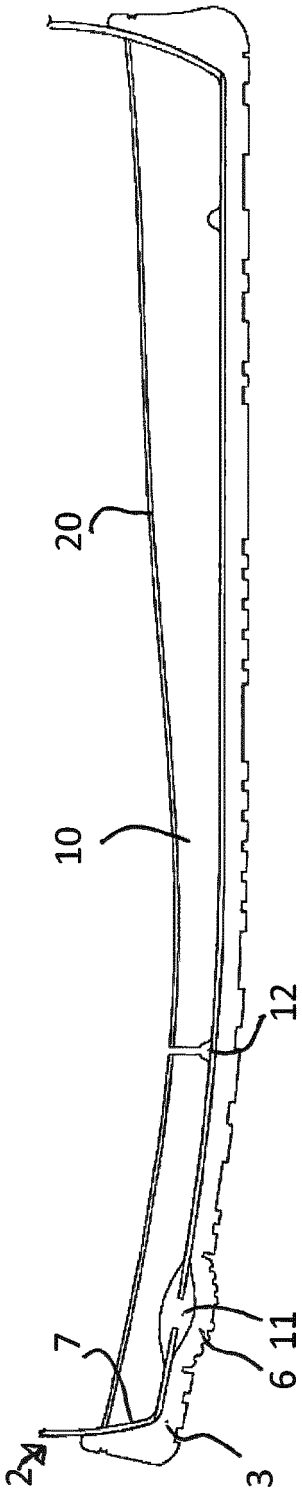

Fig. 6

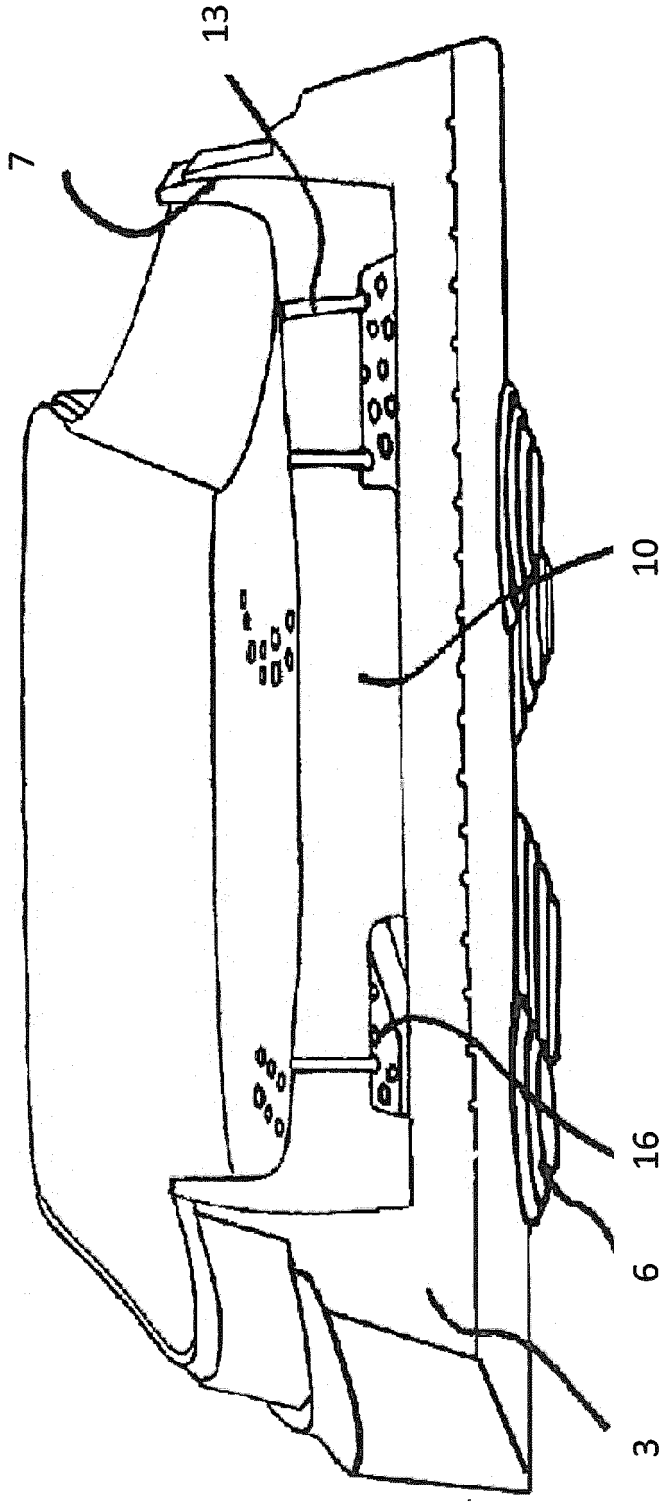

Fig. 7

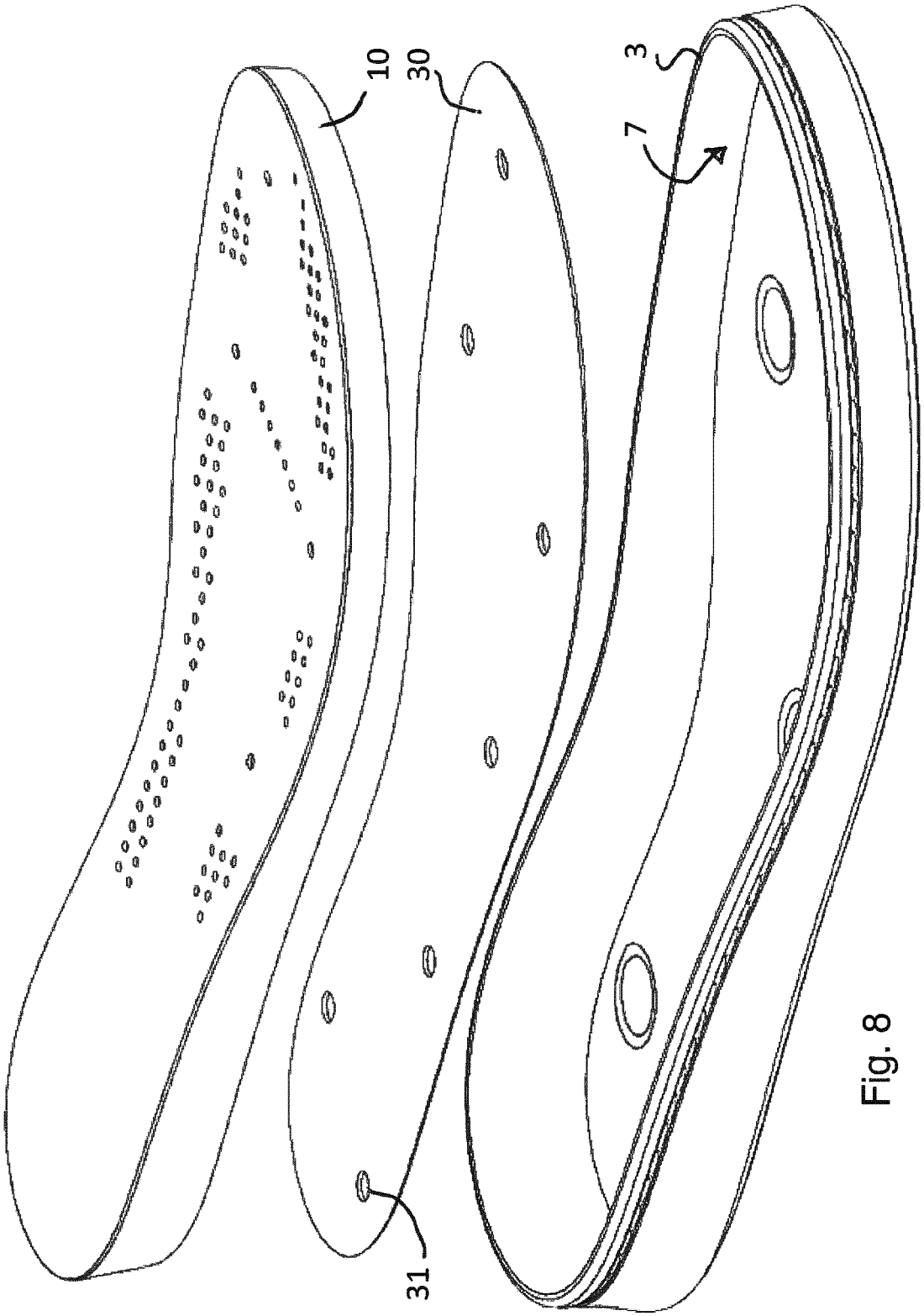

Fig. 8

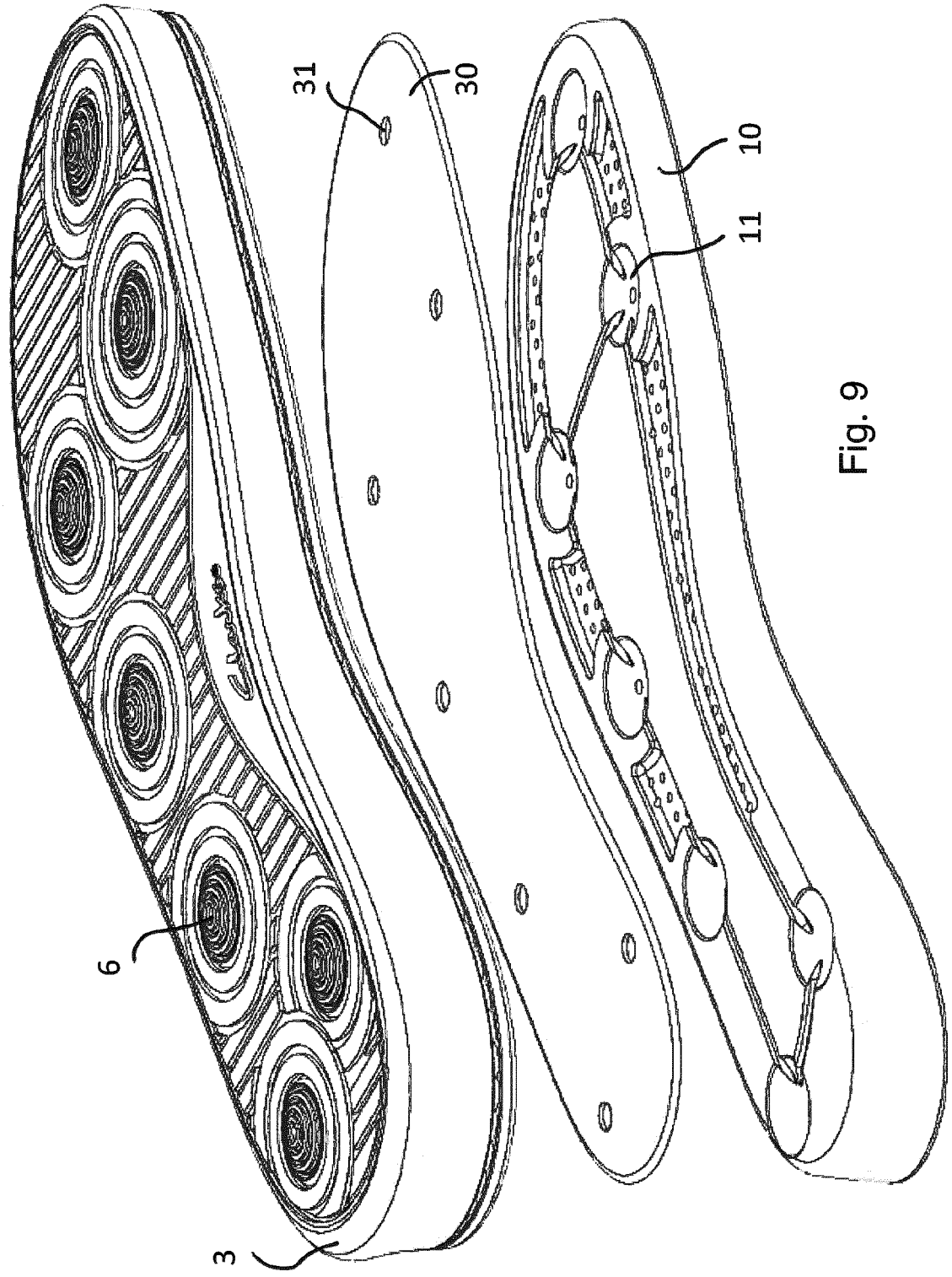

Fig. 9

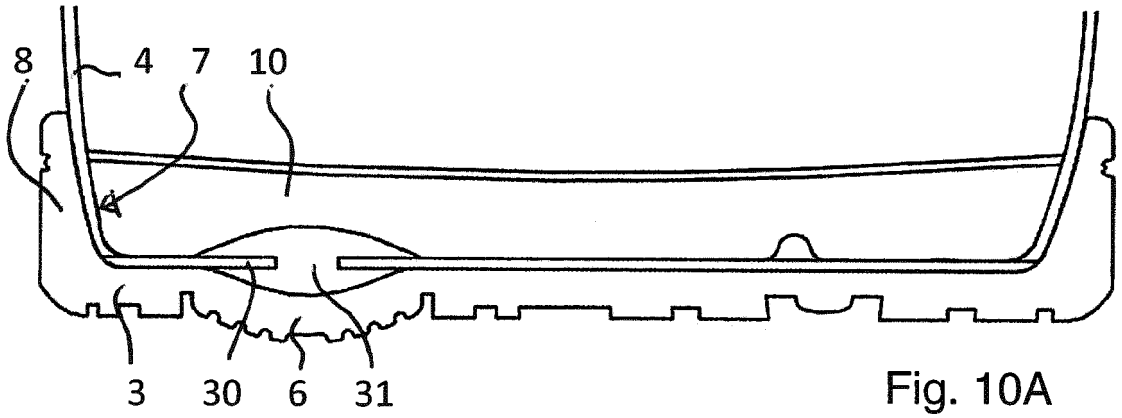

Fig. 10A

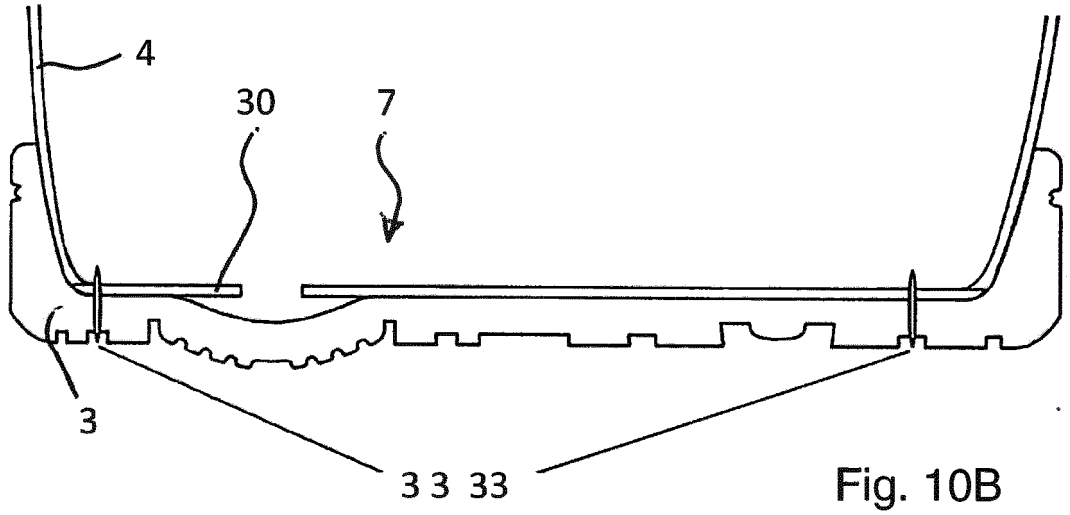

Fig. 10B

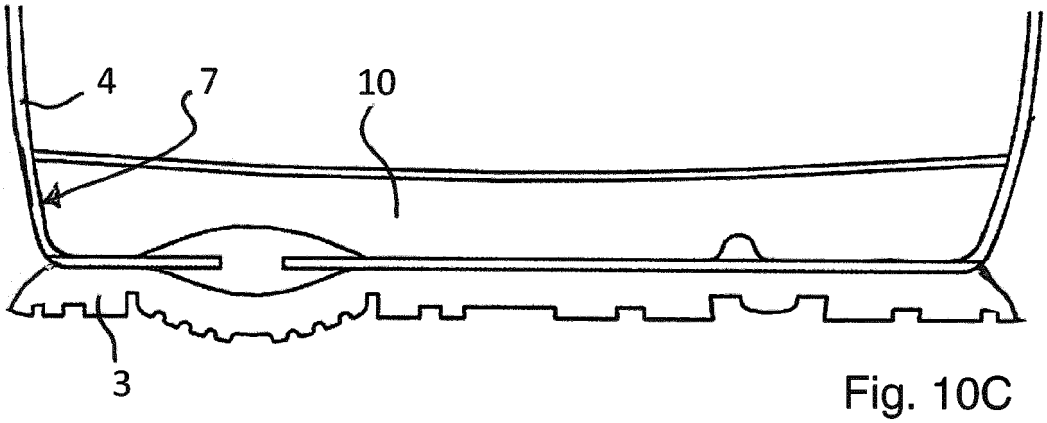

Fig. 10C

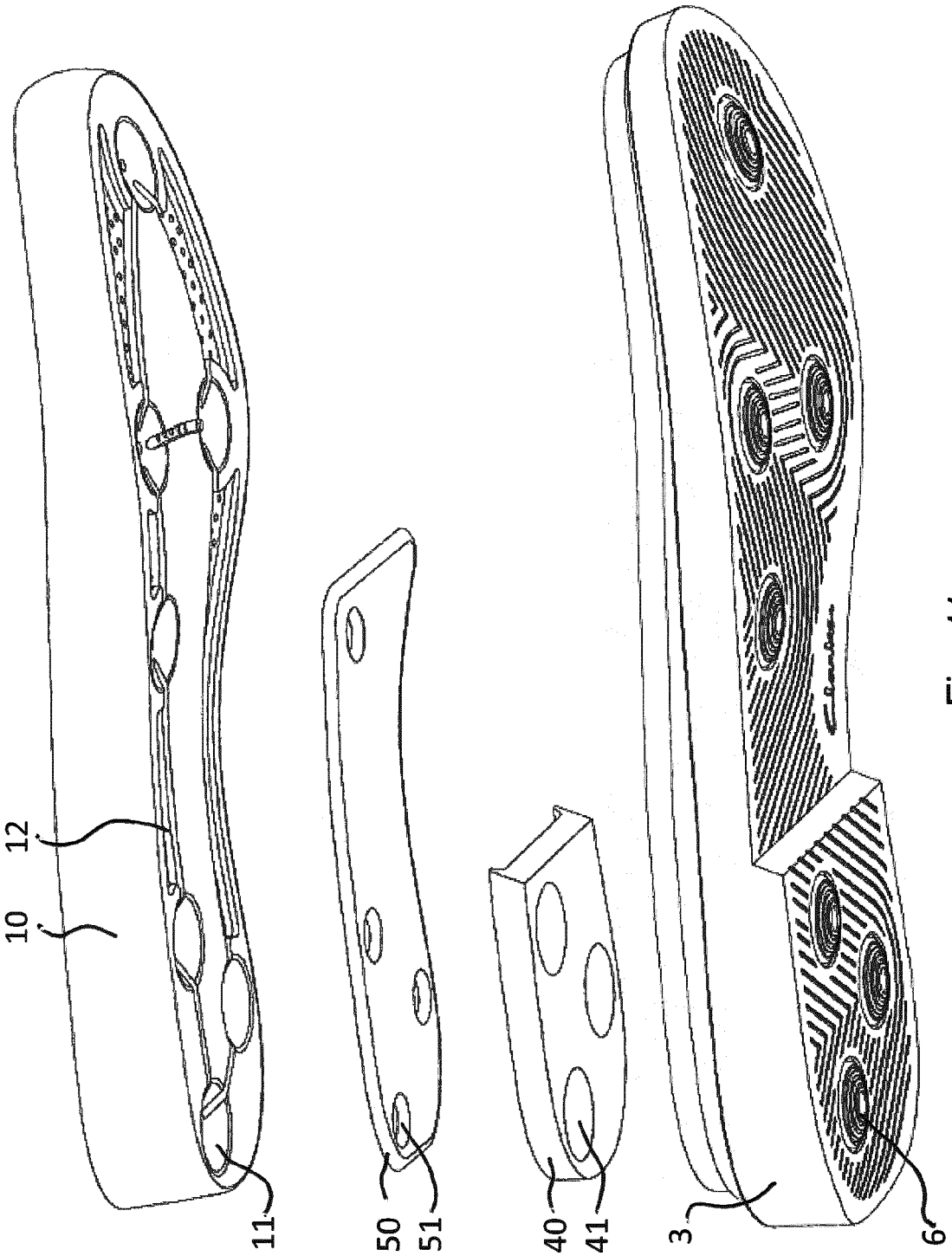

Fig. 11

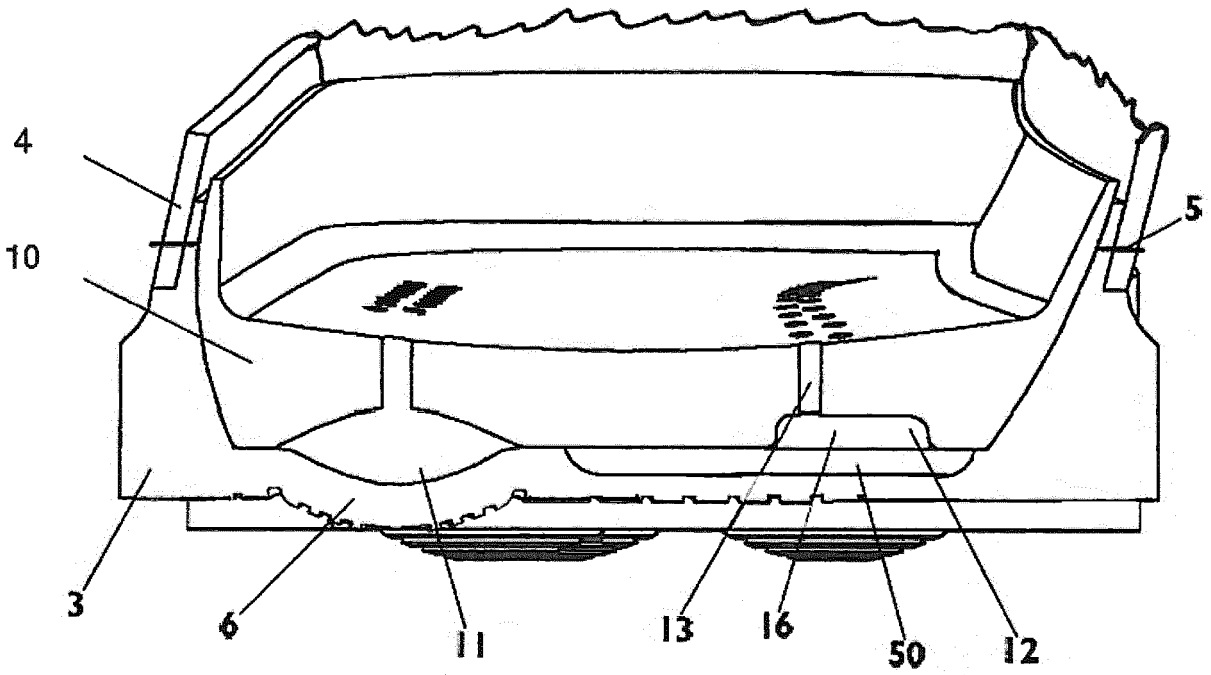

Fig. 12

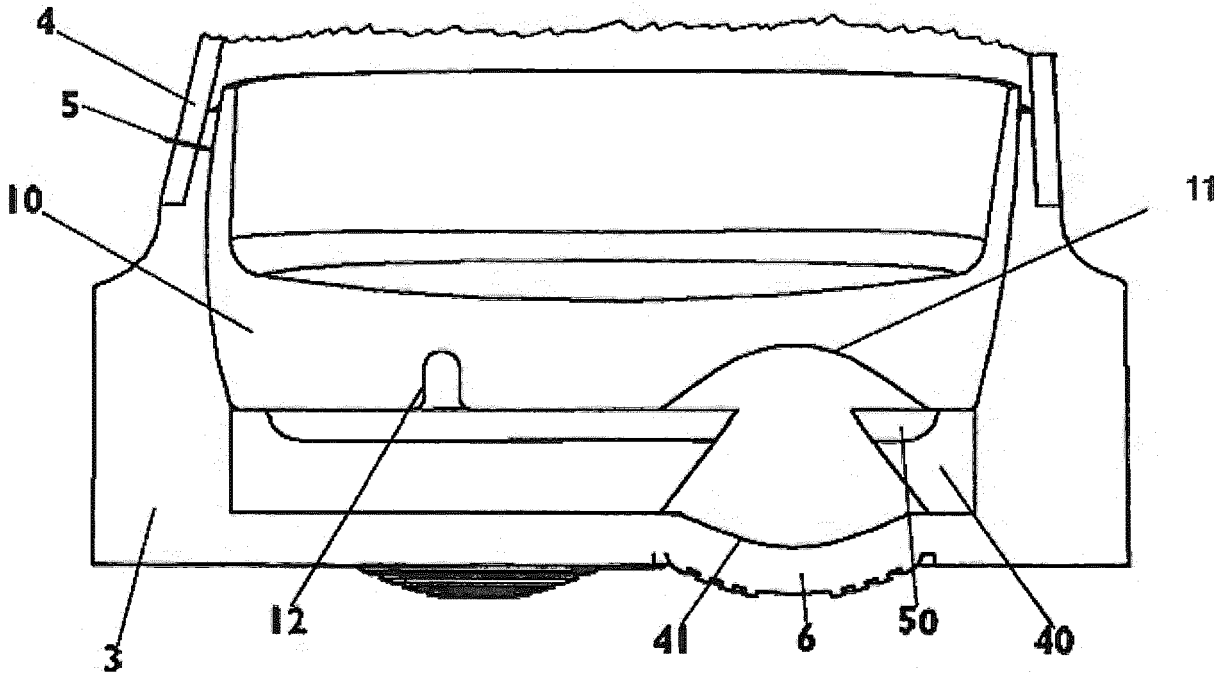

Fig. 13

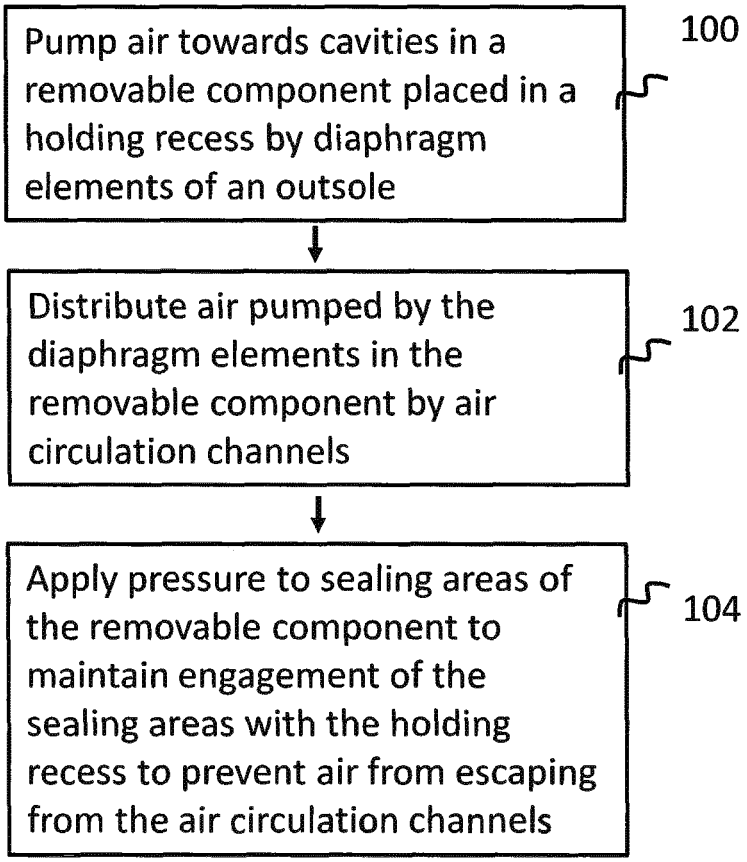
Pump air towards cavities in a removable component placed in a holding recess by diaphragm elements of an outsole
100
Distribute air pumped by the diaphragm elements in the removable component by air circulation channels
102
Apply pressure to sealing areas of the removable component to maintain engagement of the sealing areas with the holding recess to prevent air from escaping from the air circulation channels
104

Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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