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(54) Box-like container for electrical actuators for automating doors or windows

(57) A box-like container for electrical actuators for automating doors or windows, containing internally an electric motor (14), the associated electronic components (15), at least part of a push-pull element (12) for moving the leaf of the door or window, and a gear train (16) for reduction and torque transmission. The box-like container is constituted by two shell portions, a first one (17) and a second one (18), which form the outer enclosure and have corresponding internal partitions (24), which when juxtaposed when the shell portions (17, 18) are closed onto each other, provide a first chamber (20) for the motor (14), the electronic components (15) and at least part of the gear train (16), and a second chamber (21) for at least part of the push-pull element (12), a gasket (23) being interposed between the two shell portions (17, 18) and being shaped so as to cover the facing perimetric edges (17a, 18a) of the two shell portions (17, 18) and the edges (24a) of the juxtaposed partitions (24) which divide the first chamber (20) from the second chamber (21).

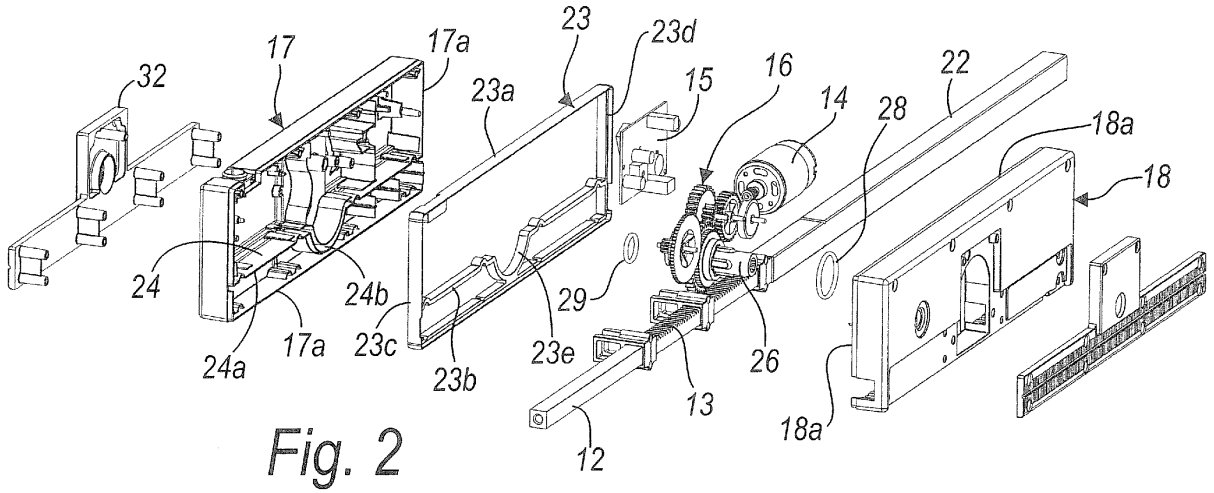

Fig. 2

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Description

[0001] The present invention relates to a box-like container for electrical actuators for automating doors or windows.

[0002] Electrical actuators for automating doors or windows, i.e., which allow to open and close automatically a leaf of a door or window with respect to its casing, are currently known and widespread.

[0003] These actuators comprise, within a box-like container which is fixed to the frame of the casing or of the leaf, an electric motor and a series of gears for reduction and transmission of the torque to a push-pull element, which can be a chain or a bar with a rack.

[0004] The push element also is contained at least partially within the box-like container, where it engages the last corresponding gear of the series of reduction and transmission gears.

[0005] A typical box-like container which has been used up to now is composed of at least three shell portions: a first outer shell portion, an intermediate shell portion, and a second outer shell portion.

[0006] The intermediate shell portion coupled to the first shell portion forms with the latter a first chamber for accommodating the electric motor, the associated electronic components for management, and the gear train for reduction and torque transmission.

[0007] The second outer shell portion, which together with the first outer shell portion forms the actual outer box-like enclosure, forms with the intermediate shell portion a second chamber for the push-pull element.

[0008] A sealing gasket is arranged between the first outer shell portion and the intermediate shell portion in order to seal the chamber in which the electric motor and the electronic components are fitted.

[0009] A box-like container such as the one described has aspects which can be improved.

[0010] Such container is in fact constituted by such shell portions, each of which has to be provided by molding, and then mutually assembled with a certain number of screws, an operation which requires an amount of time which is proportional to the number of elements to be assembled and of threaded elements to be screwed.

[0011] The number of components and the complexity of the assembly inevitably affect the overall production costs of the container.

[0012] The aim of the present invention is to provide a box-like container for electrical actuators for automating doors or windows which has a simplified structure with respect to known box-like containers.

[0013] Within this aim, an object of the present invention is to provide a box-like container for electrical actuators for automating doors or windows which is simple and quick to assemble.

[0014] Another object of the present invention is to provide a box-like container in which the hermetic seal of the chamber which accommodates the electric motor and the electronic components is ideal.

[0015] Another object of the invention is to provide a box-like container which can be manufactured at lower costs than known box-like containers.

[0016] Another object of the present invention is to provide a box-like container for electrical actuators for automating doors or windows which can be manufactured with known systems and technologies.

[0017] This aim and these and other objects, which will become better apparent hereinafter, are achieved by a box-like container for electrical actuators for automating doors or windows, which contains internally an electric motor, the associated electronic components, at least part of a push-pull element for moving the leaf of the door or window, and a gear train for reduction and torque transmission, which is interposed between said motor and said push-pull element, characterized in that it is constituted by two shell portions which form the outer enclosure and have corresponding internal partitions, which when juxtaposed when the shell portions are closed onto each other, provide a first chamber for the motor, the electronic components and at least part of the gear train, and a second chamber for at least part of said push-pull element, a gasket being interposed between said two shell portions and being shaped so as to cover the facing perimetric edges of the two shell portions and the edges of the juxtaposed partitions which divide said first chamber from said second chamber.

[0018] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a linear actuator which comprises a box-like container according to the invention;

Figure 2 is an exploded perspective view of the container according to the invention;

Figure 3 is a first sectional view, taken along a longitudinal plane, of the container according to the invention;

Figure 4 is a second sectional view, taken along the line IV-IV of Figure 3, of the container according to the invention;

Figure 5 is a third sectional view, taken along the line V-V of Figure 3, of the container according to the invention;

Figure 6 is a sectional view of a detail of the container according to the invention.

[0019] With reference to the figures, a box-like container for electrical actuators for automating doors or windows according to the invention is generally designated by the reference numeral 10.

[0020] The box-like container 10 is shown by way of non-limiting example of the invention as a part of a linear actuator 11 of the type with a bar 12 provided with a rack 13.

[0021] The container 10 is designed to contain internally an electric motor 14, the associated electronic components 15, part of a push-pull element for moving the leaf of the door or window, which in the example described here is the bar 12, and a gear train 16 for reduction and torque transmission, which is interposed between the motor 14 and the push-pull element, i.e., the bar 12 with the rack 13.

[0022] The box-like container 10 is constituted by two shell portions 17 and 18.

[0023] The two shell portions, the first one 17 and the second one 18, form the outer enclosure of the container 10 and are provided with corresponding internal partitions 24, which, juxtaposed with respect to mutually closed shell portions 17 and 18, provide a first chamber 20 for the motor 14, the electronic components 15 and at least part of the gear train 16, and a second chamber 21, which contains part of the bar 12, which passes through it; the bar 12 with the rack 13 which does not protrude at the front from the actuator 11 and is not in the second chamber 21 lies inside a tubular container 22 which is fixed to the box-like container 11.

[0024] A gasket 23 is interposed between the two shell portions 17 and 18 and is shaped so as to cover the facing perimetric edges 17a and 18a of the two shell portions 17 and 18 and the edges 24a of the juxtaposed partitions 24 which divide the first chamber 20 from the second chamber 21.

[0025] The partitions 24 are substantially flat.

[0026] In particular, in the exemplary embodiment of the invention described here, the gasket 23 is provided by a frame-like portion 23a which lies so as to affect the perimetric edges 17a and 18a of the shell portions 17 and 18, and by an intermediate portion 23b, which extends from a first side 23c to a second opposite side 23d of the frame 23a in the direction of the length of the gasket 23.

[0027] The intermediate portion 23b is intended to be interposed, as mentioned, between the edges 24a of the partitions 24, which in the central region 24b of the container 10 are shaped like a circular arc in order to allow to accommodate the last-but-one gear 25 of the gear train within the first chamber 20; the last-but-one gear 25 is keyed onto a shaft 26 which passes through the first chamber 20 and the second chamber 21 and transmits motion to the last gear 27, which is arranged in the second chamber 21 and engages directly the rack 13 to move the bar 12.

[0028] At the central region 24b shaped like a circular arc of the partitions 24, the gasket 23 has a complementary shaped arc-like portion 23e.

[0029] Each portion of the gasket 23 has two lips in order to surround the edges 24a of the partitions 24 and 17a of the first shell portion 17, while on the opposite side, on the perimetric portion 23a, there are grooves for the correct arrangement of the edges 18a of the second shell portion 18.

[0030] The hermetic seal of the first chamber 20 with respect to the second chamber 21 and with respect to the outside is ensured by two annular seals, designated by the reference numerals 28 and 29 respectively.

[0031] The first annular seal 28 is arranged between a corresponding collar 25a of the last-but-one gear 25 and the complementarily shaped facing edge of the hole through which the collar 25a faces the second chamber 21; the first seal 28 ensures protection of the first chamber 20 against water and moisture which might enter the second chamber 21, which is inevitably open onto the outside for the passage of the bar 12.

[0032] The second annular seal 29 surrounds the end of the shaft that lies opposite to the end onto which the last gear 27 is keyed, and is pressed between a shoulder 30 provided outside the first shell portion 17 and an opposite abutment 31 which is formed on a covering element 32 which is associated externally with the first shell portion 17.

[0033] The hermetic seal of the first chamber 20 is completed by the conical rubber grommet 32 for the power supply cable 33, which is pressed against the corresponding locking collar 34 on the first shell portion 17 by an annular lid 35, which together with the edge 35a of its own hole clamps the grommet 32 against the cable 33.

[0034] In an embodiment of the invention which has not been shown, the push-pull element can be a chain, which is designed to wind inside a second suitably contoured chamber.

[0035] In practice it has been found that the invention thus described achieves the intended aim and objects.

[0036] In particular, the present invention provides a box-like container for electrical actuators for automating doors or windows which has a simplified structure with respect to known box-like containers; the container 10 according to the invention is in fact composed of just two shell portions 17 and 18, instead of three like known containers, which by being appropriately contoured and with the interposition of the gasket 23 allow to provide the two chambers 20 and 21, of which the first chamber 20, with the motor 14 and the electronic components 15, is hermetic.

[0037] Just two shell portions imply fewer components to be manufactured, fewer components to be assembled, fewer threaded elements to be fitted and therefore reduced complexity and faster execution during assembly, with consequent positive effects both on production rate and on labor costs.

[0038] Further, the box-like container according to the invention allows to provide a chamber 20 for the motor and the electronic components which is perfectly hermetic, by way of the refinements constituted by the presence of the two annular seals 28 and 29 in the points in which the shaft 26 exits from the first chamber 20.

[0039] Further, the container 10 according to the invention can still be manufactured by molding plastic material, but at lower costs than known box-like containers, since it is composed of just two shell portions, as explained above.

[0040] Moreover, the present invention provides a box-like container for electrical actuators for automating doors or windows which can be manufactured with known systems and technologies.

[0041] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0042] In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0043] The disclosures in Italian Patent Application No. PD2007A000083 from which this application claims priority are incorporated herein by reference.

[0044] 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 box-like container for electrical actuators for automating doors or windows, containing internally an electric motor (14), the associated electronic components (15), at least part of a push-pull element (12) for moving the leaf of the door or window, and a gear train (16) for reduction and torque transmission, which is interposed between said motor (14) and said push-pull element (12), said box-like container (10) being **characterized in that** it is constituted by two shell portions, a first one (17) and a second one (18), which form the outer enclosure and have corresponding internal partitions (24), which when juxtaposed when the shell portions (17, 18) are closed onto each other, provide a first chamber (20) for the motor (14), the electronic components (15) and at least part of the gear train (16), and a second chamber (21) for at least part of said push-pull element (12), a gasket (23) being interposed between said two shell portions (17, 18) and being shaped so as to cover the facing perimetric edges (17a, 18a) of the two shell portions (17, 18) and the edges (24a) of the juxtaposed partitions (24) which divide said first chamber (20) from said second chamber (21).

2. The box-like container according to claim 1, **characterized in that** said push-pull element for moving the leaf of the door or window is a bar (12) with a rack (13).

3. The container according to the preceding claims, **characterized in that** said partition elements (24, 24b) are substantially flat.

4. The container according to the preceding claims, **characterized in that** said gasket (23) is provided by a frame-like portion (23a) which is arranged so as to affect the perimetric edges (17a, 18a) of the shell portions (17, 18), and by an intermediate portion (23b) which extends from a first side (23c) to a second opposite side (23d) of said frame (23a) in the direction of the length of the gasket (23).

5. The container according to one or more of the preceding claims, **characterized** that said intermediate portion (23b) is designed to be interposed between the edges (24a) of the partitions (24), which in the central region (24b) of the container (10) are shaped like a circular arc in order to allow the accommodation of the last-but-one gear (25) of the gear train inside the first chamber (20).

6. The container according to one or more of the preceding claims, **characterized in that** said last-but-one gear (25) is keyed onto a shaft (26), which passes through the first chamber (20) and the second chamber (21) and transmits motion to the last gear (27), which is arranged in the second chamber (21) and engages directly the rack (13) to move the bar (12).

7. The container according to one or more of the preceding claims, **characterized in that** the gasket (23) has a complementarily shaped arc-like portion (23e) at the central circular arc-like region (24b) of the partitions (24).

8. The container according to one or more of the preceding claims, **characterized in that** each portion of the gasket (23) has two lips in order to surround the edges (24a) of the partitions (24) and the edges (17a) of the first shell portion (17), while on the opposite side, on the perimetric portion (23a), there are grooves for correctly positioning the edges (18a) of the second shell portion (18).

9. The container according to one or more of the preceding claims, **characterized in that** the hermetic seal of the first chamber (20) with respect to the second chamber (21) and with respect to the outside is ensured by two annular seals (28, 29), a first seal (28) being arranged between a corresponding collar (25a) of the last-but-one gear (25) and the complementarily shaped facing edge of the hole through which said collar (25a) faces the second chamber (21), said second annular seal (29) surrounding the end of the shaft (26) which lies opposite the end to which the last gear (27) is keyed, and is pressed between a shoulder (30) which is provided outside the first shell portion (17), and an opposite abutment

(31) which is formed on a covering element (32) which is associated externally with respect to the first shell portion (17).

10. The container according to one or more of the preceding claims, **characterized in that** the hermetic seal of the first chamber (20) is completed by a conical grommet (32) made of rubber for the power supply cable (33), which is pressed against the corresponding locking collar (34) on the first shell portion (17) by an annular cover (35), which together with the edge (35a) of its hole clamps the grommet (32) against the cable (33).

11. The container according to one or more of the preceding claims, **characterized in that** said push-pull element can be a chain which is intended to wind inside a second chamber.

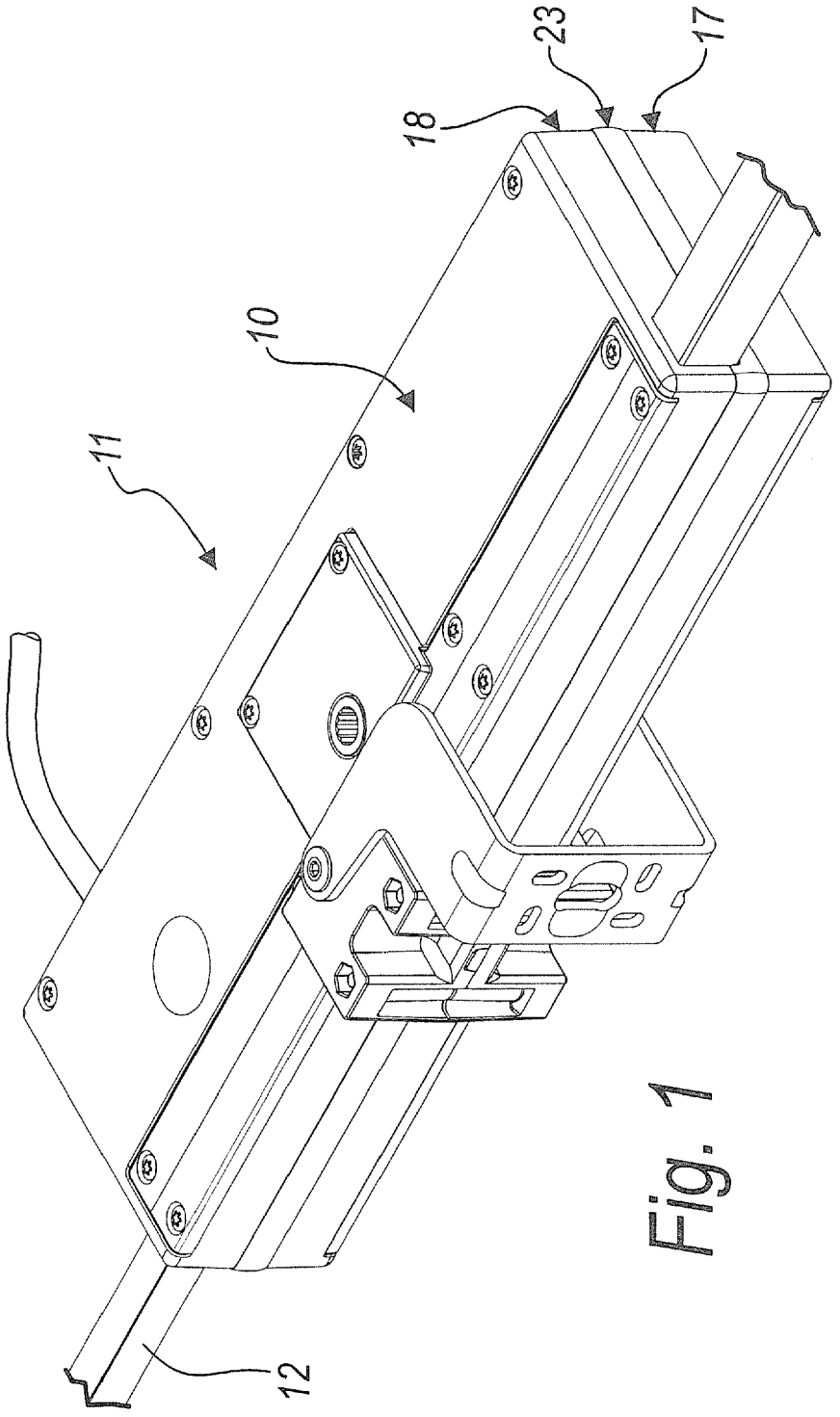

Fig. 1

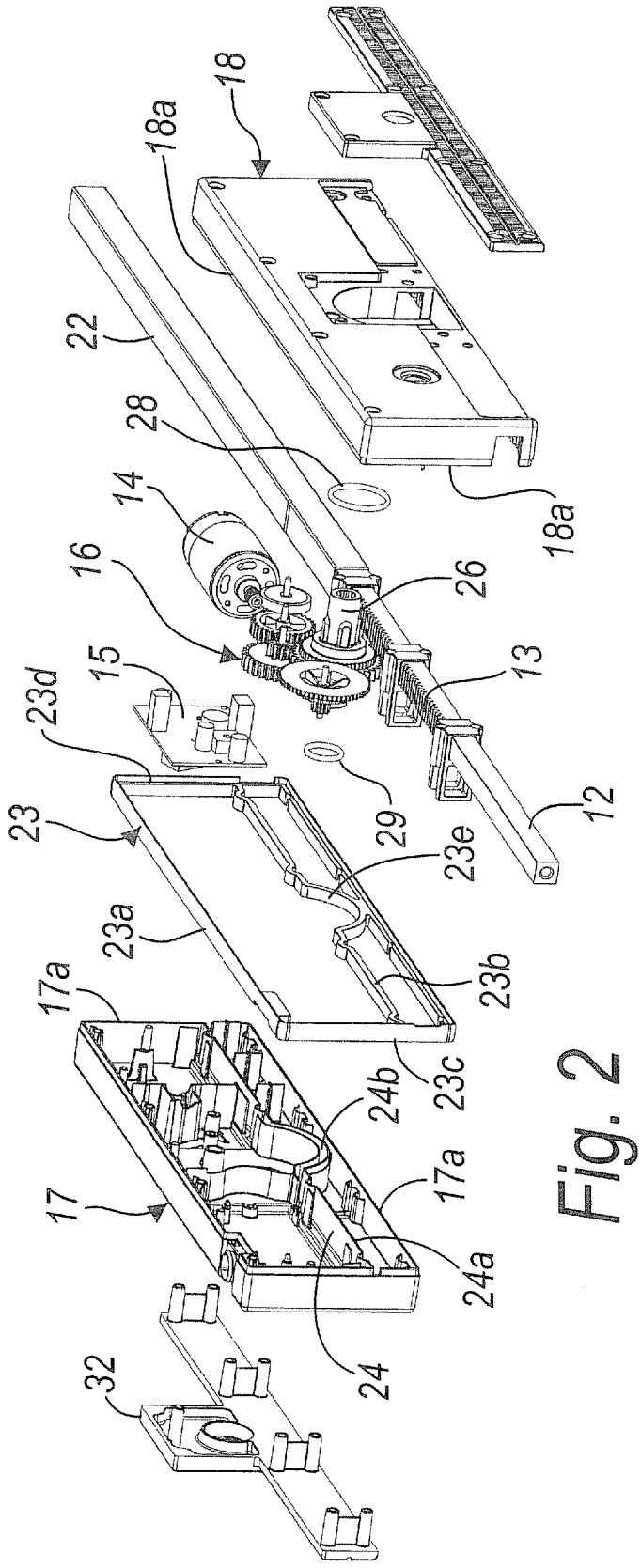
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Fig. 2

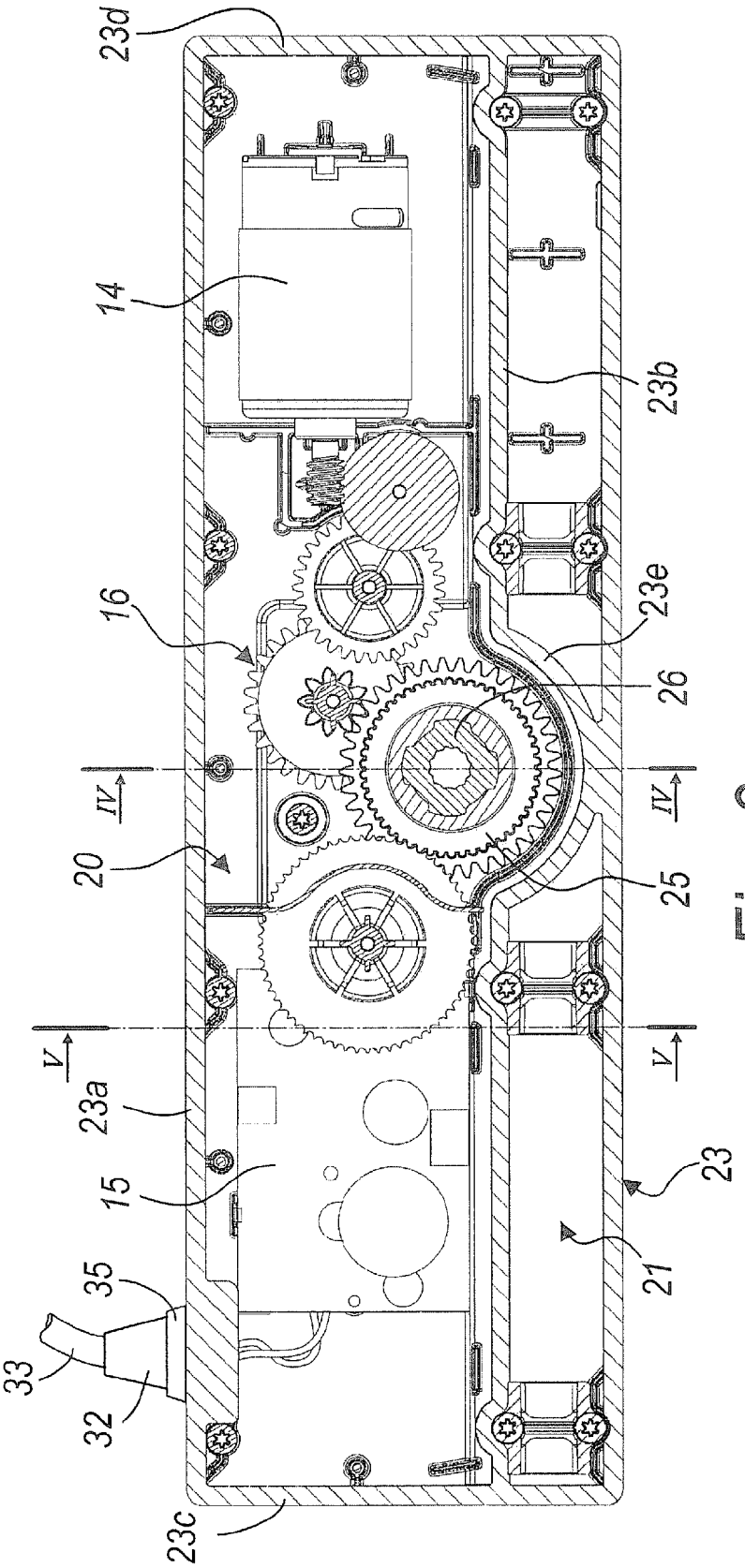

Fig. 3

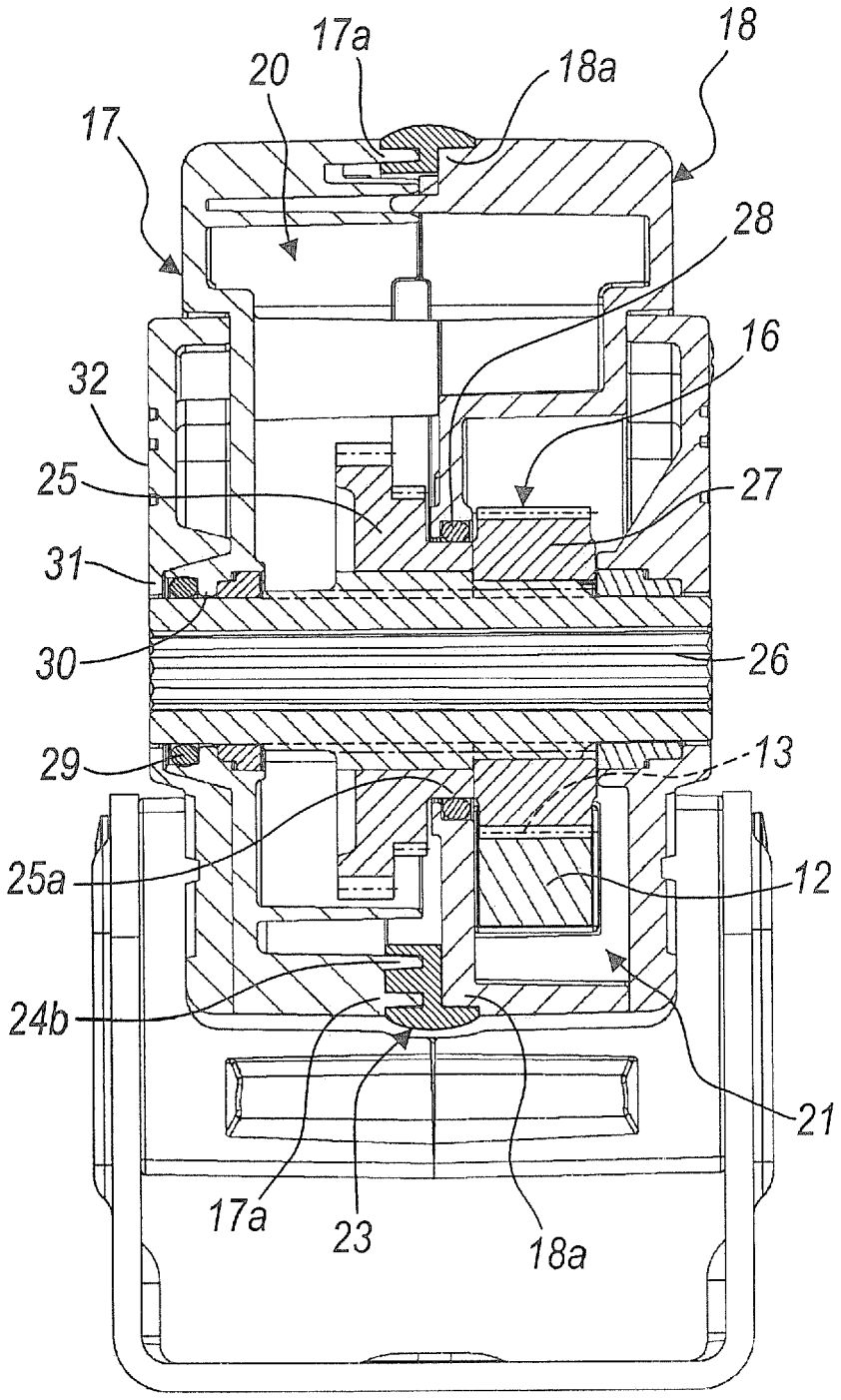
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Fig. 4

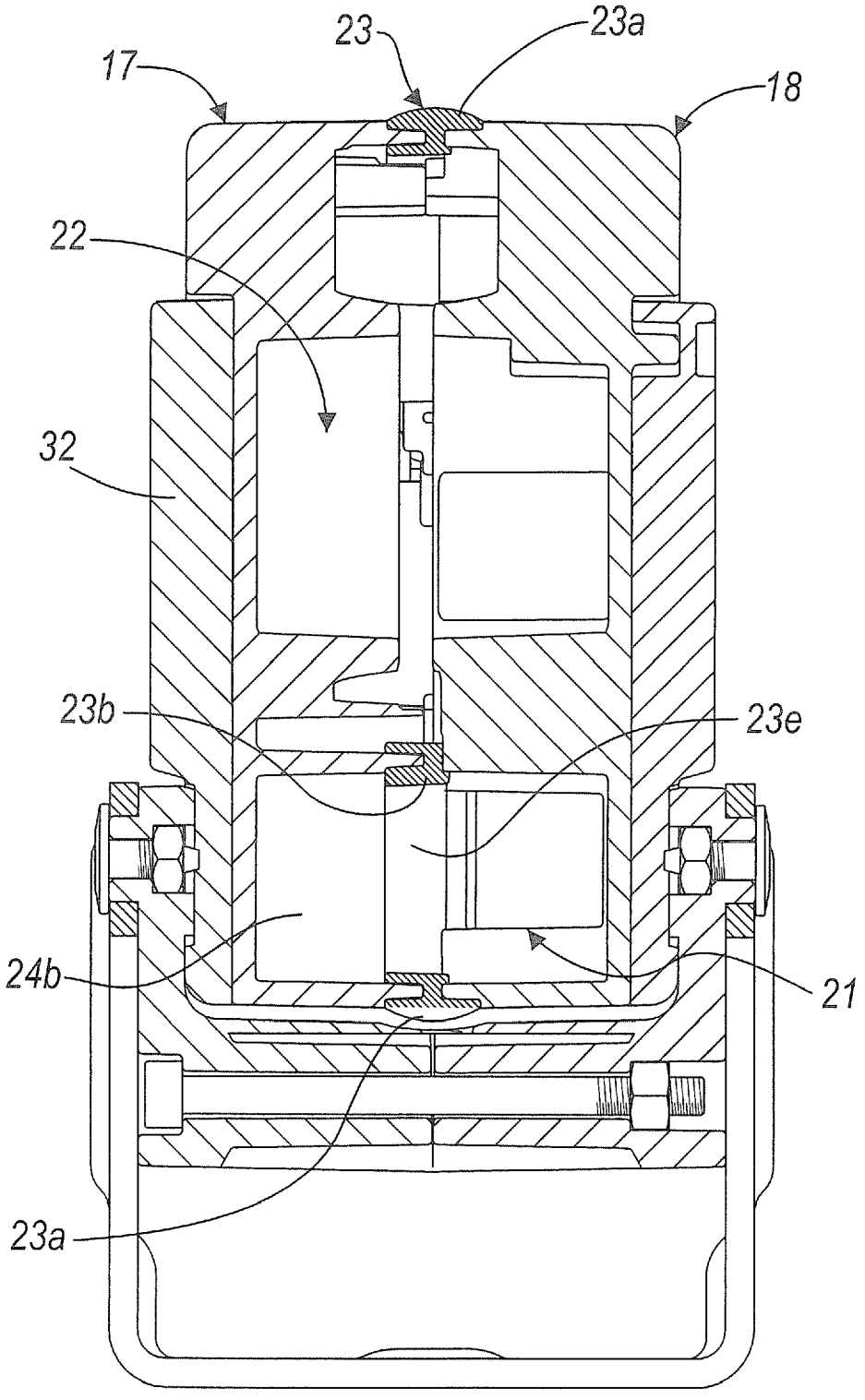

Fig. 5

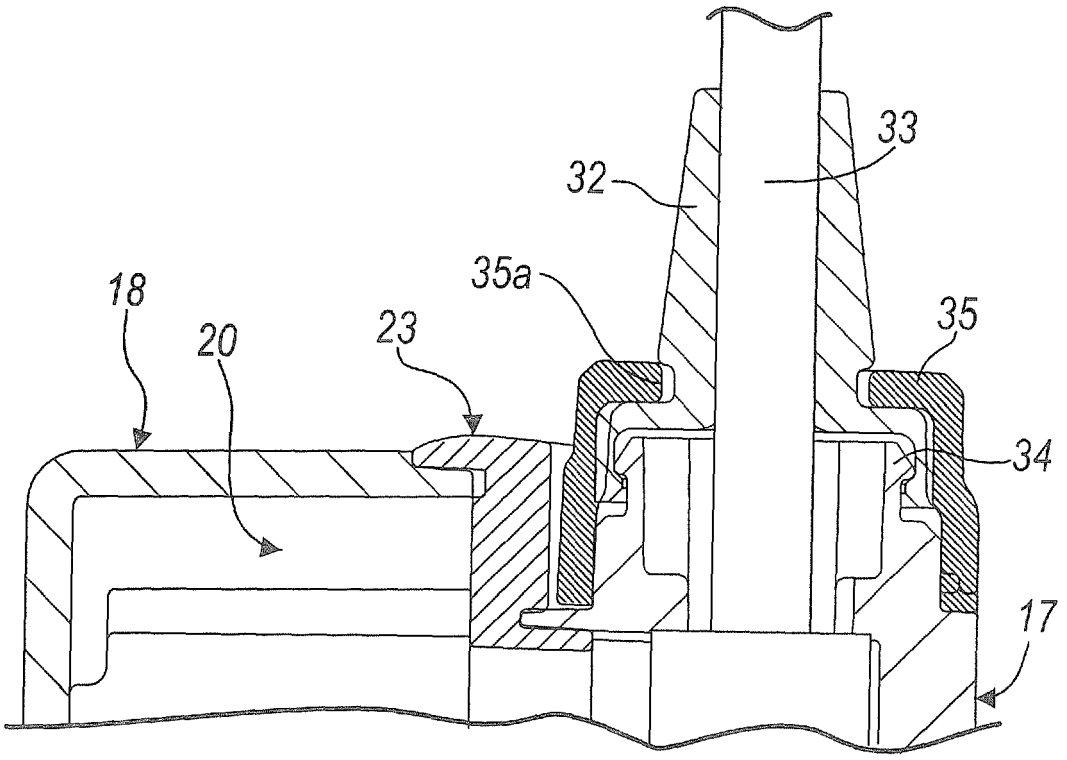

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 1555

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	EP 1 524 397 A (TOPP S P A [IT]) 20 April 2005 (2005-04-20) * the whole document *	1-11	INV. E05F15/12 E05F15/10
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TECHNICAL FIELDS SEARCHED (IPC)

E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 June 2008	Di Renzo, Raffaele

CATEGORY OF CITED DOCUMENTS

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