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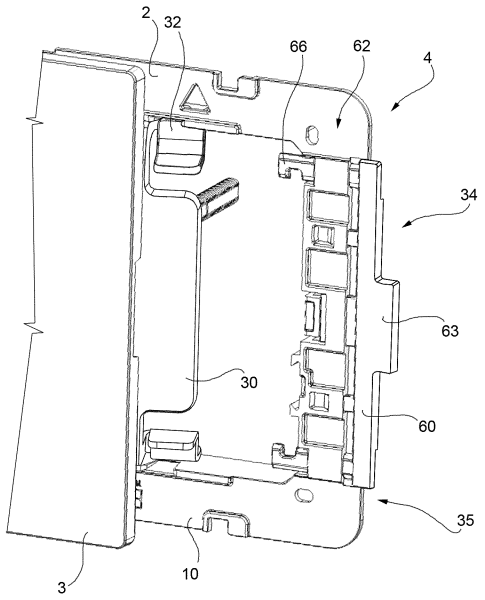
(54) Control plate assembly of a flushing tank

(57) A control plate assembly (1) of a flashing tank comprises a mounting counterplate (2), having an annular frame (10) that delimits an opening (11), and a control plate (3) connected to the counterplate (2) via a fastening system (4) which comprises a hinge element (30), that extends along a longitudinal axis (A) and has two opposite lateral ends (32, 33) hinged to the counterplate (2) by means of first rotation elements (51, 52) and to the plate (3) by means of second rotation elements (53, 54), respectively, said first and second rotation elements (51, 52; 53, 54) defining respective parallel rotation axes arranged in the opening (11) in an intermediate position between two lateral sides (16) of the counterplate (2) that delimit the opening (11).

FIG. 5



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Description

[0001] The present invention relates to a control plate assembly of a flushing tank.

[0002] In particular, the present invention relates to a control plate assembly comprising a mounting counterplate that can be fastened to a wall (or other support) and a control plate connected to the counterplate via an opening mechanism, so that the plate is movable with respect to the counterplate to open an access opening towards the tank, which can be used for example to introduce a service additive into the tank, such as a sanitizing liquid or tablet.

[0003] As known, walled or built-in flushing tanks are normally provided with control buttons which are carried by a wall-mounted plate. The buttons control members that actuate the flush valve, which are arranged through an inspection opening formed in the wall and closed by the plate. In order to mount the plate, a frame-shaped counterplate is commonly used, which is fastened to the wall or to a front wall of the tank, for example by means of screws. The plate is removably fitted to the counterplate so as to access the actuator members and the flush valve, when needed.

[0004] In certain known solutions, the plate is removable or movable with respect to the counterplate, even to allow a refill of a sanitizing device to be introduced into the tank, for example for refilling a sanitizing liquid or tablet.

[0005] Various systems are known for fitting the plate to the counterplate, which however are not completely satisfactory, especially in terms of mounting ease, efficacy and versatility.

[0006] Therefore, it is an object of the present invention to provide a control plate assembly of a flushing tank which allows the drawbacks of the known solutions to be obviated in a simple and affordable manner, and in particular which is extremely easy to make, assemble and install, while being totally efficient and reliable, thus specifically allowing easy access inside the tank to supply for example a service additive, for example a refill of a sanitizing device, such as a sanitizing liquid or tablet.

[0007] Such an object is achieved by the present invention, which relates to a control plate assembly of a flushing tank as essentially defined in appended claim 1 and, for its preferred aspects, in the dependent claims.

[0008] The plate assembly of the invention is simple to make, assemble and install, thus being at the same time totally efficient and reliable.

[0009] In particular, the plate assembly of the invention allows the plate assembly to be opened in a simple and convenient manner, and the inspection opening and thus the interior of the flushing tank to be accessed.

[0010] The invention is further described in the following non-limiting embodiment, with reference to the accompanying drawings, in which:

- figure 1 is a front exploded perspective view of a control plate assembly of a flushing tank in accordance with the invention;
- figures 2 and 3 are two front perspective views of a mounting counterplate forming part of the control plate assembly of the invention, with a support for the control members shown in respective operative positions;
- figure 4 is a rear perspective view of the plate assembly in figure 1, once assembled;
- figures 5 and 6 are a front perspective view and a rear perspective view of a lateral end portion of the control plate assembly in figure 1, shown in an open position;
- figure 7 is a perspective view of a component of the plate assembly in figure 1;
- figures 8 and 9 show a detail of the plate assembly in figure 1, in respective operative positions.

[0011] With reference to figure 1, a control plate assembly 1 of a flushing tank, known per se and thus not shown, comprises a mounting counterplate 2, which can be fitted to a wall or other support about an inspection opening which provides access to the flushing tank, and a control plate 3 connected to counterplate 2 by a fastening system 4.

[0012] The plate assembly 1 supports an actuator device 5 which can be connected to a flush valve (not shown) of the flushing tank.

[0013] In the example shown, the plate assembly 1 is configured to be used with a double flushing flush valve, i.e. of the type that allows two different quantities of water to be alternatively flushed from the tank (complete flush and partial flush of the water contained in the tank), via two actuators; therefore, plate 3 carries a pair of buttons 6, connected to respective actuator members of the flush valve via respective control members 7.

[0014] With reference also to figures 2 and 3, counterplate 2 comprises an annular frame 10, for example substantially quadrangular in shape, which delimits an opening 11; frame 10 is substantially flat and has a front face 12, defining a plane P, and a rear face 13, substantially parallel to plane P; a lateral wall 14 substantially perpendicular to faces 12, 13 and to plane P is arranged about opening 11.

[0015] Frame 10 can be fastened to an outer support element (for example a wall or panel) via suitable known fastening members (for example, screws) which can be inserted into specific seats 15 formed on frame 10.

[0016] Frame 10 is substantially quadrangular in shape and has (with reference to the regular use position of the plate assembly 1) a pair of lateral sides 16 and a lower crosspiece 17 and an upper crosspiece 18.

[0017] Frame 10 is provided with a support 20 for the control members 7, in particular for the rod portions 21 of the control members 7, which connect the buttons 6 of plate 3 to the flush valve.

[0018] Support 20 comprises a rotatable body 22 provided with at least one seat 23 formed through body 22

and shaped to receive a control member 7.

[0019] In the example shown, support 20 has a pair of seats 23 placed side-by-side, set at respective opposite lateral ends of body 22 and formed through body 22.

[0020] Body 22 has a connection portion 24, hinged to frame 10, and a support portion 25 which projects from the connection portion 24 into opening 11 and carries the seats 23.

[0021] In the example shown, body 22 has a substantially L-shaped cross section; the support portion 25 is shaped like a substantially flat plate, which in use is arranged substantially parallel to plane P, and is substantially orthogonal to the connection portion 24, which is hinged to respective lateral ends opposite to frame 10.

[0022] In particular, frame 10 has a pair of connection elements 26, which project from the lower crosspiece 17 of frame 10 into opening 11, and specifically from a portion of the lateral wall 14 defining the lower crosspiece 17; body 22 is hinged to frame 10, for example, via a pair of opposite pins which engage respective rotation seats and are, for example, snap-inserted into the rotation seats; the pins project from respective lateral ends of the connection portion 24 and engage respective seats formed in the elements 26, or vice versa.

[0023] Support 20 is rotatable about a rotation axis R parallel to crosspiece 17 and to plane P, thus substantially horizontal in use.

[0024] Support 20 is rotatable to selectively assume an operative working position (figure 2), in which the support portion 25 projects into opening 11 to receive the control members 7 and guide and support the control members 7; and an operative inspection or maintenance position (figure 3), in which the support portion 25 is outside opening 11.

[0025] In particular, support 20 is rotatable so as to be rotated by at least 90° about axis R to free opening 11; support 20 is preferably rotatable so as to be overturned by 180° with respect to axis R, to bring the support portion 25 parallel to plane P and on opposite sides of axis R.

[0026] The plate assembly 1 advantageously includes a system 27 for locking support 20, in order to keep support 20 in the operative working position; for example, the locking system 27 comprises at least one tooth 27A which projects from support 20 and snappingly engages a locking seat 27B formed on counterplate 2 in a releasable manner; tooth 27A can be selectively inserted into seat 27B and removed from seat 27B when support 20 is rotated.

[0027] In the example shown, system 27 comprises a pair of opposite teeth 27A which project from respective opposite lateral ends of body 22, in particular from the connection portion 24, and snappingly engage respective locking seats 27B formed on the connection elements 26.

[0028] When the plate assembly 1 is installed, support 20 is arranged in the operative working position and guides and supports the control members 7 which are inserted into seats 23.

[0029] If there is a need to access inside the flushing tank, for example for inspection or maintenance reasons, support 20 is rotated with respect to axis R, in order to free opening 11 and access the interior of the tank without the hindrance of support 20; the control members 7, uncoupled from the flush valve, may also remain inserted into seats 23, and rotate together with support 20 outside of opening 11.

[0030] With further reference to figures 4-6, plate 3 is fitted to counterplate 2 by the fastening system 4.

[0031] The fastening system 4 comprises: an end fastening 28, set at a first lateral end 29 of the plate assembly; a hinge element 30, that has opposite lateral ends 32, 33 hinged to counterplate 2 (precisely to frame 10) and to plate 3, respectively; and a releasable locking device 34, set at a second lateral end 35, opposite to end 29, of the plate assembly 1 and that selectively blocks plate 3 to counterplate 2 and releases plate 3 from counterplate 2.

[0032] The fastening system 4 connects plate 3 to counterplate 2 so that plate 3 is movable with respect to counterplate 2 between a closed position (figure 4), in which plate 3 is integrally fitted to counterplate 2 and is arranged facing and adjacent to counterplate 2 and closes opening 11; and an open position (figures 5-6), in which plate 3 is released from counterplate 2 and leaves opening 11 at least partially open.

[0033] Fastening 28 comprises one or more teeth 36, arranged at one end of plate 3 and which engage respective fastening seats 37 formed in counterplate 2 and precisely on the rear face 13 of frame 10. The teeth 36 are shaped so as to laterally fasten counterplate 2 from behind to hold plate 3 to counterplate 2 in a direction substantially orthogonal to plane P.

[0034] With further reference to figure 7, the hinge element 30 extends along a longitudinal axis A between two longitudinal ends 38, 39 and transversally between the lateral ends 32, 33.

[0035] The hinge element 30 comprises a monolithic body 40 made of plastic (polymeric material), shaped so as to be elastically deformable and precisely flexible transversely to axis A.

[0036] In particular, body 40 comprises a base plate 41 and two pairs of arms 42, 43 that project from the base plate 41 and form the lateral ends 32, 33 of the hinge element 30, respectively, and are hinged to counterplate 2 and plate 3, respectively.

[0037] The arms 42 comprise respective root portions 44, that project from the base plate 41, and respective rotation portions 45, that project from the root portions 44 and are shaped so as to be flexible with respect to the root portions 44, for example being joined to the root portions 44 by respective restricted-section connection portions 46. The arms 43 then have respective contact portions 47, that project from the rotation portions 45.

[0038] The hinge element 30 is arranged substantially parallel to the lateral sides 16 of frame 10 and with axis A which is substantially vertical in use.

[0039] The hinge element 30 is hinged to counterplate 2 via first rotation elements 51, 52 cooperating with each other and set on the hinge element 30, in particular on the arms 42, and on counterplate 2, in particular on the lateral wall 14 of frame 10, respectively; the hinge element 30 is also hinged to plate 3 via second rotation elements 53, 54 cooperating with each other and set on the hinge element 30, in particular on the arms 42, and on plate 3, in particular on a support portion 55 which projects from a rear face 56 of plate 3, respectively.

[0040] The rotation elements 51, 52 and 53, 54 define respective parallel rotation axes.

[0041] For example, the rotation elements 51, 52 and 53, 54 consist of respective pairs of pins and seats engaged by the pins, pins and seats being carried by the hinge element 30, and by counterplate 2 and plate 3, respectively, or vice versa.

[0042] In the example shown, the hinge element 30 is provided with a first pair of opposite pins 51 set at the lateral end 32 and protruding from respective opposite longitudinal ends 38, 39, precisely from respective arms 42, for engaging respective seats 52 formed in the lateral wall 14 of frame 10; and with a second pair of opposite pins 53, set at the lateral end 32 and also protruding from respective opposite longitudinal ends 38, 39, in particular from respective arms 43, for engaging respective seats 54 formed in the support portion 55 of plate 3.

[0043] The hinge element 30, formed by body 40, is elastically deformable for selectively assuming:

- a rest undeformed condition, that the hinge element 30 assumes when it is not mounted in the plate assembly 1 and it is not subject to any forces;
- a tensioned deformed condition, that the hinge element 30 assumes when it is mounted in the plate assembly 1 with the pins 51, 53 inserted into the respective seats 52, 54.

[0044] The pins 51, 53 of each pair are aligned with each other along respective axes; the corresponding seats 52, 54 are also aligned along respective axes.

[0045] In the rest undeformed condition, the distance between the axes of pins 51, 53 (measured perpendicular to the same axes) is greater than the distance between the axes of seats 52, 54 (measured perpendicular to said axes) in the closed position of plate 3, i.e. when plate 3 closes completely opening 11 and is fitted to counterplate 2.

[0046] When the hinge element 30 is mounted in the plate assembly, the pins 51, 53 are inserted into the respective seats 52, 54.

[0047] When plate 3 is in the closed position, the hinge element 30 assumes the tensioned deformed position, in which body 40 is compressed in a transversal direction to axis A and exerts an elastic action when it is released from the locking device 34.

[0048] The releasable locking device 34 is set at the end 33 of the plate assembly 1 and comprises a movable member 60 for fastening and releasing a contact member 61 arranged on plate 3.

[0049] In particular, the movable member 60 is arranged on one side 16 of frame 10 and can slide in a direction parallel to plane P and substantially perpendicular to side 16 in a guide 62 obtained on frame 10.

[0050] Member 60 comprises a control portion 63, that protrudes from frame 10 outside guide 62 and is housed in a cavity 64 formed in peripheral edge 65 of plate 3; and a hook portion 66, that selectively engages the contact member 61.

[0051] The contact member 61 projects from the support portion 55 on the rear face 56 of plate 3. For example, the contact member 61 projects parallel to face 56 and spaced apart therefrom; a sliding seat 67 in which the hook portion 66 slides is defined between face 56 and the contact member 61.

[0052] Member 60 is movable between two operative positions:

- a locked position, in which the hook portion 66 engages the contact member 61 and blocks plate 3 to counterplate 2, thus particularly preventing the rotation of plate 3 with respect to counterplate 2 via the hinge element 30;
- a released position, in which the hook portion 66 does not engage the contact member 61, and plate 3 is rotatable with respect to counterplate 2 via the hinge element 30.

[0053] Member 60, namely the hook portion 66 thereof, and the contact member 61 are shaped so as to fasten plate 3 to counterplate 2 in a direction substantially orthogonal to plane P.

[0054] In use, when plate 3 is brought to the closed position, member 60 (which is optionally loaded by a spring) is pushed laterally outwards by the contact portions 47 of the hinge element 30 which cooperate in abutment with member 60.

[0055] Plate 3 is fastened to counterplate 2 at end 29, via the end fastening 28.

[0056] Plate 3 is rotatable with respect to counterplate 2 via the hinge element 30, to be brought from the open position to the closed position, and vice versa.

[0057] The movement of plate 3 also results in the rotation of the hinge element 30, which presses with the contact portions 47 against member 60, thus retracting member 60 and allowing the contact member 61 to be inserted into seat 67.

[0058] By bringing plate 3 to the closed position, member 60 couples (via the hook portion 66) with the contact member 61, thus fitting the plate to counterplate 2.

[0059] The hinge element 30 is shaped so as to act as a spring on member 60.

[0060] In particular, as the hinge element 30 is in the tensioned deformed configuration, it exerts a force which keeps member 60 in the locked position, in which the hook portion 66 engages the contact member 61 and

therefore blocks plate 3 to counterplate 2. Member 60 is movable against the elastic action exerted by the hinge element 30 on member 60 when the hinge element 30 contacts member 60.

[0061] In order to release plate 3 from the counterplate and access opening 11, for example for introducing a refill of a sanitizing device set in the tank, organ 60 is pressed towards the interior of the plate assembly 1, against the action of the hinge element 30, so that the hook portion 66 releases the contact member 61.

[0062] At this point, plate 3 can be moved away from the counterplate, again by rotating plate 3 with respect to counterplate 2 via the hinge element 30.

[0063] Lastly, it is understood that further modifications and variants may be made to the plate assembly described and shown herein, which do not depart from the scope of the appended claims.

Claims

1. A control plate assembly (1) of a flushing tank, comprising a mounting counterplate (2), having a frame (10) that delimits an opening (11); and a control plate (3) connected to the counterplate (2) via a fastening system (4) which comprises a hinge element (30), that extends along a longitudinal axis (A) and has two opposite lateral ends (32, 33) respectively hinged to the counterplate (2) by means of first rotation elements (51, 52) and to the plate (3) by means of second rotation elements (53, 54), said first and second rotation elements (51, 52; 53, 54) defining respective parallel rotation axes positioned in the opening (11) in an intermediate position between two lateral sides (16) of the counterplate (2) that delimit the opening (11).

2. A plate assembly according to claim 1, wherein the hinge element (30) is positioned with the longitudinal axis (A) substantially parallel to the lateral sides (16) of the counterplate (2).

3. A plate assembly according to claim 1 or 2, wherein the fastening system (4) connects the plate (3) to the counterplate (2) so as the plate (3) is movable with respect to the counterplate (2) between a closed position, in which the plate (3) is integrally fitted to the counterplate (2) and is positioned facing the counterplate (2) and adjacent to the counterplate (2) and closes the opening (11); and an open position, in which the plate (3) is released from the counterplate (2) but remains joined thereto via the hinge element (30) and leaves the opening (11) at least partially open.

4. A plate assembly according to one of the preceding claims, wherein the hinge element (30) comprises a monolithic body (40) made of plastic, shaped so as to be elastically deformable and precisely to be flexible transversely to the longitudinal axis (A) of the hinge element (30).

5. A plate assembly according to claim 4, wherein the body (40) comprises a base plate (41) and two pairs of arms (42, 43) that project from the base plate (41) and define respective lateral ends (32, 33) of the hinge element (30) and are provided with respective rotation elements (51, 53).

6. A plate assembly according to claim 5, wherein the arms (43) comprise respective root portions (44), that project from the base plate (41), and respective rotation portions (45), that project from the root portions (44) and are shaped so as to be flexible with respect to the root portions (44), for example being joined to the root portions (44) via respective restricted-section connection portions (46).

7. A plate assembly according to one of the preceding claims, wherein the first rotation elements (51, 52) comprise first pins (51) set on the hinge element (30) and first seats (52) formed on the counterplate (2) and engaged by the first pins (51); and the second rotation elements (53, 54) comprise second pins (53) set on the hinge element (30) and second seats (54) formed on the plate (3).

8. A plate assembly according to claim 7, wherein the hinge element (30) is elastically deformable for selectively assuming: a rest undeformed condition, that the hinge element (30) assumes when it is not mounted in the plate assembly (1) and it is not subject to any forces; and a tensioned deformed condition, that the hinge element (30) assumes when it is mounted in the plate assembly (1) with the pins (51, 53) inserted in the respective seats (52, 54) and the plate (3) is in closed position with respect to the counterplate (2).

9. A plate assembly according to claim 8, wherein the pins (51, 53) of each pairs are aligned along respective pins axes, and the respective seats (52, 54) are aligned along respective seats axes; the distance between the pins axes in the rest undeformed condition is greater than the distance between the seats axes in the closed position of the plate (3).

10. A plate assembly according to one of the preceding claims, wherein the fastening system (4) comprises an end fastening (28), set at a first lateral end (29) of the plate assembly (1); and a releasable locking device (34), set at a second lateral end (33), opposite to the first lateral end (29), of the plate assembly (1) and that selectively blocks and allows the rotation of the plate (3) with respect to the counterplate (2) via the hinge element (30).

11. A plate assembly according to claim 10, wherein the releasable locking device (34) comprises a movable member (60), which is movable for engaging and releasing a contact member (61) arranged on the plate (3).

12. A plate assembly according to claim 11, wherein the hinge element (30) is shaped so as to act as a spring on the movable member (60).

13. A plate assembly according to claim 12, wherein the movable member (60) is movable against the elastic action exerted from the hinge element (30) on the movable member (60) when the hinge element (30) contacts the movable member (60).

14. A plate assembly according to one of claims 11 to 13, wherein the hinge element (30) has at least one contact portion (47), that projects from the hinge element (30) for cooperating with the movable member (60).

15. A plate assembly according to one of claims 11 to 14, wherein the movable member (60) comprises a control portion (63), that projects from the frame (10) and is housed in a cavity (64) formed in peripheral edge (65) of the plate (3); and a hook portion (66), that selectively engages the contact member (61).

16. A plate assembly according to one of claims 11 to 15, wherein the contact member (61) projects from the support portion (55) on a rear face (56) of the plate (3) and delimits a sliding seat (67) in which the hook portion (66) of the movable member (60) slides.

17. A plate assembly according to one of claims 11 to 16, wherein the movable member (60) is movable between two operative positions: a locked position, in which the hook portion (66) engages the contact member (61) and blocks the plate (3) to the counterplate (2), preventing in particular the rotation of the plate (3) with respect to the counterplate (2) via the hinge element (30); and a released position, in which the hook portion (66) does not engage the contact member (61) and the plate (3) is rotatable with respect to the counterplate (2) via the hinge element (30).

FIG. 1

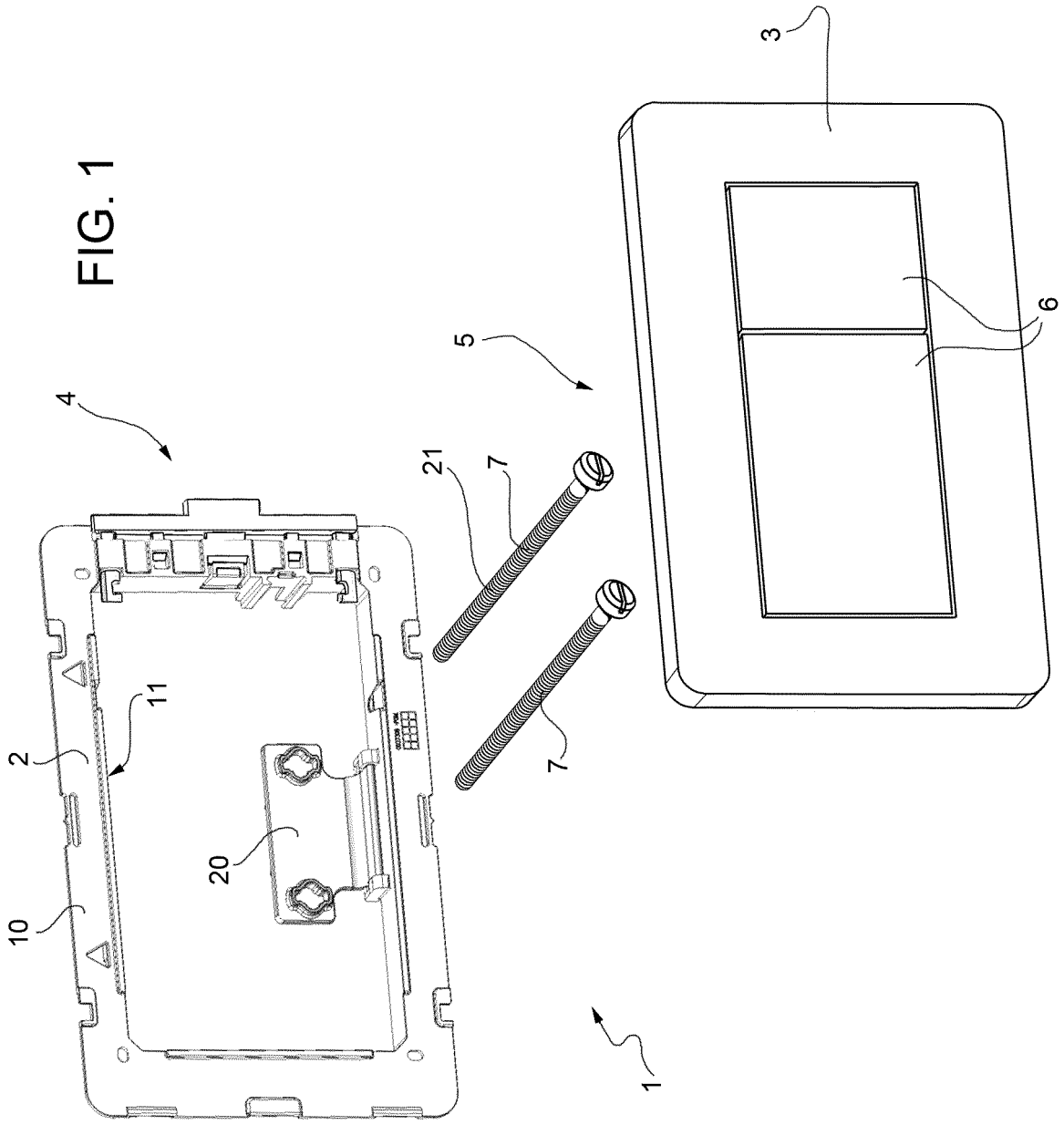

FIG. 2

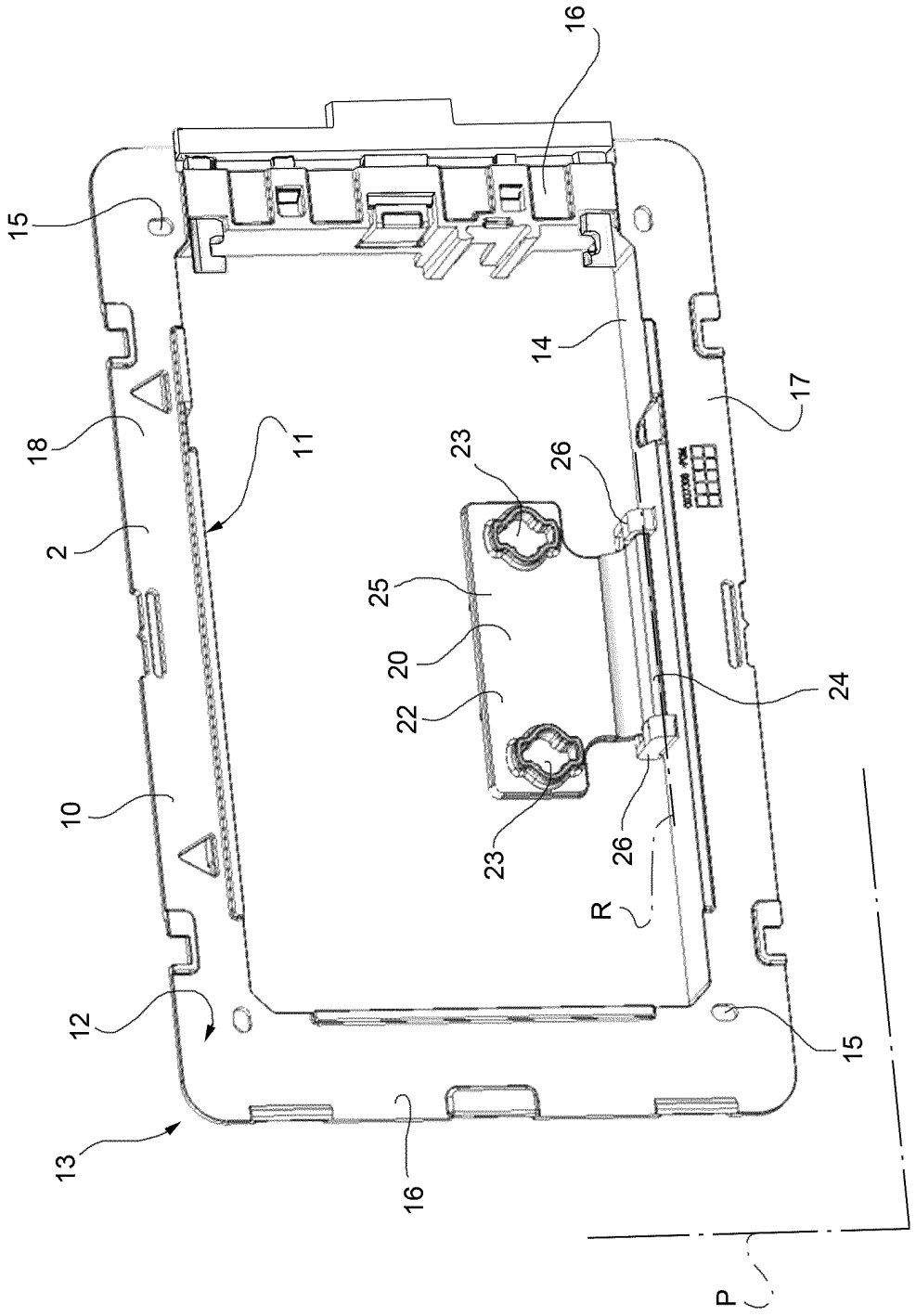

FIG. 3

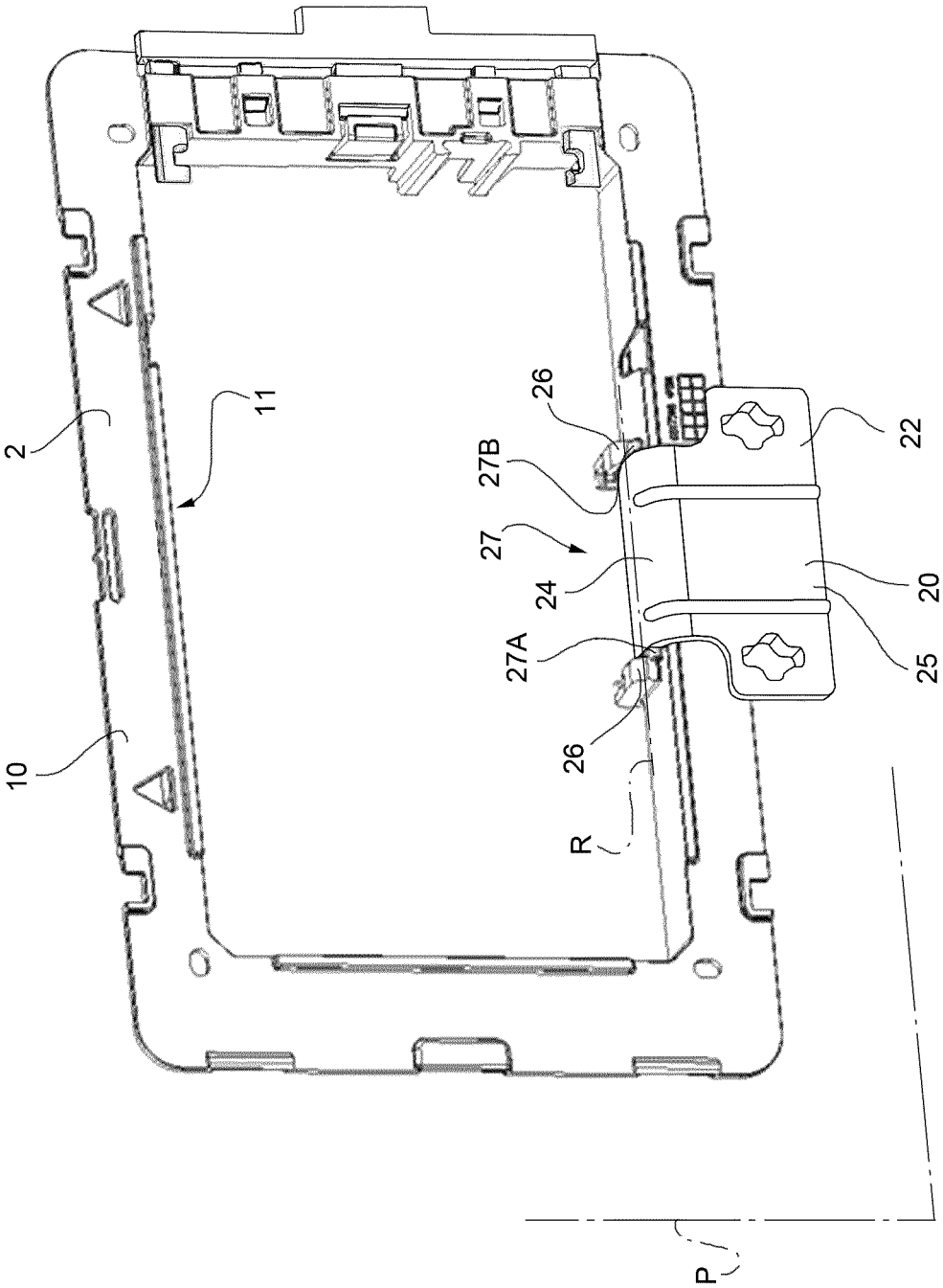

FIG. 4

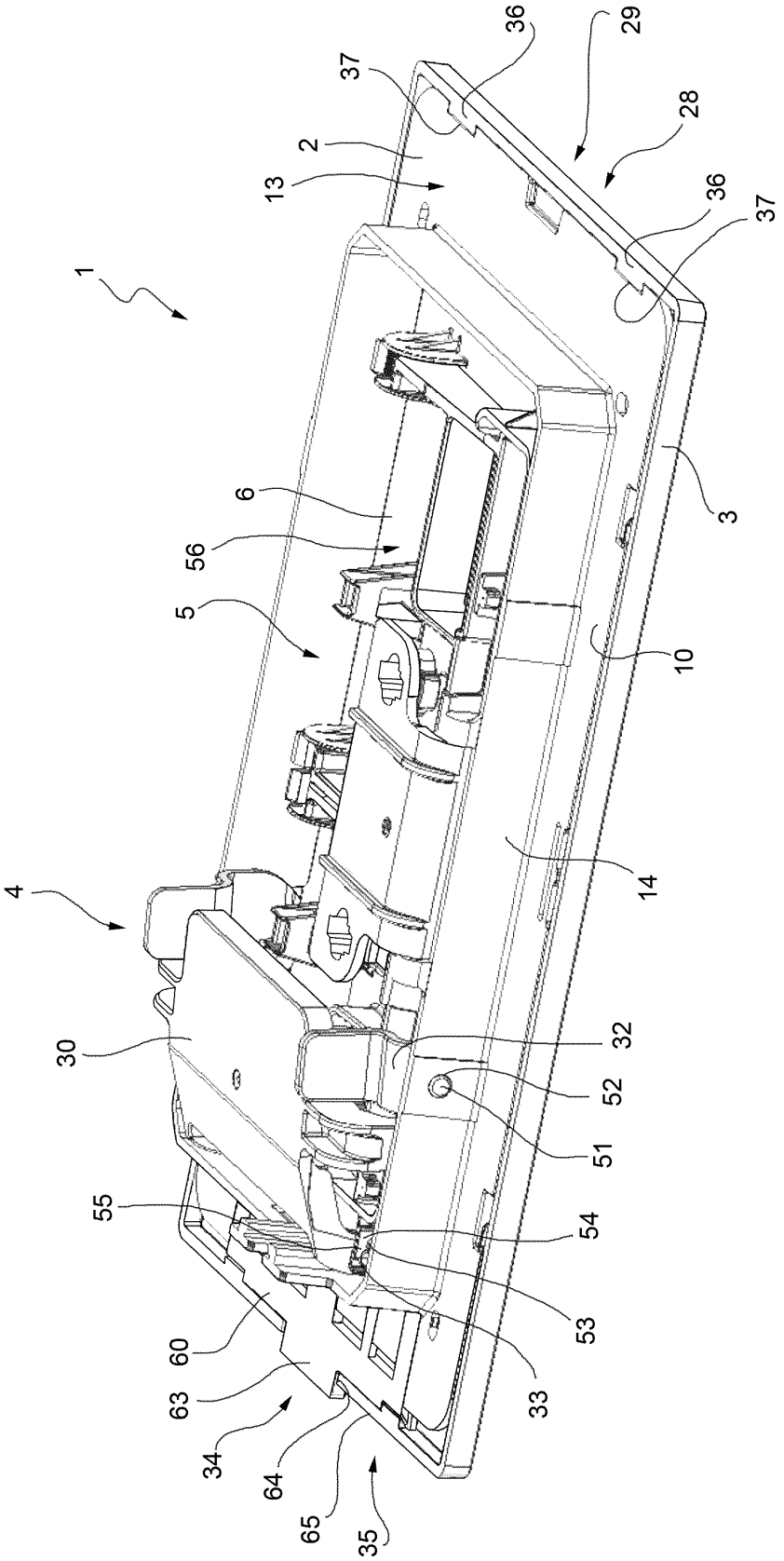
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FIG. 5

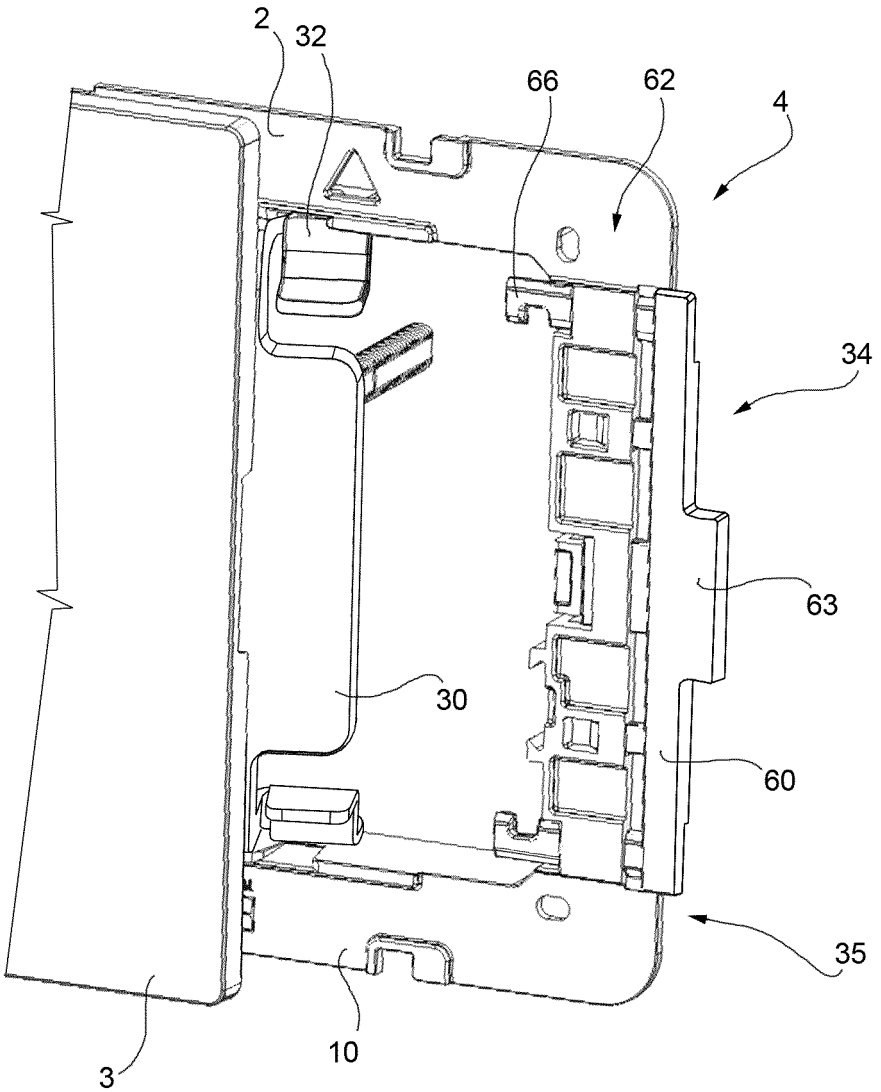


FIG. 6

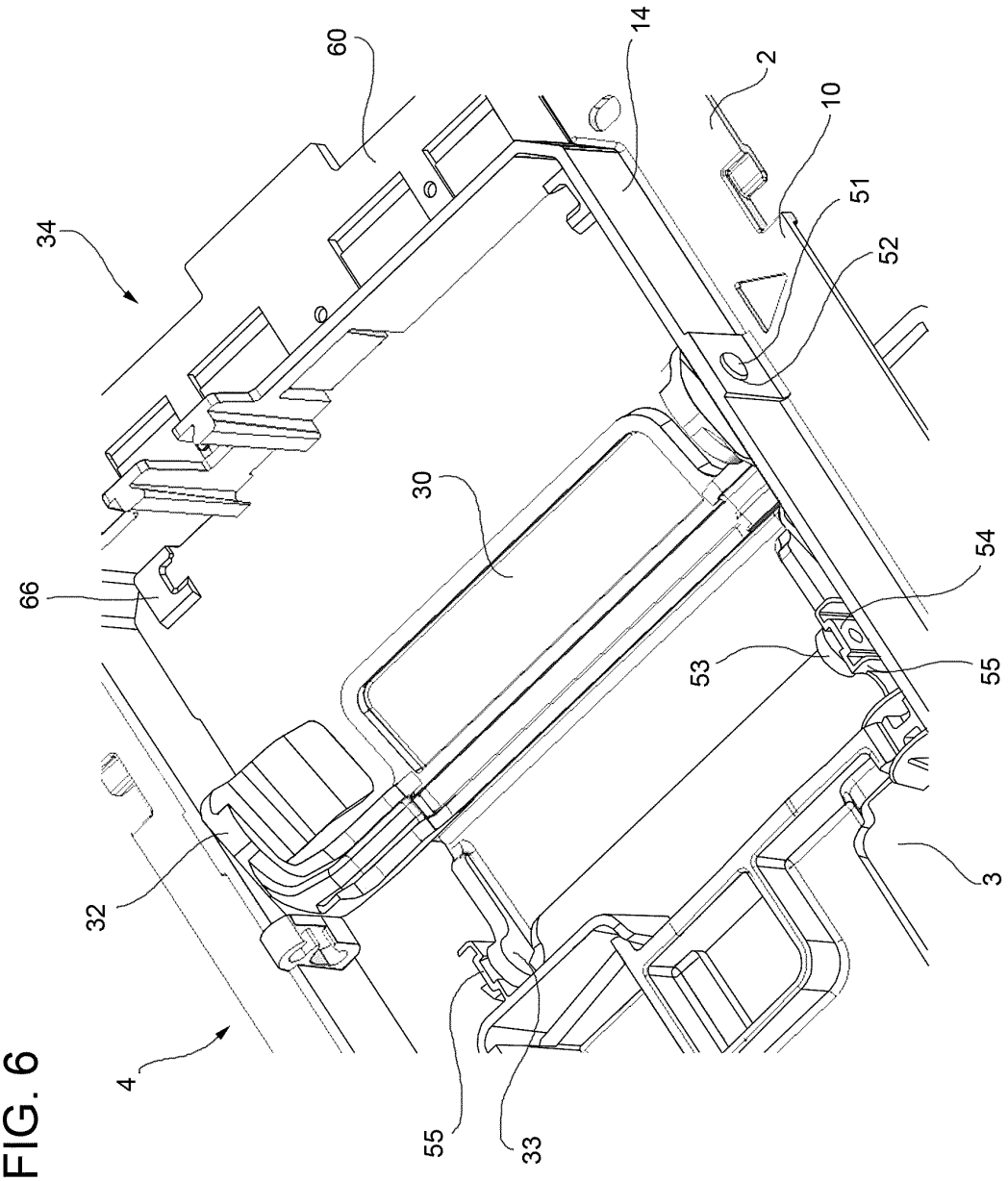


FIG. 7

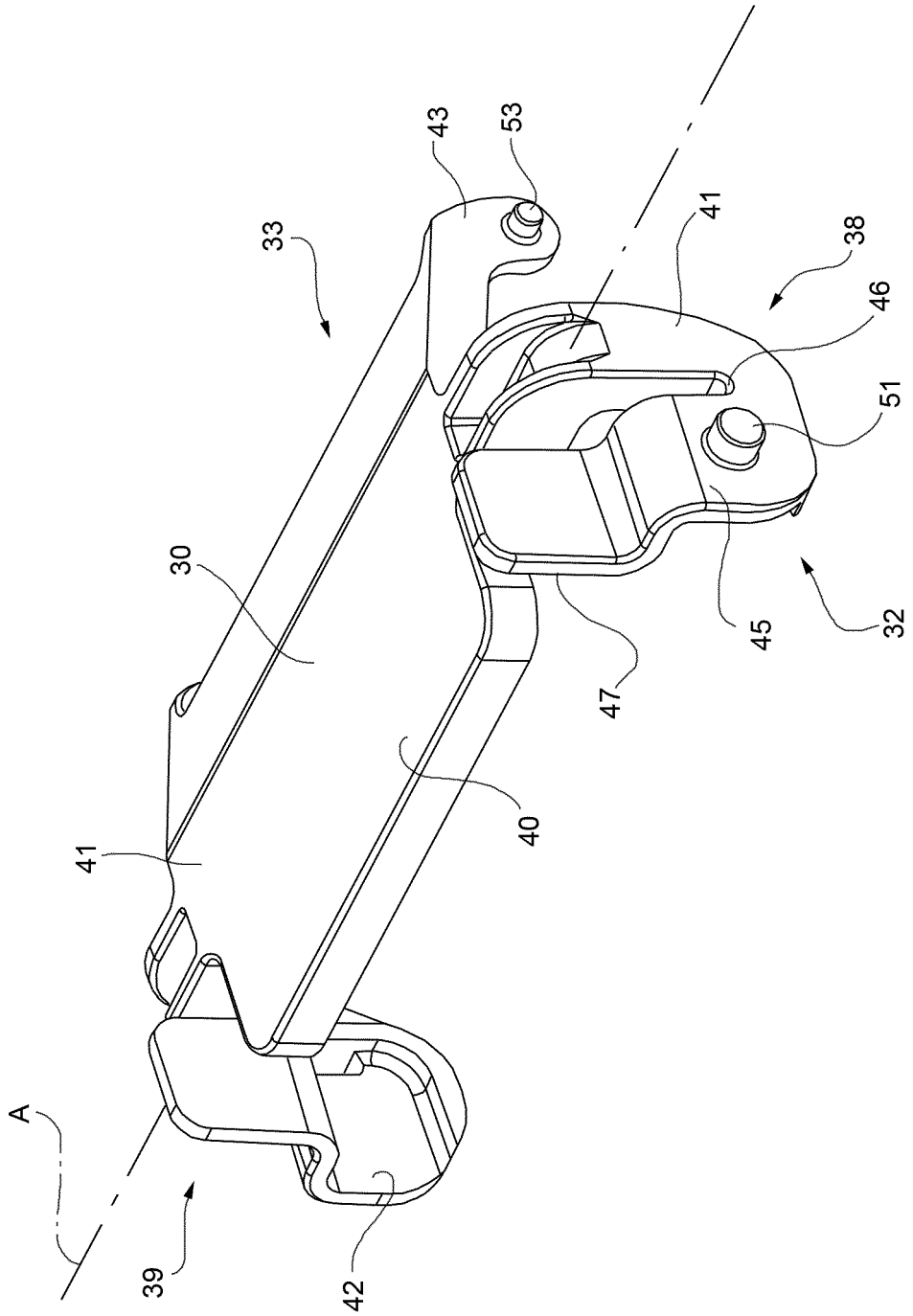


FIG. 8

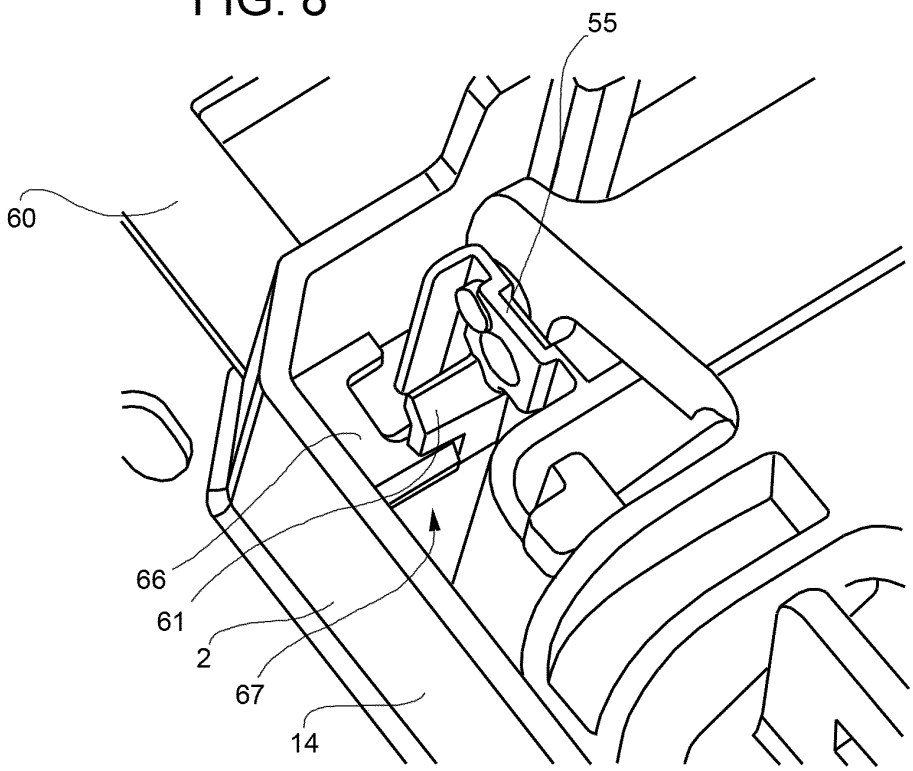
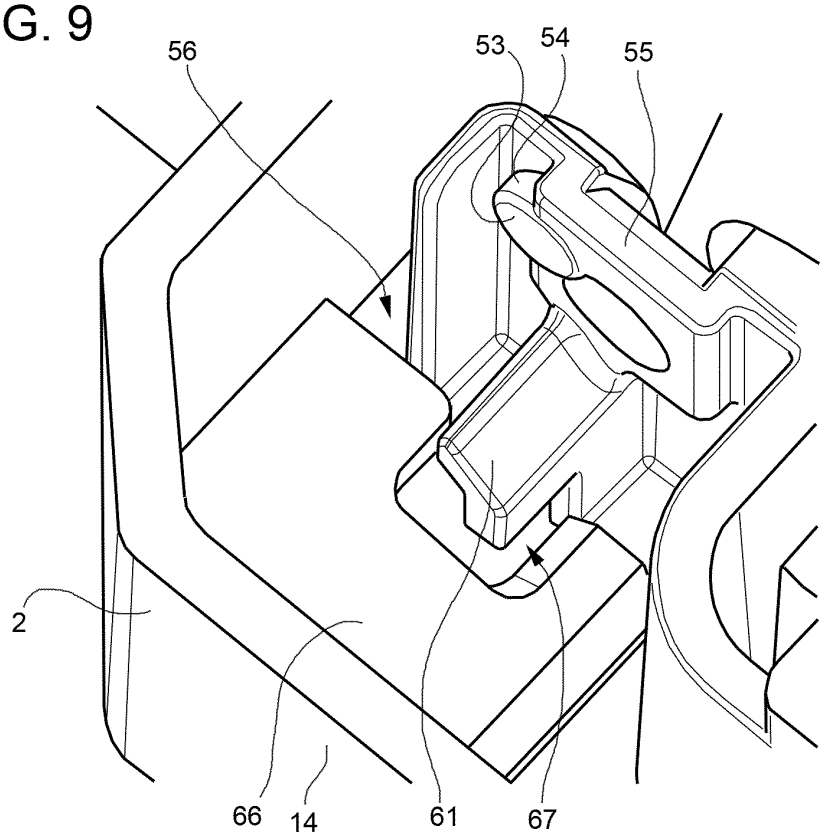


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 14 39 8002

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 102 46 513 A1 (ROTH ECKART [DE]) 22 April 2004 (2004-04-22) * paragraph [0001] - paragraph [0004] * * paragraph [0026] - paragraph [0055]; figures *	1-14	INV. E03D5/02 E05D3/12 E03D1/012
X	GB 1 314 396 A (ARMORDUCT TRADING CO LTD) 18 April 1973 (1973-04-18) * the whole document *	1-17	
X	EP 2 128 350 A1 (GROHEDAL SANITAERSYSTEME GMBH [DE]) 2 December 2009 (2009-12-02) * paragraph [0010] - paragraph [0012]; figures *	1-17	
A	EP 2 226 437 A1 (GEBERIT INT AG [CH]) 8 September 2010 (2010-09-08) * paragraph [0018] - paragraph [0025]; figures *	1-17	
A	EP 2 336 435 A1 (GEBERIT INT AG [CH]) 22 June 2011 (2011-06-22) * paragraph [0013] - paragraph [0015]; figures *	1-17	TECHNICAL FIELDS SEARCHED (IPC) E05D E03D E05C E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 June 2014	Van Bost, Sonia

CATEGORY OF CITED DOCUMENTS

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