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(54) **BOX FOR FAN COIL UNITS**

(57) A box (1) for fan coil units, which comprises a box-like body (7), arranged vertically when installed, with a substantially parallelepiped shape that defines a removable bottom (8), two longitudinal side walls (9a, 9b) and a top (10), all connected to a flat base (11), and a cover (12);
the removable bottom (8) comprises a first breakable zone (18) and a housing (19), fitted with a condensate drain, for a removable trap (21) that cooperates with guide means (24a, 24b) associated proximate to the flat base (11) proximate to the opening (15);
the top (10), the longitudinal side walls (9a, 9b) and the flat base (11) have, respectively, second, third and fourth breakable zones (27, 28, 29);
the first, the second and the third breakable zones 18, 27, 28 are adapted to accommodate at least delivery (4) and return (5) conduits for refrigerated water or water at high temperatures.

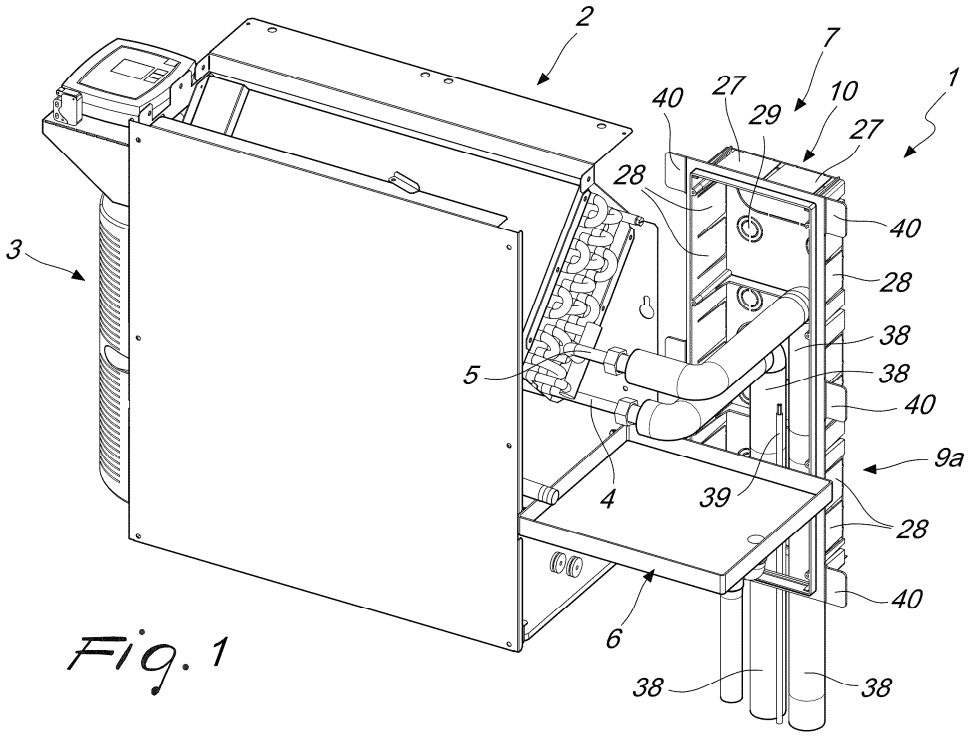

Fig. 1

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Description

[0001] The present application relates to a box for fan coil units or convectors.

[0002] Fan coil units or convectors are devices that allow heating and cooling plants to be used.

[0003] They are usually provided in a single air diffusion terminal and, given that they make it possible to generate hot air or cold air by using refrigerated water or water at high temperatures, they need to be connected to adapted delivery and return conduits and to a condensate drain.

[0004] In general, when using heating and cooling plants, it is known to use attachment point/distribution boxes, which can be inserted in a space of a building that acts as a transition space for adapted pipes that are run through interspaces and/or false ceilings.

[0005] Nowadays, in the sector of hydronic systems, which are a type of hot and cold climate control systems that use water as a heat carrier fluid, it is known to use a box, made of plastic material, with a parallelepiped shape, which has a compartment that can be closed by means of a cover, and is fitted internally and in a downward region with a base for collecting the condensate which is arranged inclined, in order to facilitate the outflow of the condensate.

[0006] Such a solution can be found at the following link: "https://emmeti.com/it/prodotti/climatizzazione/ventilconvettori-unita-terminali-ad-aria/cassetta-di-predisposizione-hydro-box/cassetta-di-predisposizione-hydro-box"

[0007] Such a solution, although described as compatible with (but not exclusively dedicated to) fan coil units, displays many drawbacks, such as the need to be rotated 90° and to be used on specific models of fan coils, odors rising from the condensate drain, difficulty in application on plasterboard as it must merely be inserted in a recess made to measure, which requires skill on the part of the installation technician.

[0008] A partial solution to some of these drawbacks is known from patent application no. 101998900707175 which describes, specifically for connecting the air conditioners and/or heat pumps that make up climate control units, an attachment point box that comprises trap means adapted for connection between a water condensate drainage circuit and trap means adapted for connection between a terminal of an internal unit and a water condensate drainage circuit.

[0009] However, many drawbacks arise in this solution, including the impossibility of using the box for a fan coil unit, given that it needs to be arranged vertically which would render the trap unusable given its fixed arrangement on the bottom of the box, and also the presence of holes on only the two short sides of the box for the delivery and return conduits and for the electrical cable.

[0010] The aim of the present invention is to solve the technical problems highlighted, eliminating the drawbacks in the cited known art and so devising a box specifically for fan coil units or convectors that makes it possible to ensure versatility of installation, excellent drainage of condensate, and simplicity of installation and maintenance also of the various pipes and of the condensate drain as a function of the specific arrangement of the fan coil unit.

[0011] Within the above aim, an object of the invention is to provide a box that simultaneously allows the installation, then or later, of a convector or fan coil unit, in that it can accommodate all the necessary pipes and connections, so further optimizing the functionality of a condensate drain according to the specific installation requirements.

[0012] Another object of the invention is to provide a box that enables the installation technician to obtain a simple and rapid alignment of the box without requiring additional special equipment.

[0013] Another object is to provide a box that can be used, in a rapid and simple manner, on masonry walls and the like or on plasterboard structures.

[0014] Not least an object of the invention is to provide a box that is structurally simple, has a low number of components, is rapid and easy to assemble and maintain, and can be provided with the usual and conventional machinery and plants.

[0015] This aim and these and other objects which will become more apparent hereinafter are achieved by a box according to claim 1, optionally provided with one or more of the characteristics of the dependent claims.

[0016] Further characteristics and advantages of the invention will become more apparent from the detailed description of a particular, but not exclusive, embodiment, illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a perspective view from above of the invention associated with a fan coil unit;

Figure 2 is a perspective view from below of the invention associated with a fan coil unit;

Figure 3 is a first perspective exploded view from above of the box;

Figure 4 is a second perspective exploded view from above of the box;

Figure 5 is a third perspective exploded view, from below, of the box;

Figure 6 is a partially exploded perspective view of the box with a housing, fitted with a condensate drain, for a trap;

Figure 7 is a partially exploded perspective view of the box with a male connector for the condensate drain pipe;

Figure 8 is a perspective view of the box with a male connector for the condensate drain pipe applied and with delivery and return conduits for refrigerated water or water at high temperatures applied;

Figure 9 is a partially exploded perspective view of the box with a female connector for the condensate

drain pipe;

Figure 10 is a perspective view of the trap, shown transparent;

Figures 11, 12 and 13 are respectively a front elevation view, a side view, and a plan view of the trap;

Figure 14 is a cross-sectional view taken along the line XIV-XIV in Figure 12.

[0017] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0018] With reference to the figures, the reference numeral 1 generally designates a box, arranged vertically when installed, for fan coil units or convectors 2, which can be associated with masonry or the like, for example using foam or cement or adhesives, or can be screwed to plasterboard structures.

[0019] The convector 2 comprises an air diffusion terminal 3 and dedicated delivery 4 and return 5 conduits and a container 6 for collecting the condensate.

[0020] The box 1 is constituted by a box-like body 7, with a substantially parallelepiped shape and open at the front, defining a removable bottom 8, two longitudinal side walls 9a, 9b and a top 10, all connected to a flat base 11, and a cover 12.

[0021] The box-like body 7 is preferably made of plastic material and more precisely of polystyrene (PS).

[0022] The removable bottom 8 is constituted by a perimetric frame 13, with a substantially rectangular shape, which is coupled at a complementarily-shaped perimetric edge 14 which delimits an opening 15 present in and defined at the lower ends of the longitudinal side walls 9a, 9b and flat base 11.

[0023] Advantageously, a pair of tabs 16a, 16b protrude from the perimetric frame 13, in the direction of the box-like body 7 and at the transverse ends, for snap-acting temporary coupling to dedicated seats or teeth 17a, 17b which are arranged at the lower ends of the longitudinal side walls 9a, 9b.

[0024] The bottom 8 is then positioned at the opening 15 and locked to the box-like body 7 by means of the temporary locking of the pair of tabs 16a, 16b to the teeth 17a, 17b.

[0025] The bottom 8 has a first breakable zone 18 of substantially rectangular shape and of a length less than the length of the bottom 8 proper.

[0026] There is a box-shaped housing 19 contiguous to the first breakable zone 18, which is open in an upward region and which when installed protrudes outside the bottom 8 proper on the opposite side from the box-like body 7.

[0027] The housing has a condensate drain 20 in a downward region.

[0028] A complementarily-shaped trap 21 is removably insertable into the housing 19 and is fitted with a drain 22, which is insertable into the condensate drain 20, and with a delivery 23, which protrudes into the box-like body 7 through the opening 15.

[0029] The removable trap 23 cooperates with guide means which are associated with the flat base 11 proximate to the opening 15.

[0030] The guide means are constituted by a pair of identical ribs 24a, 24b which are arranged mutually parallel, between which the trap 21 can be slideably associated and can thus be positioned more or less within the housing 19, which is underlying when installed.

[0031] The delivery 23 of the trap 21 can be hermetically connected to a first deviation 25, for example L-shaped, and in turn can be hermetically connected to a conveniently shaped first pipe 26, which in turn can be connected to the drain of the container 6 for collecting condensate.

[0032] As an alternative to the first deviation 25, which is L-shaped and shown for example in Figure 8, a second deviation 31 can be used for draining condensate, as shown in Figure 9.

[0033] A pair of elastically-deformable rubber bellows 56 is press-fitted onto the lower end of the conduit 26.

[0034] The second deviation 31 is of the female type and therefore comprises a funnel-shaped body 32, the lower end 33 of which is fitted to the delivery 23 of the trap 21 and the upper end 34 of which receives the first pipe 26 and the rubber bellows 56.

[0035] The upper end 34 is provided with an axial seat adapted to enable connection to a desired type of piping without requiring further accessories or adapters.

[0036] There are, at the top 10, the longitudinal side walls 9a, 9b and the flat base 11, respectively, one or more second, third and fourth breakable zones 27, 28, 29.

[0037] The number, the arrangement and the dimensions of the latter zones can vary according to specific requirements.

[0038] The first, the second and the third breakable zones 18, 27, 28 are adapted to define openings adapted to accommodate ducts 38 which can be connected for example to the delivery 4 and return 5 conduits for refrigerated water or water at high temperatures or power cables 39.

[0039] The fourth breakable zones 29 are adapted to enable, at installation time, the grip of mortar and foam on the box-like body 7.

[0040] The breakage of the fourth breakable zones 29 is enabled by the presence of multiple gaps closed by an extremely thin portion of material.

[0041] Advantageously, on the flat base 11 there are one or more eyelets 30 adapted for the connection of adapted ties the function of which is to wrap around the delivery 4 and return 5 conduits, in order to keep them fixed.

[0042] There are also two pairs of elastic tabs 36a, 36b, which protrude from the flat base 11 and between which it is possible to removably place a spirit level 37.

[0043] The box-like body 7 is furthermore associated, at the connecting region of the cover 12 and preferably in

a region adjacent to the corners, with a plurality of fins 40.

[0044] These fins 40 protrude radially from the box-like body 7, are breakable, and their function is to facilitate the mounting of the box 1.

[0045] The fins 40 have a substantially rectangular shape with rounded corners and are made of plastic material, and they can be used for connecting to a slab of plasterboard or to masonry by means of suitable screws.

[0046] The fins 40 are removable so as to be able to brick up the box 1 directly in a wall.

[0047] The trap 21 is advantageously of the "ball" type or the type with a non-return valve.

[0048] The trap 21, shown in Figures 10 to 14, is composed of a box-like element 41, with a substantially parallelepiped shape, which is closed hermetically by means of a cover 42.

[0049] Advantageously, an annular seat 43 for an O-ring 44 is provided on the drain 22.

[0050] A path for the condensate is obtained inside the box-like element 41 which, starting from the delivery 23, comprises a grille 57 for the retention of any solid bodies at the inlet of the delivery 23 and a first chamber 45 which affects the entire height of the trap 21 and approximately half the width of the trap 21.

[0051] The first chamber 45 is connected to a first pipe 46, which is raised with respect to the bottom 47 of the first chamber 45 and which extends above the drain 22 so as to affect part of the internal space of the box-like element 41.

[0052] The first pipe 46 has an opening 58, facing in the direction of the delivery 23, which is connected, through a second pipe 48, with an overlying second chamber 49.

[0053] The second chamber 49 has an open terminal end 50 placed at a chosen distance from the top 51 of the trap 21.

[0054] The second chamber 49 in turn affects part of the internal space of the box-like element 41, the space occupied by the first and second chamber 45, 49 being such as to define a third chamber 52, adjacent to the second chamber 49, which extends from the top 51 to the drain 22.

[0055] A ball 53 of a diameter smaller than the width and the height of the second chamber 49 is positioned, hermetically, on the free end of the second pipe 48.

[0056] The ball 53 can be moved axially within the third chamber 52 under the thrust of any condensate, originating from the delivery 23, when the condensate exceeds the level of the second pipe 48.

[0057] The movement of the ball 53 is advantageously guided by adapted baffles 54a, 54b, which protrude beside and parallel to the second pipe 48, and which guide the hermetic repositioning of the ball 53 onto the open terminal end 50 of the second pipe 48 when the condensate falls below the level of the open terminal end 50.

[0058] Advantageously, there is a projection 55, outside the box-like element 41, for gripping by the user in order to facilitate the insertion/extraction of the trap 21 into/from the housing 19.

[0059] Thus it has been found that the invention fully achieves the intended aim and objects, a box specifically for fan coil units or convectors having been obtained that makes it possible to ensure versatility of installation, excellent drainage of condensate, and simplicity of installation and maintenance also of the various pipes and of the condensate drain as a function of the specific arrangement of the fan coil unit.

[0060] Furthermore, the invention simultaneously allows the installation, then or later, of a convector or fan coil unit, in that it can accommodate all the necessary pipes and connections, so further optimizing the functionality of a condensate drain according to the specific installation requirements.

[0061] In addition to the foregoing characteristics, the box thus provided also adds that of enabling the installation technician to obtain a simple and rapid alignment of the box without requiring additional special equipment.

[0062] The box can be used, in a rapid and simple manner, on masonry walls and the like or on plasterboard structures, and it is structurally simple, has a low number of components, and is rapid and easy to assemble and maintain.

[0063] The use of a trap 21 with a non-return valve makes it possible to achieve a hermetic seal for the box 1 for fan coil units.

[0064] The presence of the O-ring 44 furthermore limits the possible seepage of water and odors.

[0065] Naturally the materials used as well as the dimensions of the individual components of the invention may be more relevant according to specific requirements.

[0066] The characteristics indicated above as advantageous, convenient or the like, may also be missing or be substituted by equivalent characteristics.

[0067] The content of Italian utility model applications no. 202025000000030 and no. 202025000004645, from which this application claims priority, is incorporated herein by reference.

[0068] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A box (1) for fan coil units, **characterized in that** it comprises a box-like body (7), arranged vertically when installed, with a substantially parallelepiped shape that defines a removable bottom (8), two longitudinal side walls (9a, 9b) and a top (10), all connected to a flat base (11), and a cover (12), said

removable bottom (8) comprising a first breakable zone (18) and a housing (19), fitted with a condensate drain, for a removable trap (21), said removable (21) trap (21) cooperating with guide means (24a, 24b) associated proximate to said flat base (11) proximate to said opening (15), said top (10), longitudinal side walls (9a, 9b) and flat base (11) having, respectively, second, third and fourth breakable zones (27, 28, 29), said first, second and third breakable zones (18, 27, 28) being adapted to accommodate at least delivery (4) and return (5) conduits for refrigerated water or water at high temperatures.

2. The box (1) according to claim 1, for fan coil units that comprise an air diffusion terminal (3) and dedicated delivery (4) and return (5) conduits and a container (6) for collecting condensate, **characterized in that** said box-like body (7) is open at the front so as to define said removable bottom (8).

3. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said box-like body (7) is made of plastic material such as polystyrene (PS).

4. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said removable bottom (8) is constituted by a perimetric frame (13), with a substantially rectangular shape, which is coupled at a complementarily-shaped perimetric edge (14) which delimits an opening (15) present in and defined at the lower ends of said longitudinal side walls (9a, 9b) and flat base (11).

5. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** a pair of tabs (16a, 16b) protrude from said perimetric frame (13), in the direction of said box-like body (7) and at the transverse ends, for snap-acting temporary coupling to dedicated seats or teeth (17a, 17b) which are arranged at the lower ends of said longitudinal side walls (9a, 9b).

6. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said bottom (8) is positioned at said opening (15) and locked to said box-like body (7) by means of the temporary locking of said pair of tabs (16a, 16b) to said teeth (17a, 17b).

7. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said bottom (8) has a first breakable zone (18) of substantially rectangular shape and of a length less than the length of said bottom (8).

8. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** there is a box-shaped housing (19) contiguous to said first breakable zone (18), which is open in an upward region and which when installed protrudes outside said bottom (8) on the opposite side from said box-like body (7), said housing (19) having a condensate drain (20) in a downward region.

9. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said trap (21) is removably insertable into said housing (19) and is fitted with a drain (22), which is insertable into said condensate drain (20), and with a delivery (23), which protrudes into said box-like body (7) through said opening (15).

10. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said removable trap (21) cooperates with guide means associated with said flat base (11) proximate to said opening (15), said guide means being constituted by a pair of identical ribs (24a, 24b) which are arranged mutually parallel, between which said trap (21) can be slideably associated and can thus be positioned more or less within said housing (19), which is underlying when installed.

11. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said delivery (23) of said trap (21) can be hermetically connected to a first deviation (25), which is substantially L-shaped and in turn can be hermetically connected to a conveniently shaped first pipe (26), which in turn can be connected to said drain of said container (6) for collecting condensate.

12. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that**, as an alternative to said first deviation (25), a second deviation (31) is used to drain condensate, which is female and comprises a funnel-shaped body (32) the lower end (33) of which is fitted to said delivery (23) of said trap (21) and the upper end (34) of which receives said first pipe (26) and a pair of elastically-deformable rubber bellows (56), press-fitted into the lower end of said pipe (26), said upper end (34) being provided with an axial seat adapted to enable connection to a desired type of piping without requiring further accessories or adapters.

13. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** there are, at said top (10), said longitudinal side walls (9a, 9b) and said flat base (11), respectively, one or more second, third and fourth breakable zones (27, 28, 29).

14. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said

first, second and third breakable zones (18, 27, 28) are adapted to define openings adapted to accommodate ducts (38) which can be connected to said delivery (4) and return (5) conduits for refrigerated water or water at high temperatures or power cables (39).

15. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said fourth breakable zones (29) are adapted to enable, at installation time, the grip of mortar and foam on said box-like body (7), the breakage of said fourth breakable zones (29) being enabled by the presence of multiple gaps closed by an extremely thin portion of material.

16. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** on said flat base (11) there are one or more eyelets (30) adapted for the connection of adapted ties the function of which is to wrap around said delivery (4) and return (5) conduits, in order to keep them fixed.

17. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** it comprises two pairs of elastic tabs (36a, 36b), protruding from said flat base (11), between which it is possible to removably place a spirit level (37).

18. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said box-like body (7) is associated, at the connecting region of said cover (12) and in a region adjacent to the corners, with a plurality of fins (40) which protrude radially from said box-like body (7), are breakable and have the function of facilitating the mounting of said box (1), said fins (40) having a substantially rectangular shape with rounded corners and being made of plastic material, said fins being usable for connecting to a slab of plasterboard or to masonry by means of suitable screws.

19. The box (1) for fan coil units according to claim 1, **characterized in that** said trap (21) is of the "ball" type or the type with a non-return valve.

20. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said trap (21) comprises a box-like element (41) with a substantially parallelepiped shape, which is closed hermetically by means of a cover (42), a path for the condensate being obtained inside said box-like element (41) which, starting from said delivery (23), comprises a grille (57) for the retention of any solid bodies at the inlet of said delivery (23) and a first chamber (45) which affects the entire height of said trap (21) and approximately half the width of said trap (21).

21. The box (1) for fan coil units according to claim 9, **characterized in that** an annular seat (43) for an O-ring (44) is provided on said drain (22).

22. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said first chamber (45) is connected to a first pipe (46), which is raised with respect to the bottom (47) of said first chamber (45) and which extends above said drain (22) so as to affect part of the internal space of said box-like element (41).

23. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said first pipe (46) has an opening (58), facing in the direction of said delivery (23), which is connected, through a second pipe (48), with an overlying second chamber (49) which has an open terminal end (50) placed at a chosen distance from the top (51) of said trap (21).

24. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** said second chamber (49) in turn affects part of the internal space of said box-like element (41), the space occupied by said first and second chamber (45, 49) being such as to define a third chamber (52), adjacent to said second chamber (49), which extends from said top (51) to said drain (22).

25. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** a ball (53) of a diameter smaller than the width and the height of said second chamber (49) is positioned, hermetically, on the free end of said second pipe (48), said ball (53) being moved axially within said third chamber (52) under the thrust of any condensate, originating from said delivery (23), when the condensate exceeds the level of said second pipe (48), the movement of said ball (53) being guided by adapted baffles (54a, 54b) which protrude beside and parallel to said second pipe (48) and which guide the hermetic repositioning of said ball (53) onto said open terminal end (50) of said second pipe (48) when the condensate falls below the level of said open terminal end (50).

26. The box (1) for fan coil units according to one or more of the preceding claims, **characterized in that** it has a projection (55), outside said box-like element (41), for gripping by the user in order to facilitate the insertion/extraction of said trap (21) into/from said housing (19).

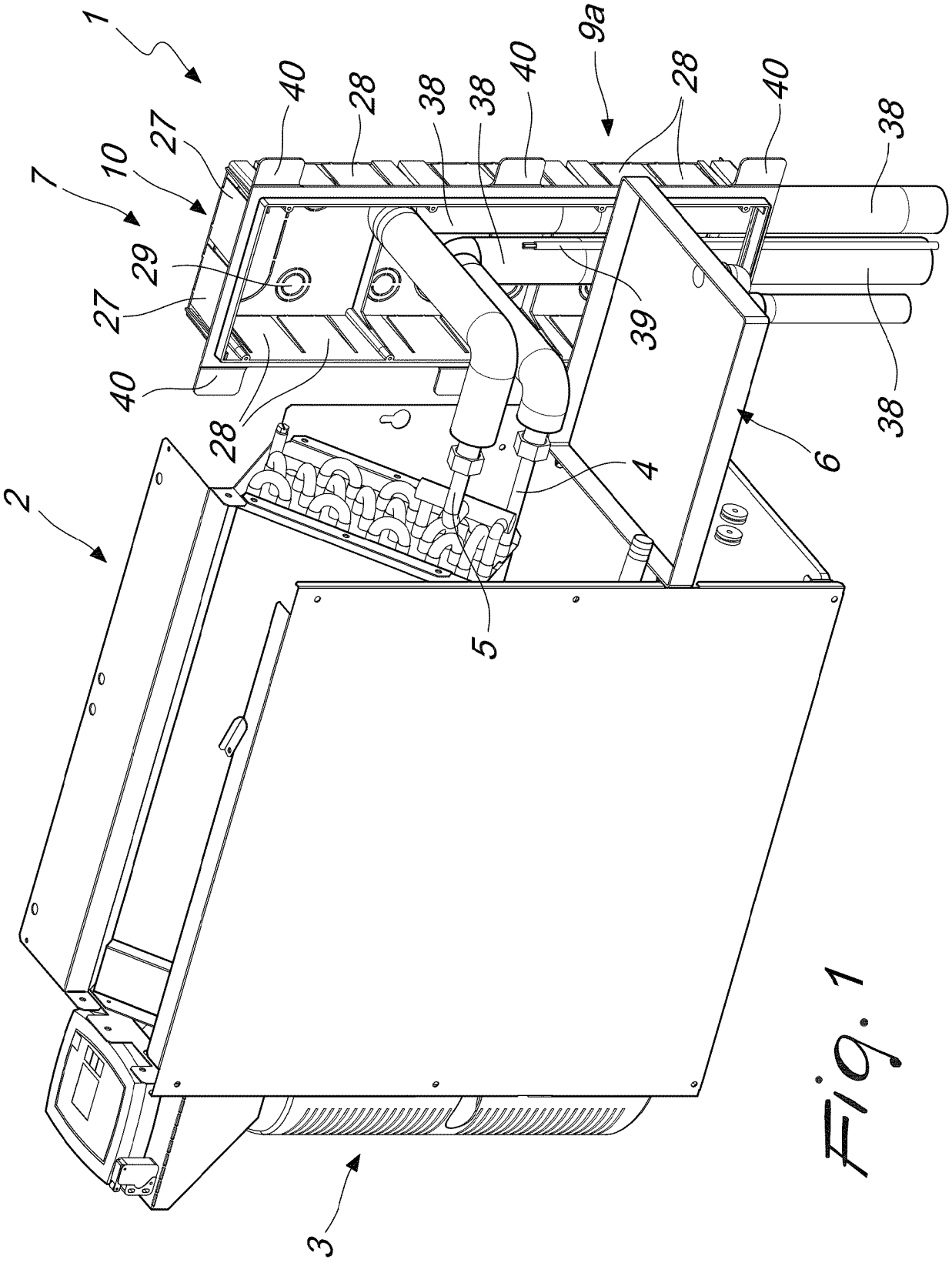

Fig. 1

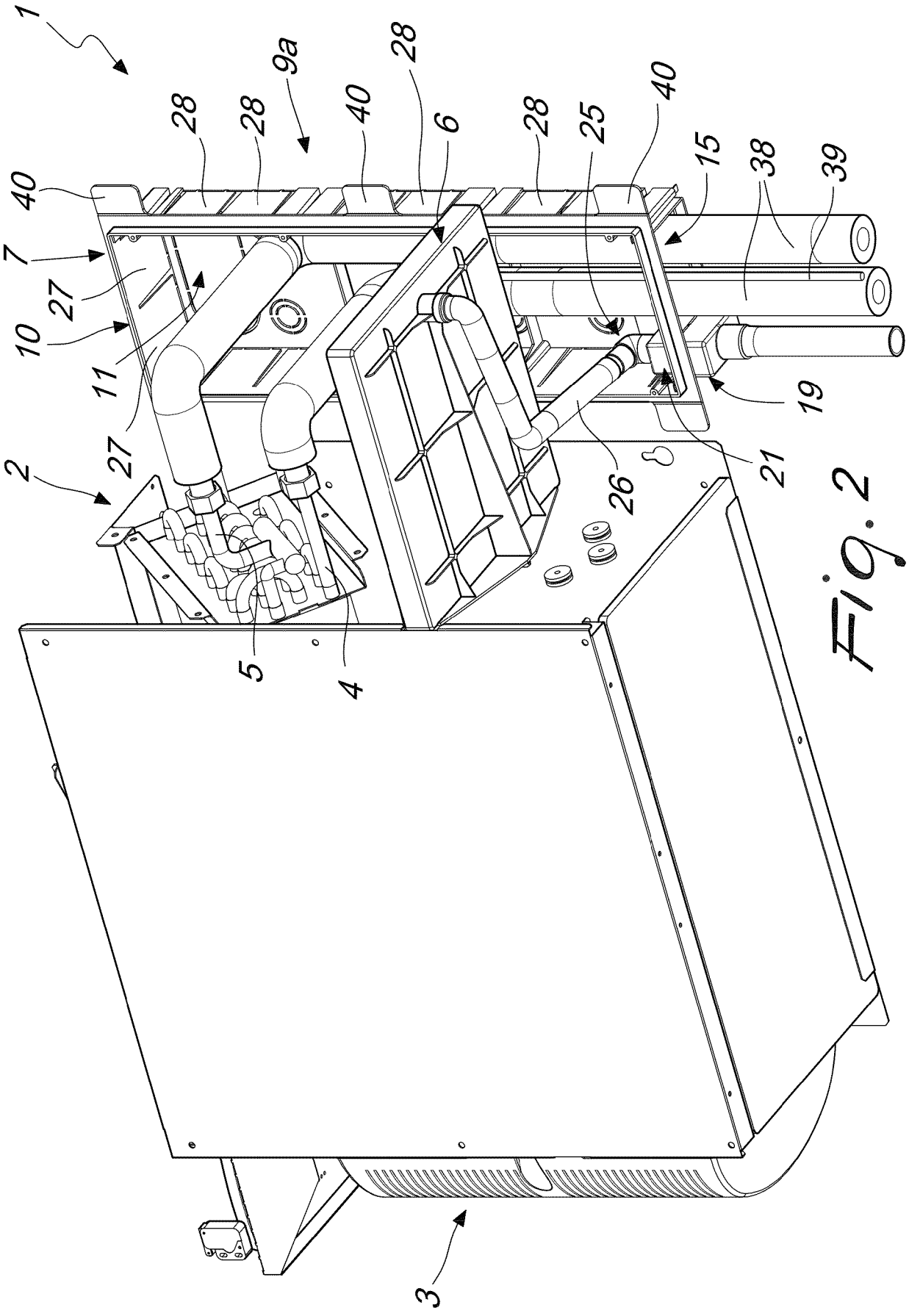

Fig. 2

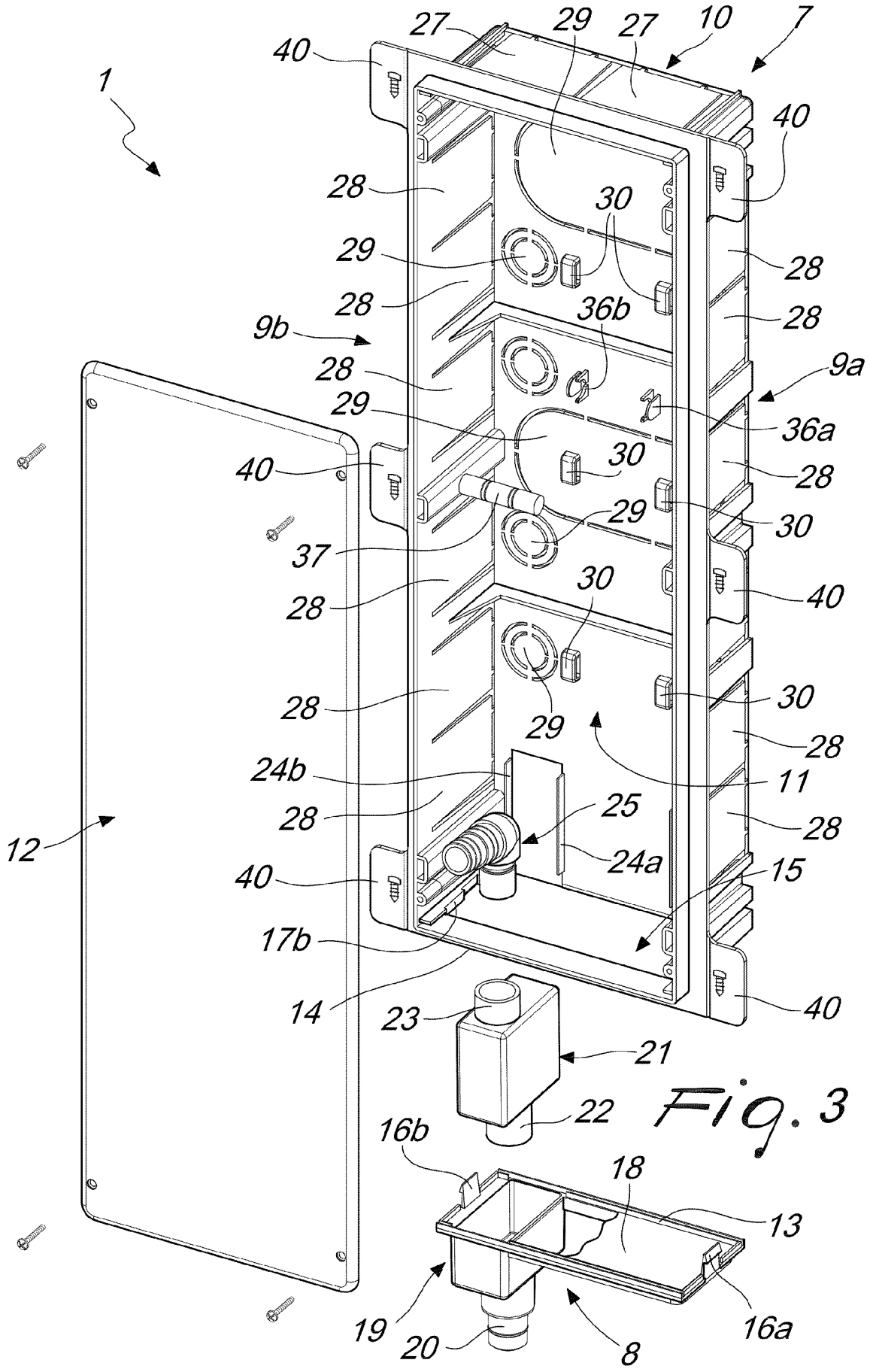
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Fig. 3

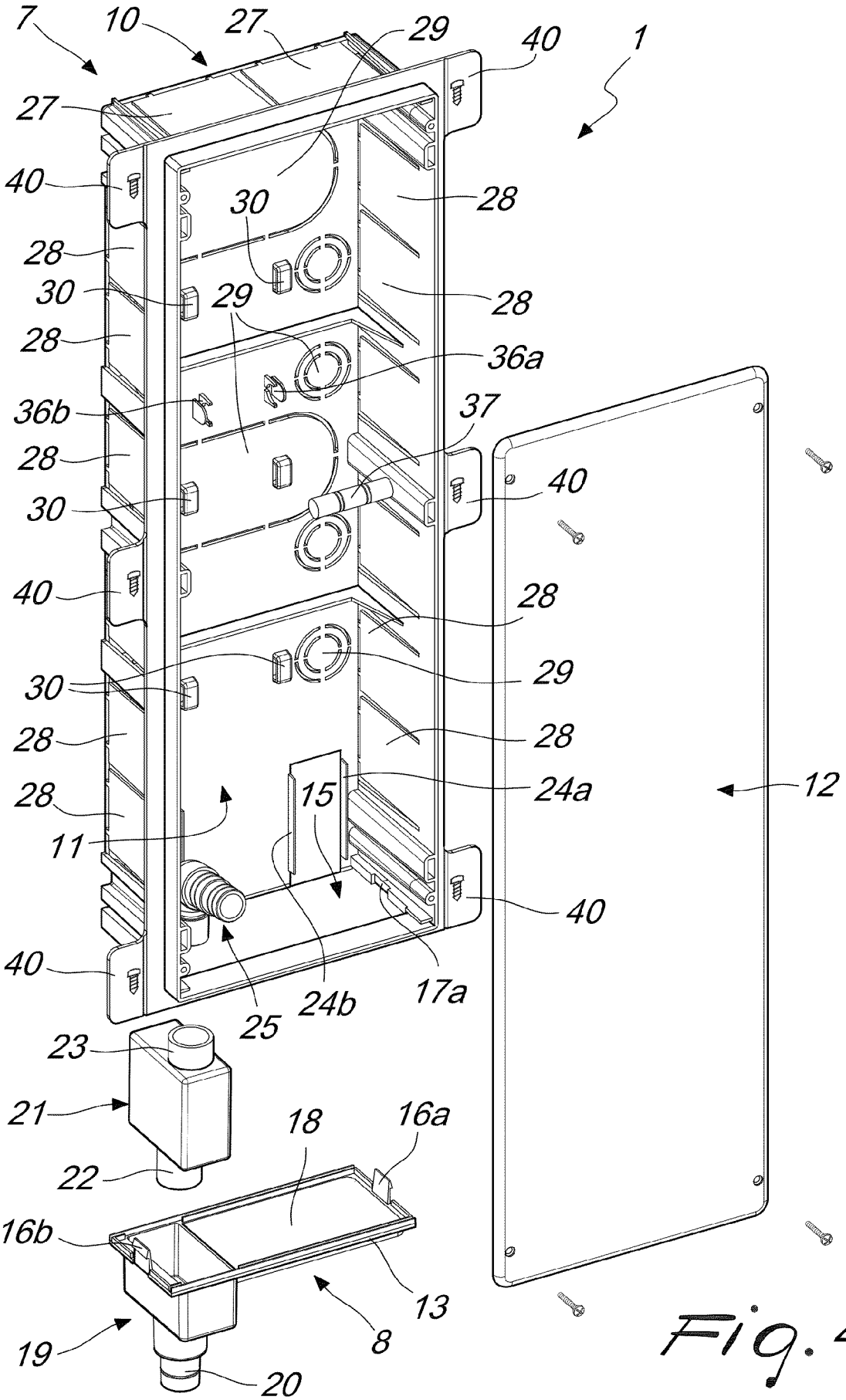
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Fig. 4

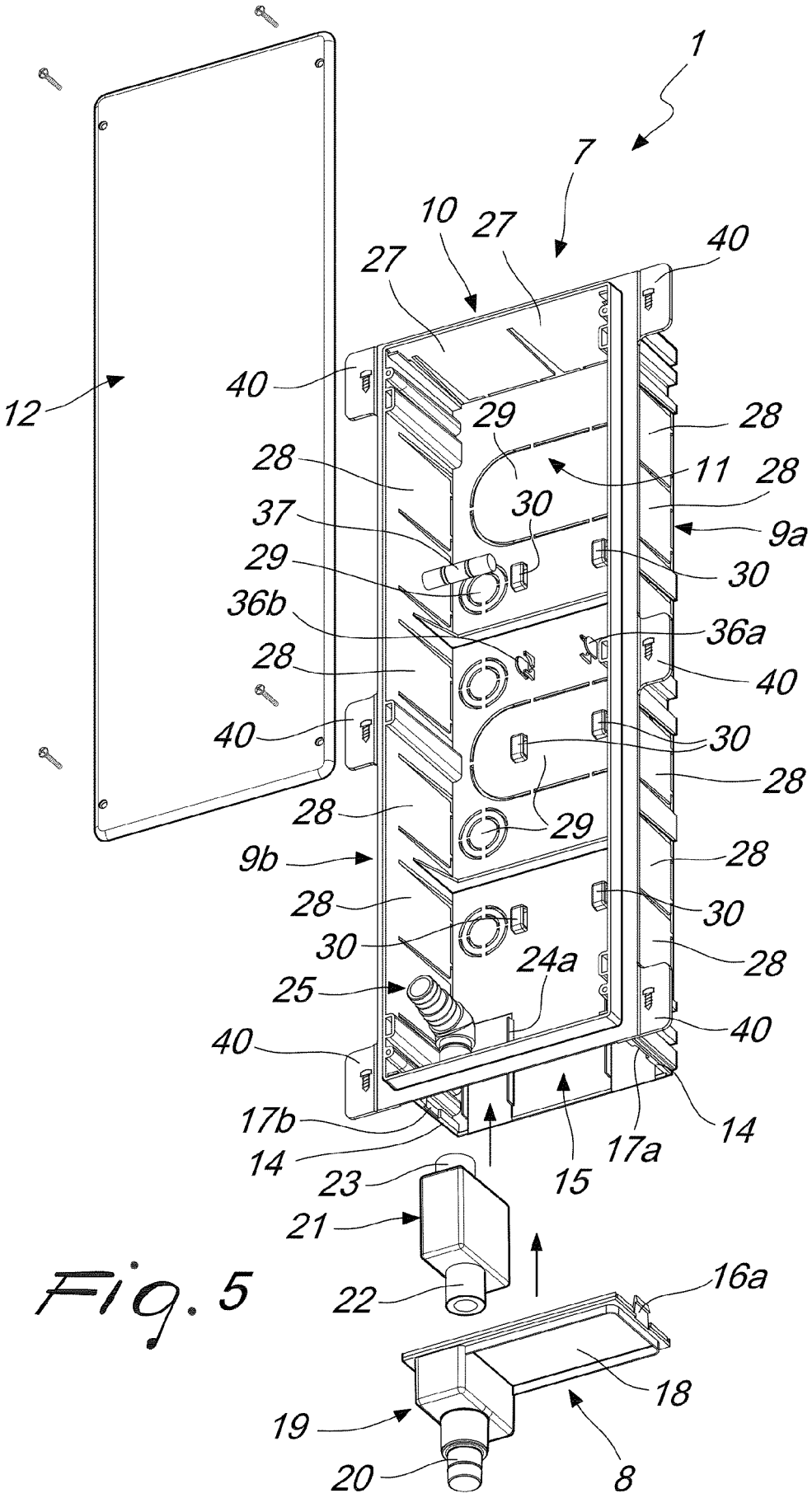
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Fig. 5

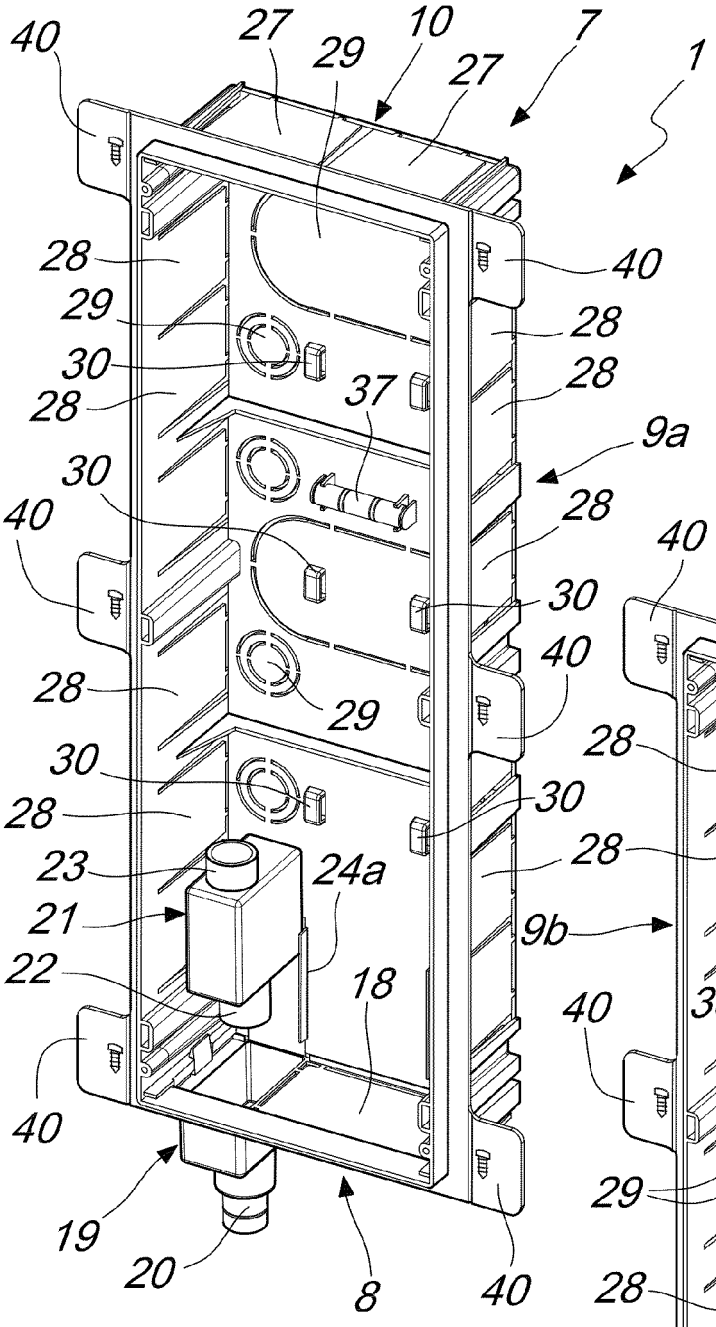
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Fig. 6

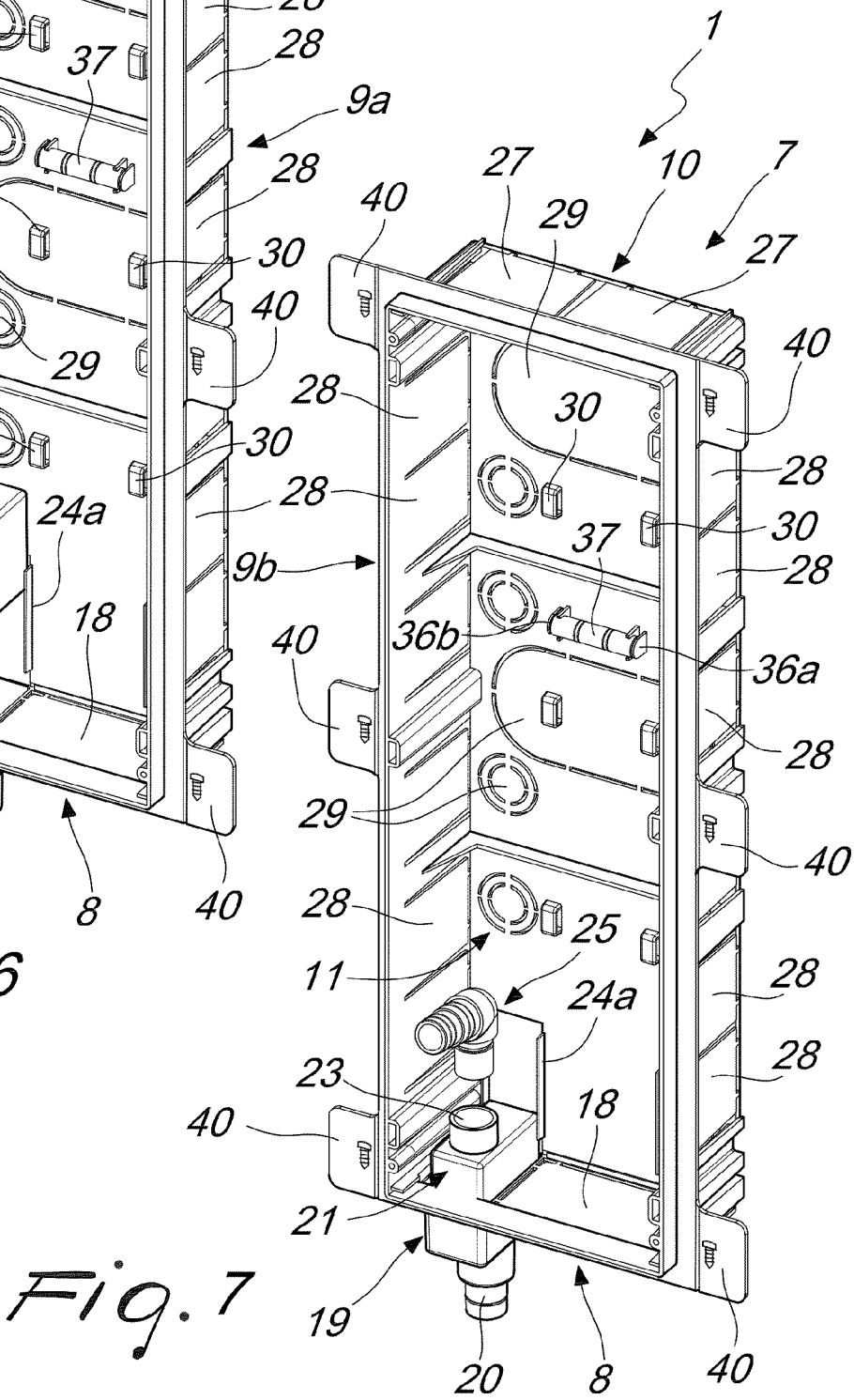
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Fig. 7

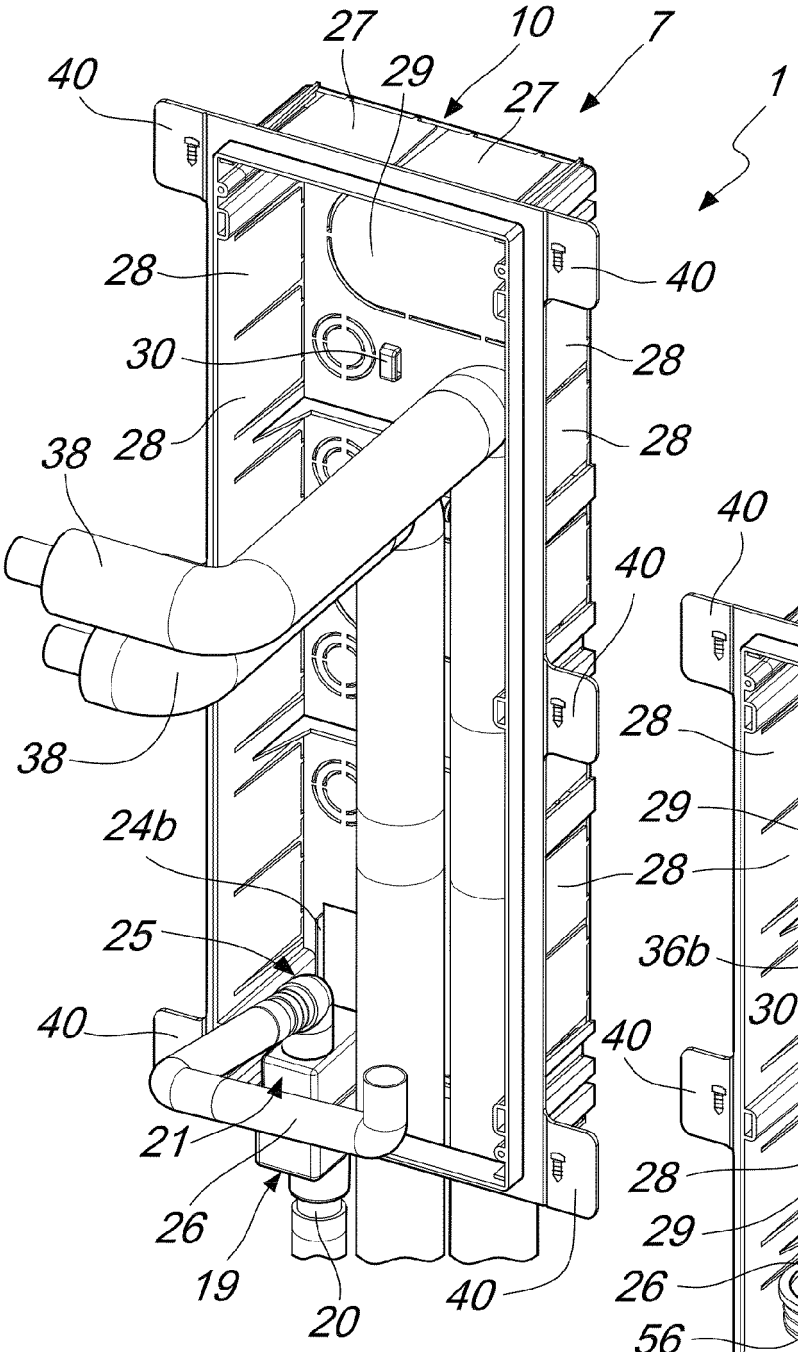
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Fig. 8

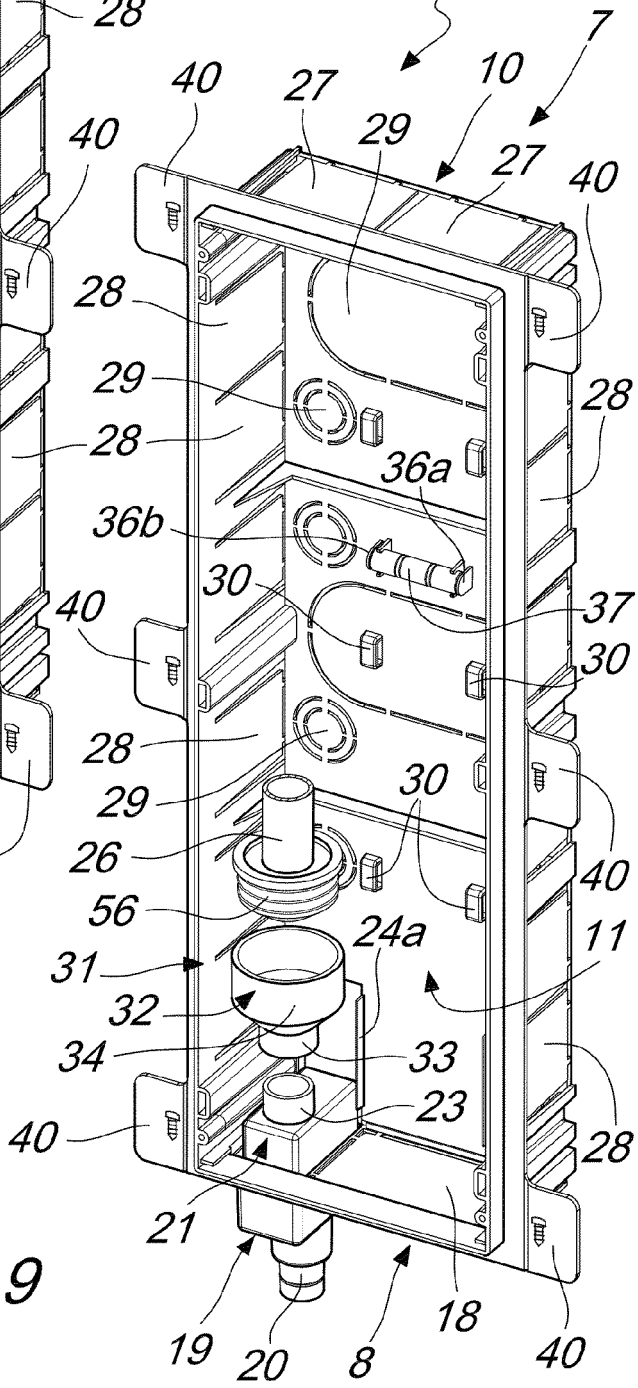
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Fig. 9

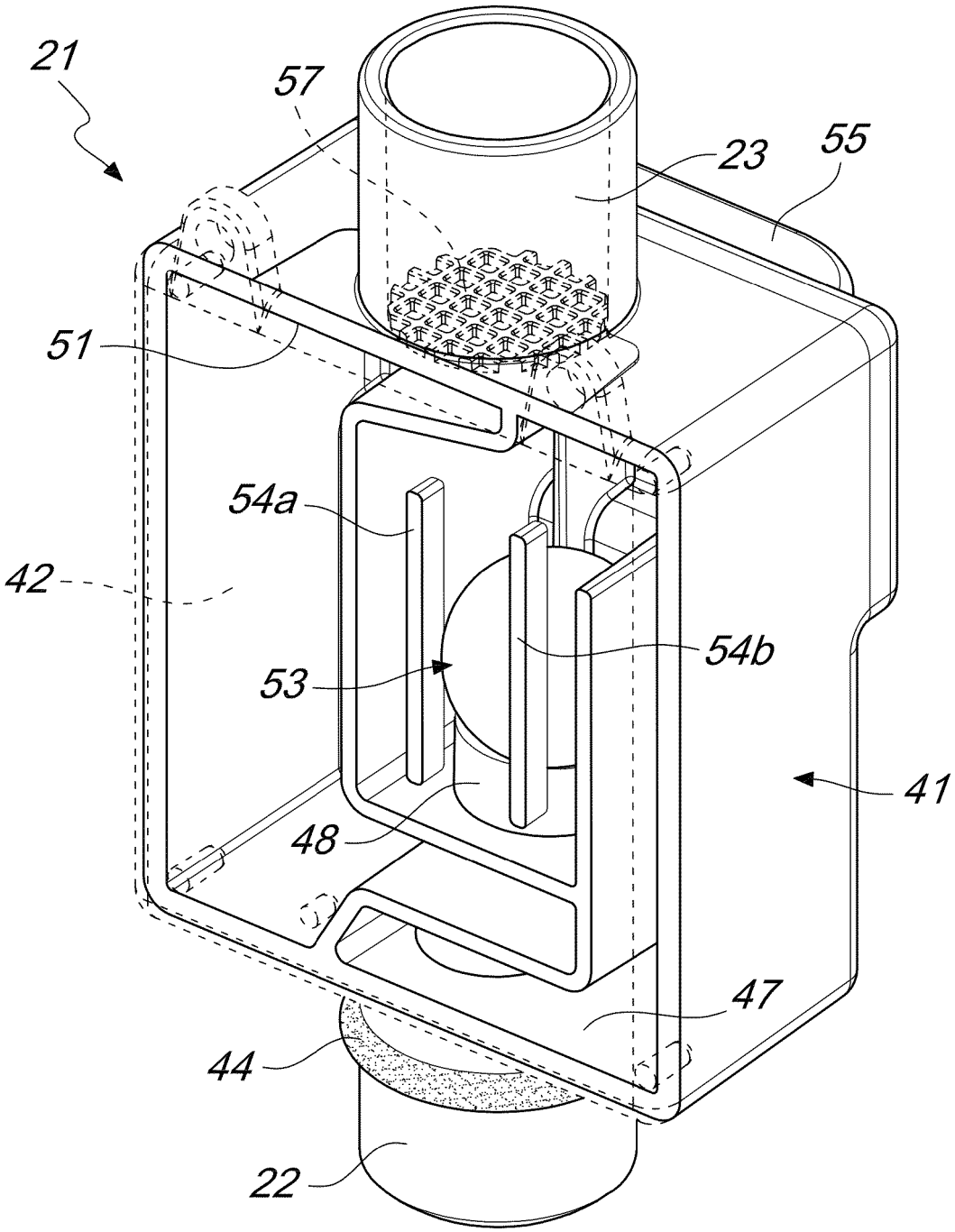

Fig. 10

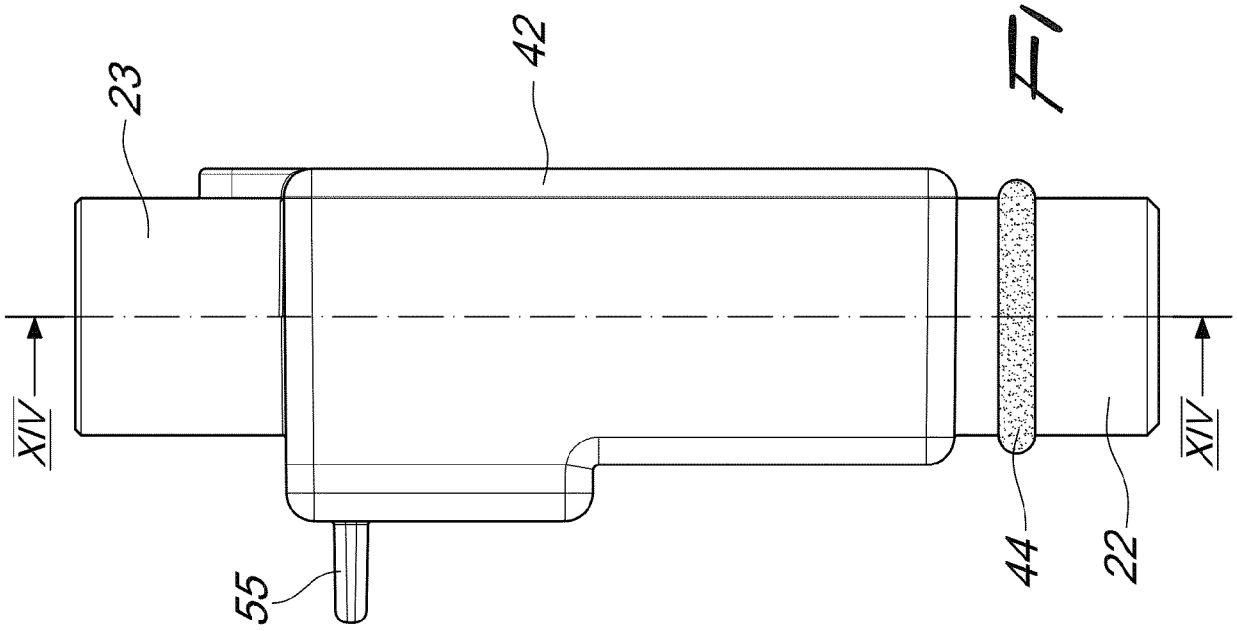

Fig. 12

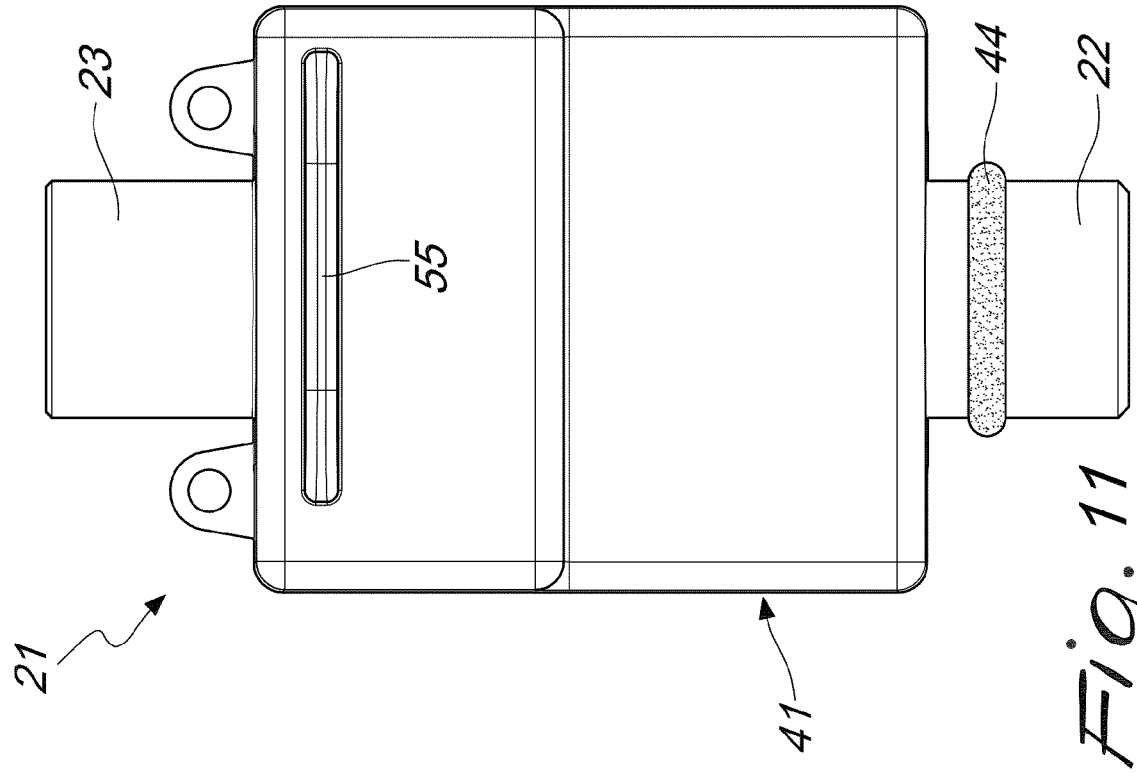

Fig. 11

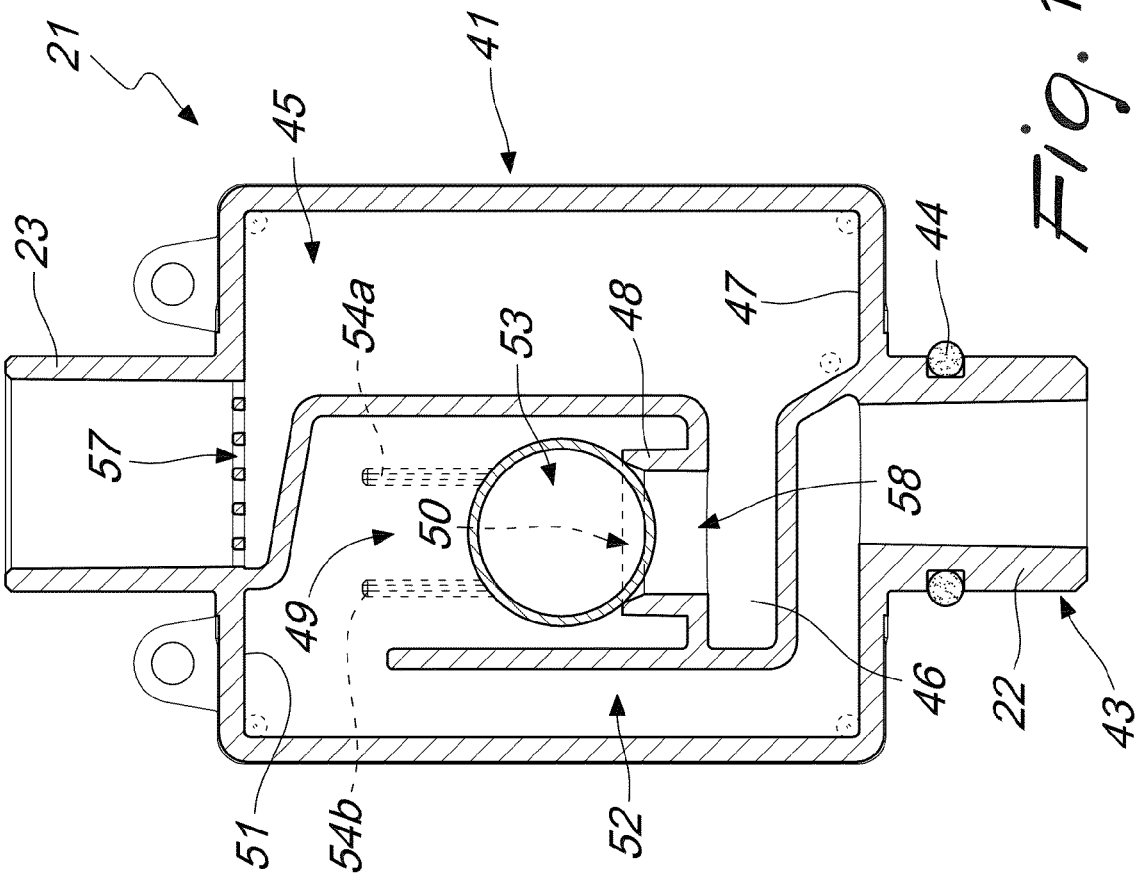
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Fig. 14

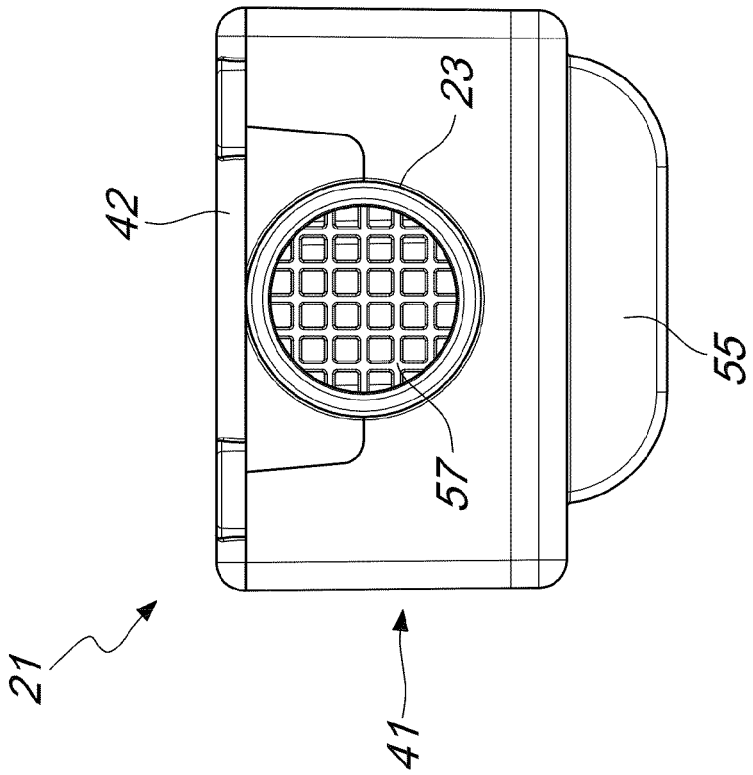
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Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 25 22 7433

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	KR 101 123 868 B1 (MUHAN CO LTD [KR]) 19 March 2012 (2012-03-19) * abstract; figures 1-4 *	1-26	INV. F24F13/20 F24F13/22
A	KR 200 344 690 Y1 (UNREADABLE) 18 March 2004 (2004-03-18) * abstract; figures 1-6 *	1-26	
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TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2026	Valenza, Davide

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31-03-2026

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