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(54) Box-like container for electric actuators for moving shutters by means of a chain

(57) A box-like container for electric actuators for moving shutters by means of a chain, comprising two shell portions (11, 12) made of plastics, which are mutually coupled so as to form the outer enclosure (13) of the box-like container (10), and a third shell portion (17) made of plastics, which is arranged inside the outer enclosure (13) and is coupled to the inner bottom (18) of one of the two shell portions (11, 12) so as to delimit a first receptacle, in which the movement chain (15) is provided, and a second receptacle (20), which contains the electric and electronic components (25, 28) and part (16) of the gear systems for actuating the chain (15), the third shell portion (17) having an overmolded gasket (22) on the edges (21) for coupling to the inner bottom (18) of one of the two shell portions (11, 12).

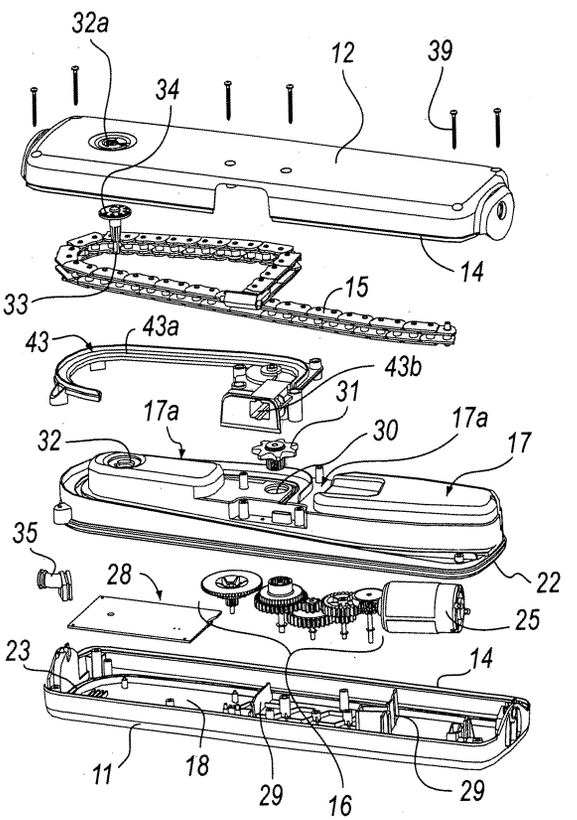

Fig. 1

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Description

[0001] The present invention relates to a box-like container for electric actuators for moving shutters by means of a chain.

[0002] Actuators for moving shutters by means of a chain, which allow to open and close shutters automatically, are known and used.

[0003] These actuators comprise, within a box-like container that is fixed to the frame of the casing of the shutter, a chain that is guided slidingly by guiding elements along a preset path that leads outside through an opening in the box-like container.

[0004] A typical box-like container used until now is composed of at least four shell portions: two outer shell portions, which are coupled and form the actual outer box-like enclosure, and two inner shell portions, which are coupled so as to form a box that provides the receptacle for the electric and electronic components and for the gear systems for actuating the chain.

[0005] A sealing gasket is arranged between the two inner shell portions in order to prevent moisture and water from making contact with the electric and electronic components, compromising their electrical insulation and their compliance with safety standards.

[0006] Assembly of the container entails inserting the components in a first inner shell portion; then the sealing gasket is arranged on the rim of said first inner shell portion, and finally the second inner shell portion is arranged as a cover, locking it by means of screws so as to obtain the box for containing said components.

[0007] The box is fixed by means of screws to the bottom of a first outer shell portion, and then the movement chain, functionally connected to the gear systems contained in the inner box, is arranged.

[0008] At this point, the second outer shell is also positioned as a cover by means of screws.

[0009] A box-like container such as the one described has drawbacks.

[0010] Such container is in fact scarcely efficient both in terms of number of components, in terms of intermediate connections between the components and in terms of assembly operations.

[0011] This inefficiency ultimately affects the overall production costs of the container.

[0012] The aim of the present invention is to provide a box-like container for electric actuators for moving shutters by means of a chain that 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 electric actuators for moving shutters by means of a chain that is simple and quick to assemble.

[0014] Another object of the present invention is to provide a box-like container for electric actuators for moving shutters by means of a chain that can be manufactured at a lower cost than known box-like containers.

[0015] Another object of the present invention is to provide a box-like container for electric actuators for moving shutters by means of a chain that can be manufactured with known systems and technologies.

[0016] This aim and these and other objects that will become better apparent hereinafter are achieved by a box-like container for electric actuators for moving shutters by means of a chain, characterized in that it comprises two shell portions made of plastics, which are mutually coupled so as to form the outer enclosure of said box-like container, and a third shell portion made of plastics, which is arranged inside said outer enclosure and is coupled to the inner bottom of one of said two shell portions so as to delimit a first receptacle, which is comprised between the outside of said third shell portion and said two shell portions and in which the movement chain is provided, and a second receptacle, which contains the electric and electronic components and part of the gear systems for actuating said chain, said third shell portion having an overmolded gasket on the edges for coupling to said inner bottom.

[0017] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is an exploded view of an electric movement actuator, illustrating a corresponding box-like container according to the invention;
Figure 2 is a sectional front view of the box-like container according to the invention;
Figure 3 is a sectional side view, taken along the line III-III of Figure 2, of the box-like container according to the invention;
Figure 4 is a sectional side enlarged-scale view of a detail of the box-like container according to the invention;
Figure 5 is a partially sectional perspective view of a detail of a box-like container according to the invention;
Figure 6 is an exploded perspective view of a detail of the box-like container according to the invention;
Figure 7 is a perspective view of a component of the box-like container according to the invention;
Figure 8 is another partially sectional perspective view of the box-like container according to the invention.

[0018] With reference to the figures, a box-like container for electric actuators for moving shutters by means of a chain according to the invention is generally designated by the reference numeral 10.

[0019] The box-like container 10 comprises two shell portions made of plastics, respectively a first shell portion 11 and a second shell portion 12, which are mutually coupled so as to form an outer enclosure 13 of the box-

like container 10.

[0020] Each shell portion 11 and 12 has peripheral edges 14 that have substantially the same profile in plan view.

[0021] The first and second shell portions 11 and 12 are coupled so that their respective peripheral edges 14 are in contact; the peripheral edges 14 are further complementarily shaped with respect to each other in a transverse direction.

[0022] Inside the outer enclosure 13 formed by the first and second shell portions 11 and 12 there is a third shell portion 17 made of plastics, which is coupled to an inner bottom 18 of one of said two shell portions (in this case, to the first shell portion 11), so as to delimit in practice a first receptacle 19, which is comprised between the outside of the third shell portion 17 and the two shell portions 11 and 12, and a second receptacle 20.

[0023] The second receptacle 20 contains the electric and electronic components and part of the actuation gear systems for said chain, which are described hereinafter.

[0024] The first receptacle 19 contains a movement chain 15 of the actuator associated with the box-like container 10.

[0025] The third shell portion 17 has an overmolded gasket 22 on the edges 21 for coupling to the inner bottom 18.

[0026] When the third shell portion 17 is coupled to the first shell portion 11, the overmolded gasket 22 is inserted in a complementarily shaped sealing seat 23 provided perimetrically on the inner bottom 18.

[0027] The third shell portion 17 is shaped so as to delimit, inside the second receptacle 20, three compartments: respectively, a first containment compartment 24 for an electric motor 25; a second compartment 26, which is adjacent to the first compartment 24 and is designed to contain part 16 of the actuation gears of the movement chain 15, which are functionally connected to the electric motor 25; and a third receptacle 27, for accommodating the electronic components, such as an electronic board 28.

[0028] The compartments 24, 26 and 27 are mutually separated by partitions 29, which protrude from the inner bottom 18 of the first shell portion 11.

[0029] A first through hole 30 is provided on the part 17a of the third shell portion 17 that lies opposite the inner bottom 18 of the first shell portion 11, in order to mechanically connect the part 16 of the gears for actuating the movement chain 15 to a sprocket 31, which is functionally arranged in the first receptacle 19 and transmits motion to the chain 15.

[0030] A second through hole 32 is also provided on the part 17a of the third shell portion 17 that lies opposite the inner bottom 18 of the first shell portion 11, in order to allow the passage of the rotation pivot 33 of a ring 34 for adjusting the strokes of the chain 15; the rotation pivot 33 is functionally connected to the electronic board 28.

[0031] The ring 34 is arranged between the third shell portion 17 and the second shell portion 12.

[0032] The ring 34 can also be viewed through a third readout and adjustment hole 32a provided in the second shell portion 12.

[0033] A grommet 35 is arranged between the walls of the third shell portion 17 and the walls of the outer enclosure 13 and allows the passage and locking of the electrical wires of the electrical board 28 and of the electric motor 25 from the inside of the second receptacle 20 to the outside of the box-like container 10.

[0034] In particular, the grommet 35 is constituted by a tubular flexible portion 36 provided with a lower longitudinal slit 36a.

[0035] The slit 36a is very handy during assembly.

[0036] The tubular portion 36 is coupled, by means of sealing grooves 35a, by one end, to the edges of two first cutouts 37a and 37b formed on the lateral edges 14a and 14b of the shell portions 11 and 12, and by the opposite end to the edges of a second cutout 38 formed on the edge of the third shell portion 17.

[0037] In this position, the tubular portion 36 indeed acts as a grommet and as a hydraulic seal.

[0038] The various shell portions 11, 12 and 17 are fixed by way of threaded elements 39.

[0039] A guide 43 for the chain 15 is provided in the first receptacle 19 and is fixed on the third shell portion 17.

[0040] The guide 43 has a part 43a for guiding the chain and an outlet 43b for the exit of the chain.

[0041] The part 43a and the outlet 43b are monolithic, differently from known containers, in which these two components are distinct and subsequently assembled.

[0042] In practice it has been found that the invention thus described solves the problems noted in known types of box-like container for actuators for moving shutters; in particular, the present invention provides a box-like container for electric actuators for moving shutters by means of a chain that has a simplified structure with respect to known box-like containers.

[0043] The number of shell portions has in fact been reduced from four to three, and assembly has been simplified, eliminating the step of arranging the sealing gasket (which is now overmolded) and facilitating the assembly of the various shell portions as well as the fitting of the power supply cables.

[0044] In practice, the materials employed, so long as they are compatible with the specific use, as well the dimensions, may be any according to requirements and to the state of the art.

[0045] The disclosures in Italian Utility Model Application No. PD2003U000095 from which this application claims priority are incorporated herein by reference.

[0046] 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 electric actuators for moving shutters by means of a chain, **characterized in that** it comprises two shell portions (11, 12) made of plastics, which are mutually coupled so as to form the outer enclosure (13) of said box-like container (10), and a third shell portion (17) made of plastics, which is arranged inside said outer enclosure (13) and is coupled to the inner bottom (18) of one of said two shell portions (11, 12) so as to delimit a first receptacle (19), which is comprised between the outside of said third shell portion (17) and said two shell portions (11, 12) and in which the movement chain (15) can be arranged, and a second receptacle (20), which contains electrical and electronic components (25, 28) and part (16) of the gear systems for actuating said chain (15), said third shell portion (17) having an overmolded gasket (22) on the edges (21) for coupling to said inner bottom (18).

2. The box-like container according to claim 1, **characterized in that** a grommet (35) is arranged between the walls of said third shell portion (17) and the walls of said outer enclosure (13) for the passage of the electric wires toward the electrical and electronic components (25, 28) from the inside of said second receptacle (20) to the outside of said box-like container (10), said grommet (35) being constituted by a flexible tubular portion (36), which is coupled, by means of sealing slots (35a), by one end to the edges of at least one first cutout (37a, 37b) formed on at least one first one of said two shell portions (11, 12), and by the opposite end to the edges of a second cutout (38) formed on said third shell portion (17).

3. The box-like container according to one or more of the preceding claims, **characterized in that** said third shell portion (17) is contoured so as to delimit, inside said second receptacle (20), three mutually separate compartments (24, 26, 27), respectively: a first compartment (24) for containing an electric motor (25); a second compartment (26), which is adjacent to said first compartment (24) and is designed to contain said part (16) of the gear systems for actuating the movement chain (15), which are functionally connected to said electric motor (25); and a third compartment (27), for accommodating an electronic board (28).

4. The box-like container according to one or more of the preceding claims, **characterized in that** on said third shell portion (17) there is a first through hole (30) for the mechanical connection of said part (16) of the gear systems for actuating the movement chain (15) to a sprocket (31), functionally arranged in said first receptacle (19), for transmitting motion to the chain (15).

5. The box-like container according to one or more of the preceding claims, **characterized in that** a second through hole (32) and a third hole (32a) are provided respectively in said third shell portion (17) and in one of said two shell portions (11, 12), said third hole being designed for viewing and adjusting the rotation pivot (33) of a ring (34) for adjusting the strokes of the chain (15), said rotation pivot (33) being functionally connected to said electrical and electronic components (25, 28).

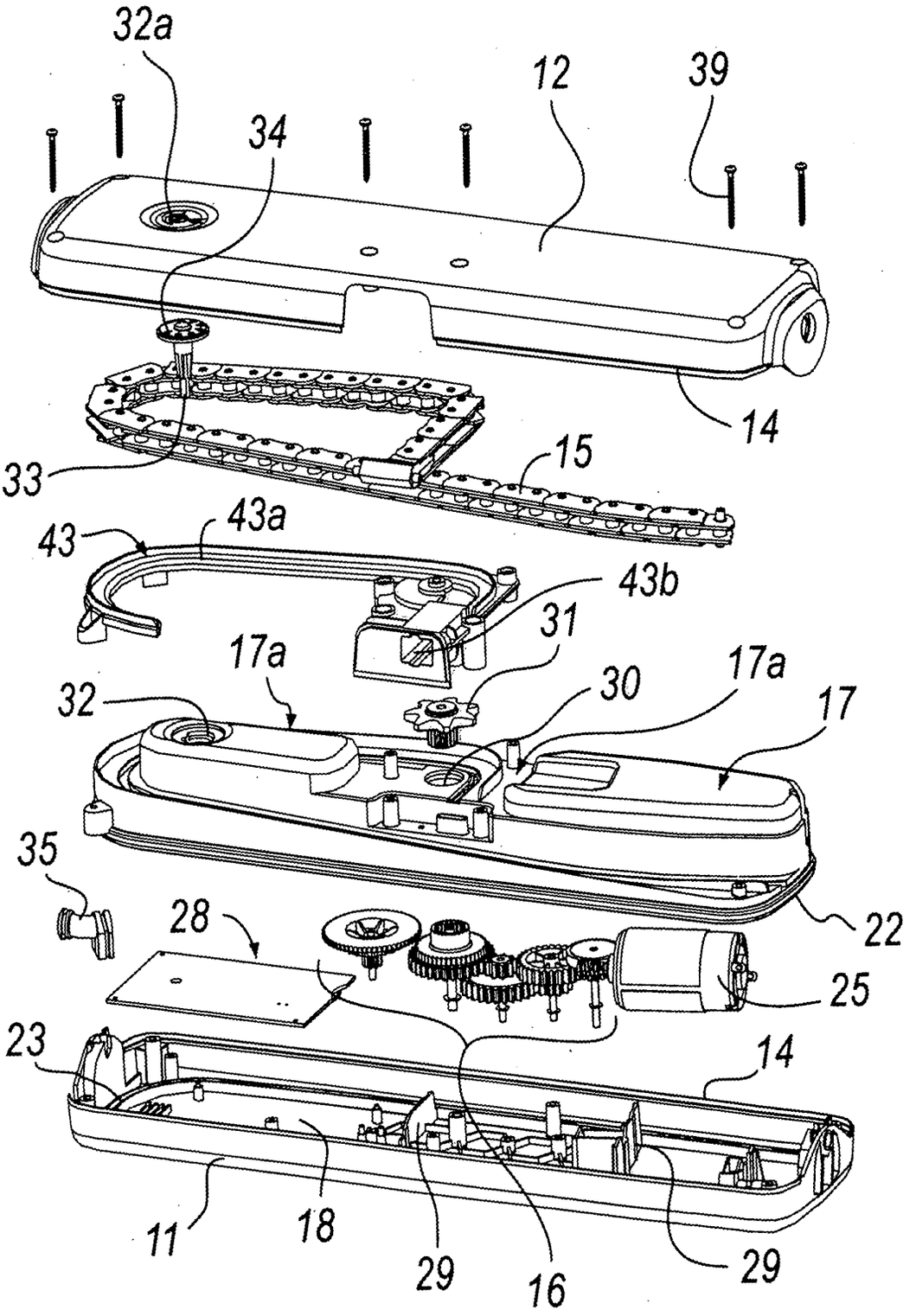
32a
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Fig. 1

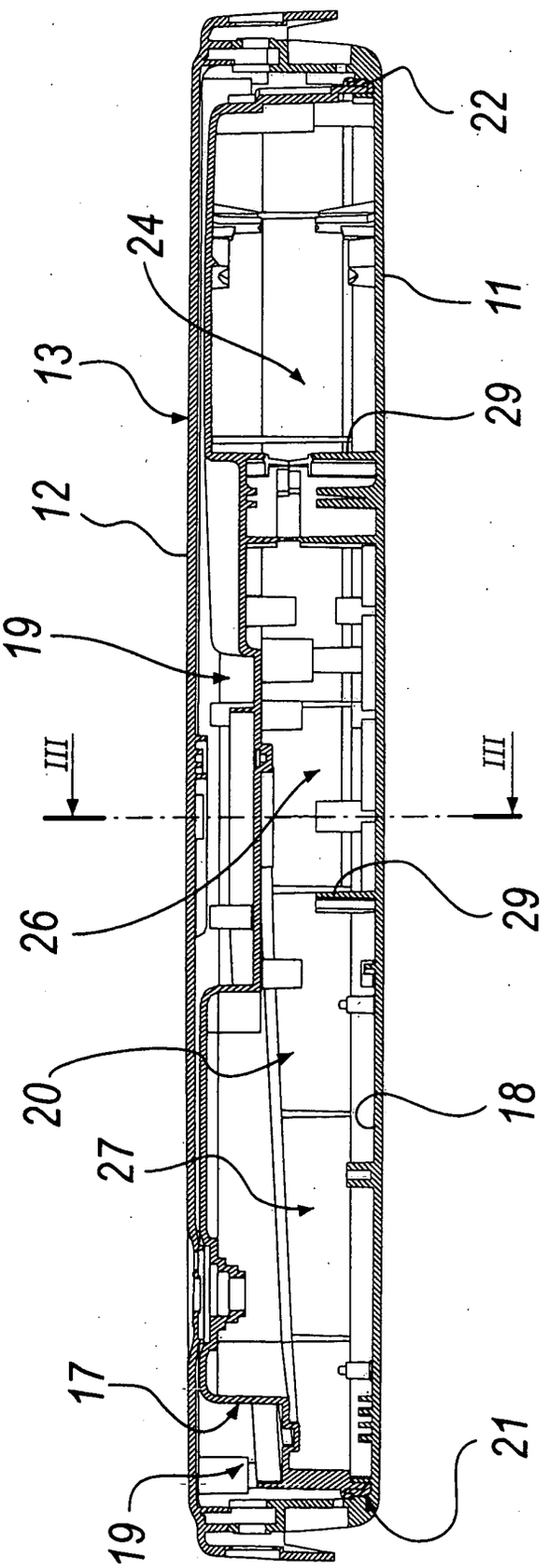

Fig. 2

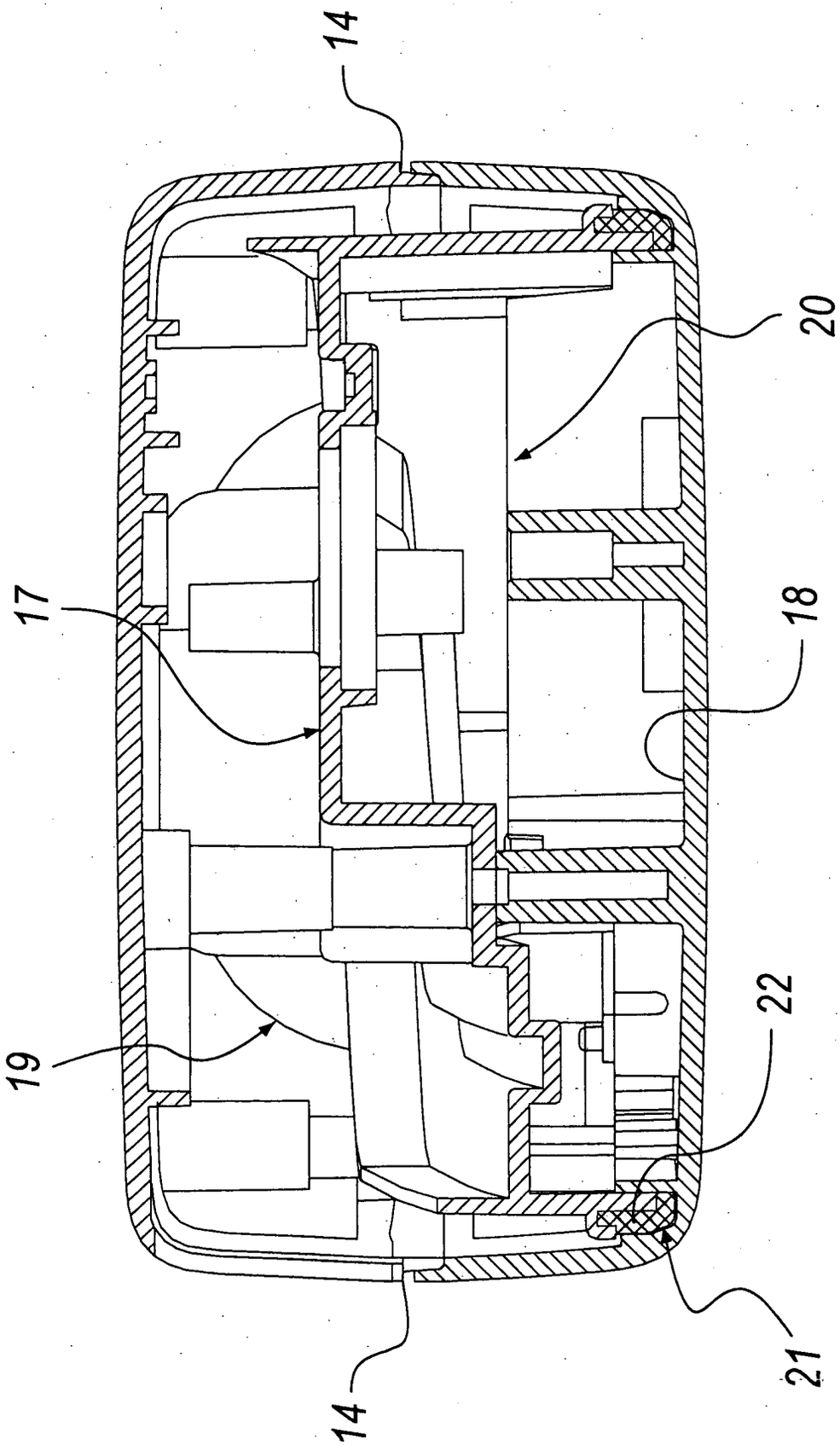

Fig. 3

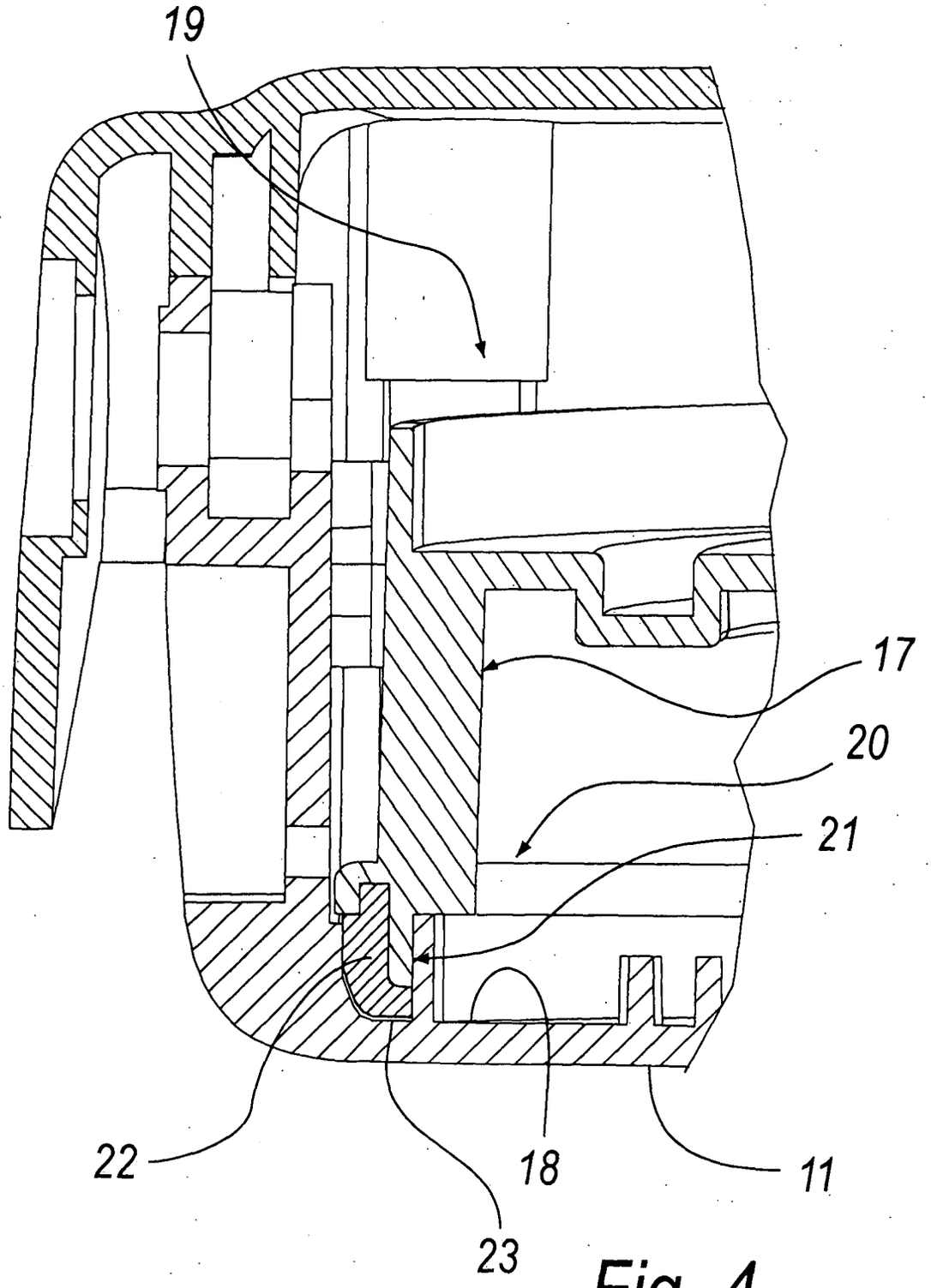

Fig. 4

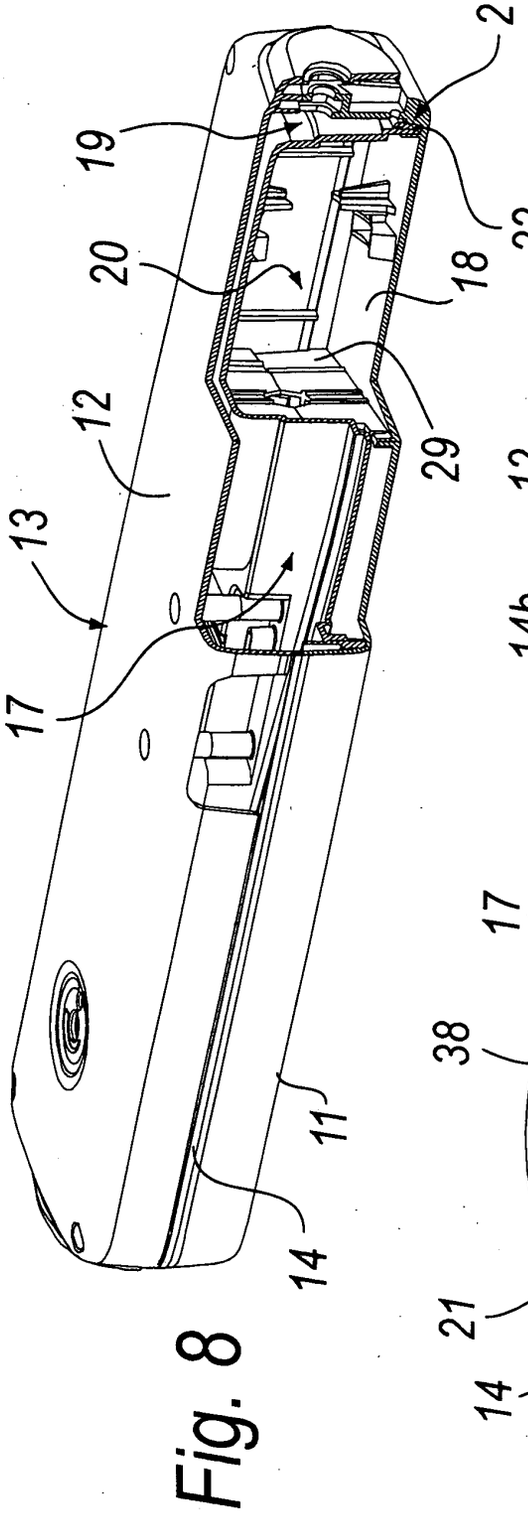

Fig. 8

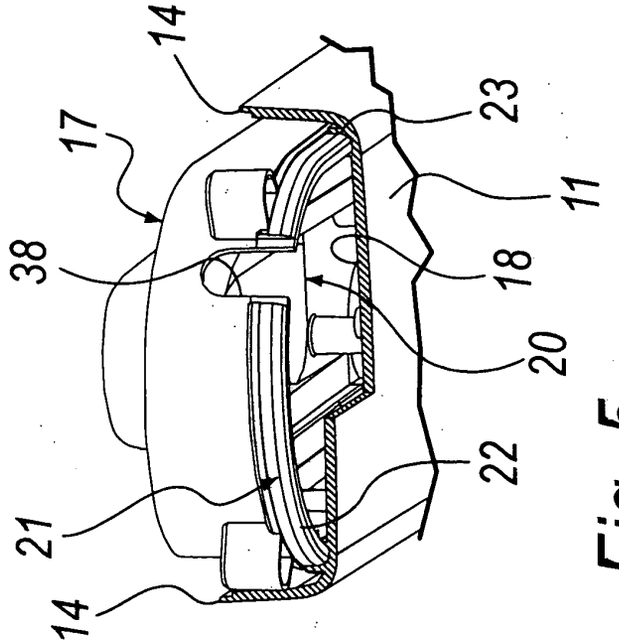

Fig. 5

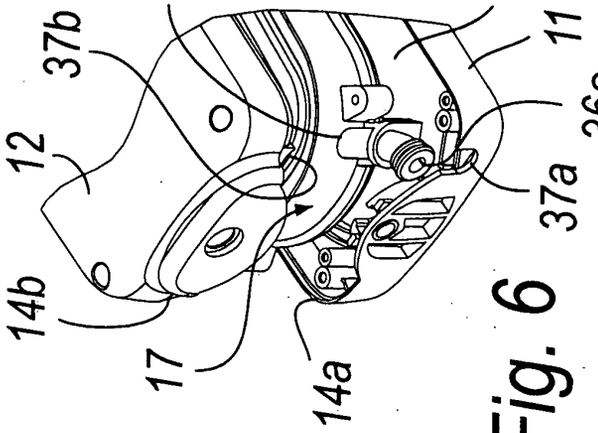

Fig. 6

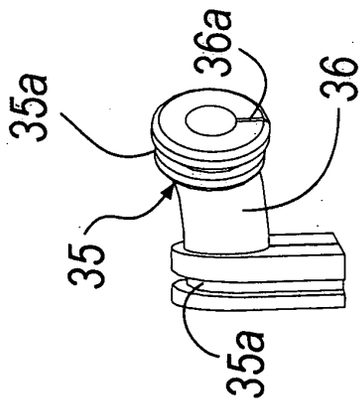

Fig. 7