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(54) Control plate assembly for a flushing tank, having an opening mechanism

(57) A control plate assembly (1) of a flushing tank, comprises a mounting counterplate (2), a control plate (3) connected to the counterplate (2) and having a least one opening (24) delimited by a peripheral edge (25), at least one movable button (42) housed in the opening (24), and at least one actuator (44) operated by the button

(42) and connectable to a flush valve of the flushing tank; the control plate (3) is connected to the counterplate (2) via an opening mechanism (29) comprising an articulated system (4) having at least one movable element (30), which has opposite ends (31, 32) hinged to the counterplate (2) and to the plate (3) respectively.

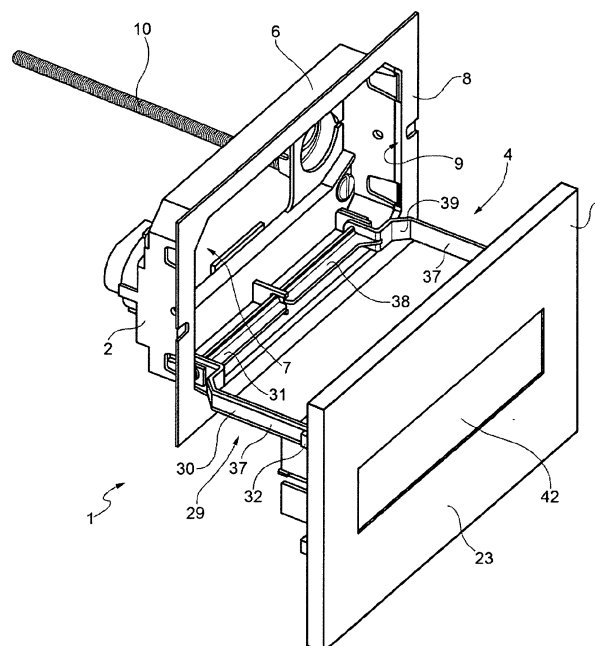


FIG. 5

Description

[0001] The present invention relates to a control plate assembly, having an opening mechanism, of a flushing tank.

[0002] In particular, the present invention relates to a control plate comprising a mounting counterplate fixable to a wall (or other support), a control plate connected to the counterplate by means of an opening mechanism, and an actuator device connectable to the flush valve of the flushing tank.

[0003] As known, wall-mounted or embedded flushing tanks are normally provided with control buttons carried by a wall mounted plate. The buttons control actuator members of the flushing valve arranged through an inspection opening formed in the wall and closed by the plate. A frame-shaped counterplate, which is fixed either to the wall or to a front wall of the tank, e.g. by means of screws, is commonly used to mount the plate. The plate is removably fixed to the counterplate in order to be able to access the actuator members in case of need.

[0004] Various systems are known for fixing the plate to the counterplate, but which do not appear fully satisfactory, above all in terms of mounting simplicity, efficacy and versatility.

[0005] In particular, in the known systems, the plate can be removed from the counterplate and is completely detached from the counterplate, to which it is coupled by means of fitting systems, snap elements, screws, or other fastening members. These systems are consequently not very practical to use, above all with plates of new design made of particularly fragile materials (glass or ceramic) which could be damaged during maintenance.

[0006] It is thus 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 solved in simple, cost-effective manner and which is, in particular, extremely simple to made, assemble and instal, being at the same time fully effective and reliable.

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

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

[0009] In particular, the opening mechanism equipping the plate assembly of the invention permits to simply and conveniently open the plate assembly and access the inspection opening, and thus inside the flushing tank; the plate does not need to be removed, but remains restrained to the counterplate, supported by the articulated system which belongs to the opening mechanism, also avoiding the risk of damage.

[0010] The invention is further described in the following non-limitative example of embodiment, with reference to the accompanying figures, in which:

- figure 1 is a diagrammatic perspective exploded view of a flushing tank control plate assembly according to the invention;
- figures 2 and 3 are a perspective longitudinal section view and a perspective cross section view, respectively, of the plate assembly in figure 1, assembled and in a resting position;
- figure 4 is a longitudinal section view of the plate assembly in figure 1, mounted and in a working position;
- figure 5 is a perspective view of the plate assembly in figure 1, shown in an open configuration.

[0011] In the accompanying figures, reference numeral 1 indicates as a whole a control plate assembly of a flushing tank, known in itself and therefore not illustrated.

[0012] The plate assembly 1 comprises a mounting counterplate 2 fixable to a wall or other support around an inspection opening which provides access to the flushing tank, a control plate 3 connected to the counterplate 2 by an articulated system 4, and an actuator device 5 connectable to a flush valve (not shown) of the flushing tank.

[0013] In the illustrated example, the plate assembly 1 is configured for use with a double flush valve, of the type which allows two different amounts of water to be alternatively discharged from the tank (for a complete flush and a partial flush of the water contained in the tank), by means of two separate actuators.

[0014] The counterplate 2 comprises a frame 6, for example essentially quadrangular, having an inner cavity 7 and a front edge 8 which delimits an access opening 9 to the cavity 7; the frame 6 is fixable to an outer support element (e.g. a wall or a panel) by means of appropriate fastening members 10 (known, only one of which is shown in figures 1 and 5).

[0015] The frame 6 is provided with a pair of seats 12, formed on a rear end 13 of the frame 6 opposite to the front edge 8; the seats 12 house respective components of the actuator device 5, described below.

[0016] The plate 3 comprises a support body 15 and a front covering element 16, fixed to the support body 15.

[0017] The support body 15 has a hollow main portion 17, delimited by a side wall 18 and having open longitudinal ends, and a radially outer front flange 19 arranged about a central opening 20 and having an annular front surface 21.

[0018] The covering element 16 has a flat plate body 23 having a through opening 24 aligned with the opening 20 of the support body 15 are delimited by a peripheral closed ring-shaped edge 25.

[0019] The covering element 16 is fixed to the support body 15, for example, by gluing (being, in particular, the front surface 21 of the flange 19 glued to a rear surface 26 of the covering element 16). It is however understood that the covering element 16 and the support body 15 may be joined in other manner, e.g. by means of releasable coupling members (e.g. by fitting).

[0020] The plate 3 is connected to the counterplate 2 by an opening mechanism 29 comprising the articulated system 4, so that the plate 3 is moveable with respect to the counterplate 2 between a closed position, in which the plate 3 is arranged near the counterplate 2 and closes the opening 9, and an open position, in which the plate 3 is detached, and spaced apart at a predetermined distance, from the counterplate 2, leaves the opening 9 open and is maintained, if desired, substantially parallel to the counterplate 2.

[0021] In particular, the articulated system 4 includes a moveable element 30, which has opposite ends 31, 32 hinged to the counterplate 2 (specifically to the frame 6) and to the plate 3 (specifically to the support body 15) respectively.

[0022] Preferably, the end 31 of the element 30 is hinged to a lower portion of the frame 6, placed at a lower end of the cavity 7, while the opposite end 32 is hinged to an upper portion of the support body 15, placed above the main portion 17 and the opening 24. For example, the element 30 is hinged to the frame 6 by means of respective pairs of opposite pins which engage respective seats, pins and seats being carried by element 30 and by the frame 6 or vice versa, respectively.

[0023] In the illustrated example, the end 31 is hinged to the frame 6 by means of a first pair of opposite pins 33 which engage respective seats 34 formed in the frame 6 within the cavity 7, while the end 32 is hinged to the support body 15 by means of a second pair of opposite pins 35 which engage respective seats 36 formed on the support body 15 behind the front flange 19.

[0024] In the illustrated example, but not necessarily, the element 30 is shaped as a substantially annular frame element, comprising two substantially parallel arms 37 connected by two crosspieces 38 substantially perpendicular to the arms 37.

[0025] When the plate 3 is in the closed position, the element 30 is entirely housed within the cavity 7; the element 30 is arranged substantially around the main portion 17 of the support body 15, behind the flange 19; when the plate 3 turns to go to the open position, the element 30 projects outwards from the cavity 7; the element 30 turns so that at least one stop portion 39 thereof rests against a shoulder 40 of the counterplate 2, e.g. defined by a portion of the edge 25 (figure 5); when the plate 3 is brought into the open position, the element 30 turns with respect to the frame 6 and also with respect to the support body 15, in the opposite sense.

[0026] The actuator device 5 comprises at least one moveable button 42, a guide structure 43 which guides the button 42, and at least one actuator 44 actuated by the button 42 and connected to the flush valve.

[0027] The button 42 is housed in the opening 24 and comprises a base body 45 and a finishing element 46 applied on a front face 47 of the base body 45.

[0028] The base body 45 has a central portion 48 which extends along a longitudinal axis A, which is substantially horizontal in use, and a pair of stems 49, which are ar-

ranged on respective longitudinal ends 51 opposite to the central portion 48 and which protrude perpendicularly from a rear face 52, opposite to the front face 47, of the central portion 48.

[0029] The button 42, and in the case in point the base body 45, is provided with directional members 53 which project from the rear face 52 and cooperate with the guide structure 43 to guide the movement of the button 42 with respect to the plate 3.

[0030] In particular, the direction members 53 comprise: a pair of side projections 54, arranged on respective longitudinal ends 51 of the base body 45 and which extend along respective axes B (vertical in use) parallel to each other and to the face 52 and perpendicular to the longitudinal axis A; and a blade 55 and central rod 56, substantially orthogonal to one another and perpendicular to the face 52 and which project from the central portion 48 of the base body 45.

[0031] The projections 54 project obliquely from (laterally and rearwardly) of the face 52 and are inclined with respect to the longitudinal axis A. The projections 54 are arranged beyond the edge 25 which delimits the opening 24 and engage respective hinge portions 57 of the edge 25; the projections 54, which are preferably rounded about the hinge portions 57, cooperate with the respective hinge portions 57 to define respective rotation hinges which allow the button 42 to turn with respect to the plate 3 alternatively about each hinge portion 57 and substantially about each of the axes B.

[0032] The blade 55 is an essentially flat blade, delimited by two opposite, flat, parallel faces; the rod 56 is substantially parallel to the stems 49 and, preferably, has a tapered free end 59.

[0033] The finishing element 46 is fixed onto the front face 47 of the base body 45 and is arranged substantially flushed with the edge 25 of the opening 24; the finishing element 46 has two longitudinal edge portions 60 arranged on respective longitudinal ends 51.

[0034] The guide structure 43 is supported by the support body 15 and comprises: the edge 25 and, in particular, the hinge portions 57, cooperating with the projections 54; and the guides 61, 62 which house the blade 55 and the rod 56, respectively.

[0035] The guides 61, 62 are, for example, formed on a piece 63 fixed to the support body 15 or to the counterplate 2 and face the base body 45 of the button 42 so as to receive the blade 55 and the rod 56, respectively.

[0036] The guide 61 is substantially shaped as a slot in which the blade 55, which is moveable in the guide 61, is inserted: in particular, the blade 55 may rotate within the guide 61 with respect to axes perpendicular to the blade 55 and shift on a plane parallel to the blade 55.

[0037] The guide 62 is formed by two symmetric channels 64 separated by a wedge-shaped partition 65 having a tip 66, facing the base body 45 of the button 42, and two sides 67 diverging from the tip 66.

[0038] The actuator 44 may be, for example, a mechanical or pneumatic actuator.

[0039] In all cases, the actuator 44 comprises a pair of members 69 arranged on respective side ends 70 of the counterplate 2 and housed, for example, in the seats 12 and cooperating with respective stems 49.

[0040] In the case of mechanical actuator, as that shown in the accompanying figures, the members 69 are levers; each lever 69 has a contact end 71 cooperating by pushing with a stem 49, and an opposite end 72 connected to a control stem of the flush valve; the lever 69 is hinged in an intermediate position between the ends 71, 72 to a support 73 mounted in the seat 12.

[0041] The support 73 is interchangeable with another support which houses a pneumatic device.

[0042] The button 42 is loaded by springs, e.g. interposed between respective contrast surfaces of the part 63 and respective longitudinal ends 51 of the base body 45 of the button 42.

[0043] In use, the plate assembly 1 is normally in a resting position, shown in figures 2 and 3, in which the button 42 is substantially parallel to the plate 3.

[0044] The user presses the button 42 laterally (i.e. on a longitudinal end portion 60) when needing to operate the flush.

[0045] If, as in the illustrated example, the plate assembly 1 is associated to a double flushing valve, the user may press alternatively either one or the other longitudinal end portion 60 to activate respective flushing modes.

[0046] The button 42, pressed by the user laterally on a longitudinal end portion 60, moves guided by the guide structure 43 to assume a working position, shown in figure 4: in particular, the button 42 turns about an axis B on a hinge portion 57, while the blade 55 moves within the guide 61 and the rod 56 slides in a channel 64 of the guide 62.

[0047] The rotation of the button 42 makes a stem 49 push the corresponding member 69 (lever), which actuates the flush valve.

[0048] The spring 75 then returns the button 42 to the resting position.

[0049] If the button 42 is pressed by the user centrally, i.e. in a central portion, instead of laterally on a longitudinal end portion 60, the button 42 is blocked by the rod 56 which rests against the partition 65, which constitutes a contrast element for the rod 56. The button 52 therefore does not move and the flushing valve is not activated.

[0050] If accessing the cavity 7 and the flushing valve is needed, it will suffice to detach the plate 3 from the counterplate 2 (figure 5); also in open configuration, the plate 3 remains restrained to the counterplate 2 without being disconnected therefrom, remaining connected to the counterplate of the element 30. In closed configuration, the plate 3 may possibly be coupled to the counterplate 2 by means of a mechanical fitting or a magnetic coupling.

[0051] Finally, it is understood that further changes and variations can be made to the plate assembly described and shown herein without departing from the scope of

protection of the appended claims.

Claims

1. A control plate assembly (1) of a flushing tank, comprising a mounting counterplate (2), a control plate (3) connected to the counterplate (2) and having a least one opening (24) delimited by a peripheral edge (25), at least one movable button (42) housed in the opening (24), and at least one actuator (44) operated by the button (42) and connectable to a flush valve of the flushing tank; the plate assembly (1) being **characterized in that** the plate (3) is connected to the counterplate (2) via an opening mechanism (29) comprising an articulated system (4) having at least one movable element (30), which has opposite ends (31, 32) hinged to the counterplate (2) and to the plate (3) respectively.
2. A plate assembly according to claim 1, wherein the element (30) is rotatable with respect to both the counterplate (2) and the plate (3), in respective opposite rotation directions.
3. A plate assembly according to claim 1 or 2, wherein a first end (31) of the element (30) is hinged to a lower portion of the counterplate (2), set at a bottom end of the counterplate (2), while a second end (32) of the element (30) is hinged to an upper portion of the plate (3), set above the opening (24).
4. A plate assembly according to claim 3, wherein the counterplate (2) comprises a frame (6), having an inner cavity (7) and a front edge (8) that delimits an access opening (9) of the cavity (7); and the element (30) is hinged to the frame (6) by means of respective pairs of opposite pins (33, 35) which engage respective seats (34, 36), pins and seats being carried by the element (30) and the frame (6) respectively, or vice versa.
5. A plate assembly according to claim 4, wherein the first end (31) is hinged to the frame (6) by means of a first pair of opposite pins (33) that engage respective seats (34) formed in the frame (6) inside the cavity (7).
6. A plate assembly according to claim 5, wherein the plate (3) comprises a support body (15) having a hollow main portion (17) and a radially outer front flange (19) set around a central opening (20); and the second end (32) is hinged to the support body (15) by means of a second pair of opposite pins (35) that engage respective seats (36) formed on the support body (15) behind the front flange (19).
7. A plate assembly according to claim 6, wherein when

the plate (3) is attached to the counterplate (2) in a closed position the element (30) is entirely housed in the cavity (7) and is set substantially around the main portion (17) of the support body (15), behind the flange (19); while when the plate (3) is spaced apart from the counterplate (2) in an open position, the element (30) projects outside the cavity (7). 5

8. A plate assembly according to one of the preceding claims, wherein the element (30) is shaped as a substantially annular frame element, comprising two substantially parallel arms (37) connected by two crosspieces (38) substantially perpendicular to the arms (37). 10

9. A plate assembly according to one of the preceding claims, wherein the plate (3) is movable with respect to the counterplate (2) by means of the articulated system (4) between a closed position, in which the plate (3) contacts the counterplate (2), and an open position, in which the plate (3) is supported by the element (30) and is spaced apart and at a preset distance from the counterplate (2). 15 20

10. A plate assembly according to one of the preceding claims, wherein the element (30) has at least one stop portion (39) that rest against an abutment (40) of the counterplate (2), for example defined by a portion of the edge (25). 25

11. A plate assembly according to one of the preceding claims, comprising at least one mechanical joint or a magnetic coupling for keeping the plate (3) attached to the counterplate (2) in a closed position. 30 35

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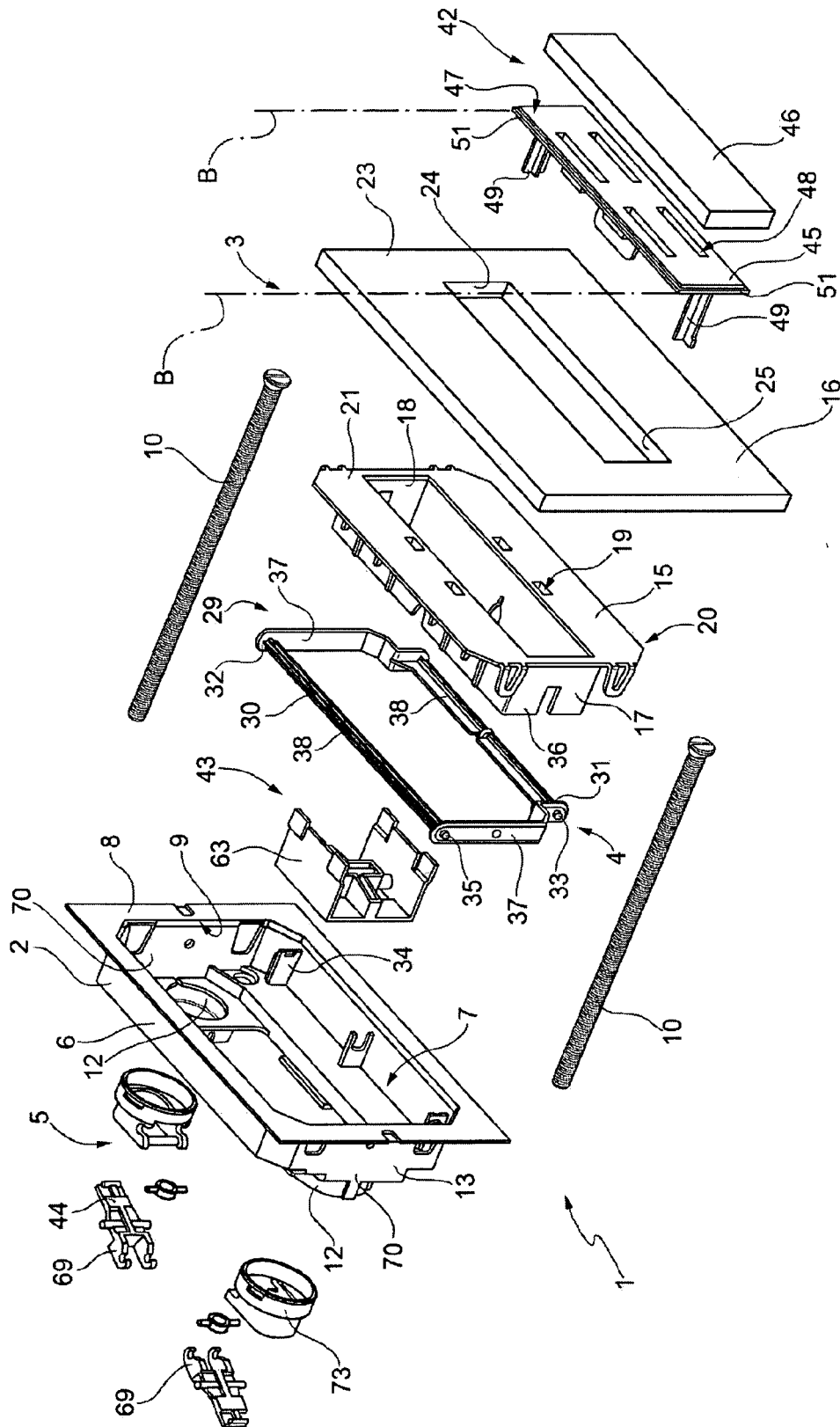


FIG. 1

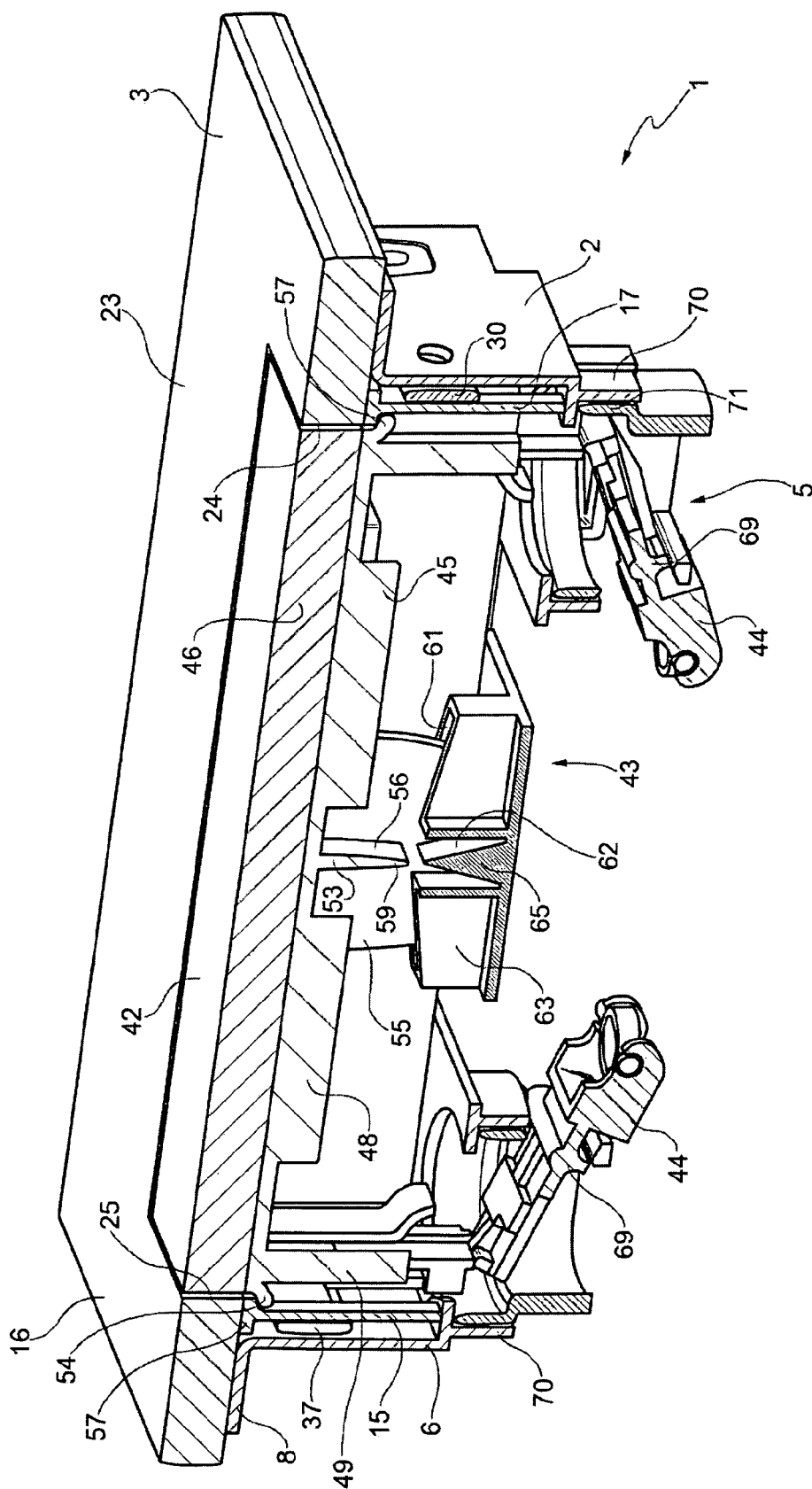


FIG. 2

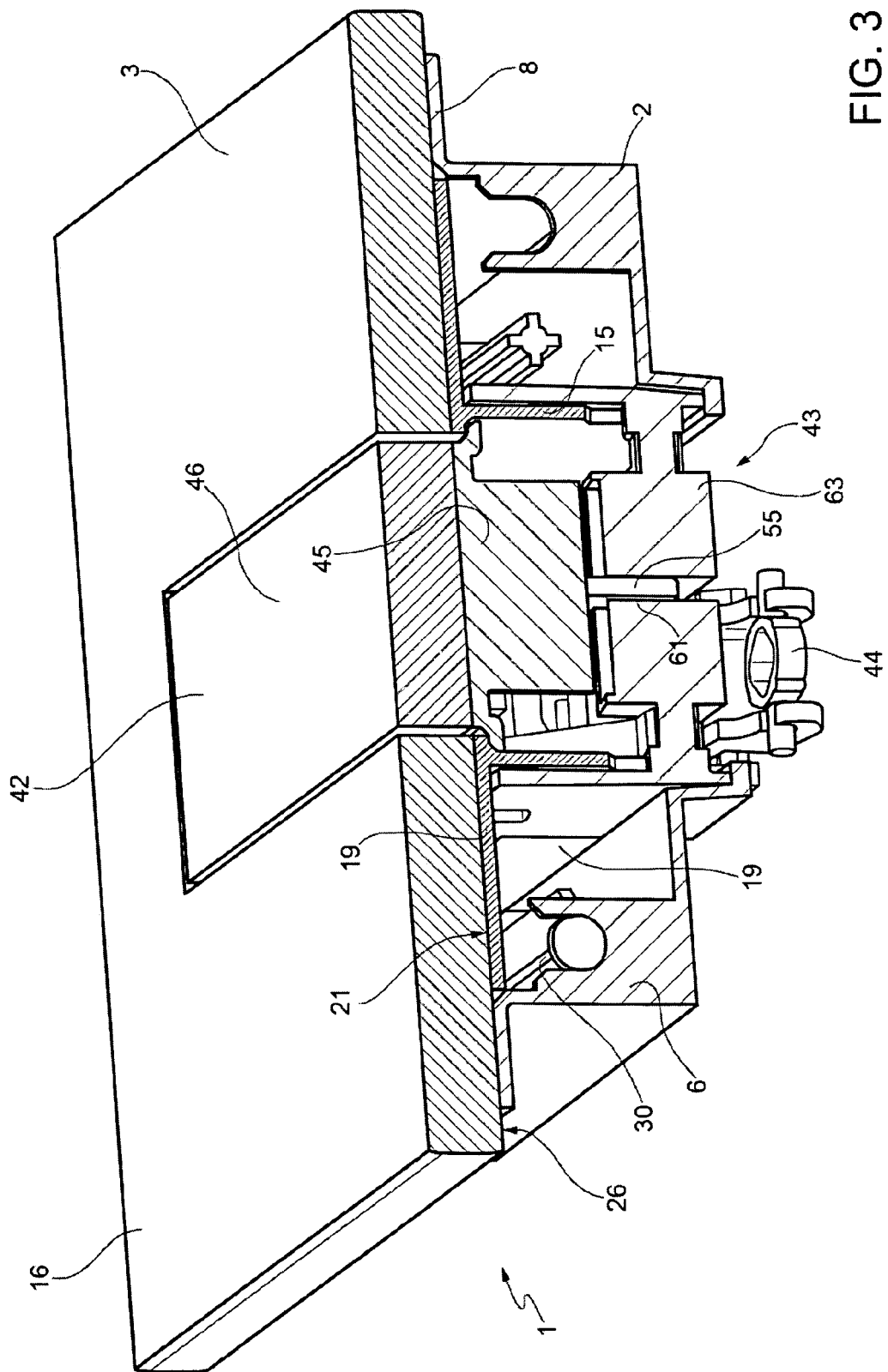


FIG. 3

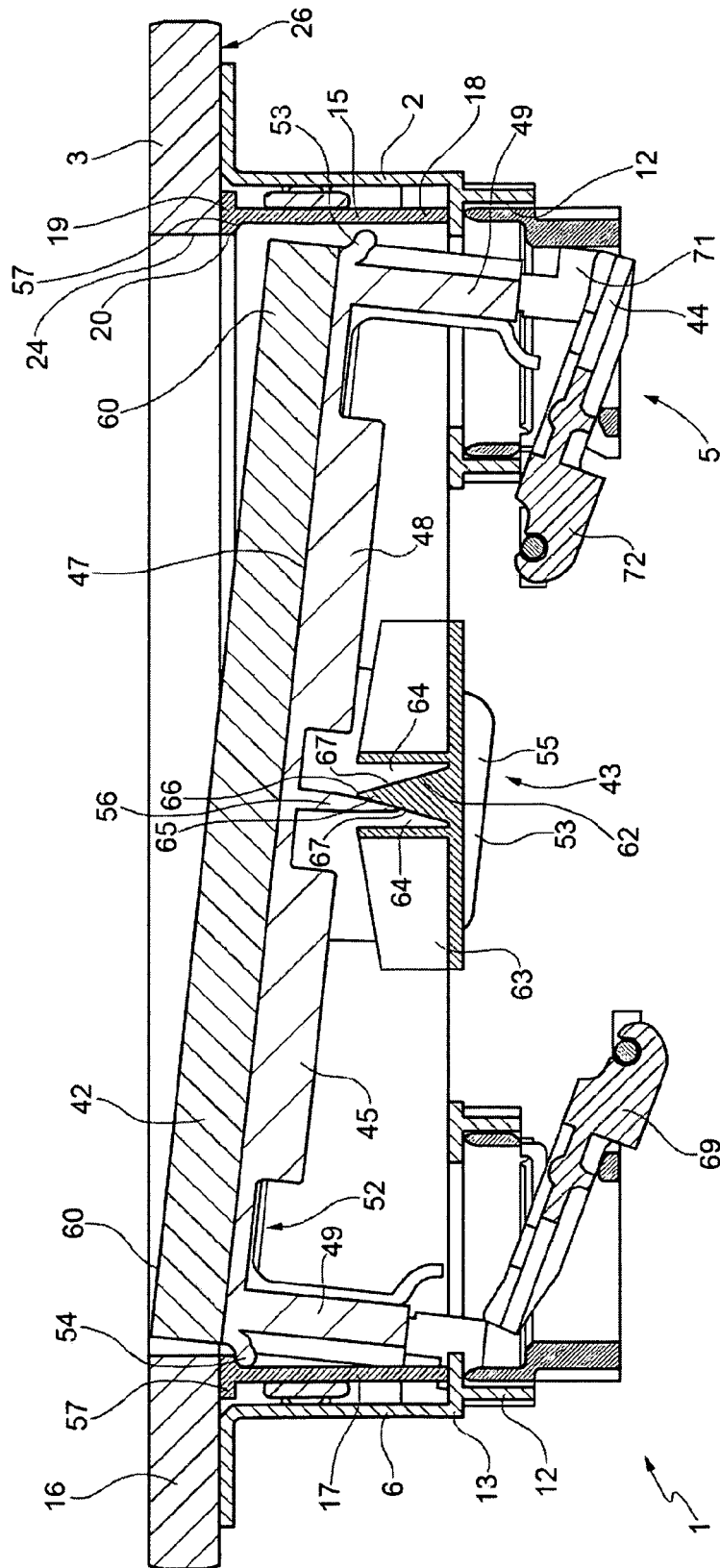


FIG. 4

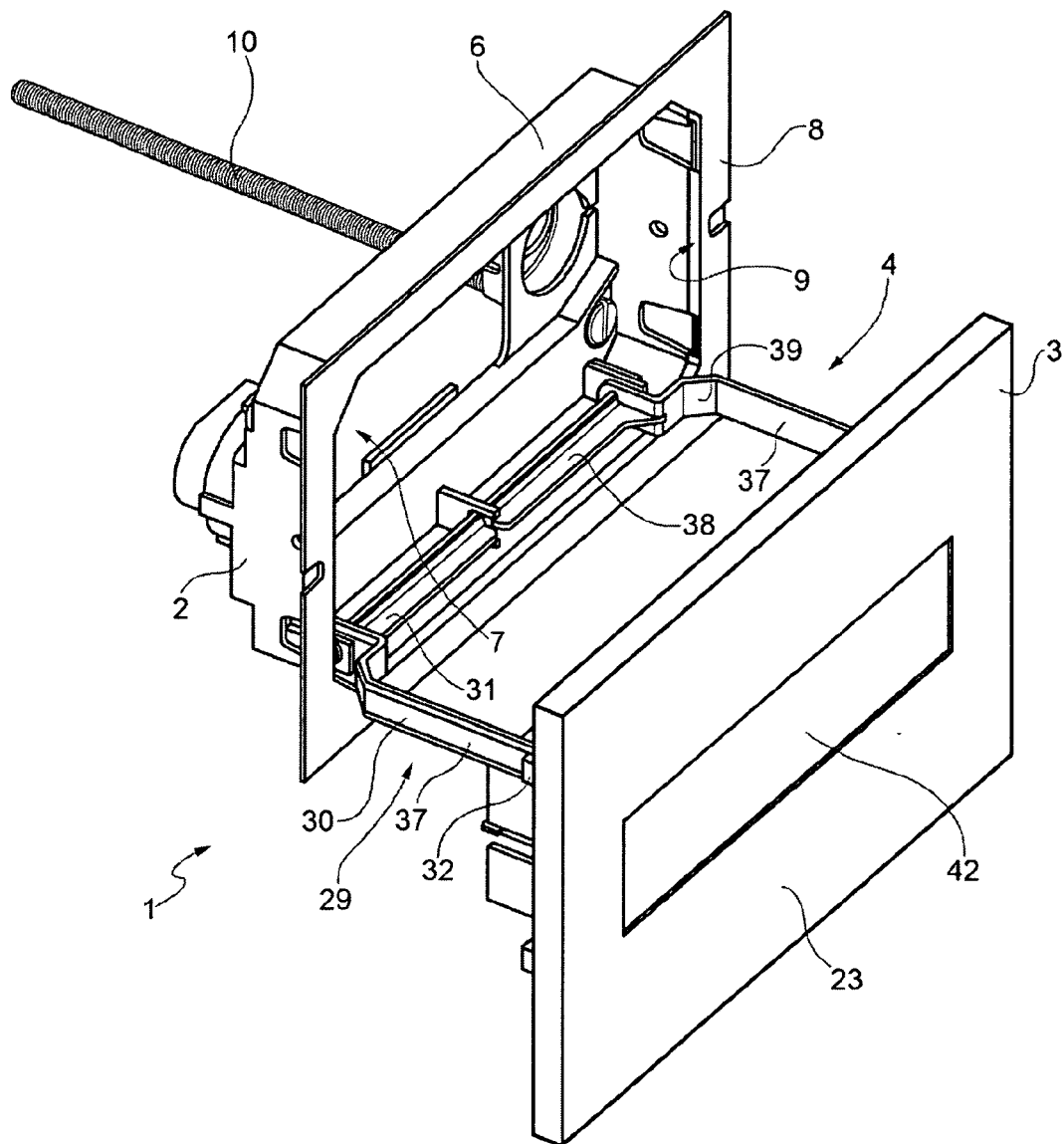


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 13 39 8002

DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 March 2013	Examiner Leher, Valentina
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 13 39 8002

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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