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(71) Applicant: **Moplan d.o.o.**
3331 Nazarje (SI)

(72) Inventor: **Poljan ek, Bojan**
3312 Prebold (SI)

(74) Representative: **Sveticic, Andrej**
Patentna pisarna d.o.o.
Copova 14
1000 Ljubljana (SI)

(54) **MECHANISM FOR HEIGHT ADJUSTMENT OF RUCKSACK STRAPS OR LUMBAR SUPPORT**

(57) The invention relates to a mechanism (1) for height adjustment of backpack, schoolbag or similar straps or lumbar support or for length adjustment of straps on the backpack. The mechanism comprises an elongate base plate (2) with an elongate first cut-out (2a) with a plurality of first tooth-shaped projections (2b), and with a pair of guide grooves (2c), a sliding plate (3) with a pair of tongues (3a) that slides in guide grooves (2c) of the base plate, and with a second cut-out (3b), a supporting plate (4) with a third cut-out (4a) and a pair of noses (4b) that engage the second cut-out (3b) of the sliding plate in a form-fit manner and in which a pair of receiving elements (4c) is formed, a locking part (5) with a rotational axis (5a) in the pair of receiving elements (4c) of the supporting plate, with a body (5b) of the locking part with second tooth-shaped projections (5c) and with a lever (5d), and a mounting plate (6) with a fourth cut-out (6a), through which the lever (5d) of the locking part protrudes. The advantage of the mechanism according to the invention is its possibility of allowing for a quick and easy height adjustment of shoulder straps or lumbar support or length adjustment straps without a risk of inadvertent unlocking.

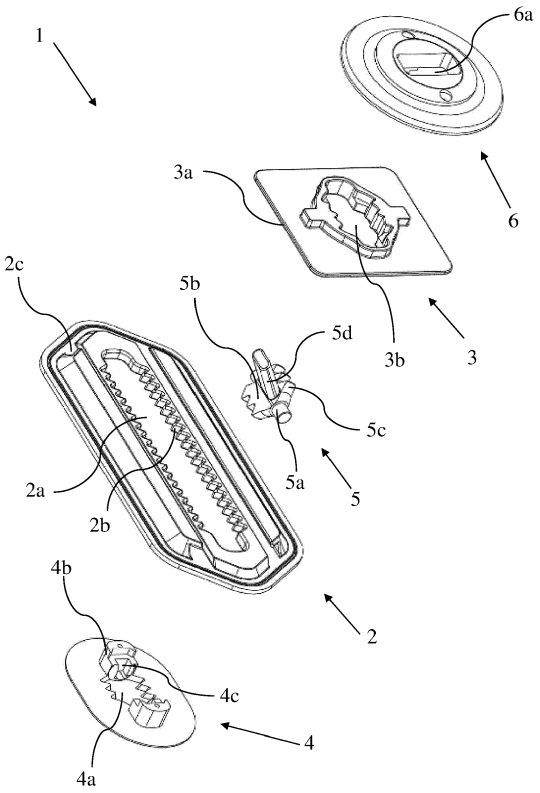

Fig. 1

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Description

Field of Invention

[0001] The invention relates to a mechanism for height adjustment of backpack, schoolbag or similar straps, belts or lumbar support.

Prior art

[0002] A backpack is usually equipped with a pair of straps that are adjustable in length so that the backpack can be adjusted to users of different heights. By lengthening and shortening the straps, the fit of the backpack to the back is no longer optimal. There was a need for a mechanism that would allow a quick and easy height adjustment of backpack shoulder straps or lumbar support.

[0003] A mechanism for height adjustment of backpack straps or lumbar support is known from document US 5004135A. The mechanism comprises a guide rail fixed to the back of the backpack. The guide rail is formed with upper and lower vertically extending and longitudinal through-going slots and has flanges defining the vertical edges of these slots formed on the rear side with two rows of teeth. Each slot is provided with an adequate slide with a latch that pushes the front bulged side of the rail in a complementary manner and includes a spring-loaded button and four lateral projections engageable with the edges of the slot and the respective row of teeth. When the button is pressed back, the projections retract from the contact with the teeth and the corresponding slide can slide vertically and longitudinally along the rail. When the projections engage the teeth, the slide is fixed longitudinally to the rail. The mechanism allows for a quick and simple height adjustment of the straps or lumbar support. Its disadvantage is the spring-loaded button which may get activated automatically during the backpack use, which undoes the height adjustment and the height needs to be re-adjusted.

Technical problem

[0004] The technical problem is to provide a mechanism for height adjustment of backpack, schoolbag or similar straps or lumbar support, which mechanism cannot get inadvertently unlocked.

Solution to the technical problem

[0005] The relative expressions such as vertical, etc. are defined with respect to the user when the backpack is in use.

[0006] The technical problem is solved by a mechanism for height adjustment of backpack, schoolbag or similar straps or lumbar support, said mechanism comprising:

- an elongate base plate connectable or connected to the back of the backpack and having a longitudinal elongate first cut-out, the longitudinal edges of the first cut-out being provided with a plurality of first tooth-shaped projections, and the base plate further having a pair of guide grooves,
- a sliding plate that further comprises a pair of tongues that can slide in the pair of guide grooves of the base plate, and a second cut-out,
- a supporting plate arranged on the opposite side of the base plate as the sliding plate and having a third cut-out and a pair of noses projecting through the first cut-out of the base plate, which engage the second cut-out of the sliding plate in a form-fit manner and define the end positions of the sliding plate when sliding in the base plate, wherein a pair of receiving elements is formed in the pair of noses of the supporting plate, and
- a locking part comprising a rotary axis arranged in the pair of receiving elements of the supporting plate, a body of the locking part having in the axial direction a plurality of second tooth-shaped projections formed complementary to the first tooth-shaped projections, and a lever protruding from the body of the locking part through the second cut-out of the sliding plate,

the mechanism being formed in a way that the lever can assume a first position, in which the first projections of the base plate engage the second projections of the locking part and thus the sliding plate is positionally fixed relative to the base plate, and a second position in which the second projections of the locking part are angularly offset from the first projections of the base plate and thus the sliding plate is movable relative to the base plate.

[0007] The mechanism may further comprise a mounting plate which is detachably connected to the supporting plate and comprises a fourth cut-out through which the lever of the locking part protrudes.

[0008] Due to its simplicity, the mechanism of the invention is suitable for height adjustment of backpack, schoolbag or similar straps, belts or lumbar support. It can also be used to adjust the length of different straps on the backpack or bag. Its advantage lies in the fact that it cannot be inadvertently unlocked while the backpack or bag is in use.

[0009] The advantage of the mechanism according to the invention over known solutions is its possibility of allowing for a quick and easy height adjustment of shoulder straps or lumbar support of a backpack, school bag or similar or length adjustment of backpack or bag straps without a risk of inadvertent unlocking.

Figure 1: Components of the mechanism of the invention in exploded view

Figure 2: Mechanism of the invention in an unlocked position

Figure 3: Mechanism of Figure 2 in the AA-AA cross-section

Figure 4: Mechanism of Figure 2 in the B-B cross-section
Figure 5: Mechanism of the invention in a locked position
Figure 6: Mechanism of Figure 5 in the AA-AA cross-section
Figure 7: Mechanism of Figure 5 in the B-B cross-section
Figure 8: Mechanism with a spring and a latch means
Figure 9: Mechanism of Figure 8 in the B-B cross-section
Figure 10: Mechanism, in which the end face of the lever of the locking part is aligned with the external face of the mounting plate.

[0010] The invention is described in more detail in the following.

[0011] The technical problem is solved by a mechanism 1 for height adjustment of backpack, schoolbag or similar straps or lumbar support, said mechanism comprising:

- an elongate base plate 2 connectable or connected to the back of the backpack and having a longitudinal elongate first cut-out 2a, the longitudinal edges of the first cut-out being provided with a plurality of first tooth-shaped projections 2b, and the base plate further having a pair of guide grooves 2c,
- a sliding plate 3 that further comprises a pair of tongues 3a that can slide in the pair of guide grooves 2c of the base plate, and a second cut-out 3b,
- a supporting plate 4 arranged on the opposite side of the base plate as the sliding plate and having a third cut-out 4a and a pair of noses 4b projecting through the first cut-out 2a of the base plate, which engage the second cut-out 3b of the sliding plate in a form-fit manner and define the end positions of the sliding plate when sliding in the base plate, wherein a pair of receiving elements 4c is formed in the pair of noses of the supporting plate, and
- a locking part 5 comprising a rotary axis 5a arranged in the pair of receiving elements 4c of the supporting plate, a body 5b of the locking part having in the axial direction a plurality of second tooth-shaped projections 5c formed complementary to the first tooth-shaped projections 2b, and a lever 5d protruding from the body of the locking part through the second cut-out 3b of the sliding plate,

the mechanism being formed in a way that the lever 5d can assume a first position, in which the first projections 2b of the base plate engage the second projections 5c of the locking part and thus the sliding plate 3 is positionally fixed relative to the base plate 2, and a second position in which the second projections 5c of the locking part are angularly offset from the first projections 2b of the base plate and thus the sliding plate 3 is movable relative to the base plate 2.

[0012] The mechanism may further comprise a mounting plate 6 which is detachably connected to the supporting plate 4 and comprises a fourth cut-out 6a through which the lever 5d of the locking part protrudes.

[0013] The mechanism can further be provided with a spring 7, one end of which is connected to the lever 5d of the locking part and another end of which is connected to the sliding plate 3 to force the locking part 5 into the locked position.

[0014] In analogy to the version with a spring, the mechanism can alternatively be provided with a pair of magnets, one of which is connected to the lever of the locking part and another is connected to the sliding plate to force the locking part into the locked position.

[0015] Switching the mechanism from the locked position to the unlocked position and vice versa can be done manually. Alternatively, the switching can be done by means of an electric motor. In this case, the rotary axis of the locking part is provided with a gear that engages a gear on the drive axis of the electric motor controlled by the user.

[0016] The mechanism can further be provided with a latch means 6b arranged on the mounting plate 6 that interacts with the lever 5d of the locking part when the locking part 5 is in the locked position, in a way to make it difficult for the locking part 5 to move from the locked position to the unlocked position. The latch means may be formed as a static bulge 6b. Alternatively, the latch means can also be formed as a dynamic means, e. g. with a spring-loaded ball.

[0017] The end surface 5e of the lever of the locking part, which is distal with respect to the rotational axis of the locking part 5, can be formed so as to be aligned with the outer surface 6c of the mounting plate when the locking part is in the locked position. In this way, the possibility of inadvertently unlocking the mechanism is further reduced. In the portion where the lever of the locking part rests on the mounting plate, the mounting plate may be provided with a recess 6d. The user can thus more easily reach the lever with his finger when the user wants to move the locking part to the unlocked position.

[0018] The edges of the first projections 2b of the base plate and the second projections 5c of the locking part are chamfered in a direction perpendicular to the rotary axis 5a of the locking part. The chamfering makes it easier to get the second projections of the locking part into engagement with the first projections of the base plate.

[0019] Preferably, the tips of the second tooth-shaped projections 5c of the locking part are formed radially rounded with a radius originating in the centre of the rotary axis 5a of the locking part. In this way, the second projections of the locking part more easily engage the first projections of the base plate when the locking part moves from the unlocked position to the locked position.

[0020] Both of these measures, i. e. chamfering the edges of the first projections of the base plate and the second projections of the locking part as well as rounding the tips of the second projections of the locking part con-

tribute to the fact that the position in which the projections can engage is more easily pinpointed.

[0021] Understandably, the first projections 2b of the base plate and the second projections 5c of the locking part must be formed with a certain clearance to facilitate the movement of the locking part from the locked position to the unlocked position and vice versa.

[0022] When moving the locking part 5 from the locked position to the unlocked position, the body of the locking part deflects from the plane of the base plate and slightly presses against the ground (e. g. the back of the backpack). This in itself forces the locking part into the locked position and prevents inadvertent unlocking.

[0023] Fine adjustment is defined by the width of the first and second tooth-shaped projections. The narrower the first 2b and the second 5c projections are, the finer the adjustment is.

[0024] The second tooth-shaped projections 5c of the locking part are preferably formed with a greater height than the first tooth-shaped projections 2b of the base plate. The height may be even double.

[0025] The detachable connection of the mounting plate 6 with the supporting plate 4 is formed by means of screws. Alternatively, the connection of the mounting plate to the base plate may be formed by a latching mechanism or by a rivet.

[0026] The first cut-out 2a of the base plate is formed such that in both end longitudinal sliding positions of the mounting plate within the first cut-out, the gaps between the first projections of the base plate overlap the second projections of the locking part.

[0027] The third cut-out 4a of the supporting plate and the second cut-out 3b of the sliding plate are formed in such a way as to allow unimpeded rotational movement of the locking part 5.

[0028] The base plate is preferably sawn to the backpack, schoolbag or the like. Alternatively, it can be connected by screws and nuts or a latching mechanism. In the same way, the sliding plate is connected with the straps, the lumbar support or the belts of the backpack or bag.

Claims

1. A mechanism (1) for height adjustment of backpack, schoolbag or similar straps or lumbar support or for length adjustment of straps on the backpack, said mechanism comprising:

   - an elongate base plate (2) connectable or connected to the back of the backpack and having a longitudinal elongate first cut-out (2a), the longitudinal edges of the first cut-out being provided with a plurality of first tooth-shaped projections (2b), and the base plate further having a pair of guide grooves (2c),
   - a sliding plate (3) that further comprises a pair of tongues (3a) that can slide in the pair of guide grooves (2c) of the base plate, and a second cut-out (3b),
   - a supporting plate (4) arranged on the opposite side of the base plate as the sliding plate and having a third cut-out (4a) and a pair of noses (4b) projecting through the first cut-out (2a) of the base plate, which engage the second cut-out (3b) of the sliding plate in a form-fit manner and define the end positions of the sliding plate when sliding in the base plate, wherein a pair of receiving elements (4c) is formed in the pair of noses of the supporting plate, and
   - a locking part (5) comprising a rotary axis (5a) arranged in the pair of receiving elements (4c) of the supporting plate, a body (5b) of the locking part having in the axial direction a plurality of second tooth-shaped projections (5c) formed complementary to the first tooth-shaped projections (2b), and a lever (5d) protruding from the body of the locking part through the second cut-out (3b) of the sliding plate,

   the mechanism being formed in a way that the lever (5d) can assume a first position, in which the first projections (2b) of the base plate engage the second projections (5c) of the locking part and thus the sliding plate (3) is positionally fixed relative to the base plate (2), and a second position in which the second projections (5c) of the locking part are angularly offset from the first projections (2b) of the base plate and thus the sliding plate (3) is movable relative to the base plate (2).

2. A mechanism according to claim 1, **characterized by** further comprising a mounting plate (6) which is detachably connected to the supporting plate (4) and comprises a fourth cut-out (6a) through which the lever (5d) of the locking part protrudes.

3. A mechanism according to claims 1 or 2, **characterized in that** the mechanism is provided with a spring (7), one end of which is connected to the lever (5d) of the locking part and another end of which is connected to the sliding plate (3) to force the locking part (5) into the locked position.

4. A mechanism according to claim 1 or 2, **characterized in that** the mechanism is provided with a pair of magnets, one of which is connected to the lever of the locking part and another is connected to the sliding plate to force the locking part into the locked position.

5. A mechanism according to any of claims 2 to 4, **characterized in that** the mechanism is provided with a latch means (6b) arranged on the mounting plate (6) that interacts with the lever (5d) of the locking part

when the locking part (5) is in the locked position, in a way to make it difficult for the locking part (5) to move from the locked position to the unlocked position.

6. A mechanism according to claim 5, **characterized in that** the latch means is formed as a static bulge (6b).

7. A mechanism of claim 5, **characterized in that** the latch means is formed as a dynamic means, e. g. with a spring-loaded ball.

8. A mechanism according to any of claims 2 to 7, **characterized in that** the end surface (5e) of the lever of the locking part, which is distal with respect to the rotational axis of the locking part (5), is formed so as to be aligned with the outer surface (6c) of the mounting plate when the locking part is in the locked position.

9. Mechanism according to claim 8, **characterized in that** the mounting plate (6) is formed with a recess (6d) in the portion where the lever of the locking part rests on the mounting plate.

10. A mechanism according to any of preceding claims, **characterized in that** the edges of the first projections (2b) of the base plate and the second projections (5c) of the locking part are chamfered in a direction perpendicular to the rotary axis (5a) of the locking part.

11. A mechanism according to any of preceding claims, **characterized in that** the tips of the second tooth-shaped projections (5c) of the locking part are formed radially rounded with a radius originating in the centre of the rotary axis (5a) of the locking part.

12. A mechanism according to any of preceding claims, **characterized in that** the second tooth-shaped projections (5c) of the locking part are formed with a greater height than the first tooth-shaped projections (2b) of the base plate, up to twice the height.

13. A mechanism according to any of claims 2 to 12, **characterized in that** the detachable connection of the mounting plate (6) with the supporting plate (4) is formed by means of screws.

14. A mechanism according to any of preceding claims, **characterized in that** the first cut-out (2a) of the base plate is formed such that in both end longitudinal sliding positions of the mounting plate within the first cut-out, the gaps between the first projections of the base plate overlap the second projections of the locking part.

15. A mechanism according to any of preceding claims, **characterized in that** the third cut-out (4a) of the supporting plate and the second cut-out (3b) of the sliding plate are formed in such a way as to allow unimpeded rotational movement of the locking part (5).

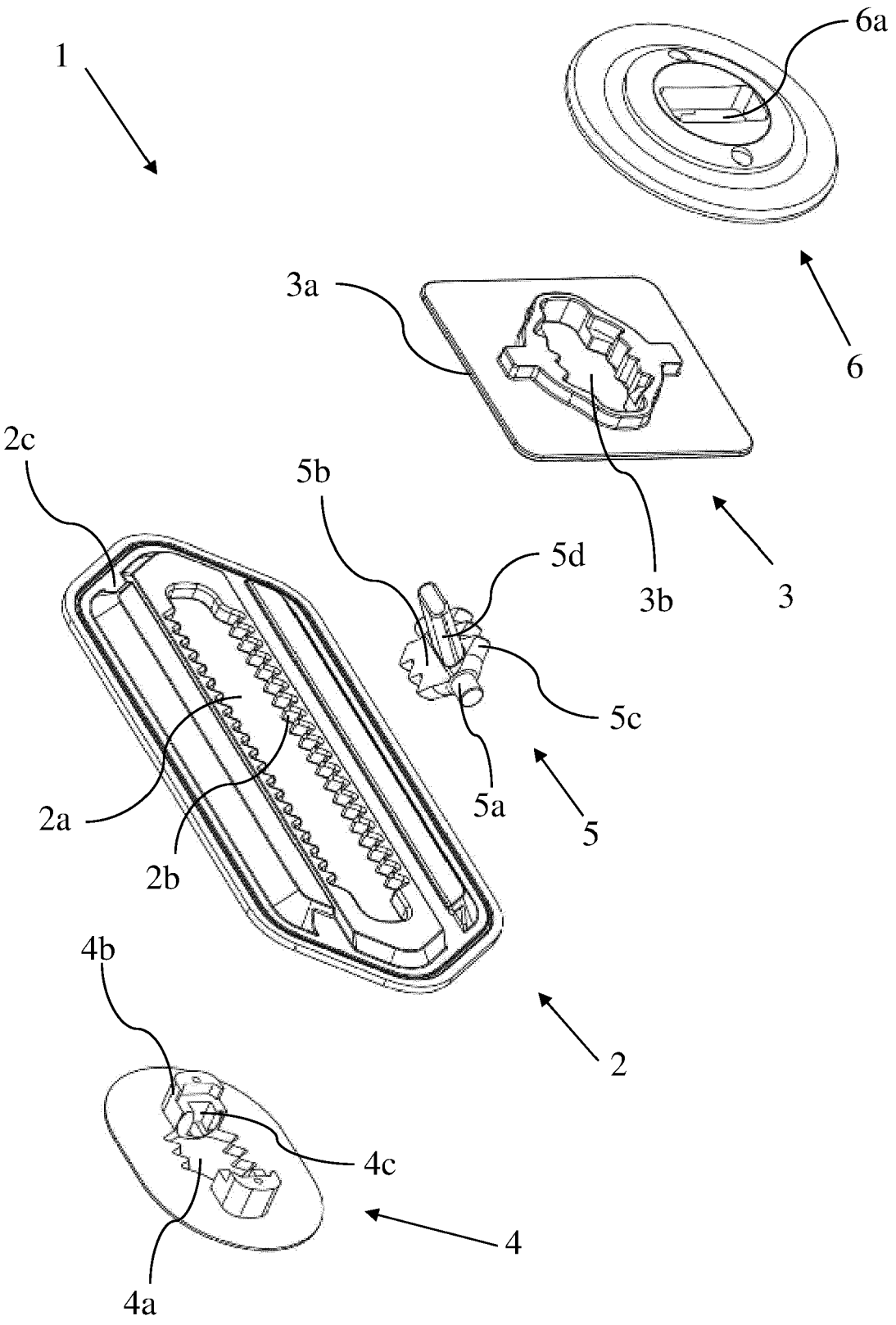

Fig. 1

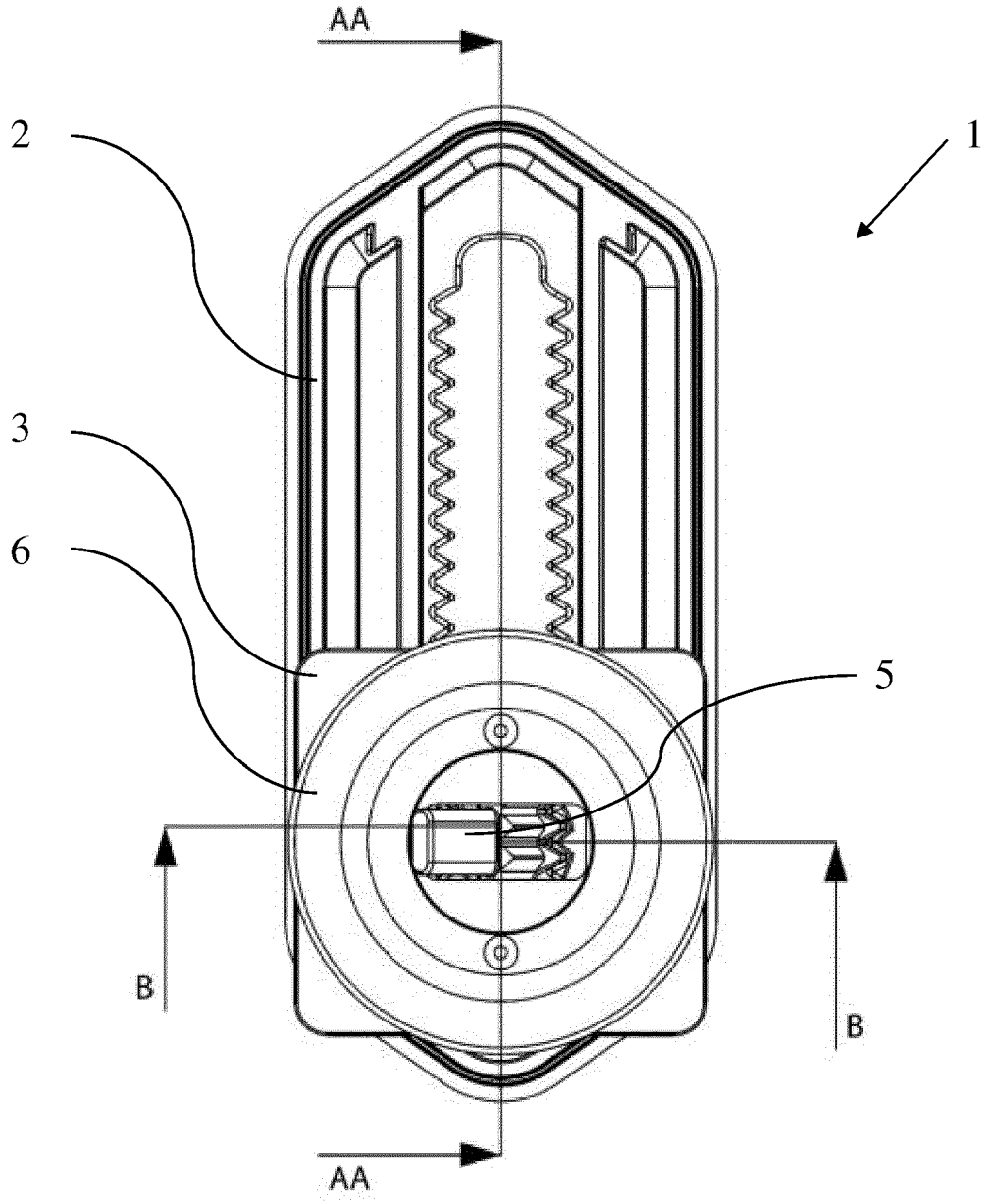

Fig. 2

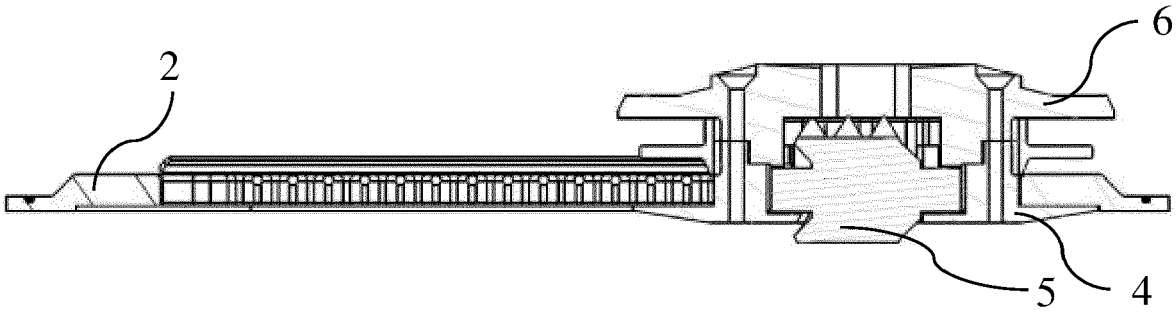

Fig. 3

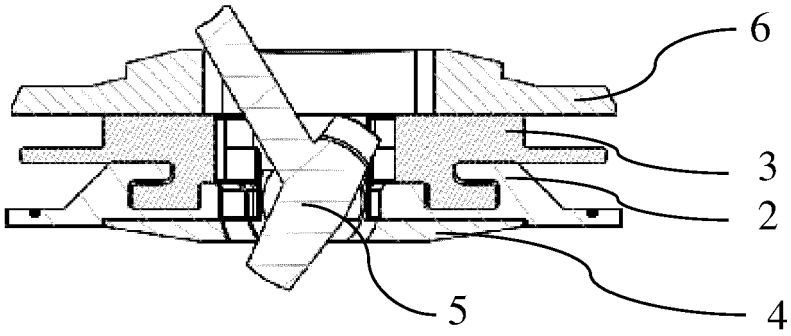

Fig. 4

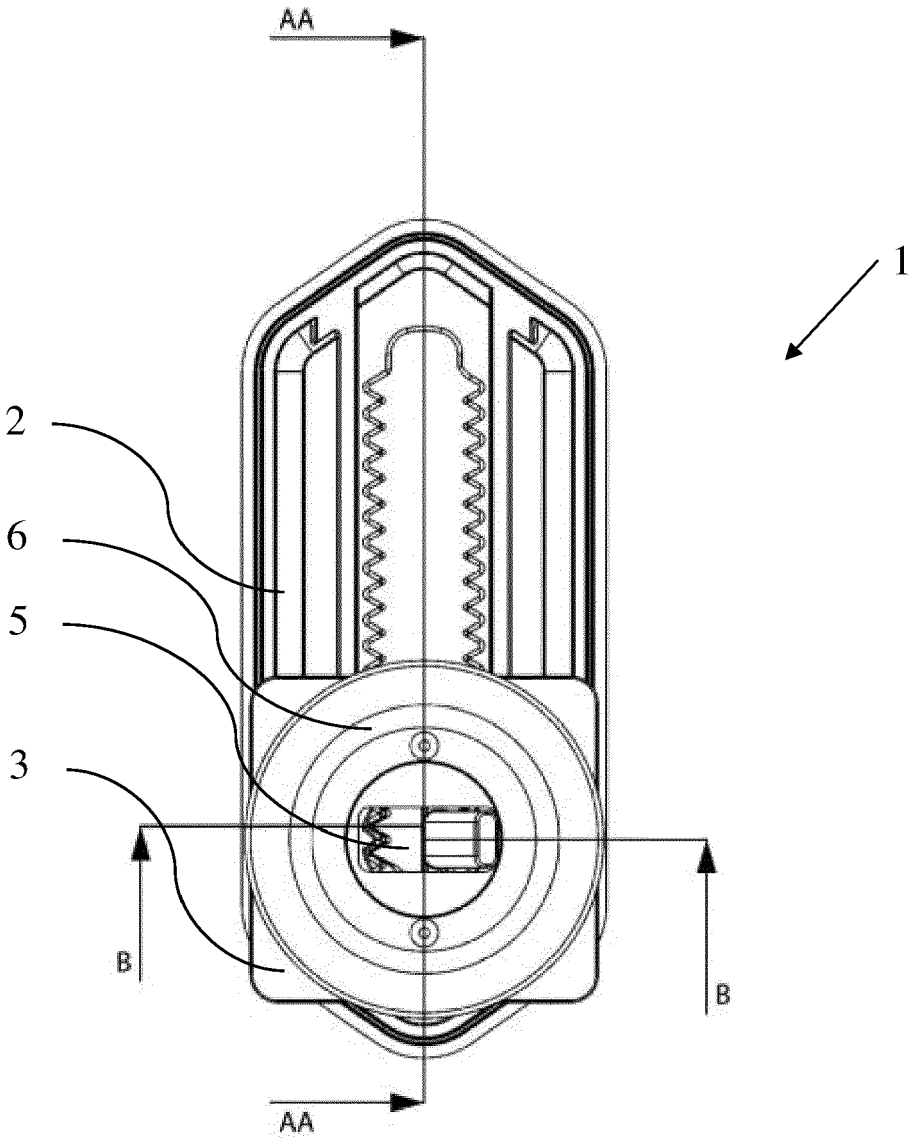

Fig. 5

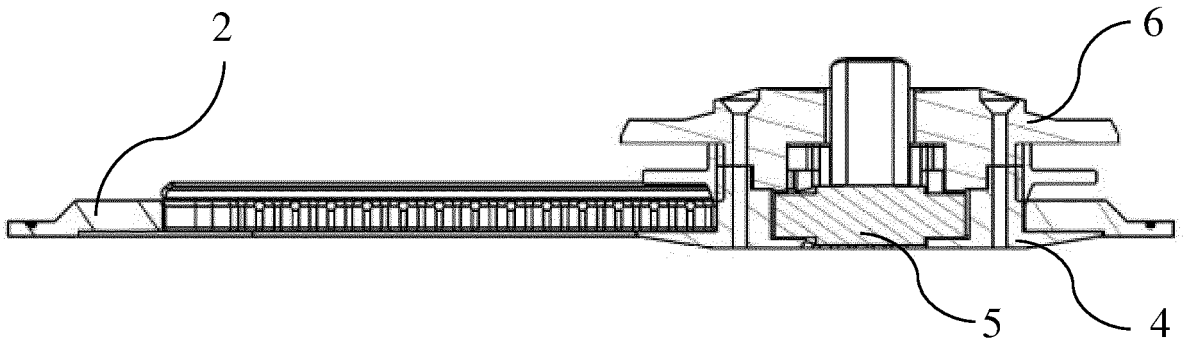

Fig. 6

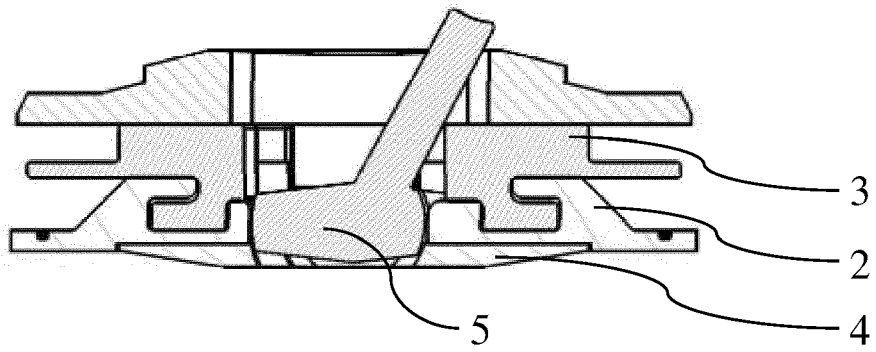

Fig. 7

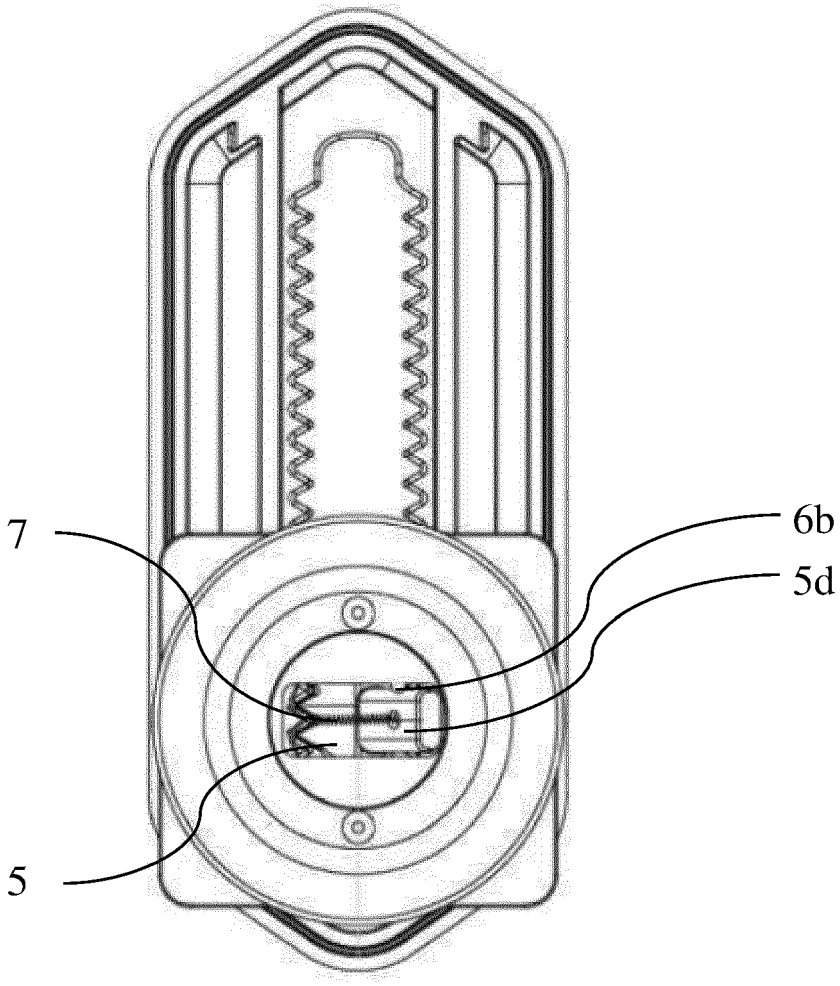

Fig. 8

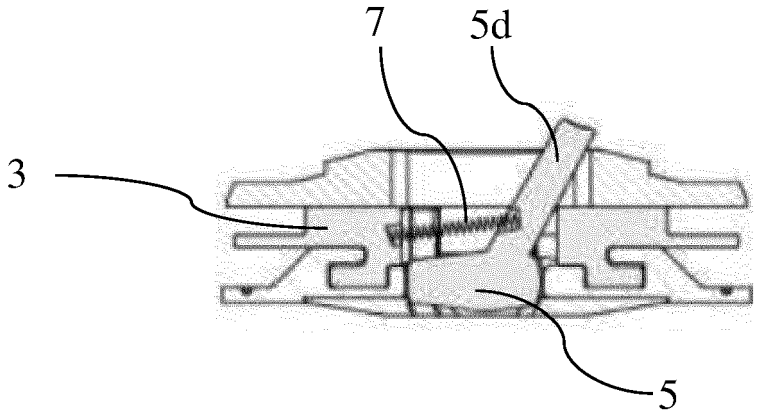

Fig. 9

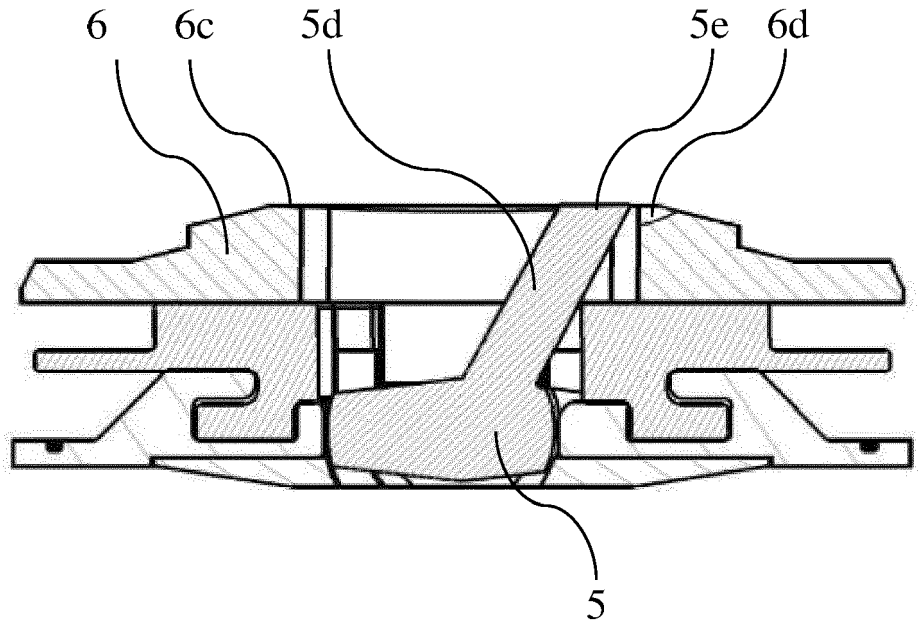

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 7123

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2013 004306 U1 (STERNJAKOB ALFRED KG [DE]; SUDHAUS GMBH & CO KG [DE]) 8 August 2014 (2014-08-08) * paragraph [0019] - paragraph [0047]; figures 1-7 *	1-15	INV. A45F3/04
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TECHNICAL FIELDS SEARCHED (IPC)

A45F
A47C
A47D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 July 2020	Ehrsam, Sabine

CATEGORY OF CITED DOCUMENTS

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