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

(11) **EP 3 064 080 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.09.2016 Bulletin 2016/36

(51) Int Cl.:
A43B 5/04 *(2006.01)* ***A43B 13/14*** *(2006.01)*

(21) Application number: **16155852.3**

(22) Date of filing: **16.02.2016**

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

(30) Priority: **06.03.2015 IT UB20150397**

(71) Applicant: **Tecnica Group S.p.A.**
31040 Giavera del Montello (TV) (IT)

(72) Inventors:
- **GRANDIN, Giorgio**
  31040 Giavera del Montello (TV) (IT)
- **MACCARI, Dino**
  31040 Giavera del Montello (TV) (IT)

(74) Representative: **Robba, Pierpaolo**
Interpatent S.R.L.
Via Caboto, 35
10129 Torino (IT)

(54) FOOTWEAR SOLE, MORE PARTICULARLY SPORTS FOOTWEAR SOLE, AND FOOTWEAR PROVIDED WITH SUCH A SOLE

(57) The present invention relates to a footwear sole (1), more particularly to a sports footwear sole, the extension of which in the transverse direction can be adjusted. The sole (1) according to the invention comprises a deformable portion (3) made of the same material as the rest of the sole and is made with no discontinuity with the rest of the sole. Said deformable portion extends in the longitudinal direction of the sole (1) over the whole length of said sole or at least over a substantial portion thereof. Owing to this solution, the sole (1) does not have any discontinuity areas and the non-uniformities in the structural features of said sole, for instance in terms of flexional and torsional rigidity, are remarkably limited.

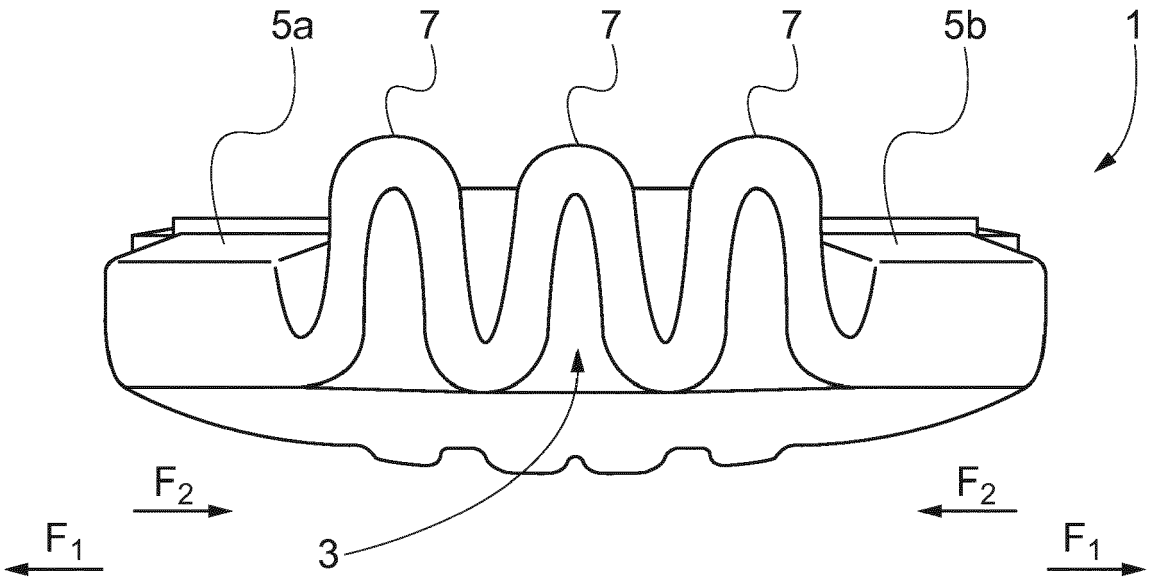

Fig. 3

EP 3 064 080 A1

Description

Technical Field

[0001] The present invention relates to a footwear sole, more particularly to a sports footwear sole.

[0002] More particularly, the invention relates to a footwear sole the extension of which in the transverse direction can be adjusted.

Prior Art

[0003] It is known that both the comfort and the performance of footwear, for example of sports footwear, are strictly related to the conformity of the footwear to the specific morphology of the particular user.

[0004] This correlation is especially pronounced in the case in which the footwear comprises a rigid, non-deformable element, as with a sports footwear comprising a substantially soft inner liner and a substantially rigid, non-deformable outer shell.

[0005] Reference can be made, by way of example, to ski boots. In the case of ski boots, not only does the conformity of the footwear to the morphology of the foot of the particular user increases the user's comfort, but it also improves the maneuverability of the ski, since even minimal movements of the user's foot are transmitted effectively to the ski boot and from this to the ski.

[0006] In particular, for the same length of the foot - and therefore for the same footwear size - there are users with a particularly large plantar surface, and others with a particularly narrow plantar surface.

[0007] It is therefore evident that the same footwear may not fit all users with the same footwear size equally well.

[0008] It is also apparent that making custom-made footwear, while allowing efficient customization on one hand, would on the other hand involve high manufacturing costs and, consequently, very high, non-competitive market prices.

[0009] In the past sports footwear were developed which, starting from a standard, non-customized article, which could therefore be manufactured on a large scale, allowed some degree of customization.

[0010] In particular, footwear were developed having a transversely adjustable sole, so that the transverse width of the sole could be increased or reduced for adapting it to users having a wider or narrower plantar surface, respectively, than the average one.

[0011] Still referring to the specific example of ski boots, ski boots were developed comprising a substantially soft inner liner and a substantially rigid outer shell, in which the sole of the outer shell is adjustable in a transverse direction in order to adapt the shell - and consequently the ski boot as a whole - to users with a wider or narrower plantar surface than the average one.

[0012] By way of example, the documents CH 486 857 and CH 515 002 both describe a ski boot comprising a sole consisting of two separate side portions connected to each other by means of an elastic joint interposed therebetween and extending in the longitudinal direction; adjusting screws allow to adjust the transverse extension of the elastic joint by virtue of its deformability, so as to vary the width of the sole.

[0013] Document EP 1 683 434 shows a substantially analogous solution applied to a generic sports footwear.

[0014] These solutions, however, while allowing to adjust the transverse dimension of the sole of sports footwear, involve several drawbacks.

[0015] The main drawbacks of said solutions arise from the fact that a discontinuity is introduced in the footwear sole.

[0016] Firstly, the discontinuity represented by the elastic joint brings about a very remarkable localized reduction in the flexional and torsional rigidity of the sole.

[0017] Secondly, the connecting areas between the side sections of the sole and the elastic joint interposed therebetween are subject to wear and consequent detachment.

[0018] This leads to a malfunctioning in the adjustment of the sole on one hand and to a loss of tightness of the sole with respect to the outer environment on the other hand. In particular, in the case of ski boot, snow and water can penetrate the boot.

[0019] Document EP 2 335 506 describes a sole intended for the shell of ski boot and comprising a slot extending in a substantially longitudinal direction and adjusting means for controlling deformation of said slot so as to bring closer / spread apart the edges thereof: in this way the overall width of the sole of the ski boot shell can be customized.

[0020] This solution, too, involves several drawbacks related to the presence of a discontinuity (the slot) in the footwear sole.

[0021] Firstly, there is inevitably a very remarkable localized reduction in the flexional and torsional rigidity of the sole in the area of the slot.

[0022] Secondly, said slot constitutes a passage to the outside, which may involve snow and water infiltrations in the boot, unless specific sealing elements are provided, which would in any case involve a more complex and - therefore - more cost-expensive structure.

[0023] The main object of the present invention is therefore to provide a footwear sole that is adjustable in the transverse direction while at the same time being free from the drawbacks described above.

[0024] Another object of the present invention is to provide a footwear sole that is adjustable in the transverse direction while at the same time having a simple and cost-effective structure, with a limited number of components.

[0025] These and other objects are achieved with the footwear sole as claimed in the appended claims.

Disclosure of the Invention

[0026] Owing to the fact the footwear sole according

to invention comprises a deformable portion which is made of the same material as the rest of the sole and is made without discontinuity with the rest of the sole, the non-uniformity in the features of flexional and torsional rigidity are remarkably limited with respect to known solutions.

[0027] In addition, the absence of connecting areas between portions of the sole that are made of different materials eliminates the possibility of detachment and the consequent risks of malfunctioning and infiltration of water and foreign bodies from the outer environment. Said deformable portion extends in the longitudinal direction of the footwear sole - along the longitudinal axis of said sole or in parallel thereto - at least over a substantial portion of the length of said sole.

[0028] According to a preferred embodiment, said deformable portion is made as a bellows-like portion, the pleats of which can be more or less compressed / stretched so as to vary the extension of said bellows-like portion in the transverse direction and therefore, in the end, of the sole as a whole.

[0029] According to a preferred embodiment, the deformable portion is made as a single piece with the rest of the sole, during a single step of injection molding.

[0030] According to an alternative embodiment of the invention, the deformable portion is made as a an element which is double-molded or over-molded with respect to the rest of the sole; such construction allows, for the same material, to obtain, for the deformable portion, a lower rigidity than the rest of the sole.

[0031] In its simplest embodiment, the deformable portion is deformed as a consequence of the insertion of the user's foot into the footwear.

[0032] However, the footwear sole of the invention preferably comprises an adjusting arrangement for adjusting said deformable portion in order to vary the extension thereof in a transverse direction.

[0033] Advantageously, according to a preferred embodiment of the invention, said adjusting arrangement is configured so as to vary the extension of the deformable of the sole by overcoming its resistance and to adjust the deformation of said deformable portion to a desired value so that the sole maintains unchanged its flexional and torsional rigidity.

[0034] For this purpose, the adjusting arrangement comprises one or more rigid members, to which the deformable portion of the sole is anchored at one or both of its longitudinal ends and which support the adjusting elements of said deformable portion.

Brief Description of the Drawings

[0035] Further features and advantages of the invention will become more apparent from the following detailed description of a preferred embodiment of the invention, given by way of non-limiting example with reference to the annexed drawings, in which:

- Figure 1 schematically shows the footwear sole according to the invention, viewed from the outside and illustrated in a first configuration;
- Figure 2 1 schematically shows the footwear sole according to the invention, viewed from the outside and illustrated in a second configuration;
- Figure 3 is a section taken along the line III-III of the footwear sole of Figure 1;
- Figure 4 schematically shows a detail of the footwear sole according to the invention relating to the adjusting arrangement for adjusting the deformable portion of said sole, viewed from the inside.

[0036] It is clear that herein the term "inside" means the side of the sole facing the user's foot and the term "outside" means the side of the sole facing the outer environment.

Detailed Description of a Preferred Embodiment of the Invention

[0037] The preferred embodiment of the invention described below in detail refers to the application of the invention to a sole for a ski boot, and more particularly to a sole for the outer shell of a ski boot.

[0038] This embodiment is in no way to be intended as limiting the scope of the invention and the invention can be applied to the sole of any footwear for which it is deemed necessary or advantageous to customize the width of the sole of the footwear for adapting it to the specific morphology of a particular user.

[0039] Further non-limiting examples of application of the invention comprise footwear for skates (both roller skates and ice skates), mountaineering and trekking footwear, motorcycle footwear and safety footwear.

[0040] Referring to Figures 1 and 2, there is schematically illustrated the sole 1 of a substantially rigid outer shell of a ski boot.

[0041] According to the invention, said sole 1 comprises a deformable portion 3 extending longitudinally along said sole 1 and is arranged between two side portions 5a, 5b.

[0042] The deformable portion 3 can extend along the longitudinal axis L of the sole 1 (as in the illustrated example) or in parallel thereto.

[0043] The deformable portion 3 can extend over the whole length of the sole 1 (as in the illustrated example) or over a portion of said length.

[0044] According to the invention, the deformable portion 3 is made of the same material as the side portions 5a, 5b and is made continuously with said side portions and without discontinuity therewith.

[0045] In particular, said deformable portion can be made as a single piece with the side portions 5a, 5b or, alternatively, as an element double-molded or over-molded with respect to said side portions, but in any case of the same material as said side portions and without junctions between the different portions.

[0046] The deformable portion 3 is therefore deformable not by virtue of the material of which it is made, but rather because of its geometrical configuration, which allows to vary the extension thereof in the transverse direction, i.e. to vary the distance between the two side portions 5a, 5b.

[0047] In particular, in the illustrated embodiment, the deformable portion 3 is made as a bellows comprising a plurality of longitudinally oriented pleats 7, as better visible in Figure 3:

- by exerting a traction in the transverse direction (arrows F1) onto the pleats 7 it is possible to spread them apart from one another, thus increasing the extension of the deformable portion 3 in the transverse direction and spreading apart the two side portions 5a, 5b, thereby obtaining a configuration suitable for users with a wide plantar surface (configuration shown in Figure 1);
- by exerting a compression in the transverse direction (arrows F2) onto the pleats 7 it is possible to bring them closer to one another, thus reducing the extension of the deformable portion 3 in the transverse direction and bringing the two side portions 5a, 5b closer to each other, thereby obtaining a configuration suitable for users with a narrow plantar surface (configuration shown in Figure 2).

[0048] By virtue of the fact that the deformable portion 3 is made of the same material as the side portions 5a, 5b and has no junctions, the sole 1 has no areas of discontinuity, which ensures more robustness and integrity of the sole and more uniform features, especially regarding its flexional and torsional flexibility.

[0049] Still referring to Figures 1 and 2, although it is possible to imagine that the sole 1 is not provided with any adjusting elements and that the deformation of the portion 3 takes place spontaneously as a consequence of the insertion of the user's foot into the footwear, it is preferable to provide adjusting elements for adjusting the deformation of said deformable portion.

[0050] In the illustrated embodiment, the deformable portion 3 of the sole 1 is anchored at its opposite longitudinal ends to corresponding rigid members 9, 11.

[0051] In particular, said rigid members are made as plates 9, 11 made of a material having a much higher stiffness than the material of which the sole 1 is made, and arranged at the toe region and at the heel region of the sole 1, respectively. Fastening means 13 - for example in the form of screws or the like - are provided for firmly anchoring each of the plates 9,11 to the sole 1, at the corresponding ends of the deformable portion 3 of said sole.

[0052] The plates 9, 11 support the adjusting elements 15 for adjusting the transverse extension of the deformable portion 3, said adjusting elements 15 being arranged on the plates 9, 11 at a distance from the fastening means 13 enough to allow adjustment of the deformation of the deformable portion 3 in the transverse direction.

[0053] Said adjusting elements can be arranged on one side only or - preferably - on both sides of the deformable portion 3, so as to be capable of exerting a traction / compression force onto the pleats 7 of the deformable portion 3 on one side only or on both sides, respectively.

[0054] In addition, the adjusting elements can be configures so as to cause a symmetric traction / compression of the deformable portion 3 or so as to selectively cause a traction on either side of the deformable portion 3, respectively.

[0055] In the shown embodiment, two pair of adjusting elements 15 are provided, namely a first pair on a first plate 9 close to the toe portion of the sole 1 and a second pair on a second plate 11 close to the heel portion of the sole 1, each pair comprising two elements arranged on opposite sides of the deformable portion 3.

[0056] The plate 9 with its corresponding fastening means 13 and corresponding adjusting elements 15 is also shown in more detail in Figure 4.

[0057] In the illustrated embodiment, the adjusting elements 15 consist of corresponding eccentric elements.

[0058] Each eccentric element 15 has a cylindrical portion fitted in a corresponding through-hole formed in the rigid plate 9, 11, and an eccentric portion engaged in a corresponding seat in the sole 1, in the proximity of the deformable portion 3 of said sole.

[0059] In this way, a rotation of the eccentric element 15 exerts a traction or compression force onto the deformable portion 3 of the sole 1 and a consequent variation of the transverse extension of said deformable portion 3, whereas the rigid plate 9, 11 remains fixed to the sole 1 without deformation or displacement.

[0060] Rotation of the eccentric element 15 can be effected by means of an appropriate tool 100 - for example an Allen wrench or a lever specific for amplifying the torque to be applied - and to this aim each eccentric element 15 has a seat 15a in which said tool 100 can engage.

[0061] As anticipated above, the adjustment arrangement of the sole according to the invention comprises at least one adjusting element 15.

[0062] In the illustrated embodiment, the presence of a pair of eccentric elements 15 on each of the plates advantageously allows separate, independent adjustment of the deformation of the deformable portion 3 on the medial side and on the lateral side of the sole 1.

[0063] From the above description, it is apparent that the invention allows to achieve the objects set forth above, as it allows to combine the possibility of adjusting the transverse extension of a footwear sole, for adapting it to users with a more or less wide plantar surface, with the need of avoiding any discontinuity and non-uniformity in the structural features of the sole.

[0064] It is further apparent that the above description has been given by way of non-limiting example and that several modifications and variants are within the reach

of the person skilled in the art and in any case fall within the scope of the invention as defined in the appended claims.

[0065] In particular, although the preferred embodiment described above relates to a ski boot, the invention is profitably applicable to a variety of different footwear as well.

[0066] Furthermore, although in the embodiment described above reference is made to a deformable portion made as a bellows, any other geometrical configuration of the deformable portion that allows to vary the extension thereof in the transverse direction can also be used.

Claims

1. Footwear sole (1), of the kind comprising a deformable portion (3), extending in the longitudinal direction of said sole (1), and a pair of side portions (5a, 5b), arranged on opposite sides of said deformable portion (3), **characterized in that** said deformable portion (3) is made of the same material as said side portions (5a, 5b) and is made continuously with said side portions (5a, 5b), with no discontinuity.

2. Footwear sole (1) according to claim 1, wherein said deformable portion (3) is made as a bellows comprising a number of pleats (7) oriented along the longitudinal direction of said sole (1).

3. Footwear sole (1) according to claim 1 or 2, wherein said deformable portion (3) extends over the whole length of said sole (1) or at least over a substantial portion thereof.

4. Footwear sole (1) according to any of the preceding claims, wherein said deformable portion (3) is made as a single piece with said side portions (5a, 5b).

5. Footwear sole (1) according to any of the preceding claims, wherein said deformable portion (3) is provided with an adjusting arrangement (9, 11, 15) for varying the extension thereof in a transverse direction and for setting said extension at a preset value.

6. Footwear sole (1) according to any of the preceding claims, wherein said deformable portion (3) is anchored at one or both of its longitudinal ends to one or more corresponding rigid members (9, 11), said one or more rigid members being made of a material having a much higher stiffness than the material of said sole (1).

7. Footwear sole (1) according to claim 6, wherein said deformable portion (3) is provided with an adjusting arrangement (9, 11, 15) for varying the extension thereof in a transverse direction and for setting said extension at a preset value and wherein said one or more rigid members support adjusting elements (15) for adjusting the extension in the transverse direction of said deformable portion (3).

8. Footwear sole (1) according to claim 7, wherein said adjusting elements comprise respective eccentric elements (15).

9. Footwear, more particularly sports footwear, comprising a sole (1) according to any of the claims 1 to 8.

10. Footwear according to claim 9, wherein said footwear comprises a substantially soft inner boot and a substantially rigid outer shell and wherein said sole (1) according to any of the claims 1 to 8 is the sole of said substantially rigid outer shell.

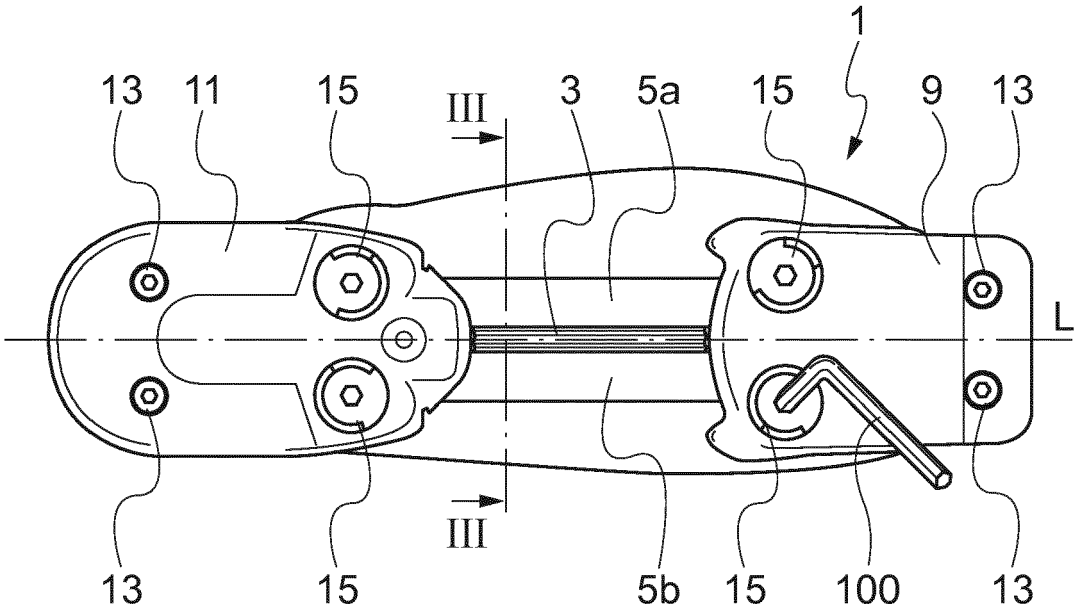
1
13
11
15
III
3
5a
15
9
13
L
III
13
15
5b
15
100
13

Fig. 1

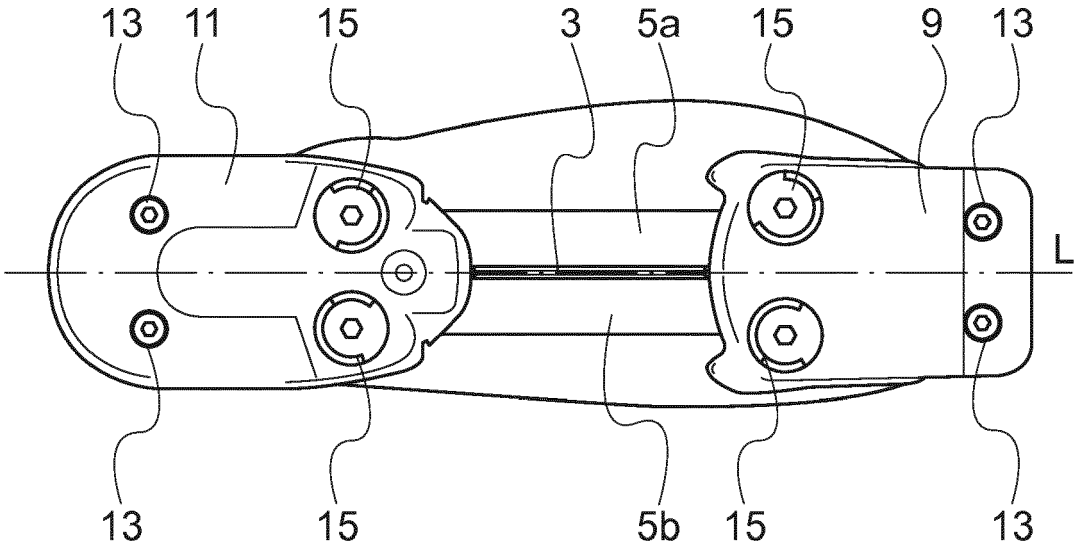
13
11
15
3
5a
15
9
13
L
13
15
5b
15
13

Fig. 2

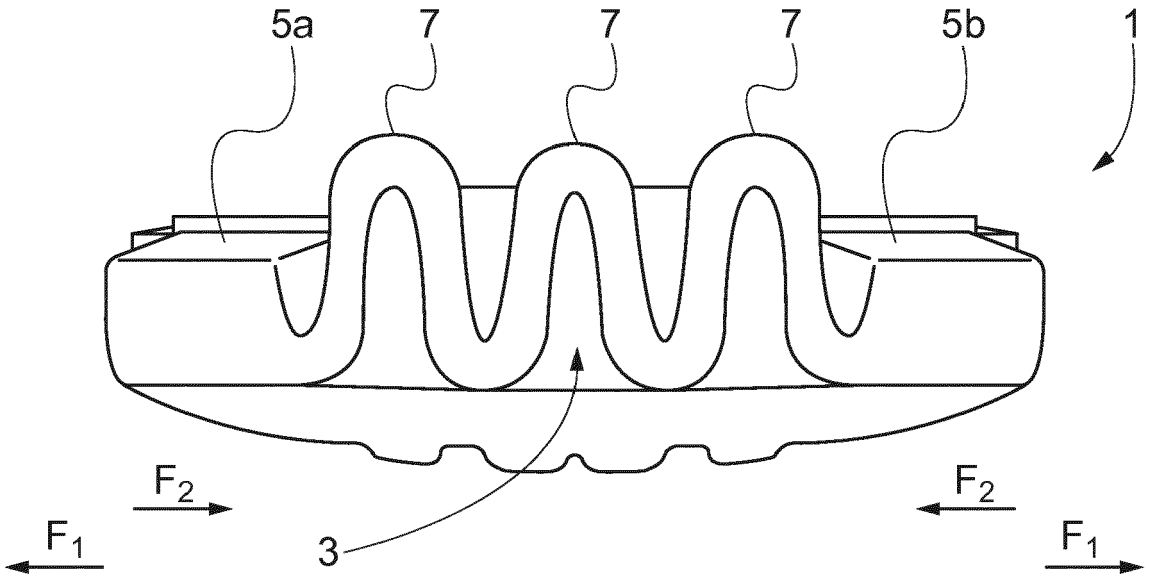

Fig. 3

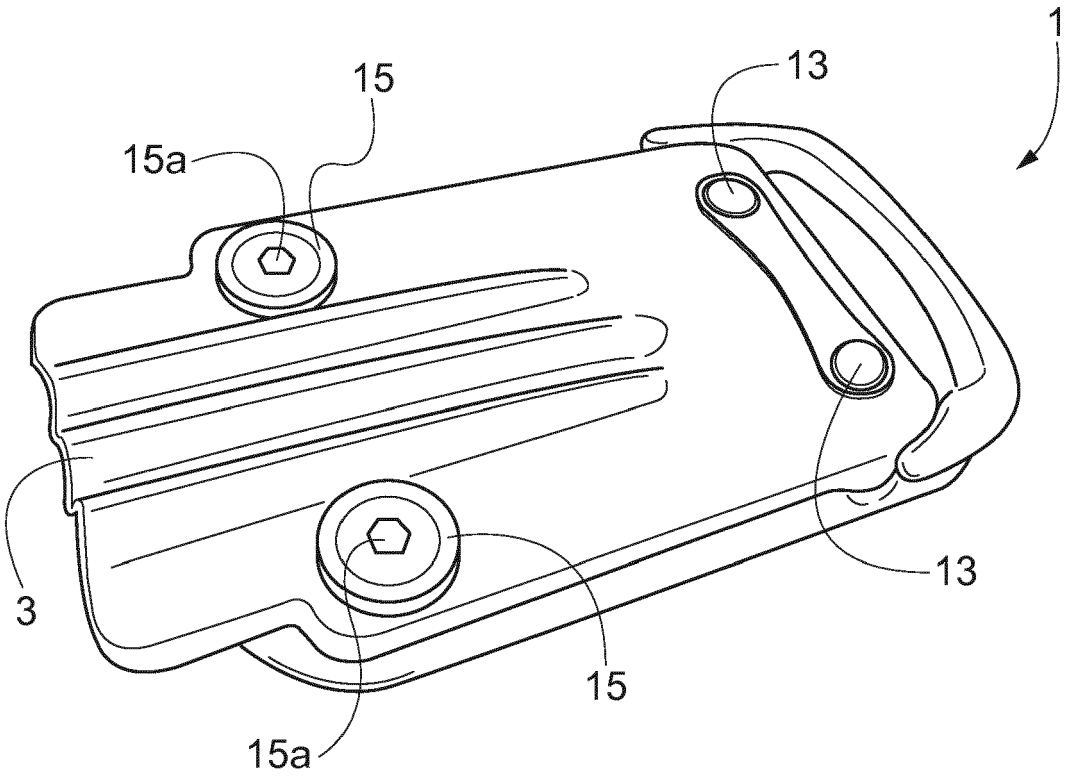

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 15 5852

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 Y	US 2015/047222 A1 (RUSHBROOK THOMAS J [US]) 19 February 2015 (2015-02-19) * paragraph [0030]; figures *	1,3-9 2,10	INV. A43B5/04 A43B13/14
Y	WO 2007/048678 A (GARMONT S.R.L) 3 May 2007 (2007-05-03) * figures *	2,10	
A	CH 486 857 A (MOTTET WILLY BERNARD [CH]) 15 March 1970 (1970-03-15) * figures *	1-10	
A	EP 2 335 506 A1 (HEAD TECHNOLOGY GMBH [AT]) 22 June 2011 (2011-06-22) * figures *	1-10	
			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	22 April 2016	Gkionaki, Angeliki

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 15 5852

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-04-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015047222 A1	19-02-2015	NONE	
WO 2007048678 A	03-05-2007	EP 1940257 A1	09-07-2008
		WO 2007048678 A1	03-05-2007
CH 486857 A	15-03-1970	NONE	
EP 2335506 A1	22-06-2011	EP 2335506 A1	22-06-2011
		IT 1397596 B1	16-01-2013
		US 2011146105 A1	23-06-2011

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- CH 486857 **[0012]**
- CH 515002 **[0012]**
- EP 1683434 A **[0013]**
- EP 2335506 A **[0019]**