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(54) **Articulation device for a foldable awning arm**

(57) The articulation device comprises first and second articulation members (4, 5) fixed respectively to first and second arm segments (1, 2) and connected to one another by bearing means, a core (6) supported between two fork branches (4a, 4b) of the first articulation member (4) and surrounded by a surrounding wall (9) of the second articulation member (5). The core (6) has an anchor (7) in which there is attached a terminal (31) of a flexible tie element (30). Portions of first and second retention parts (13, 14) are inserted such that they cannot rotate in respective openings (15a, 15b) of the fork branches (4a, 4b) and in the housings (16a, 16b) formed in the core (6). A connecting screw keeps the first and second retention parts (13, 14) connected to one another.

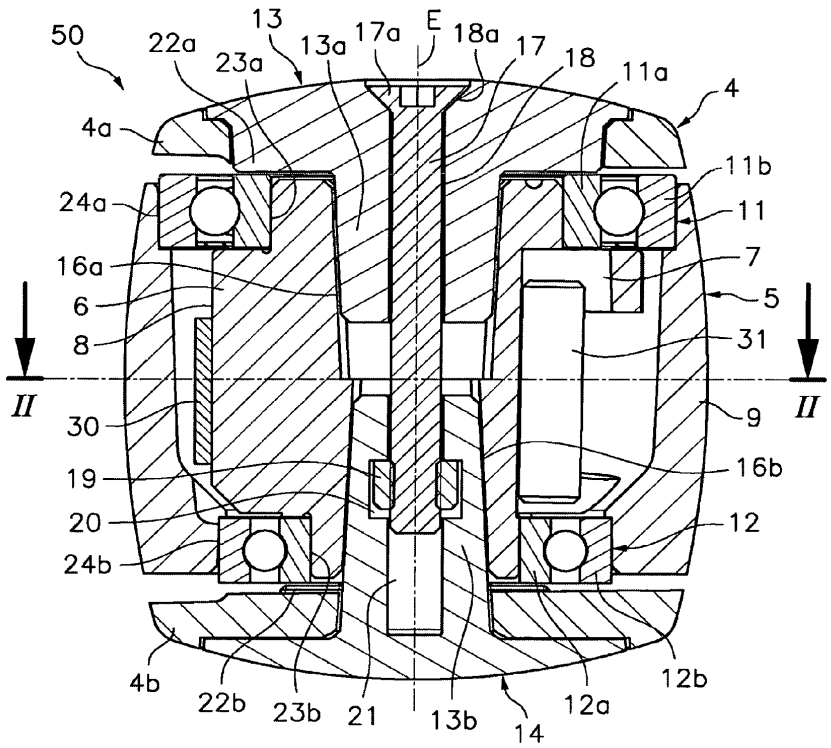

Fig.3

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Description

Field of the Art

[0001] The present invention generally relates to an articulation device for a retractable awning arm, and more particularly to an articulation device including bearings for connecting two segments of a retractable awning arm to one another in an articulated manner.

Background of the Invention

[0002] International patent application WO 2008037815 A1 discloses an articulation device for a retractable awning arm comprising a first articulation member fixed to a first arm segment and a second articulation member fixed to a second arm segment. The first articulation member has formed two fork branches between which there is supported a core configured around an articulation axis. The core has an anchor in which there is attached a thickened terminal of a flexible tie element connected to an elastic member housed inside said second arm segment and a supporting surface on which said flexible tie element is supported. The second articulation member has a surrounding wall arranged around the core such that there is clearance sufficient for accommodating the flexible tie element between both.

[0003] In the mentioned international patent application WO 2008037815 A1, the relative rotation between the first and second articulation members is guided by a pair of bearings coaxial with the articulation axis. Each bearing comprises an inner annular element fixed to the core and an outer annular element fixed to the surrounding wall. The parts forming the articulation device are kept in position by retention parts having respective portions inserted such that they cannot rotate through respective openings formed in the fork branches and coupled such that they cannot rotate in respective housings formed in the core, and by a central tubular rod inserted through the corresponding holes formed in the core and in the retention parts, where the ends of said central rod are flared with respect to the mouths of the holes of the retention parts.

[0004] One drawback of the articulation device described in the mentioned international patent application WO 2008037815 A1 is that the flaring of the ends of the central tubular rod is not reversible, and it is necessary to destroy the central rod to disassemble the articulation device, which is complex and economically expensive.

[0005] The mentioned flexible tie element is described in the international patent application WO 9801638 A1.

Disclosure of the Invention

[0006] The present invention aims to solve the foregoing and other problems by providing an articulation device for a retractable awning arm, which comprises a first articulation member fixed to a first arm segment and a second articulation member fixed to a second arm segment.

[0007] The first articulation member has two fork branches between which a core configured around an articulation axis is supported. This core has an anchor in which there is attached a thickened terminal of a flexible tie element connected to an elastic member housed inside said second arm segment and a supporting surface, generally eccentric with respect to the articulation axis, on which said flexible tie element is supported.

[0008] The second articulation member has a surrounding wall arranged around the core leaving a clearance between both sufficient for accommodating the flexible tie element. The relative rotational movements of the first and second articulation members around the articulation axis are guided by bearing means.

[0009] The core is connected to the fork branches by first and second retention parts inserted such that they can neither rotate nor go through respective openings formed in the fork branches and coupled such that they cannot rotate in respective housings formed in the core, and by connecting means keeping said first and second retention parts connected to one another. These connecting means comprise a connecting screw inserted through a through hole formed in the first retention part and screwed in a threaded hole formed in the second retention part or in a nut retained such that it can neither rotate nor move axially in a housing of the second retention part.

[0010] The option of screwing the retention screw directly in a threaded hole formed in the second retention part is acceptable if the material of the second retention part is hard enough, such as steel, for example. Nevertheless, when the material of the second retention part is relatively soft, such as aluminium alloy or plastic for example, the option of screwing the retention screw in a nut retained in a housing of the second retention part will be preferred.

[0011] With this construction, the two retention parts keeping the core connected to the fork branches of the first articulation member are connected to one another by the mentioned connecting screw, which can be loosened and removed with ease, which allows disassembling the articulation device without the need of destroying any component, and reassembling it without the need of special tools.

[0012] Preferably, said through hole of the first retention part is parallel to the articulation axis, and more preferably is aligned with the articulation axis. In an embodiment, the second retention part comprises an axial cavity sized for receiving an end portion of the rod of said connecting screw, and the housing is in the form of a groove transverse to said axial cavity and perpendicular to the articulation axis. In a particular embodiment, the housing has a radial access opening at a lateral side of the second retention part, and the axial cavity has a longitudinal opening at the same lateral side of the second retention part and intersects said radial access opening of the

housing. Thus, the nut can radially be inserted into and removed from its housing, and even the mentioned end portion of the rod of the connecting screw with the nut coupled thereto can radially be inserted into and removed from the axial cavity and housing.

[0013] In an embodiment, the first and second retention parts have respective pyramidal portions which in position of use are facing one another, and said housings of the core are formed at opposite axial ends thereof and configured for fitting said pyramidal portions. Preferably, the through hole, which is preferably aligned with the articulation axis, and the axial cavity are positioned at the centre of the respective pyramidal portions of the first and second retention parts. Furthermore, each of the first and second retention parts has one or more protruding plugs fitting into respective recesses formed in the corresponding fork branch. Optionally, each of the first and second retention parts has a cover portion configured to be placed on an area of the respective fork branch around the mentioned opening through which the pyramidal portion is inserted and the one or more plugs extend from an inner surface of said cover portion.

[0014] Preferably, the through hole of the first retention part in which the connecting screw is inserted has a countersink at an axial end adjacent to an outer side of the corresponding cover portion. This countersink is sized for housing the head of the connecting screw. Preferably, the head of the connecting screw is conical shaped and has a gripping element for an Allen-type rod key, therefore the countersink is relatively discrete and in condition of use it can be covered with a conventional lid secured in said gripping element. The outer side of the corresponding cover portion of the second retention part is smooth as a result of the fact that the axial cavity is not a through hole and is closed at this outer side.

[0015] In an embodiment, the mentioned bearing means comprise a pair of bearings, each of which comprises an inner annular element fixed to the core, which is in turn fixed to the fork branches of the first articulation member, and an outer annular element fixed to the surrounding wall of the second articulation member. To that end, in an embodiment the core has a pair of inner seats configured for receiving said inner annular elements of the bearings, and both the anchor and the supporting surface are located between said pair of inner seats to facilitate the actuation of the mentioned flexible tie element, which is preferably in the form of a flat belt, and the attachment of the thickened terminal thereof. The surrounding wall has a pair of outer seats configured for receiving said outer annular elements of the pair of bearings. The inner and outer seats can be like those described in the mentioned international patent application WO 2008037815 A1.

[0016] In an embodiment, each of the first and second retention parts has a plurality of said plugs distributed around the articulation axis, and the fork branches have a plurality of said recesses through which the protruding plugs are inserted, and the protruding plugs project from an inner surface of the corresponding fork branch for contacting with the inner annular element of the corresponding bearing.

[0017] In an embodiment, both bearings are ball or roller bearings. Nevertheless, an embodiment in which one of the bearings is a ball or roller bearing and the other is a friction bearing, and another embodiment in which both bearings are friction bearings are also within the scope of the present invention. Furthermore, in the event of using friction bearings, at least one of them could comprise a single annular element fixed to the core and in sliding contact with the surrounding wall or vice versa.

Brief Description of the Drawings

[0018] The foregoing and other features and advantages will be more evident from the following description of an embodiment with reference to the attached drawings, in which:

Figure 1 is a top view of a retractable awning arm including an articulation device according to an embodiment of the present invention in a folded position;

Figure 2 is a cross section view taken by the plane II-II of Figure 5;

Figure 3 is a cross section view taken by the plane III-III of Figure 1;

Figure 4 is a perspective view of an outer side of the articulation device in the folded position;

Figure 5 is a perspective view of an outer side of the articulation device in an extended position;

Figure 6 is a perspective view of an inner side of the articulation device in an extended position;

Figure 7 is a perspective view of a first articulation member of the articulation device;

Figure 8 is a perspective view of a second articulation member of the articulation device;

Figure 9 is a perspective view of a core of the articulation device; and

Figure 10 is an exploded perspective view of first and second retention parts, a connecting screw and a nut of the articulation device.

Detailed Description of an Embodiment

[0019] Referring first to Figure 1, there is shown a retractable awning arm including a first arm segment 1 and a second arm segment 2 having adjacent ends connected to one another by an articulation device 50 according to an embodiment of the present invention. In the other end of the first arm segment 1 there is arranged a first end articulation element 25 by means of which the awning arm is connected to a load bar (not shown) fixed at a front end of an awning canvas (not shown) and at the other end of the second arm segment 2 there is arranged a second end articulation element 26 by means of which the awning arm is connected to a support (not shown)

adjacent to a winding bar (not shown) on which the awning canvas is wound.

[0020] By means of the articulation device 50, the first and second arm segments 1, 2 can perform relative rotations around an articulation axis E between a folded position (Figures 1 to 4) and an extended position (Figures 5 and 6).

[0021] The articulation device 50 comprises a first articulation member 4 fixed to the first arm segment 1 and a second articulation member 5 fixed to the second arm segment 2. In the embodiment shown, the first and second arm segments 1, 2 are hollow profiles made of extruded aluminium and said first and second articulation members 4, 5 have respective connecting portions 27, 28 (Figure 2) inserted tightly at the adjacent ends of the respective hollow profiles.

[0022] As better shown in Figures 7 and 8, the first articulation member 4 has two fork branches 4a, 4b parallel to and spaced apart from one another, and the second articulation member 5 has a surrounding wall 9 in the form of a ring, the height of which is only a little less than the distance between said two fork branches 4a, 4b. The second articulation member 5 also has a passage 29 communicating an inner space of the surrounding wall 9 with the hollow inner space of the profile forming the second arm segment 2.

[0023] In relation to Figure 3, the articulation device 50 further comprises a core 6 configured around said articulation axis E and supported between the two fork branches 4a, 4b of the first articulation member 4. This core 6 is fixed to the fork branches 4a, 4b by first and second retention parts 13, 14 shown separately in Figure 10 which will be described in detail below, and the surrounding wall 9 of the second articulation member 5 is arranged surrounding the core 6. Between the surrounding wall 9 and the core 6 there is a clearance sized for accommodating a flexible tie element 30 in the form of a flat belt the function of which will be described below.

[0024] The first and second articulation members 4, 5, the core 6 and the first and second retention parts 13, 14 are preferably obtained by molding an aluminium alloy although other materials and other forming techniques are possible.

[0025] For guiding the relative rotation of the first and second articulation members 4, 5 around the articulation axis E a pair of bearings 11, 12 in the form of ball bearings are arranged. Each of these bearings 11, 12 comprises an inner annular element 11a, 12a fixed to the core 6 and an outer annular element 11b, 12b fixed to the surrounding wall 9. To that end, the core 6 has a pair of inner seats 23a, 23b configured for receiving the inner annular elements 11a, 12a of the respective bearings 11, 12, and the surrounding wall 9 has a pair of outer seats 24a, 24b configured for receiving the outer annular elements 11b, 12b of the respective bearings 11, 12.

[0026] As shown in Figure 2, the surrounding wall 9 of the second articulation members 5 has a protruding stop 33 interfering with a recess stop 34 of the first articulation members 4 for limiting the relative rotation of the first and second articulation members 4, 5 in the extended position (Figure 5).

[0027] The core 6, which is shown individually in Figure 9, also has an anchor 7 in which there is attached a terminal 31 of the mentioned flexible tie element 30, and a supporting surface 8 on which a portion of said flexible tie element 30 is supported. The pair of inner seats 23a, 23b are located at opposite ends of the core 6, and the anchor 7 and the supporting surface 8 are located between the inner seats 23a, 23b.

[0028] The flexible tie element 30 is introduced into the second arm segment 2 through the mentioned passage 29 (Figure 2), and its other end (not shown) opposite the terminal 31 is connected to an elastic member, such as a helical spring (not shown), housed and secured inside the second arm segment 2. The tension of said elastic member is transmitted to the core 6 by the flexible tie element 30 and pushes the first and second arm segments 1, 2 towards the extended position.

[0029] Figure 10 separately shows the aforementioned first and second retention parts 13, 14, each of which comprises a relatively wide cover portion 13b, 14b and a narrower pyramidal portion 13a, 14a extending inwards from the respective cover portion 13b, 14b. The cover portion 13b, 14b of each first and second retention parts 13, 14 is configured to be placed on a recessed area of the respective fork branch 4a, 4b (Figure 3). Each of the first and second retention parts 13, 14 also has a plurality of protruding plugs 22a, 22b extending from an inner surface of the corresponding cover portion 13b, 14b distributed around the articulation axis E.

[0030] As shown in Figure 7, the fork branches 4a, 4b of the first articulation member 4 have formed in a central region thereof respective openings 15a, 15b through which the pyramidal portions 13a, 14a of the respective first and second retention parts 13, 14 are inserted. The fork branches 4a, 4b further comprise a plurality of recesses 32a, 32b in which the protruding plugs 22a, 22b are fitted. The protruding plugs 22a, 22b are sized such that they project from inner surfaces of the respective fork branches 4a, 4b when the first and second retention parts 13, 14 are assembled.

[0031] Thus, the contact of the cover portions 13b, 14b with the recessed area around the openings 15a, 15b prevents the first and second retention parts 13, 14 from being able to pass through the openings 15a, 15b of the first and second fork branches 4a, 4b, and the fitting of the protruding plugs 22a, 22b into the recesses 32a, 32b prevents the first and second retention parts 13, 14 from being able to rotate with respect to the first and second fork branches 4a, 4b. Nevertheless, it must be pointed out that even if the protruding plugs 22a, 22b and the recesses 32a, 32b were not present, the rotation of the first and second retention parts 13, 14 with respect to the first and second fork branches 4a, 4b would be prevented by the form fitting between the pyramidal portions 13a, 14a and the openings 15a, 15b.

[0032] The core 6 has a pair of housings 16a, 16b (only one of which is shown in Figure 9) open in the opposite axial ends thereof in which the pyramidal portions 13a, 14a of the respective first and second retention parts 13, 14 are fitted. The housings 16a, 16b have a shape complementary to that of the pyramidal portions 13a, 14a, thereby the core 6 cannot rotate in relation to the first and second retention parts 13, 14 and consequently, it also cannot rotate in relation to the first and second fork branches 4a, 4b of the first articulation member 4.

[0033] The first retention part 13 (Figures 3 and 10) has a through hole 18 aligned with the articulation axis E. This through hole 18 has an opening at an inner end of the pyramidal portion 13a and an opening with a countersink 18a at an axial end adjacent to an outer side of the first retention part 13. The through hole 18 is sized for receiving the rod of a connecting screw 17 and the countersink 18a is sized for housing a head 17a of the connecting screw 17 such that the head 17a does not project from the outer surface of the cover portion 13b.

[0034] The second retention part 14 (Figures 3 and 10) comprises a housing 20 and an axial cavity 21 aligned with the articulation axis E. The axial cavity 21 is in the form of a channel with an axial opening at the inner end of the pyramidal portion 14a and a longitudinal opening along the pyramidal portion 14a, and the housing 20 is in the form of a groove transverse to said axial cavity 21 and perpendicular to the articulation axis E with a radial access opening at the same lateral side as the longitudinal opening of the axial cavity 21. Therefore, the longitudinal opening of the axial cavity 21 intersects with the radial access opening of the housing 20 (Figure 10). The axial cavity 21 is sized for receiving an end portion of the rod of the connecting screw 17, and the housing 20 is sized for housing a nut 19 and configured for retaining said nut 19 such that it can neither rotate nor move axially in relation to the second retention part 14.

[0035] To keep the first and second retention parts 13, 14 connected to one another, the articulation device comprises connecting means including the mentioned connecting screw 17 and nut 19. The connecting screw 17 is inserted through the through hole 18 formed in the first retention part 13 and screwed in the nut 19 retained in the housing 20 of the second retention part 14.

[0036] When the connecting screw 17 is coupled and tightened to the nut 19, the first and second retention parts 13, 14 are attracted to one another until the inner surfaces of the protruding plugs 22a, 22b press the inner annular elements 11a, 12a of the respective bearings 11, 12 against the corresponding inner seats 23a, 23b formed in the core 6. By uncoupling the connecting screw 17 from the nut 19, the first and second retention parts 13, 14 can be removed and the articulation device can be easily disassembled in a reversible manner.

[0037] A person skilled in the art will be capable of introducing modifications and variations to the embodiment shown and described without departing from the scope of the present invention as defined in the attached claims.

Claims

1. An articulation device for a retractable awning arm, comprising:

   a first articulation member (4) fixed to a first arm segment (1) and a second articulation member (5) fixed to a second arm segment (2);
   a core (6) configured around an articulation axis (E) and supported between two fork branches (4a, 4b) formed in said first articulation member (4), said core (6) having an anchor (7) in which there is attached a terminal (31) of a flexible tie element (30) connected to an elastic member housed inside said second arm segment (2) and a supporting surface (8) on which said flexible tie element (30) is supported;
   a surrounding wall (9) formed in said second articulation member (5) and arranged around said core (6) with a clearance between both for accommodating the flexible tie element (30);
   bearing means arranged for guiding a relative rotation of the first and second articulation members (4, 5) around said articulation axis (E);
   first and second retention parts (13, 14) having respective portions inserted such that they cannot rotate through respective openings (15a, 15b) formed in the fork branches (4a, 4b) and coupled such that they cannot rotate in respective housings (16a, 16b) formed in the core (6); and
   connecting means keeping said first and second retention parts (13, 14) connected to one another;
   characterized in that said connecting means comprise a connecting screw (17) inserted through a through hole (18) formed in the first retention part (13) and screwed in a threaded hole formed in the second retention part (14) or in a nut (19) retained such that it can neither rotate nor move axially in a housing (20) of the second retention part (14).

2. The articulation device according to claim 1, **characterized in that** said through hole (18) is parallel to the articulation axis (E) or is aligned therewith, the second retention part (14) comprises an axial cavity (21) sized for receiving said connecting screw (17), and said housing (20) is in the form of a groove transverse to said axial cavity (21) and perpendicular to the articulation axis (E).

3. The articulation device according to claim 2, **characterized in that** the housing (20) has a radial access opening at a lateral side of the second retention

part (14).

4. The articulation device according to claim 3, **characterized in that** said axial cavity (21) has a longitudinal opening at the same lateral side of the second retention part (14) and intersects said radial access opening of the housing (20).

5. The articulation device according to claim 1, **characterized in that** the first and second retention parts (13, 14) have respective pyramidal portions (13a, 14a) and said housings (16a, 16b) of the core (6) are configured for fitting said pyramidal portions (13a, 14a).

6. The articulation device according to claim 5, **characterized in that** said through hole (18) and said axial cavity (21) are positioned at the centre of said respective pyramidal portions (13a, 14a) of the first and second retention parts (13, 14), aligned with the articulation axis (E).

7. The articulation device according to claim 1, **characterized in that** each of the first and second retention parts (13, 14) has at least one protruding plug (22a, 22b) fitting into a respective recess (32a, 32b) formed in the corresponding fork branch (4a, 4b).

8. The articulation device according to claim 7, **characterized in that** each of the first and second retention parts (13, 14) has a cover portion (13b, 14b) configured to be placed on an area of the respective fork branch (4a, 4b) around said opening (15a, 15b), and said plug (22a, 22b) extends from an inner surface of said cover portion (13b, 14b).

9. The articulation device according to claim 8, **characterized in that** each of the first and second retention parts (13, 14) has a plurality of said plugs (22a, 22b) distributed around the articulation axis (E), which are inserted through a plurality of said recesses (32a, 32b) and project from an inner surface of the corresponding fork branch (4a, 4b) for contacting with an inner annular element (11a, 12a) of a corresponding bearing (11, 12) of said bearing means.

10. The articulation device according to claim 1, **characterized in that** said bearing means comprise a pair of bearings (11, 12), each of which comprises an inner annular element (11a, 12a) fixed to the core (6) and an outer annular element (11b, 12b) fixed to said surrounding wall (9).

11. The articulation device according to claim 10, **characterized in that** the core (6) has a pair of inner seats (23a, 23b) configured for receiving said inner annular elements (11a, 12a) of the bearings (11, 12), and said anchor (7) and said supporting surface (8) are located between said pair of inner seats (23a, 23b).

12. The articulation device according to claim 10, **characterized in that** the surrounding wall (9) has a pair of outer seats (24a, 24b) configured for receiving said outer annular elements (11b, 12b) of the pair of bearings (11, 12).

13. The articulation device according to claim 1, **characterized in that** at least one of the bearings (11, 12) is a ball or roller bearing.

14. The articulation device according to claim 1, **characterized in that** said through hole (18) has a countersink (18a) at an axial end adjacent to an outer side of the first retention part (13) sized for housing a head (17a) of the connecting screw (17).

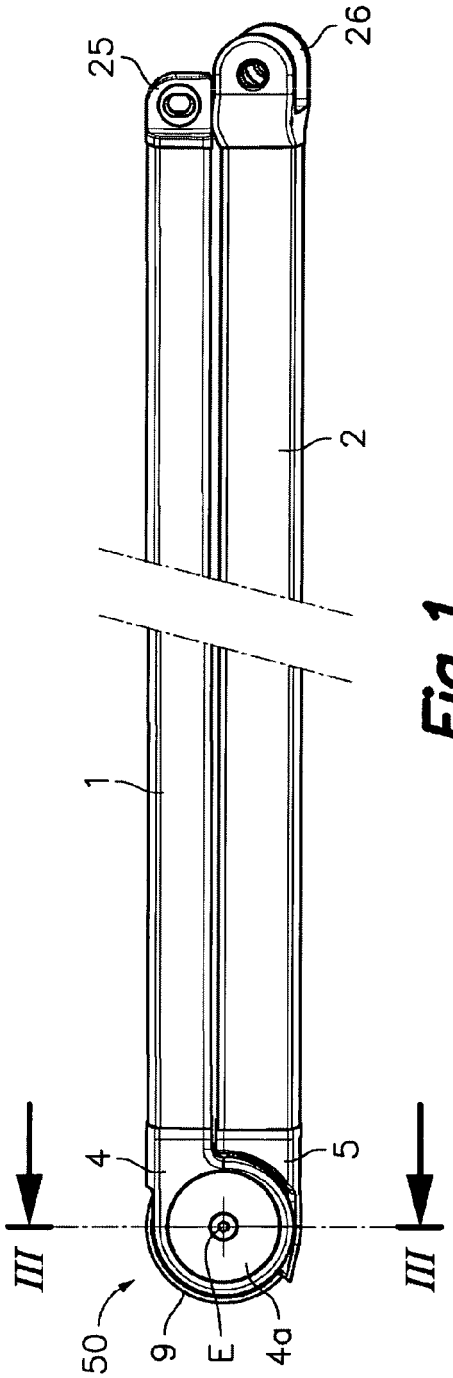


Fig.1

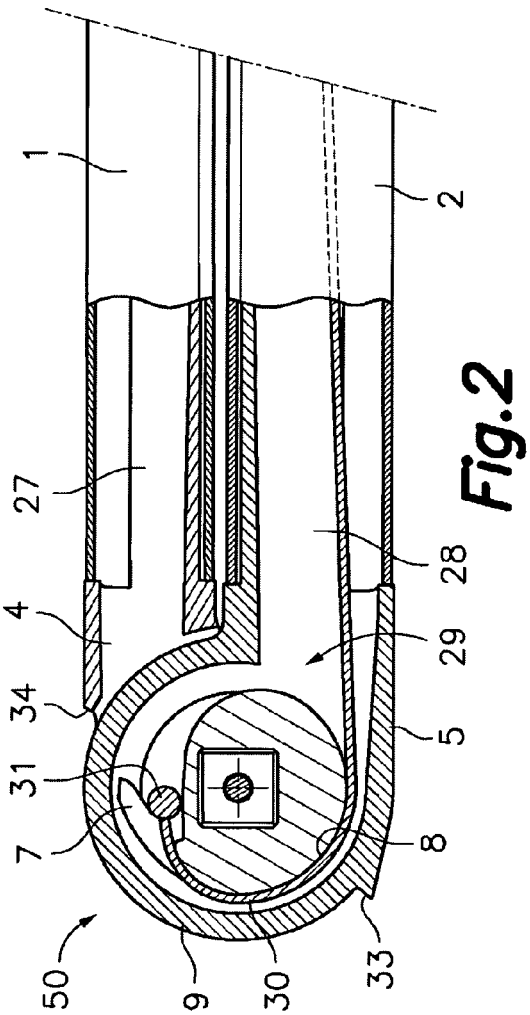
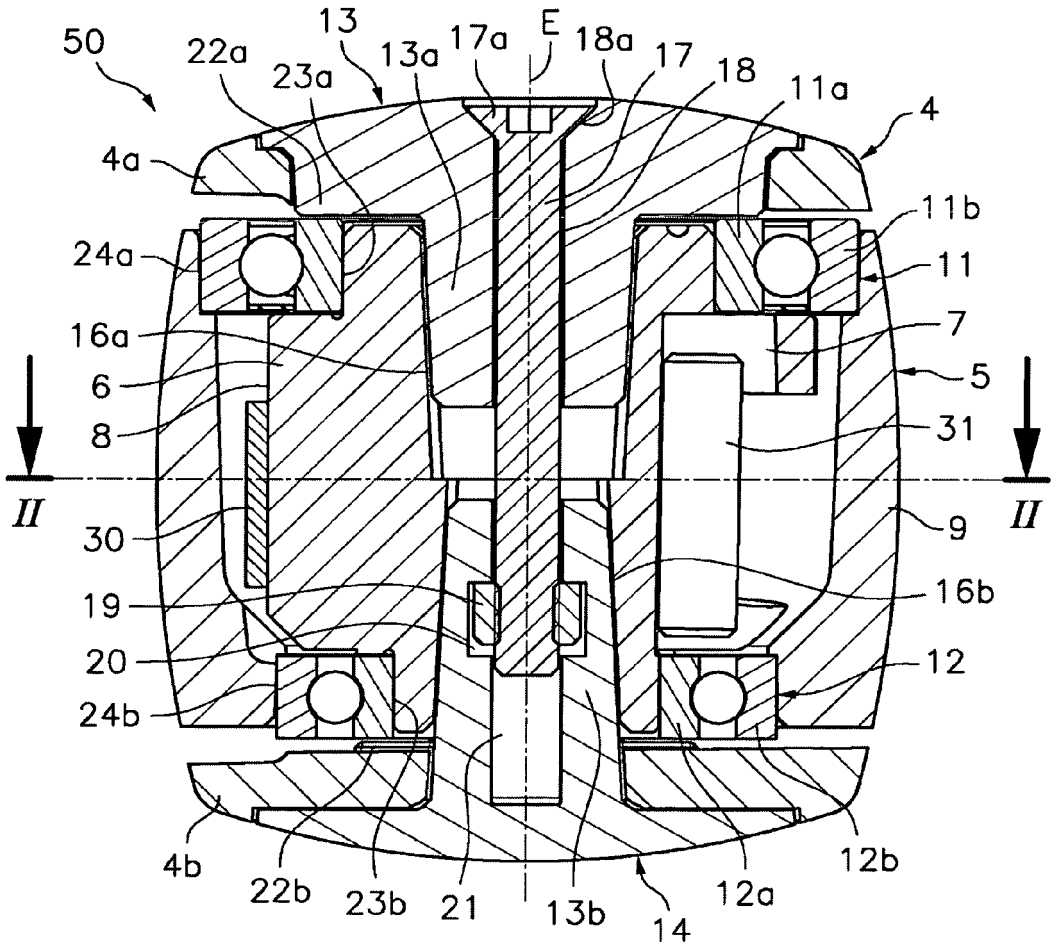


Fig.2


50
22a
13
23a
13a
17a
E
18a
17
18
11a
4
4a
11b
24a
11
16a
7
6
5
8
31
II
II
30
9
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16b
20
12
24b
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23b
21
13b
14
12a
12b

Fig.3

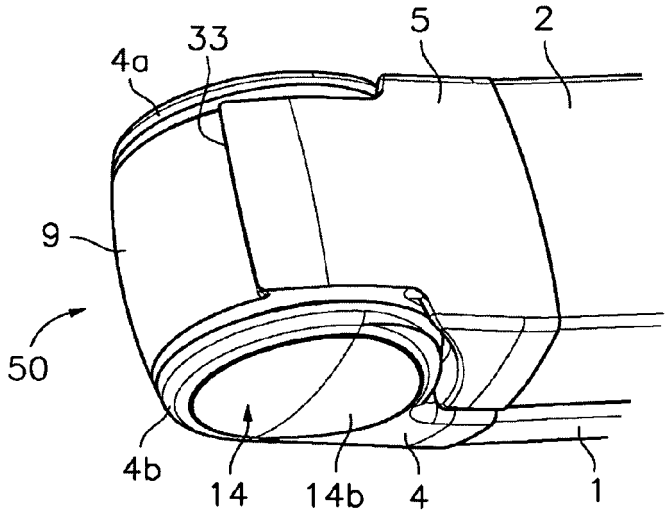

33
5
2
4a
9
50
4b
14
14b
4
1

Fig.4

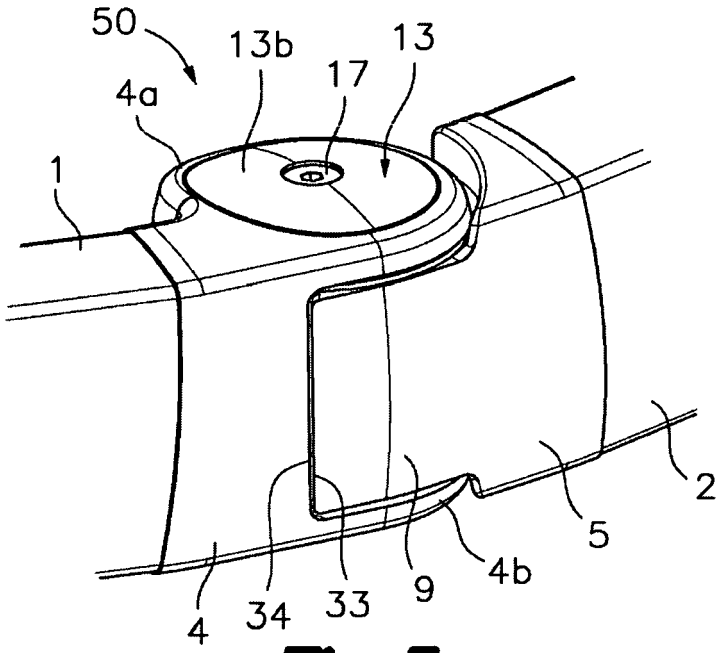


Fig.5

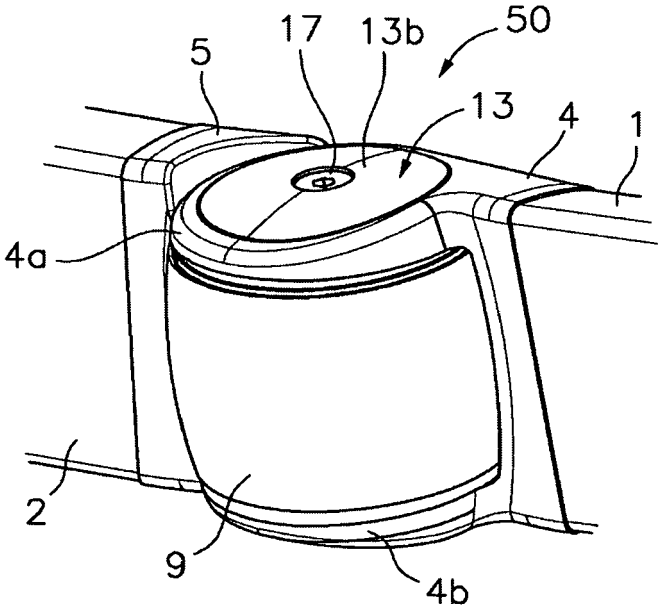


Fig.6

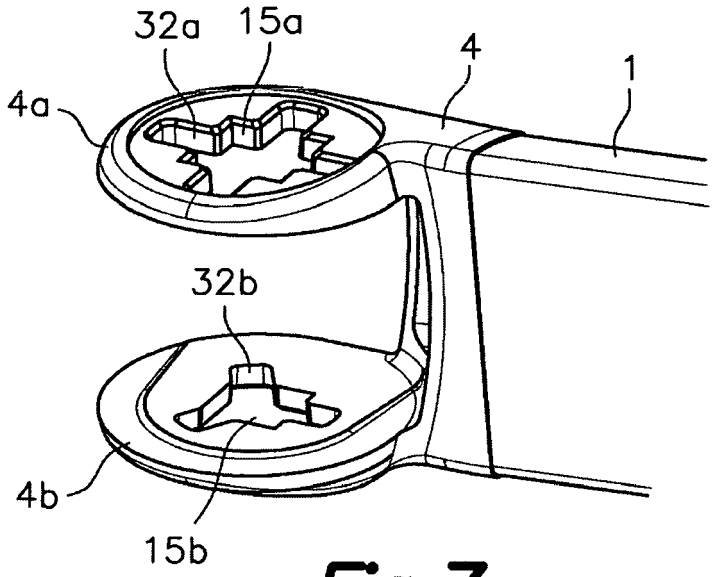


Fig.7

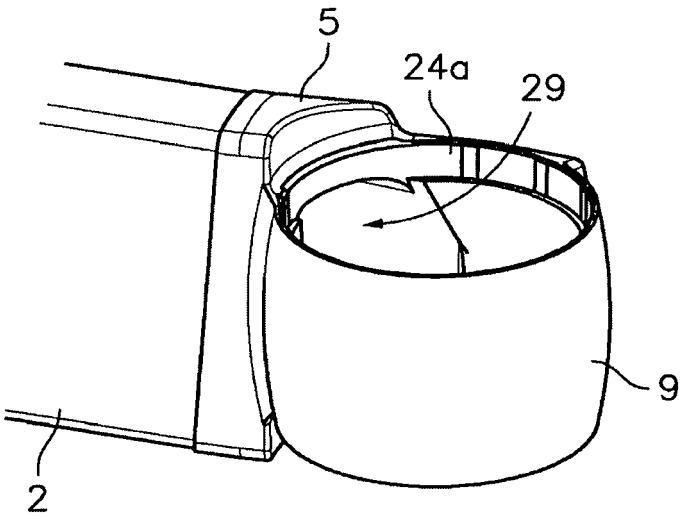
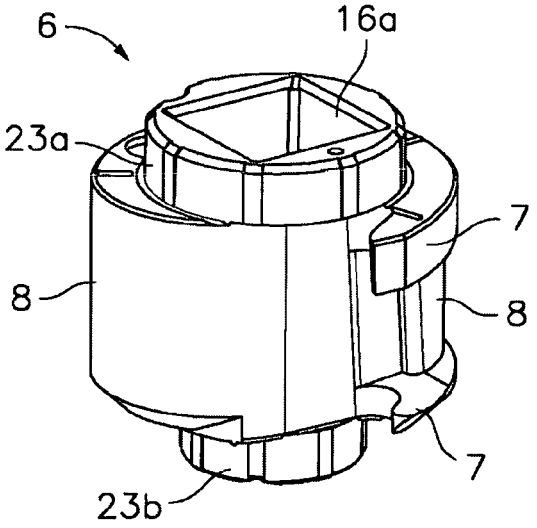


Fig.8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16a
23a
7
8
8
7
23b

Fig.9

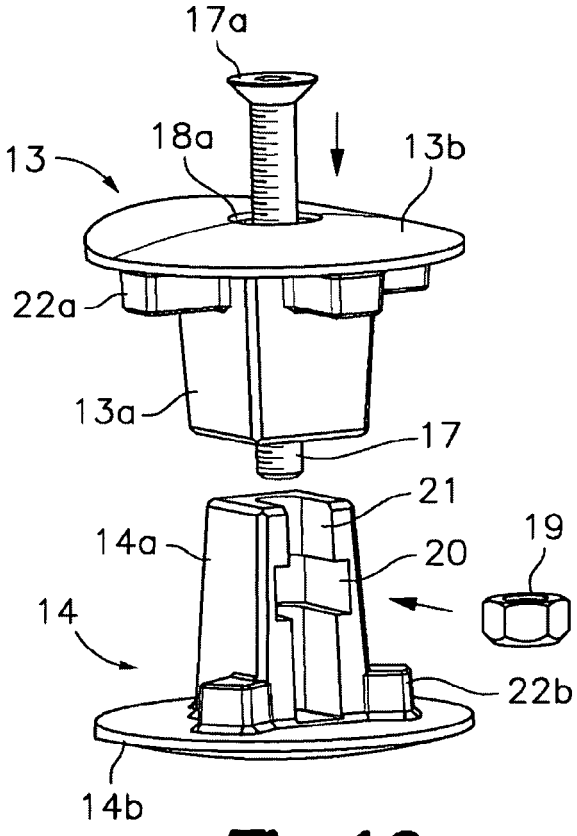
17a
18a
13
13b
22a
13a
17
21
19
14a
20
14
22b
14b

Fig.10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 11 38 0104

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y,D	WO 2008/037815 A1 (LLAZA SA [ES]; LLAGOSTERA FORNS JOAN [ES]) 3 April 2008 (2008-04-03)	1,7-13	INV. E04F10/06
A	* abstract; figures 1-6 *	2-6	
Y	EP 1 650 373 A1 (LLAZA SA [ES]) 26 April 2006 (2006-04-26) * abstract * * paragraph [0022]; figures 1-4 *	1,7-13	

TECHNICAL FIELDS SEARCHED (IPC)

E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 July 2012	Koulo, G

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