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(54) Device for mutually locking/releasing either the backrest or the seat or both, particularly for chairs

(57) A device (101) for mutually locking/releasing either the back or the seat or both, particularly for chairs, comprising a box-like structure (102), which can be associated with a seat and with a stem of a gas-assisted spring, to which a supporting element (103) for a back is articulated in contrast with an elastic element, and comprising a pivot (114), which can move axially in contrast with a first elastically deformable element (113) or a second elastically deformable element (117).

A lever (104) is provided, which can be gripped by the user, and which can be associated rotatably with, and which protrudes laterally from, the box-like structure (102).

Means adapted to actuate the axial movement of the pivot (114) upon a clockwise or counterclockwise rotation imparted to the lever (104) are associated axially with the lever (104).

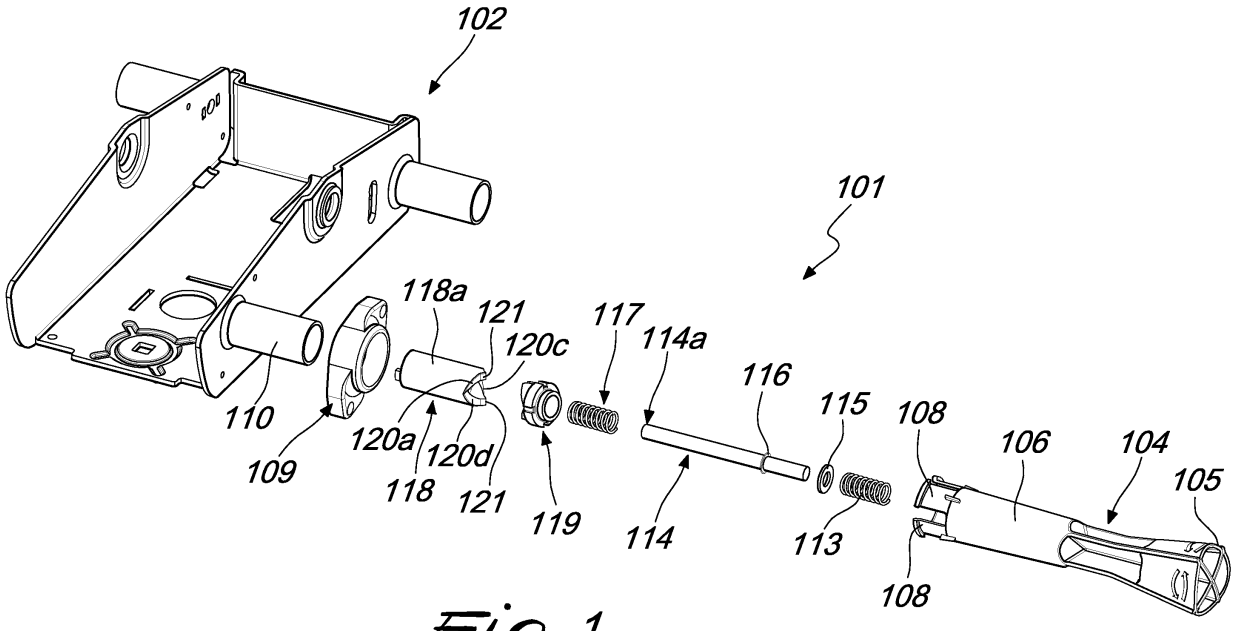

Fig. 1

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Description

[0001] The present invention refers to a device for mutually locking/releasing either the back or the seat or both, particularly for chairs.

[0002] Nowadays devices are known which are adapted to predetermine the achievement of a desired inclination between the seat and the back of a chair or armchair.

[0003] Thus, DE 4.318.516 A1 is known, in which a device is disclosed for modifying the reciprocal positioning between two movable components of a seat, such device comprising a lock-bolt which engages with a toothing which is jointly connected to the body of a chair in order to lock it in several different positions.

[0004] The device can be said to be bistable, in that it allows two distinct stable positions of the lock-bolt to be determined.

[0005] Movement of the lock-bolt is in fact actuated by a device that is accommodated in a container, the lock-bolt being jointly connected to a bracket to which a pair of pivots is fixed, in axially offset positions with respect to each other, a first spring acting between the bracket and the container while a second spring, stronger than the first, acts between the container and an enlarged head of the pivot.

[0006] The device is actuated by the user by imposing a rotation upon a lever or cam, which pushes upon the head of the pivot. This rotation is impressed according to an axis that is perpendicular to that of the pivot. The lever has a determined, but not inconsiderable, length in order to allow the user to impose, following the effort brought to bear to obtain its rotation, a sufficient axial thrust upon the head, and this constitutes a drawback owing to the consequent spatial arrangement that is imposed by the various components.

[0007] This known solution has many other drawbacks, in addition to the structural complexity of the arrangement of, and the volume occupied by, the individual components, such as the need to act anyway with a determined rotation force on the lever in order to obtain movements to the desired extent; in addition the lever is not easy to activate, since it has to transform a rotation force impressed on the lever into an axial thrust for the pivot.

[0008] Lastly, sticking points can be identified in the mechanical interaction between the lock-bolt and the toothed wheel.

[0009] Also known is the Italian Utility Model No. 225116 in the name of DONATI S.r.l., which refers to a rocking assembly for seats with a device for locking in various different positions in which a device is shown that interacts with the lever arm to lock it in different positions or release it, respectively in order to permit or not permit the rocking of the rocking support, and with it the seating elements, with respect to the box-shaped body.

[0010] The device comprises a command lever that is susceptible to rotation about one of its axes, to which is associated, approximately radially, a rigid tension member with one end connected to such lever, and a locking element which is connected to the other end of the tension member.

[0011] The locking element rotates in its turn about a vertical axis and moves towards and away from the lever arm following the rotation of the command lever.

[0012] Springs are provided which make the device substantially bistable, i.e. following successive activations of the command lever the device is capable of ensuring two corresponding stable positions.

[0013] The device has a number of drawbacks, however: first and foremost, it is composed of many components, which are located in various positions in the seat and are interconnected with each other, which make its manufacture and assembly expensive.

[0014] In addition, activation of the locking element is achieved by rotating the lever, but this transmits motion by means of the interposition of the rigid tension member, such member being able to disengage or deform following the forces impressed upon it.

[0015] The articulation of the locking element also contributes to defining further drawbacks, which are due both to the possible problems in activation owing to possible seizing or limitations to the freedom to slide between elements, and also to the force that is necessary to impress in order to defeat both the resistance of a spring and the friction present between the lever arm and the locking element, such friction being much greater because the user is seated during the manoeuvre and therefore the coupling between the lever arm and the locking element is increased.

[0016] Also known is EPA 0902634 which discloses a device for adjusting the inclination of the seat in chairs and armchairs in general, **characterised in that** it comprises a lock-bolt which is part of the locking element and which is fixed to one of the two parts of the seat support, a plurality of holes cut into the other part of the seat support in positions that can be engaged by the lock-bolt and which correspond to the different reciprocal inclinations between the two parts of such support, a stem for axially commanding such lock-bolt, an axially bistable device for controlling such stem, a pair of preloaded springs interposed between such stem and such bistable device and a button to command such bistable device.

[0017] This solution also has many drawbacks: first and foremost, activation of the device must take place by means of a button, which is usually placed on a grip which is located below the chair, such button not being easy to activate.

[0018] In addition the lock-bolt is located far from the button, necessitating the presence of the stem, accommodated in a provided sheath, for the interconnection between the lock-bolt and the button for its activation.

[0019] Still further, the presence of the sheath may lead to the non-optimal activation of the lock-bolt, since when the button is activated the stem might not slide optimally inside the sheath, or equally it might lead to a deformation of the stem which frustrates the thrust with

respect to the lock-bolt.

[0020] The aim of the present invention is to solve the above mentioned technical problems, eliminating the drawbacks of the cited known art, by providing a device that makes it possible to rapidly and simply achieve the mutual locking/releasing of the back and the seat or only the seat or only the back of a chair, at the same time making it possible to obtain an optimal transmission of the forces.

[0021] Within this aim, an object of the invention is to provide a device that is structurally simple and compact, thus limiting the space occupied by it.

[0022] Another object of the invention is to provide a device which can be rapidly assembled to a chair and easily maintained.

[0023] A further object is to provide a device that combines the foregoing characteristics with low cost manufacture and which can be made with the usual known plants.

[0024] This aim and these objects, as well as others which will become better apparent hereinafter, are achieved by a device for mutually locking/releasing either the back or seat or both, particularly for chairs, comprising a box-like structure, which can be associated with a seat and with a stem of a gas-assisted spring, to which a supporting element for a back is articulated in contrast with an elastic element, and comprising a pivot, which can move axially in contrast with a first elastically deformable element or a second elastically deformable element, a lever being provided which can be gripped by the user and which can be associated rotatably with, and which protrudes laterally from, said box-like structure, **characterized in that** means adapted to actuate the axial movement of said pivot upon a clockwise or counterclockwise rotation imparted to said lever are associated axially with said lever.

[0025] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular, but not exclusive, embodiment thereof, illustrated by way of an indicative and non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective and exploded view of a device and a box-like structure according to the invention;

Figures 2 and 3 are respectively a top view and a front view of the device;

Figure 4 is a sectional view taken along the line IV-IV of Figure 2 when the device is in the released condition;

Figure 5 is a similar view to that of Figure 1 in which the supporting element has been added and the position of the movable helical structure has been altered;

Figure 6 is a similar view to that of Figure 4 when the device is in the locked condition;

Figures 7, 8, 9, 10 and 11 are different views of the second movable helical structure;

Figure 12 is a partially sectional view of the lever;

Figure 13 is a partially sectional view of the device associated with the box-like structure which is in turn associated with the support;

Figures 14, 15 and 16 are two different views of the first fixed helical structure.

[0026] In the embodiments that follow, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0027] In addition, it should be noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subj ect of a disclaimer.

[0028] With reference to the figures, the reference numeral 101 designates a device for mutually locking/releasing the back and the seat or only the seat or only the back (seat and back not shown), particularly for chairs, comprising a box-like structure 102, which can be associated with the seat and with a stem of a gas-assisted spring (not shown), to which a supporting element 103 for the back is articulated in contrast with an elastic element (not shown).

[0029] The device 101 is constituted by a lever 104 which is constituted by a handle 105 for the user, from which a substantially cylindrical and hollow box-like body 106 protrudes axially, elastically deformable appendages 108 being provided radially at the end 107 of such body for temporary and rotary interconnection with a bush 109 that can be associated laterally with the box-like structure 102 at and coaxially to an appropriately provided cylindrical flange 110, which is hollow internally and which protrudes at right angles to the lateral surface 111 of the box-like structure 102, a first hole 128 being provided at such structure.

[0030] Inside the box-like body 106, on the side that lies opposite with respect to the end 107 and axially contiguous to the handle 105, a sleeve 112 protrudes and acts as a seat for a first elastically deformable element 113 which is arranged coaxially to a pivot 114 and is interposed between the end of the sleeve 112 and a washer 115 which is fitted on the pivot 114 and which in turn abuts against a first annular ridge 116, which is radial with respect to the pivot 114.

[0031] A second elastically deformable element 117 is arranged coaxially to the remaining part of the pivot 114, which is directed toward the bush 109.

[0032] Means adapted to actuate the axial movement of the pivot 114 upon a clockwise or counterclockwise rotation imparted to the handle 105 of such lever by the user are associated axially with such lever, such means being constituted by a first fixed helical structure 118 and by a second movable helical structure 119.

[0033] The first fixed helical structure 118 is constituted by a cylindrical and hollow element 118a which is arranged coaxially and internally to the cylindrical flange

110 and is slightly shorter than such flange.

[0034] The first helical structure 118 is fixed, i.e. the cylindrical element 118a is prevented from performing any rotation.

[0035] The end 118b of the first fixed helical structure 118 that is directed away from the box-like structure 102 has a particular shape, being constituted substantially by two first pairs of surfaces 120a, 120b, 120c, 120d which are approximately V-shaped and which are mutually mirror-symmetrical with respect to a plane that is diametrical to the cylindrical element 118a and which protrude, at first vertices 121, toward the handle 105.

[0036] The shape of such two first pairs of surfaces is helical.

[0037] A first seat 122 is provided at the end 118b of the first fixed helical structure 118, axially with respect to the cylindrical element 118a and along part of its length, for a corresponding end of the second elastically deformable element 117 which is thus interposed between the first ridge 116 and the bottom of the first seat 122.

[0038] The second movable helical structure 119 is constituted by a cylindrical and hollow element 119a on the lateral surface of which there are, preferably along diametrical axes, four second seats 123 for ridges 124 that protrude internally and axially with respect to the box-like body 106 of the lever 104.

[0039] The interaction between the ridges 124 and the second seats 123 jointly and rotatably connects the second movable helical structure 119 to the lever 104.

[0040] The inside diameter of the second movable helical structure 119 is such as to allow it to be arranged coaxially and externally to the second elastically deformable element 117 and therefore also to the pivot 114, its end directed toward the sleeve 112 abutting against the washer 115.

[0041] The end 118b of the second fixed helical structure 119 that is directed toward the box-like structure 102 has a particular shape that is constituted substantially by second pairs of surfaces 125a, 125b, 125c, 125d which are approximately V-shaped and which are mutually mirror-symmetrical with respect to a plane that is diametrical to the cylindrical element 119a and which protrude, at the second vertices 126, toward the two first pairs of surfaces 120a, 120b, 120c, 120d, so as to interact with them upon a rotation imparted to the handle 105.

[0042] The first and second pairs of surfaces are therefore helical, so that a rotation imparted to the second moving helical structure 119 is matched by a retraction or advancement thereof toward the handle 105 with consequent loading or unloading of the first elastically deformable element 113.

[0043] At the second vertices 126, third seats 127 are provided for the first vertices 121 of the two first pairs of surfaces 120a, 120b, 120c, 120d, so as to allow a temporarily stable condition between the first fixed helical structure 118 and the second movable helical structure 119.

[0044] The operation of the device according to the invention is as follows.

[0045] In the condition where the seat and the back are mutually released, shown in Figure 4, the end 114a of the pivot 114 protrudes beyond the first hole 128 formed on the lateral surface 111 of the box-like structure 102, such end however not engaging with any of the second holes 129 formed on the opposite lateral surface 103a of the support 103.

[0046] In this condition the first elastically deformable element 113 is preloaded and tends to push the pivot 114 toward the second holes 129.

[0047] Moreover, the condition is stable because of the interaction between the first and second vertices of the first pairs of surfaces 120a, 120b, 120c, 120d and of the second pairs of surfaces 125a, 125b, 125c, 125d.

[0048] If the user imparts a rotation to the lever 104, clockwise or anticlockwise, of ninety degrees, then in the same way a rotation is imparted to the second movable helical structure 119 which leads to the mutual decoupling of the first vertices and the second vertices and the reciprocal sliding of the first pairs of surfaces 120a, 120b, 120c, 120d against the second pairs of surfaces 125a, 125b, 125c, 125d forced by the first elastically deformable element 113.

[0049] Thus a second condition of equilibrium is achieved, shown in Figure 6, of mutually locked positioning of the seat and the back because the end of the pivot 114 passes through one of the various second holes 129.

[0050] In this condition the second elastically deformable element 117 is preloaded, which will help achieve the release upon a subsequent rotation of such lever.

[0051] In practice it has been found that the invention fully achieves the intended aim and objects, since a device is obtained that makes it possible to rapidly and simply achieve the mutual locking/releasing of the back and the seat of a chair, thanks to the low number of components it contains and their compaction in the body of the lever.

[0052] This shape of the device makes it possible to optimally transmit the forces directly from the lever to the pivot, so achieving the mutual locking/releasing of the seat and the back without effort.

[0053] The device therefore occupies a small space and is completely outside the box-like structure, which makes its rapid assembly possible as well as its maintenance.

[0054] Naturally the materials used as well as the dimensions constituting the individual components of the invention may be more relevant according to specific requirements.

[0055] The various different means for effecting certain different functions shall not in any way coexist in the illustrated embodiment only, but may be present in and of themselves in many embodiments, even if not illustrated.

[0056] The characteristics indicated as advantageous, advisable or similar, may also be lacking or be substituted by equivalent characteristics.

[0057] The disclosures in Italian Patent Application No.

TV2009A000110 from which this application claims priority are incorporated herein by reference.

[0058] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device (101) for mutually locking/releasing either the back or the seat or both, particularly for chairs, comprising a box-like structure (102), which can be associated with a seat and with a stem of a gas-assisted spring, to which a supporting element (103) for a back is articulated in contrast with an elastic element, and comprising a pivot (114), which can move axially in contrast with a first elastically deformable element (113) or a second elastically deformable element (117), a lever (104) being provided which can be gripped by the user and which can be associated rotatably with, and which protrudes laterally from, said box-like structure (102), **characterized in that** means adapted to actuate the axial movement of said pivot (114) upon a clockwise or counterclockwise rotation imparted to said lever (104) are associated axially with said lever (104).

2. The device according to claim 1, **characterized in that** said lever (104) is constituted by a handle (105) for the user, from which a substantially cylindrical and hollow box-like body (106) protrudes axially, elastically deformable appendages (108) being provided radially at the end (107) of said body for temporary and rotary interconnection with a bush (109) that can be associated laterally with said box-like structure (102) at and coaxially to an appropriately provided cylindrical flange (110), which is hollow internally and protrudes at right angles to the lateral surface (111) of said box-like structure (102), a first hole (128) being provided at said structure.

3. The device according to claim 2, **characterized in that** a sleeve (112) protrudes inside said box-like body (106), on the side that lies opposite with respect to the end (107) and is axially contiguous to said handle (105), and acts as a seat for said first elastically deformable element (113) arranged coaxially to said pivot (114) and interposed between the end of said sleeve (112) and a washer (115) that is fitted on said pivot (114) and in turn abuts against a first annular ridge (116), which is radial with respect to said pivot (114), a second elastically deformable element (117) being arranged coaxially to the remaining part of said pivot (114), which is directed toward said bush (109).

4. The device according to claim 3, **characterized in that** means adapted to actuate the axial movement of said pivot (114) upon a clockwise or counterclockwise rotation imparted to said handle (105) by the user are associated axially with said lever (104), said means being constituted by a first fixed helical structure (118) and by a second movable helical structure (119).

5. The device according to claim 4, **characterized in that** said first fixed helical structure (118) is constituted by a cylindrical and hollow element (118a), which is arranged coaxially and internally to said cylindrical flange (110) and is slightly shorter than said flange, said first helical structure (118) being fixed **in that** said cylindrical element (118a) is prevented from performing any rotation.

6. The device according to claim 5, **characterized in that** the end (118b) of said first fixed helical structure (118) that is directed away from said box-like structure (102) has a shape that is constituted substantially by two first pairs of surfaces (120a, 120b, 120c, 120d), which are approximately V-shaped and are mutually mirror-symmetrical with respect to a plane that is diametrical to said cylindrical element (118a) and protrude, at the first vertices (121), toward said handle (105), the shape of said two first pairs of surfaces (120a, 120b, 120c, 120d) being helical.

7. The device according to claim 6, **characterized in that** a first seat (122) is provided, at said end (118b) of said first fixed helical structure (118), axially with respect to said cylindrical element (118a) and along part of its length, for a corresponding end of said second elastically deformable element (117), which is thus interposed between said first ridge (116) and the bottom of said first seat (122).

8. The device according to claim 4, **characterized in that** said second movable helical structure (119) is constituted by a cylindrical and hollow element (119a), on the lateral surface of which there are four second seats (123) for ridges (124) that protrude internally and axially with respect to the box-like body (106) of the lever (104), the interaction between said ridges (124) and said second seats (123) jointly connecting said second movable helical structure (119) to said lever (104) for rotation.

9. The device according to claim 4, **characterized in that** the inside diameter of said second movable helical structure (119) is such as to allow to arrange it coaxially and externally to said second elastically deformable element (117) and therefore also to said pivot (114), its end directed toward said sleeve (112)

abutting against said washer (115).

10. The device according to claim 9, **characterized in that** the end (118b) of said second movable helical structure (119) that is directed toward said box-like structure (102) has a shape that is constituted substantially by second pairs of surfaces (125a, 125b, 125c, 125d), which are approximately V-shaped and mutually mirror-symmetrical relative to a plane that is diametrical with respect to said cylindrical element (119a) and protrude, at second vertices (126), in the direction of said two first pairs of surfaces (120a, 120b, 120c, 120d), so as to interact with them upon a rotation imparted to said handle (105), said first and second pairs of surfaces having a helical shape, so that a rotation imparted to said second movable helical structure (119) is matched by a retraction or advancement thereof toward said handle (105), with consequent loading or unloading of said first elastically deformable element (113).

11. The device according to claim 10, **characterized in that** third seats (127) are provided at said second vertices (126) for the first vertices (121) of said two first pairs of surfaces (120a, 120b, 120c, 120d), so as to allow a temporarily stable condition between said first fixed helical structure (118) and said second movable helical structure (119).

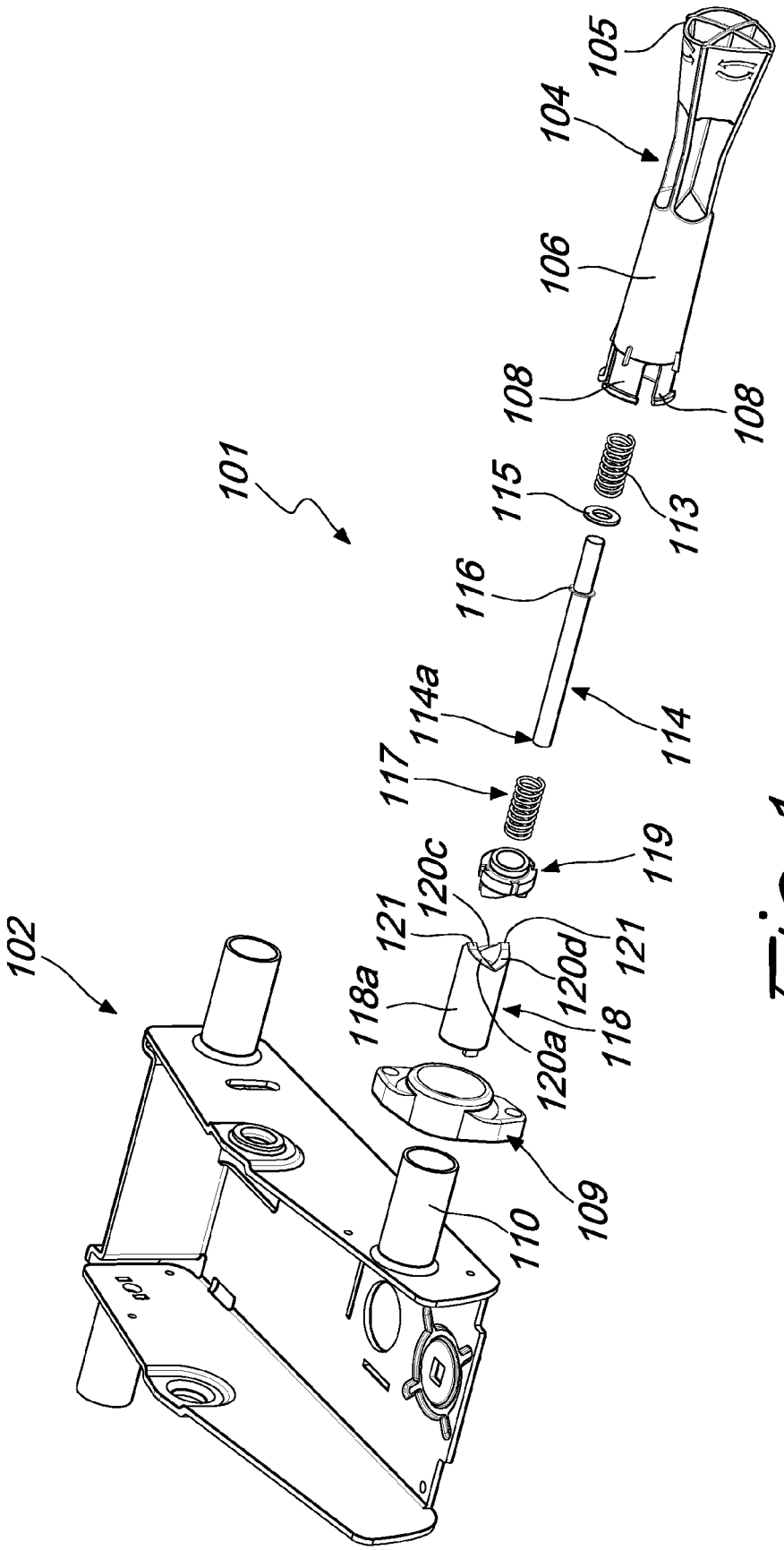
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Fig. 1

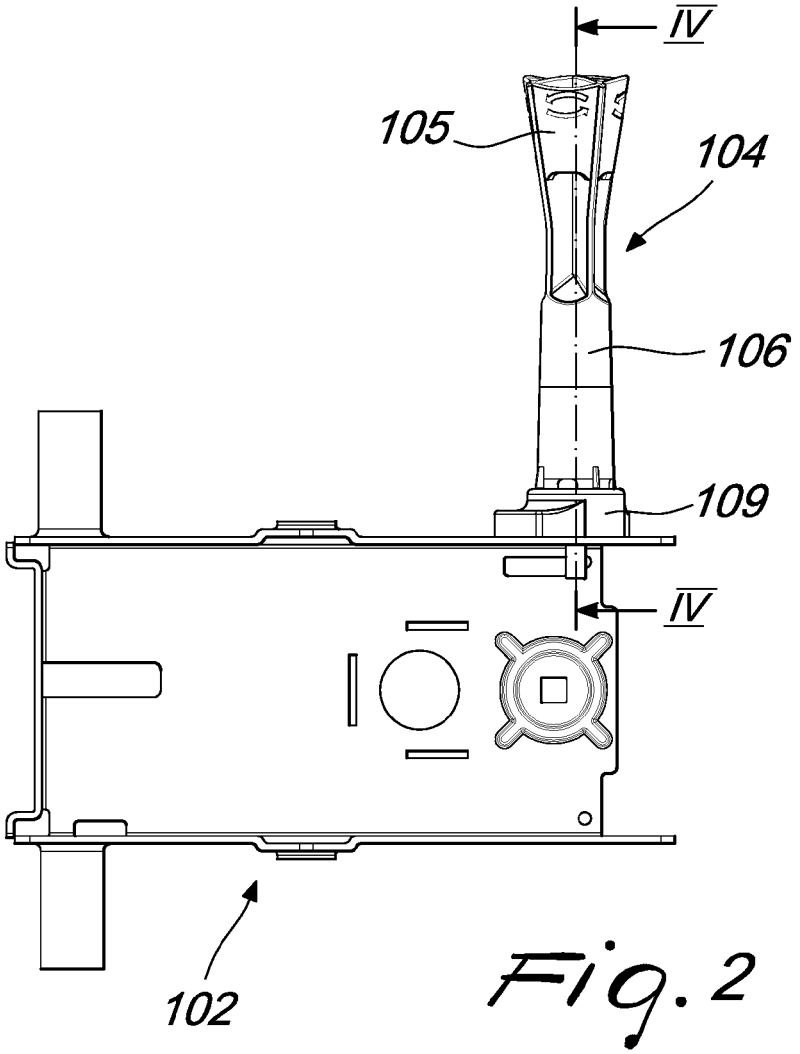

Fig. 2

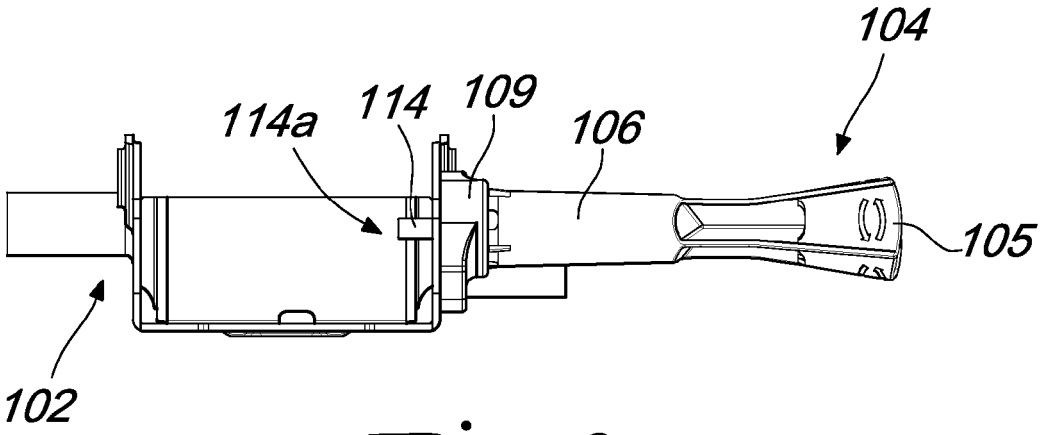

Fig. 3

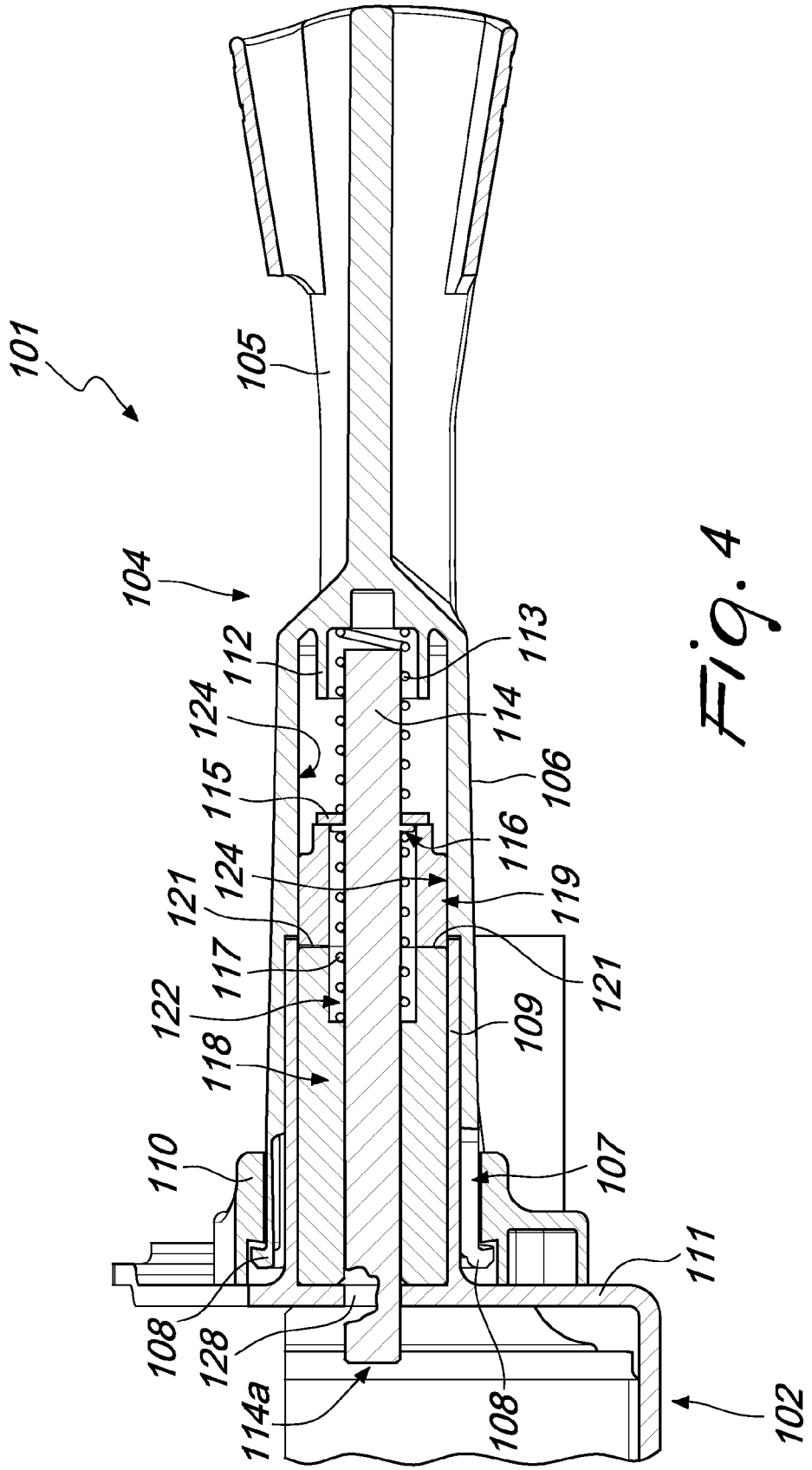
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Fig. 4

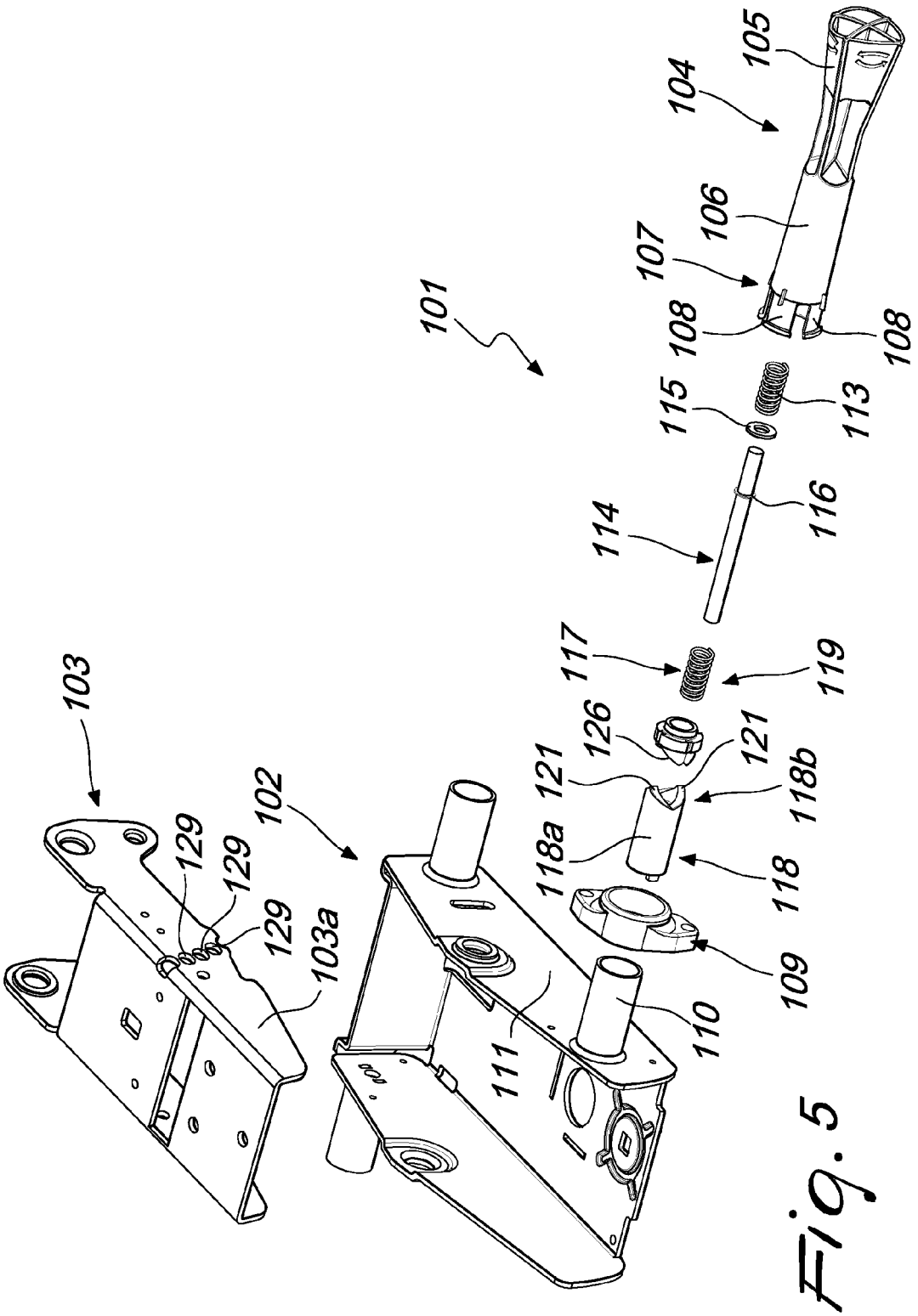
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Fig. 5

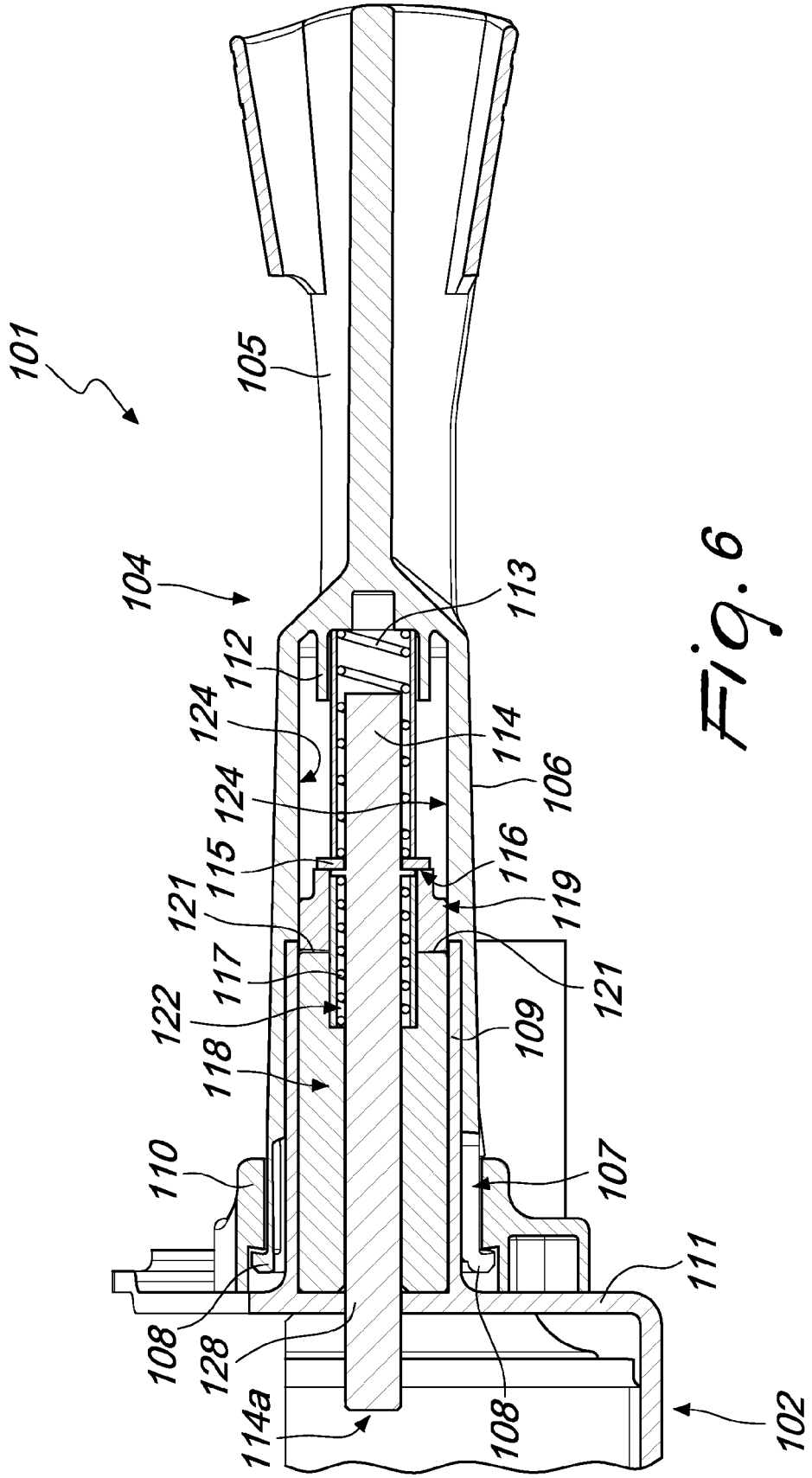
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Fig. 6

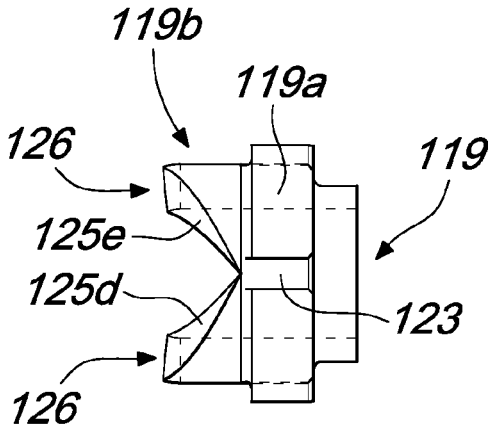

Fig. 7

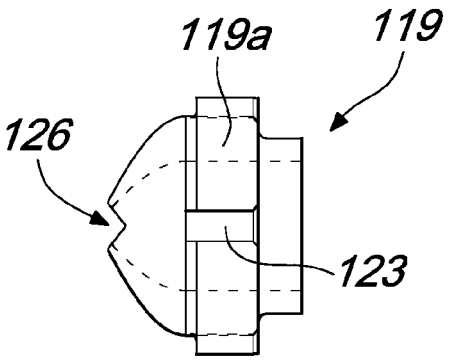

Fig. 8

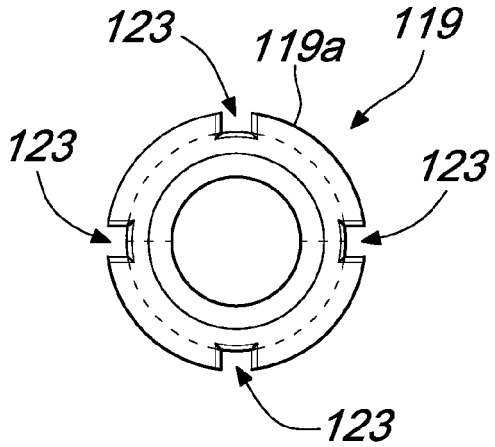

Fig. 9

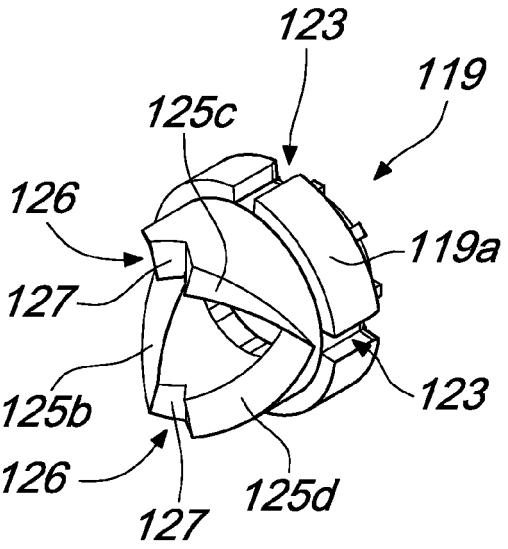

Fig. 10

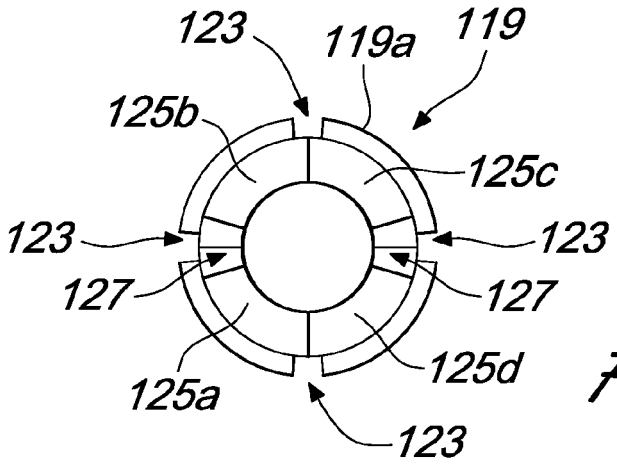

Fig. 11

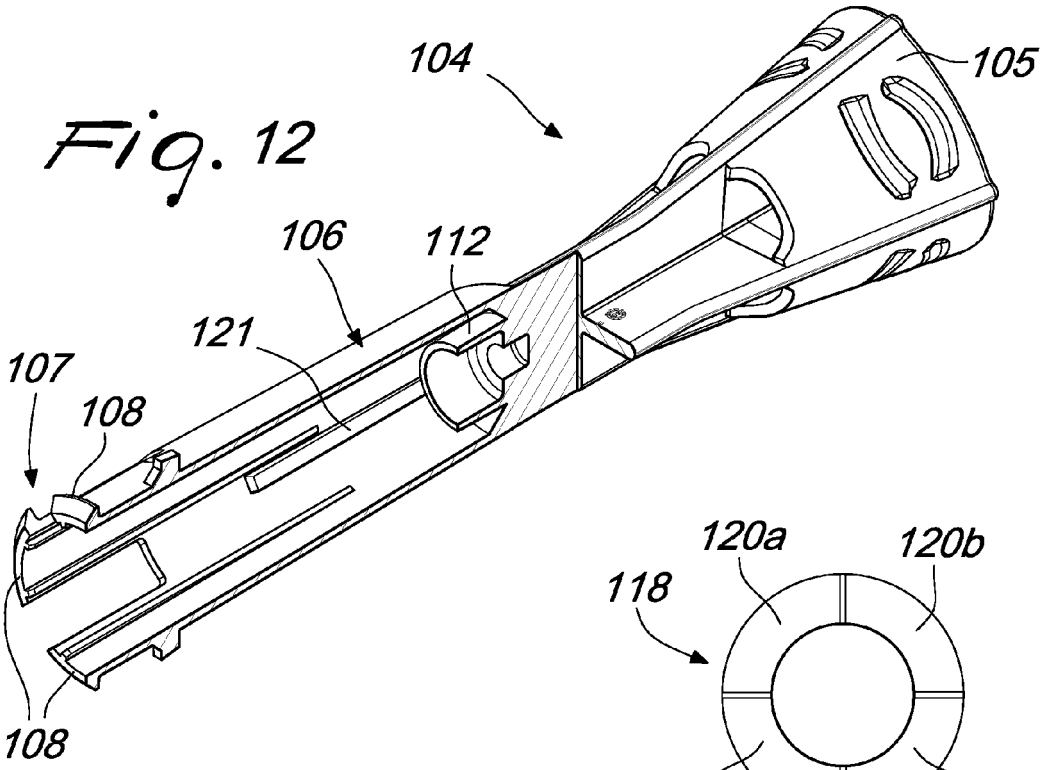

Fig. 12

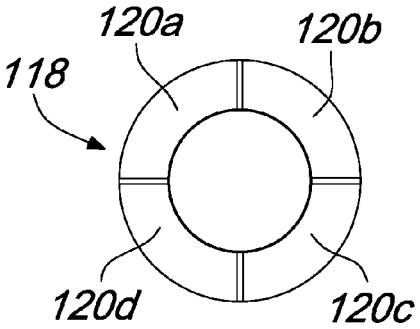

Fig. 14

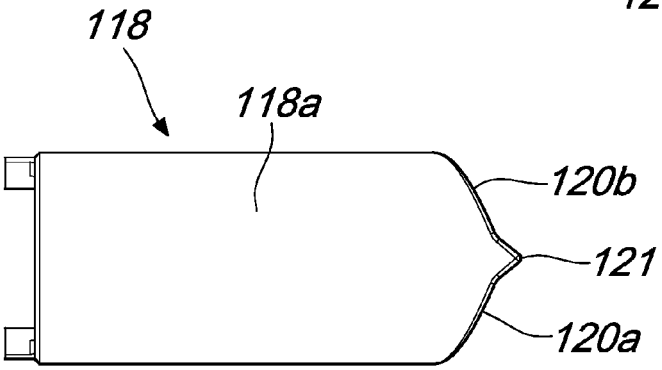

Fig. 15

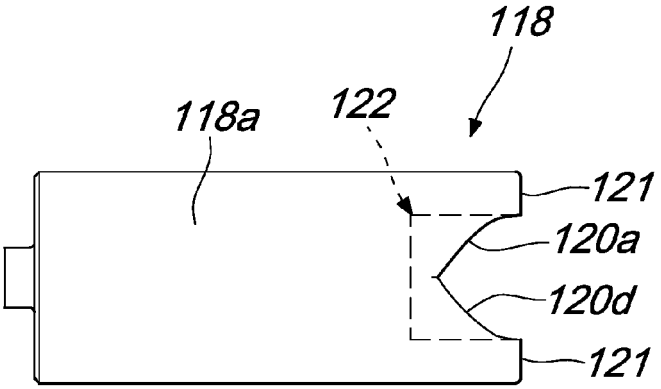

Fig. 16

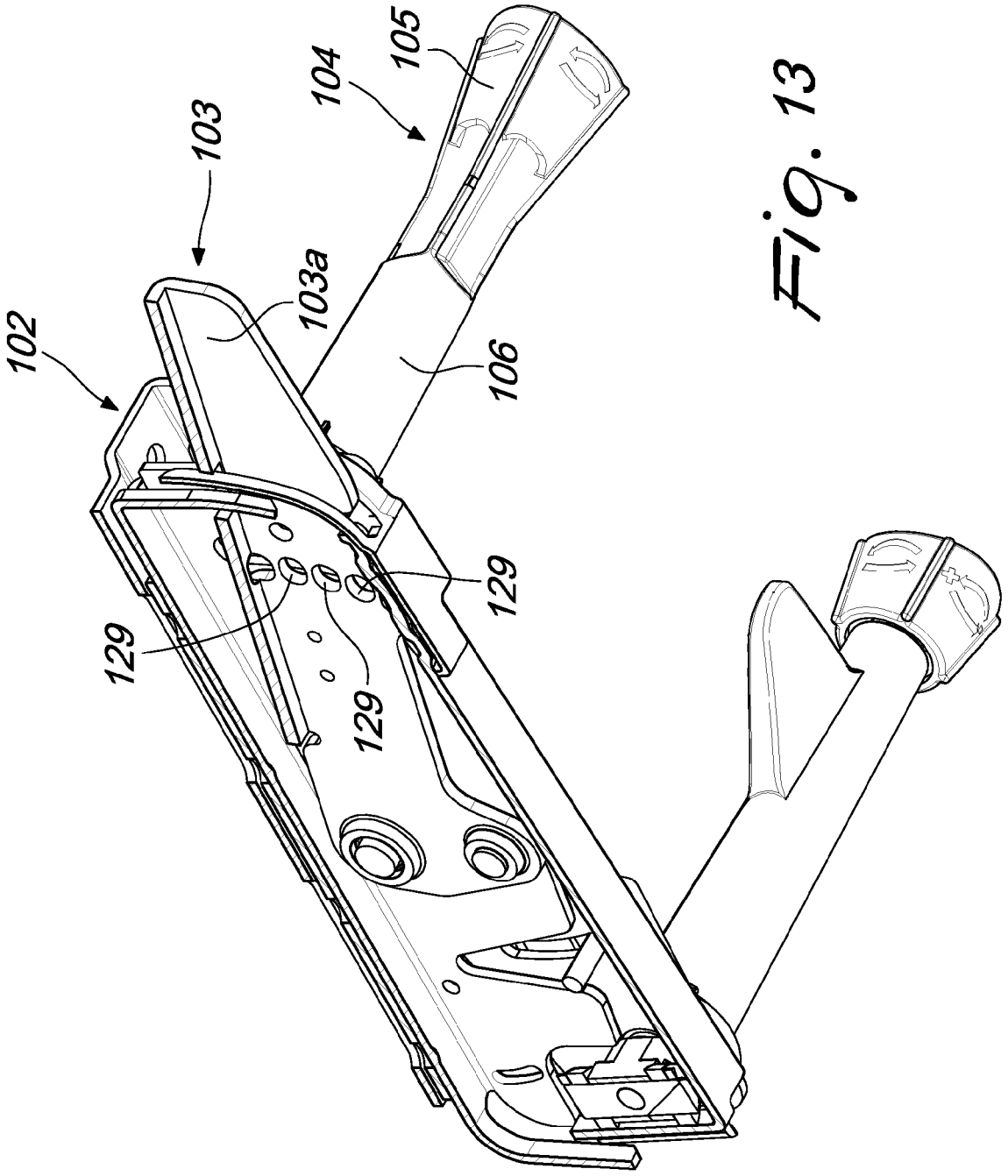

Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 10 16 3328

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 September 2010	MacCormick, Duncan

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