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(54) RUCKSACK WITH LUMBAR SUPPORT

(57) The invention refers to a rucksack (1) that comprises a container part (2), a back (3) of the rucksack, at least one shoulder strap (4), a lumbar support (5) that is connected by means of an articulated joint (6) with the lower part of the back of the rucksack, wherein the articulated joint (6) provides for a limited movement of the lumbar support (5) around the joint in all three rotational degrees of freedom with respect to the back (3) of the rucksack and in one linear degree of freedom. The articulated joint (6) is provided with at least one spring. An advantage of the rucksack with the lumbar support of the invention over known solutions lies in that the lumbar support allows perfect adjustment to the user's lumbar area while he is walking.

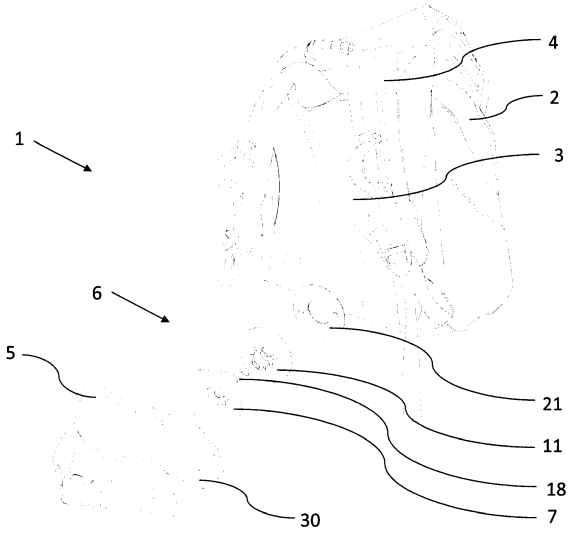


Figure 1

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Description

Field of Invention

[0001] The invention refers to a wide range of rucksacks, such as rucksacks used as school bags, hiking backpacks, and mountaineering backpacks.

Prior Art

[0002] Rucksacks provided at their lower back area with a padding, a so-called lumbar support, are known from prior art. The function of a lumbar support is to transfer part of the rucksack's weight from user's shoulders to the lumbar area; the lumbar support also functions as a spacer element that shifts the back of the rucksack somewhat away from a user's back, thus allowing air circulation along a user's back and preventing excessive sweating.

[0003] While a person is walking, his hips swing, consequently the body's lumbar area rubs against the lumbar support and this is rather uncomfortable. A solution is known from prior art, in which a lumbar support pivots as the hips swing. It is disclosed in document US 2006/0151559 A1. A rotation link is formed between a back of the rucksack and a hip belt for fastening the rucksack, said link allowing rotation in vertical direction. A disadvantage of this solution lies in that the rotation link does not provide for tilting the hip belt for fastening the rucksack backwards and forwards with respect to the back of the rucksack.

[0004] Said disadvantage is eliminated by the solution disclosed in document US 3355075. In this solution, a rotary articulated joint is formed between the frame of a rucksack and the lumbar support, said support being connected with the hip belt for fastening the rucksack; the articulated joint allows rotation in all directions, resulting in the fact that the rucksack is comfortable to carry. A disadvantage of this solution is a freely rotating rotary link when the rucksack is not used with the hip belt fastened, the link can consequently assume an improper position.

Technical Problem

[0005] A technical problem is how to conceive a rucksack with a rotary link between a lumbar support of the rucksack and a back of the rucksack, which will allow adjustment of the support to the back or a correct position of the lumbar support in the user's lumbar area even if the rucksack has no hip belt or if the latter is not used by the user. A further task of the invention is to absorb shocks of a container part of the rucksack along the user's lumbar area while he is walking.

Solution to the Technical Problem

[0006] The technical problem is solved by a rucksack that comprises:

- a container part for receiving objects to be carried,
- a back of the rucksack that abuts against a user's back when in use,
- at least one shoulder strap, preferably a pair of shoulder straps,
- a lumbar support that is connected by means of an articulated joint with the lower part of the back of the rucksack, wherein the articulated joint provides for a limited movement of the lumbar support around the joint in all three degrees of freedom with respect to the back of the rucksack.

The articulated joint includes

- a first portion in the form of a plate, on which a spherical segment is centrally formed, and four radially oriented first projections are axially symmetrically arranged on the circumference, and
- a second portion in the form of a plate, on which at least two concave second projections, preferably four second projections, are arranged around the centre, the inner concave surfaces of the projections engaging in a form-locking manner with the spherical segment of the first portion, and on which a circumferential wall is formed with four axially symmetrical recesses for receiving the first projections of the first portion.

[0007] The width of the recesses in the circumferential wall of the second portion is larger than the width of the first projections of the first portion, such that, in the assembled position of the first and second portions, limited movement around the joint in the plane of the first or second portions is allowed.

[0008] The height of the first projections of the first portion is selected in a way that, in the assembled position of the first and second portions when they are arranged parallel to each other, the first projections do not reach the bottoms of the recesses in the circumferential wall of the second portion, wherewith limited movement around the joint in transversal directions to the plane of the first or second portions is allowed.

[0009] The second projections of the second portion, which engage with the spherical segment of the first portion in the working position, are elastically deformable in order to allow assembly of the first and second portions and subsequent disassembly.

[0010] One of the first and second portions is connected with the lower part of the back of the rucksack, and the other of them is connected with the lumbar support.

[0011] The first and second portions in the form of a plate are further dimensioned in a way to allow linear motion one with respect to the other in axial direction when in the assembled position.

[0012] The articulated joint may be fabricated from a metallic material, such as aluminium, plastics, such as

polyamide, polyamide reinforced with glass fibres, nylon, POM or a combination thereof.

[0013] Further, the articulated joint may be provided with at least one spring that forces the articulated joint to its equilibrium state when deflected.

[0014] An advantage of the rucksack with the lumbar support of the invention over known solutions lies in that the lumbar support allows perfect adjustment to the user's lumbar area while he is walking, because the support can move around the articulated joint in all three degrees of freedom with respect to the back of the rucksack. The limited movement of the lumbar support around the articulated joint prevents an improper position of the lumbar support. Proper movement and position of the lumbar support is yet additionally improved if the articulated joint is provided with a spring. If the articulated joint is provided with a spring, the rucksack of the invention has a further advantage, namely the shocks caused by the rucksack against the user's lumbar area while he is walking are absorbed.

Figure 1: A rucksack with details of the articulated joint and a lumbar support
Figure 2: A first portion of the articulated joint; a) front view, b) back view
Figure 3: A second portion of the articulated joint; a) front view, b) back view
Figure 4: A nut provided with a flange
Figure 5: The articulated joint with a helical spring; a) in released state, b) in compressed state
Figure 6: The articulated joint with a cantilever spring
Figure 7: Assembled articulated joint

[0015] The invention is described in more detail hereinbelow.

[0016] The technical problem is solved by a rucksack 1 that comprises:

- a container part 2 for receiving objects to be carried,
- a back 3 of the rucksack that abuts against a user's back when in use,
- at least one shoulder strap 4, preferably a pair of shoulder straps,
- a lumbar support 5 that is connected by means of an articulated joint 6 with the lower part of the back of the rucksack, wherein the articulated joint 6 provides for a limited movement of the lumbar support 5 around the joint in all three degrees of freedom with respect to the back 3 of the rucksack.

The articulated joint 6 includes

- a first portion 7 in the form of a plate, on which a spherical segment 8 is centrally formed, and four radially oriented first projections 9 are axially symmetrically arranged on the circumference, and
- a second portion 11 in the form of a plate, on which at least two concave second projections 12, preferably four second projections, are arranged around the centre, the inner concave surfaces 12a of the projections engaging in a form-locking manner with the spherical segment 8 of the first portion 7, and on which a circumferential wall 13 is formed with four axially symmetrical recesses 14 for receiving the first projections 9 of the first portion.

[0017] The first 7 and second 11 portions in the form of a plate are further dimensioned in a way to allow linear motion one with respect to the other in axial direction when in the assembled position. A stroke H represents a difference between the utmost compressed and the utmost opened position of the first 7 and second 11 portions of the articulated joint in the assembled state.

[0018] The width of the recesses 14 in the circumferential wall 13 of the second portion 11 is larger than the width of the first projections 9 of the first portion 7, such that, in the assembled position of the first and second portions, limited movement around the joint in the plane of the first or second portions is allowed.

[0019] The height of the first projections 9 of the first portion 7 is selected in a way that, in the assembled position of the first 7 and second 11 portions when they are arranged parallel to each other, the first projections 9 do not reach the bottoms of the recesses 14 in the circumferential wall 13 of the second portion, wherewith limited movement around the joint in transversal directions to the plane of the first or second portions is allowed.

[0020] The second projections 12 of the second portion 11, which engage with the spherical segment 8 of the first portion 7 in the working position, are elastically deformable in order to allow assembly of the first and second portions and subsequent disassembly.

[0021] One of the first 7 and second 11 portions is connected with the lower part of the back 3 of the rucksack, and the other of them is connected with the lumbar support 5.

[0022] A connection between the first 7 or second 11 portions and the lower part of the back 3 of the rucksack or the lumbar support 5 is formed in one of the following ways: by gluing, welding, stitching, with circumferentially arranged screws, by a centrally arranged external thread and a nut provided with a flange, by a snap-fit connection, or a combination thereof.

[0023] A connection between the first 7 or second 11 portions and the lower part of the back 3 of the rucksack or the lumbar support 5 with circumferentially arranged screws in formed in a way that the rear side of the first 7 or second 11 portions is provided with four lugs with boreholes with inner threads that engage with four screws, a washer plate provided with holes for the passage of the screws being placed in-between.

[0024] A connection between the first 7 or second 11 portions and the lower part of the back 3 of the rucksack or the lumbar support 5 with centrally arranged external thread and a nut provided with a flange is formed in a way that the rear side of the first 7 or second 11 portions

is provided with a lug 19 with an external thread 20 that is inserted into the recess in the back 3 of the rucksack or in the lumbar support 5, a nut 21 with a flange 22 is fastened from the other side, wherein the flange presses the material of the back of the rucksack or the lumbar support against the rear side of the first or second portions. The rear side of the first 7 or second 11 portions is further provided with at least one projecting part 23 that reaches into the material of the back of the rucksack or the lumbar support to prevent rotation of the first 7 and second 11 portions.

[0025] A connection between the first 7 or second 11 portions and the lower part of the back 3 of the rucksack or the lumbar support 5 with a snap-fit connection is formed in a way that elastically deformable hook-like projections are formed on the rear side of the first 7 or second 11 portions, wherein a washer plate with holes is further foreseen, wherein the hook-like projections, in the assembled state, engage with the holes in the washer plate, the material of the back of the rucksack or the lumbar support being arranged therebetween.

[0026] The first 7 and second 11 portions in the form of a plate are further dimensioned in a way to allow linear motion one with respect to the other in axial direction when in the assembled position. A stroke H represents a difference between the utmost compressed and the utmost opened positions.

[0027] Further, the articulated joint may be provided with at least one spring 17, 18 that forces the articulated joint to its equilibrium state when deflected and at the same time absorbs shocks of the rucksack that occur while the user is walking.

[0028] Peripherally on the front side of the first 7 or second 11 portions, projections and/or indentations for receiving four first helical springs are formed, said springs being equidistantly arranged on the circumference between the first and second portions of the articulated joint.

[0029] According to a second embodiment, a second helical spring is arranged between the first 7 and second 11 portions centrally around a spherical joint formed by the spherical segment 8 and the second projections 12.

[0030] According to a third embodiment, a spring connection between the first 7 and second 11 portions is formed by a third helical spring 18 arranged centrally in the hollow spherical segment 8 perpendicularly to the first 7 or second 11 portions.

[0031] According to a fourth embodiment, a spring connection between the first 7 and second 11 portions is formed by a cantilever spring 17 arranged centrally in the hollow spherical segment 8 perpendicularly to the first 7 or second 11 portions. The cantilever spring can be made from a plastic elastic material or a metallic material.

[0032] The articulated joint 6 may be fabricated from a metallic material, such as aluminium, plastics, such as polyamide, nylon, POM or a combination thereof. The material of the articulated joint 6 may further be reinforced with fibres, for instance glass fibres.

[0033] The lumbar support may further be provided with a belt 30 to be fastened around a user's belly in order to fix the rucksack.

Claims

1. A rucksack (1) that comprises:

- a container part (2) for receiving objects to be carried,
- a back (3) of the rucksack that abuts against a user's back when in use,
- at least one shoulder strap (4), preferably a pair of shoulder straps,
- a lumbar support (5) that is connected by means of an articulated joint (6) with the lower part of the back of the rucksack, **characterized in that**

the articulated joint (6) is configured to provide for a limited movement of the lumbar support (5) around the joint in all three degrees of freedom with respect to the back (3) of the rucksack.

2. The rucksack according to claim 1, **characterized in that** the articulated joint (6) includes

- a first portion (7) in the form of a plate, on which a spherical segment (8) is centrally formed, and four radially oriented first projections (9) are axially symmetrically arranged on the circumference, and
- a second portion (11) in the form of a plate, on which at least two concave second projections (12), preferably four second projections, are arranged around the centre, the inner concave surfaces (12a) of the projections engaging in a form-locking manner with the spherical segment (8) of the first portion (7), and on which a circumferential wall (13) is formed with four axially symmetrical recesses (14) for receiving the first projections (9) of the first portion.

3. The rucksack according to claim 2, **characterized in that** the width of the recesses (14) in the circumferential wall (13) of the second portion (11) is larger than the width of the first projections (9) of the first portion (7).

4. The rucksack according to claims 2 or 3, **characterized in that** the height of the first projections (9) of the first portion (7) is selected in a way that, in the assembled position of the first (7) and second (11) portions when they are arranged parallel to each other, the first projections (9) do not reach the bottoms of the recesses (14) in the circumferential wall (13) of the second portion.

5. The rucksack according to any of claims 2 to 4, **characterized in that** the second projections (12) of the second portion (11), which engage with the spherical segment (8) of the first portion (7) in the working position, are elastically deformable.

6. The rucksack according to any of claims 2 to 5, **characterized in that** one of the first (7) and second (11) portions is connected with the lower part of the back (3) of the rucksack, and the other of them is connected with the lumbar support (5).

7. The rucksack according to any of claims 2 to 6, **characterized in that** the first (7) and second (11) portions in the form of a plate are dimensioned in a way to allow linear motion one with respect to the other in axial direction when in the assembled state.

8. The rucksack according to any of claims 1 to 7, **characterized in that** the articulated joint is provided with at least one spring (17, 18) that forces the articulated joint to its equilibrium state when deflected.

9. The rucksack according to claim 8, **characterized in that** peripherally on the front side of the first (7) or second (11) portion projections and/or indentations for receiving helical springs are formed.

10. The rucksack according to claim 8, **characterized in that** a helical spring is arranged between the first (7) and second (11) portions centrally around a spherical joint formed by the spherical segment (8) and the second projections (12).

11. The rucksack according to claim 8, **characterized in that** a spring connection between the first (7) and second (11) portions is formed by a third helical spring (18) arranged centrally in the hollow spherical segment (8) perpendicularly to the first (7) or second (11) portion.

12. The rucksack according to claim 8, **characterized in that** a spring connection between the first (7) and second (11) portions is formed by a cantilever spring (17) arranged centrally in the hollow spherical segment (8) perpendicularly to the first (7) or second (11) portions.

13. The rucksack according to any preceding claim, **characterized in that** the articulated joint (6) is fabricated from a metallic material, such as aluminium, plastic material, such as polyamide, nylon, POM or a combination thereof.

14. The rucksack according to claim 13, **characterized in that** the material of the articulated joint (6) is reinforced with fibres, for instance glass fibres.

15. The rucksack according to any preceding claim, **characterized in that** the lumbar support is provided with a belt (30) for fastening the rucksack around the user's belly.

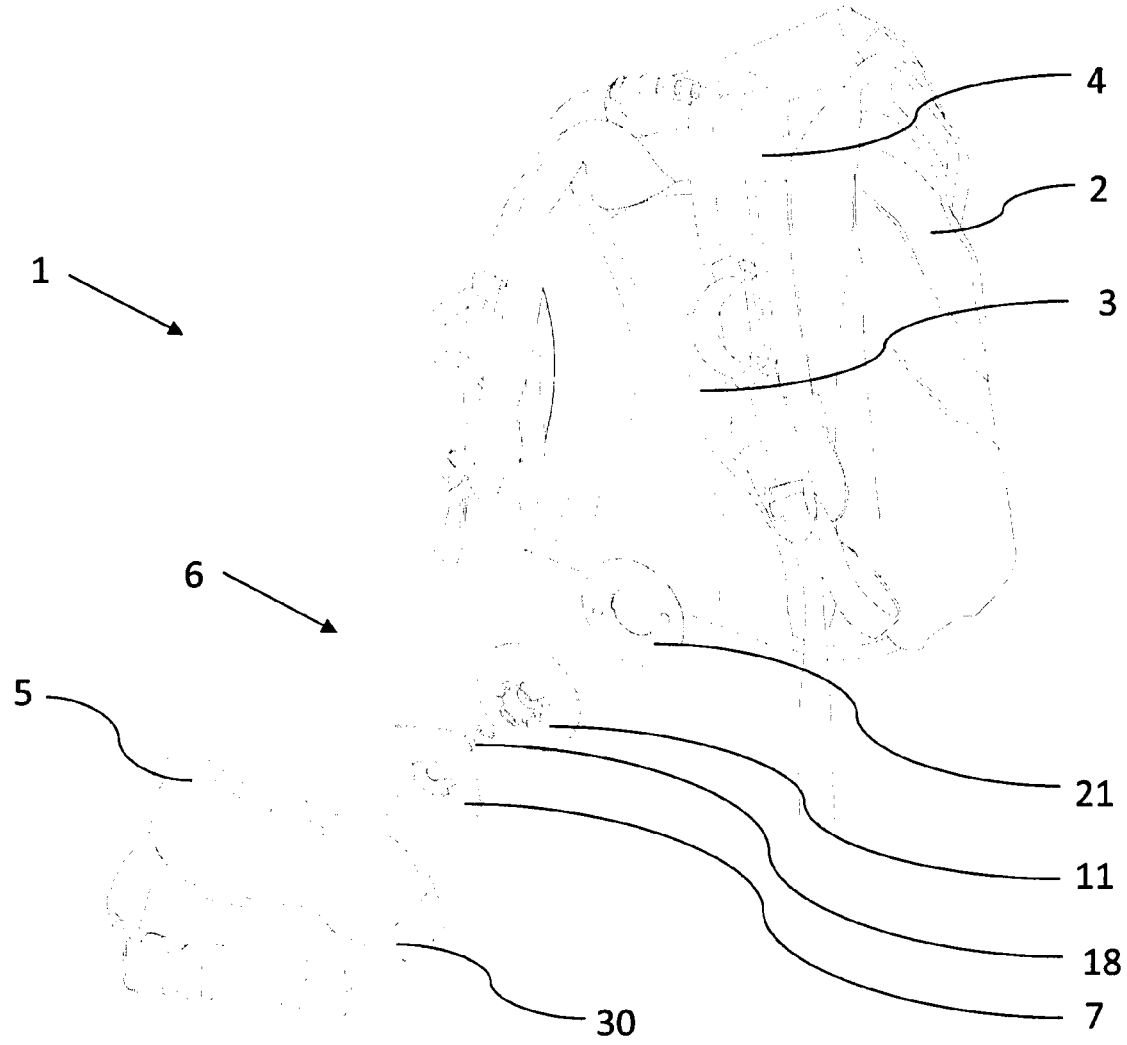


Figure 1

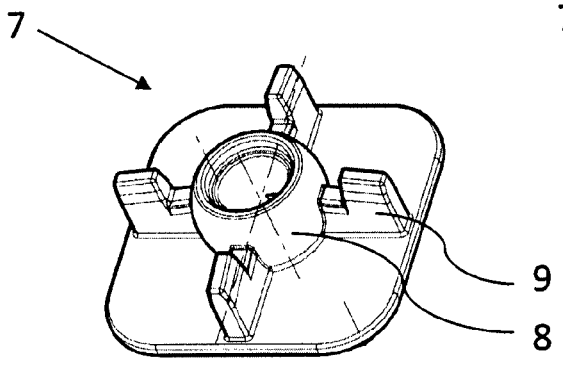


Figure 2a

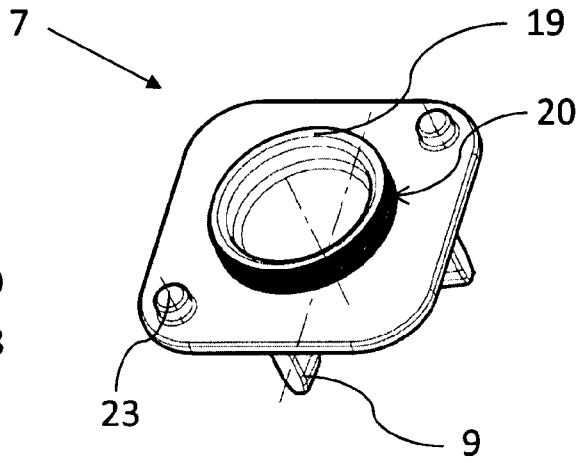


Figure 2b

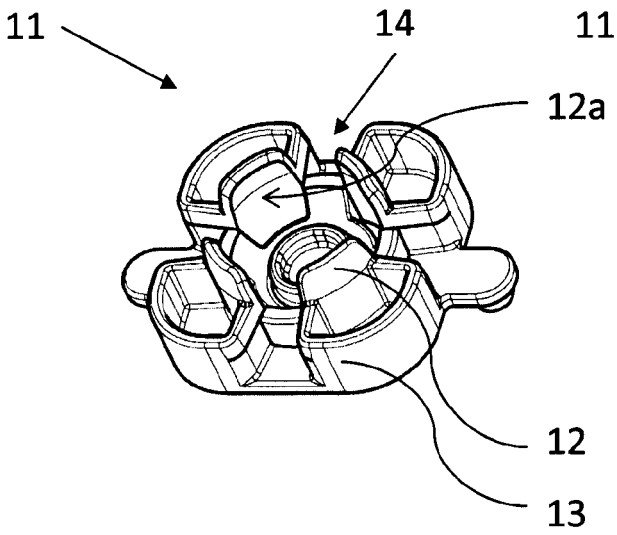


Figure 3a

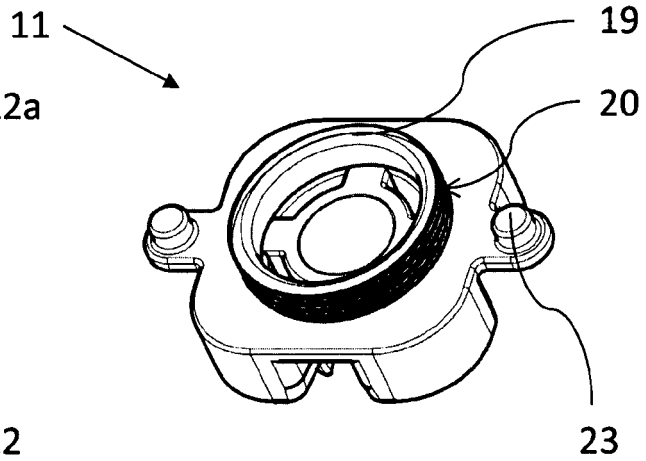


Figure 3b

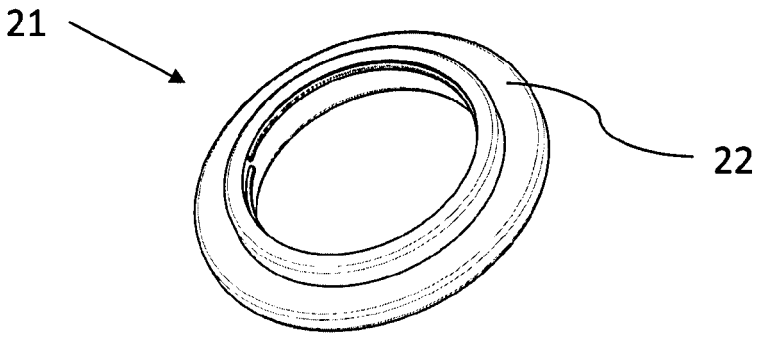


Figure 4

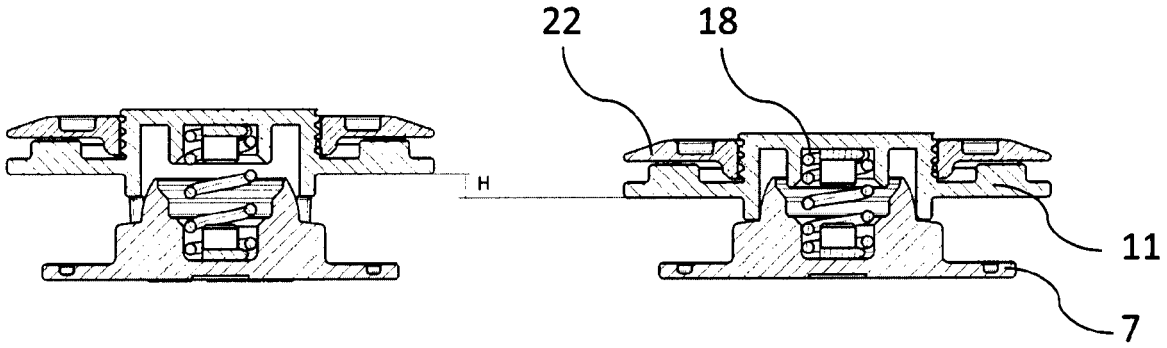


Figure 5a

Figure 5b

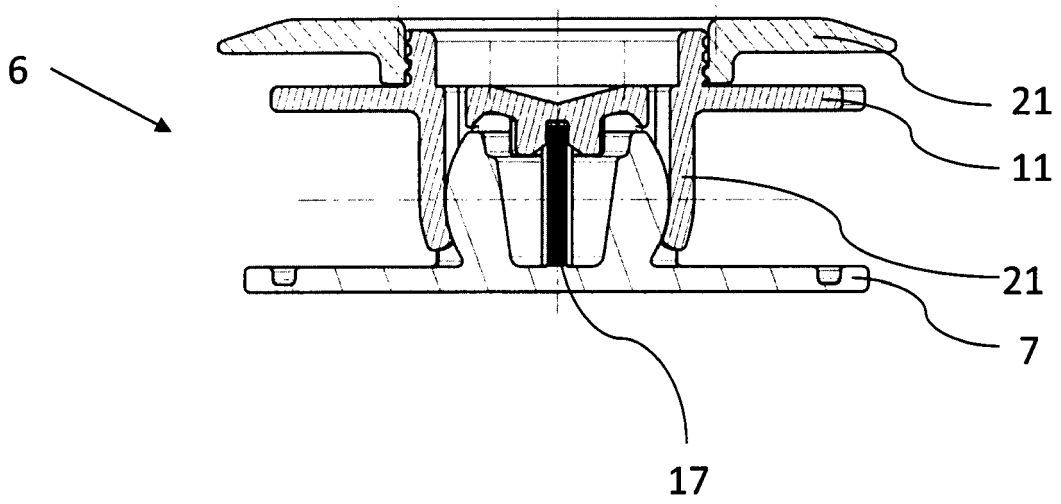


Figure 6

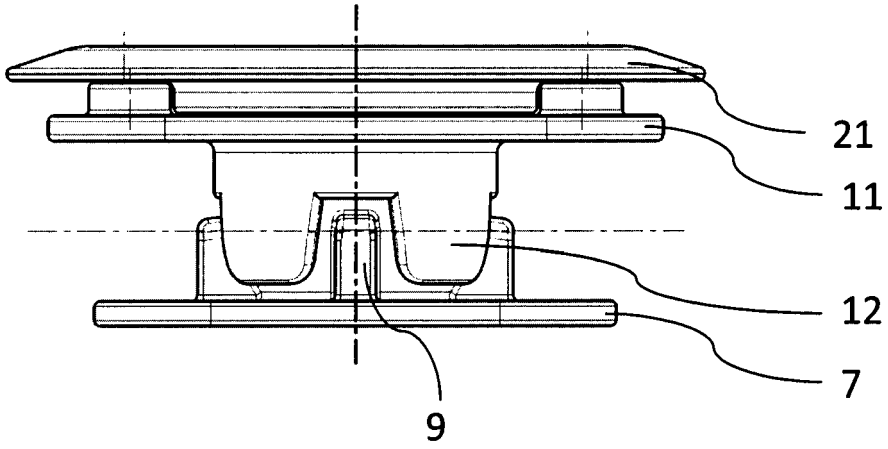


Figure 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 00 1473

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 0 628 265 A1 (MODAN IND 1983 LTD [IL]) 14 December 1994 (1994-12-14) * abstract; claims 1-10; figures 1-19b * * columns 6,10,12 - column 13 * -----	1-15	INV. A45F3/04
X	US 2015/189974 A1 (BERCAW JOHN A [US] ET AL) 9 July 2015 (2015-07-09) * abstract; claims 1-29 * * paragraphs [0042], [0056], [0057], [0067], [0070] * * paragraph [0080] * -----	1-15	
X	WO 2015/080956 A1 (1MSA TECHNOLOGY LLC 1 [US]) 4 June 2015 (2015-06-04) * abstract * * paragraph [0055]; claims 14-18; figures 2,5a * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A45F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 January 2018	Oliveras, Mariana

CATEGORY OF CITED DOCUMENTS

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- US 3355075 A **[0004]**