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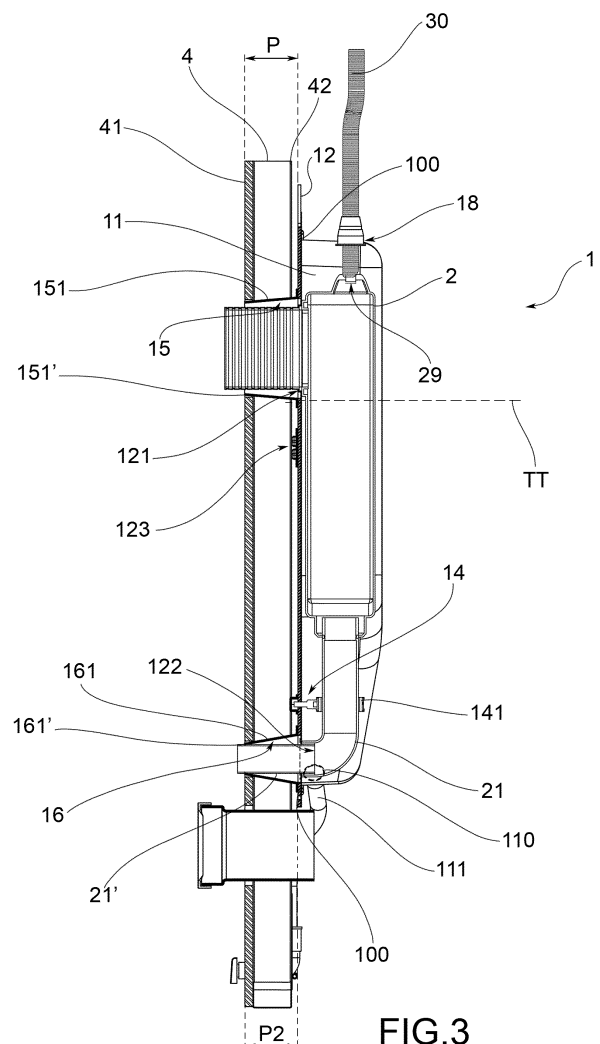
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(54) **LEAKAGE PROTECTION DEVICE FOR A TOILET FLUSH TANK**

(57) A leakage protection device (1) for a tank (2) for a toilet (3) of a bathroom comprises a shell (10) and a closing panel (12) sealably joined to the shell at a shell perimeter edge (100) so as to define a chamber (11) intended to house the tank (2). The closing panel (12) is intended to be arranged substantially parallel to the bathroom wall (4). The protection device (1) is configured to completely enclose the tank (2). Moreover, the closing panel (12) comprises at least one upper opening (121) to allow access to the tank, and a lower opening (122), distinct from the upper opening (121), suitable to accommodate the passage of a pipe (21) for flushing water from the tank (2) to the toilet (3).



**FIG.3**

## Description

**[0001]** The present invention relates to a device for protection against accidental loss for a built-in toilet flush tank.

**[0002]** As is known, the toilet flush tank is used for sanitary flushing.

**[0003]** The water supply to the tank is connected to the water supply lines. A water connection valve ensures that the tank takes a constant amount of water until it is filled. When an actuating device is operated for flushing, the water contained in the tank is released and delivered for flushing the toilet via a conduit which connects the toilet inlet connection to an outlet opening on the tank. Subsequently, the flush tank is filled again with water coming from the water supply.

**[0004]** To prevent the occurrence of problems of humidity or condensation or damage caused by any copious losses of water due to breakages in the tank or in the water connections, it is known to provide for the installation of devices to protect against accidental leakage.

**[0005]** This prevention from accidental leakage is particularly felt in the Scandinavian countries. In these countries, the houses are still made of wood. This peculiarity requires particular attention to prevent the contact of wood with water or humidity, so as to avoid the formation of mold or rot, which otherwise would result in often irreparable consequences.

**[0006]** A type of leakage protection device for a specific type of toilet tank is known for example from EP2821557A1.

**[0007]** The protection device described in EP2821557A1 requires a special frame anchored to the floor to support the cassette and to anchor the device itself. After its installation on the wall of the bath, such protection device requires a costly operation of closing and sealing the perimeter edge directly and in the proximity of the wall, thus lengthening the installation time. Furthermore, if the sealing operation is not performed properly, it exposes the device to possible risks of leakage.

**[0008]** In an improper manner, therefore, the type of protection devices of the prior art require complicated installation procedures on the wall of the bathroom. Moreover, the devices of the prior art are designed to accommodate only one type of toilet tank and therefore cannot be adapted to different sizes and shapes of flush tanks present on the market.

**[0009]** The object of the present invention is to solve the problems of the prior art and in particular to provide a leakage protection device for a toilet flush tank which can be easily installed, which can be adapted to different types of toilet flush tanks and which at the same time maintains an adequate reliability in leakage protection.

**[0010]** According to the invention, these objects are achieved by a leakage protection device for a toilet flush tank according to the appended independent claims. Preferred embodiments of the invention are defined in the

dependent claims.

**[0011]** The features and the advantages of a leakage protection device for a toilet flush tank will appear more clearly from the following description, made by way of an indicative and non-limiting example according to the accompanying figures, in which:

- figure 1 shows a perspective view of a leakage protection device installed in the proximity of a toilet, in which the wall of the bath has been fictitiously removed for purposes of illustrative clarity, according to an embodiment of the present invention;
- figure 2 shows a plan elevational view of a leakage protection device, in which internal components contained in the protection device or not visible by an observer are visible with dashed lines;
- figure 2a shows a perspective view of a leakage protection device installed in the proximity of a toilet as in figure 1, in which internal components contained in the protection device or not visible by an observer are visible with dashed lines;
- figure 3 shows a sectional view of a leakage protection device installed on a bathroom wall of a bathroom, for example a prefabricated bathroom, according to an embodiment of the present invention;
- figure 3a shows a sectional view along a plane B-B shown in figure 2 of a leakage protection device, according to an embodiment of the present invention;
- figure 3b shows an enlargement of the area F1 in figure 3a;
- figure 3c shows an enlargement of the area F2 in figure 3a;
- figure 4 shows a sectional view along a plane A-A shown in figure 2 of a leakage protection device, according to an embodiment of the present invention;
- figure 4a shows an enlargement of area F3 in figure 4;
- figure 5 shows a perspective view of a leakage protection device installed on a wall in the proximity of a toilet, according to an embodiment variant of the present invention.

**[0012]** According to the accompanying figures, reference numeral 1 generally indicates a leakage protection device 1 for a flush tank 2 for a toilet 3 of a bathroom. The tank 2 is of the recessed type in a bathroom wall 4 or of the type disposed on the back of a bathroom wall 4, that is, arranged on a rear surface 42 of the wall not facing the inside of the bathroom.

**[0013]** The leakage protection device 1 comprises a shell 10, preferably rigid and made of metal or rigid plastic material. The shell 10 comprises a shell perimeter edge 100 which defines an access opening to an inner concavity of the shell.

**[0014]** The leakage protection device 1 further comprises a closing panel 12, for example in the form of a backrest, joined to the shell 10 at the shell perimeter edge 100 so as to define a chamber 11 intended to house the

tank 2. Such a chamber 11 is therefore preferably formed by the inner concavity of the shell, whose access opening is closed by the closing panel 12.

**[0015]** Preferably, the shell 10 is a single body, for example obtained by injection molding, having only the access opening defined by the shell perimeter edge 100.

**[0016]** In a preferred embodiment, the closing panel 12 is adapted to support the flush tank 2 and the shell 10 by itself. In other words, the flush tank 2 and the shell 10 are directly anchored and supported only by the closing panel 12.

**[0017]** In one embodiment, the shell comprises a bottom wall 10', from which a shell side wall 10'' protrudes, having a height such as to define a chamber space sufficient to contain the flush tank 2. Preferably, the perimeter edge 100 is shaped in the form of a sealing flange 100' which protrudes from the shell side wall 10'', for example parallel to the bottom wall 10'.

**[0018]** According to an embodiment shown in the figures, the shell 10 is shaped like a parallelepiped with an irregular hexagonal base with rounded edges, in which the shell side wall 10'' consists of the side faces of the parallelepiped.

**[0019]** Preferably, the closing panel 12 is sealably joined to the shell by suitable clamping means 200, such as screws or rivets.

**[0020]** Preferably, as shown in figure 3b, the clamping means 200 comprise a tightening seat 201 applied to or formed in the closing panel 12.

**[0021]** When the leakage protection device 1 is installed on the wall 4, it is intended to be arranged parallel to such a bathroom wall 4, for example with the closing panel 12 arranged substantially parallel to the bathroom wall 4.

**[0022]** Preferably, a gasket 101', for example a rubber gasket, is interposed between the shell 10 and the closing panel 12.

**[0023]** In particular, preferably, in the shell perimeter edge 100, for example in the sealing flange 100', a gasket seat 101 is obtained which houses the gasket. In this way, the seal between the closing panel 12 and the shell 10 is facilitated and guaranteed.

**[0024]** The protection device 1 is configured to completely enclose the flush tank 2, so as to collect any possible leak from the tank. Moreover, the flush tank 2 is accommodated in the chamber 11, preferably spaced from the walls which define the chamber 11, i.e. in a spaced manner both from the bottom wall 10' and from the shell side wall as well as preferably from the closing panel 12.

**[0025]** The closing panel 12 comprises at least one upper opening 121 to allow access to the tank, and in particular to the means for actuating the water flushing from the tank.

**[0026]** Furthermore, the closing panel 12 comprises a lower opening 122, distinct from the upper opening 121, adapted to accommodate the passage of a pipe 21, in particular of an end portion 21' of the pipe 21, for flushing

water from the flush tank 2 to the toilet 3.

**[0027]** Then, in the chamber 11 the flush pipe 21 is also housed, which is designed to be fluidly connected to the water inlet of the toilet 3.

**[0028]** In an embodiment variant, shown for example in figure 5, the shell 10, in addition to having the access opening closed by the closing panel 12, comprises an inspection opening 102, obtained on the shell side wall 10'', and a cover 103 which closes such an inspection opening 102 (for example a plate).

**[0029]** For simplicity of representation, in figure 5 the water supply pipe 30 and the supply inlet mouth 18 are not shown, but it is clear that the aforesaid features may be arranged in an equivalent manner to the embodiments shown in the other figures included in the present application or according to the expertise of a man skilled in the art.

**[0030]** Preferably, the cover 103 closes the inspection opening 102.

**[0031]** The inspection opening 102 thus allows a further access to the inner chamber 11 with respect to the upper opening 121 of the closing panel 12.

**[0032]** The leakage protection device 1 further comprises a supply inlet mouth 18, suitable for receiving a water supply pipe 30 for the fluidic connection of the water inlet 29 in the flush tank 2.

**[0033]** Preferably, the leakage protection device 1 comprises tank fixing means 123 to allow the flush tank 2 to be fixed to the closing panel 12.

**[0034]** The tank fixing means 123 comprise, for example, a bolt 1230 anchored to the closing panel 12 and a flange 1231 anchored to the flush tank 2.

**[0035]** Preferably, the tank fixing means 123 comprise one or more screw fixing seats 1232, 1233 applied on or obtained in the closing panel 12 and suitable to receive a screw or a bolt 1230 for screwing. For example, the screw fixing seat 1232, 1233, is internally threaded or is adapted to accommodate a threaded nut 1234, 1235 preventing the rotation thereof in the screw fixing seat 1232, 1233.

**[0036]** In a preferred embodiment, for example shown in figure 4a, the tank fixing means 123 comprise a seat body 123' sealingly applied on the closing panel 12 (for example welded) on a face 12' of the closing panel 12 intended to be arranged facing the wall 4, i.e. on the opposite side with respect to the chamber 11. In the seat body 123', one or more screw fixing seats 1232, 1233 are formed.

**[0037]** The presence of the tank fixing means 123 allows easily obtaining the fixing of the flush tank 2 inside the chamber 11, thus ensuring an easy adaptability of the protection device 1 to multiple shapes and dimensions of tanks 2.

**[0038]** Moreover, preferably, the leakage protection device 1 comprises flush fixing means 14 suitable for anchoring the flush pipe 21 to the closing panel 12.

**[0039]** The flush fixing means 14 comprise, for example, a flush fixing bolt 142 anchored to the closing panel

12 and a collar 141 anchored to the flush pipe 21.

**[0040]** Preferably, the flush fixing means 14 comprise at least one screw fixing seat 1400, applied on or formed in the closing panel 12 and suitable for receiving by screwing a flush fixing screw or bolt 142. For example, the screw fixing seat 1400, is internally threaded or is adapted to accommodate a threaded nut 1401 preventing the rotation thereof in the screw fixing seat 1400.

**[0041]** In a preferred embodiment, for example shown in figure 3c, the flush fixing means 14 comprise a flush fixing seat body 14' sealingly applied on the closing panel 12 (for example welded) on the face 12' of the closing panel 12 intended to be arranged facing the wall 4, i.e. on the opposite side with respect to the chamber 11. In the seat body 14', one or more screw fixing seats 1400 are formed.

**[0042]** In an embodiment according to the invention, the leakage protection device 1 comprises an upper frame 15, comprising upper frame side walls 151 projecting from the closing panel 12 and disposed around the upper opening 121.

**[0043]** Preferably, the upper frame side walls 151 project from the closing panel 12 for an upper frame depth P, such that when the protection device 1 is installed on the bathroom wall 4, such upper frame side walls 151 extend through the bathroom wall 4 to an upper internal vertical surface 41 of said bathroom wall 4, facing towards the inside of the bathroom. In other words, a distal edge 151' of the upper frame side walls 151 is substantially aligned with (i.e., does not protrude from) the inner surface 41 of the bathroom wall 4 when the leakage protection device 1 is installed on the wall 4.

**[0044]** In an advantageous embodiment according to the invention, the leakage protection device 1 comprises a lower frame 16, comprising lower frame side walls 161 projecting from the closing panel 12 and disposed around the lower opening 122.

**[0045]** Preferably, the lower frame side walls 161 project from the closing panel 12 for a lower frame depth P2, for example equal to the upper frame depth P, such that when the protection device 1 is installed on the bathroom wall 4, the lower frame side walls 161 extend through the bathroom wall 4 to the upper internal vertical surface 41 of the bathroom wall 4. In other words, a distal edge 161' of the lower frame side walls 161 is substantially aligned with (i.e., does not protrude from) the internal vertical surface 41 of the bathroom wall 4 when the leakage protection device 1 is installed on the wall 4.

**[0046]** Preferably, the upper frame side walls 151 and/or the lower frame side walls 161 are inclined with respect to a plane  $\pi$  perpendicular to the bathroom wall 4, so as to favor the outflow of a possible water leak towards the inside of the chamber 11 rather than towards the inside of the bathroom.

**[0047]** In the embodiment in which the upper frame side walls 151 and/or the lower frame side walls 161 are inclined, the upper frame 15 is shaped in a truncated-pyramid shape.

**[0048]** Furthermore, preferably, the lower frame 16 is shaped in a frustoconical shape.

**[0049]** It is clear that the upper frame 15 and the lower frame 16 are sealably fixedly to the closing wall 12, so that any water leakage inside the upper frame 15 or lower frame 16 flows inside the chamber.

**[0050]** According to a preferred embodiment of the invention, the leakage protection device 1 comprises wall fixing means suitable for anchoring the protection device 1 to the wall 4 from the side of the rear surface 42 of the bathroom wall 4 not facing the inside of the bathroom. For example, such fixing means comprise a plurality of holes 125, 126, 127, 128, suitable for being crossed by screws 126' for fixing to the wall 4.

**[0051]** Preferably, the wall fixing means are configured to keep the closing panel 12 spaced from the rear surface 42 of the bathroom wall 4. For example, the fixing means comprise one or more spacer elements, for example spacer bars 500, 501 shown in figure 5, interposed between the closing panel 12 and the rear surface 42 of the wall 4. Such spacer bars are preferably fixed to the wall 4 by means of suitable anchoring means and the closing panel is fixed to said spacer bars, for example by means of the aforementioned screws or rivets.

**[0052]** According to an embodiment, the spacer elements are shims, arranged around the screws 126' for wall mounting. In this embodiment, it is not necessary to provide spacer bars 500, 501 on which to anchor the closing panel 12, but such a panel may be directly anchored to the wall 4 by the screws, being spaced by means of the shims. Such thicknesses are, for example, cylinders or washers or equivalent elements.

**[0053]** According to an embodiment, the leakage protection device 1 comprises an indicator connection opening 110 suitable for allowing fluid communication between the chamber 11 and a leakage indicator pipe 111. The leakage indicator tube 111 is suitable for being connected to a leakage indicator device, for example an inspection window 112.

**[0054]** According to a preferred embodiment, the closing panel 12 and/or the shell 10, and/or the flush fixing seat body 14' and/or the seat body 123' are made of plastic material.

**[0055]** Innovatively, the leakage protection device according to the present invention is adaptable to a plurality of flush tanks of different shapes and sizes, while ensuring adequate protection against leakage. Contrary to the devices of the prior art, the presence of a shell and a sealable closing panel allows an easy installation on different types of tanks.

**[0056]** In fact, for the installation, an operator first fixes the flush tank 2 (and optionally the flush pipe 21) to the closing panel 12 and thereafter, tightly connects the shell 10 on the closing panel 12 by suitable tightening means (for example screws or rivets, and after connecting the water supply pipe), enclosing at the same time the flush tank 2 completely inside the chamber 11.

**[0057]** In a simple manner, the seal between the clos-

ing panel 12 and the shell 10 is guaranteed by the interposed seal and therefore no further sealing operation between the shell and the wall is necessary.

**[0058]** Once the shell has been closed on the closing panel, it is therefore possible to install the protection device 1 on the bathroom wall 4.

**[0059]** The only possible residual seal that the operator must implement is a quick and simple sealing around the lower frame 16, preferably made by means of additional gaskets (not shown) arranged between the frame 16 and the flush pipe 21, or by means of a suitable sealing mastic.

**[0060]** Advantageously, the tank fixing means allow anchoring any type of tank to the closing panel 2, thus allowing a substantially "pre-sealed" installation of the protection device and of the tank directly on the bathroom wall 4.

**[0061]** Furthermore, the presence of screw fixing seats 1232, 1233, 1400, obtained in the wall of the closing panel or sealably applied on the sealing panel allows fixing the flush tank 2 without having to access the closing panel at the back and without there being openings in the closing panel, which could involve risks of leakage if not properly sealed.

**[0062]** Advantageously, moreover, thanks to the inclination of the walls of the upper frame 15 and of the lower frame 16, any accidental leakage that should occur inside the lower upper frame 15 (i.e. in the area of the device inside the wall), would certainly be signalled as it flows directly into the chamber 11 of the device 1.

**[0063]** Furthermore, advantageously, the shell has dimensions such as to allow the flush tank 2 to be housed in the chamber spaced from the walls of the shell and the closing panel so that it is possible to vary the position of the tank inside the chamber of the protection device or change the tank housing a different type.

**[0064]** It is clear that a man skilled in the art may make changes to the invention described above in order to meet incidental needs, all falling within the scope of protection defined in the following claims.

## Claims

1. Leakage protection device (1) for a tank (2) for a toilet (3) of a bathroom, said tank (2) being of a recessed type in a bathroom wall (4) or of the type disposed on the back of a bathroom wall (4), said leakage protection device (1) comprising:

- a shell (10) comprising a shell perimeter edge (100) ;
- a closing panel (12) joined to the shell at the shell perimeter edge (100) so as to define a chamber (11) intended to house the tank (2), said closing panel (12) being designed to be substantially parallel to the bathroom wall (4);

wherein the protection device (1) is configured to

completely enclose the tank (2),

and wherein the closing panel (12) comprises at least one upper opening (121) to allow access to the tank, and a lower opening (122), distinct from the upper opening (121), suitable to accommodate the passage of a pipe (21) for flushing water from the tank (2) to the toilet (3).

2. Leakage protection device (1) according to claim 1, wherein a gasket (101'), for example a rubber gasket, is interposed between the shell (10) and the closing panel (12) .
3. Leakage protection device (1) according to claim 2, wherein a gasket seat (101) is obtained in the perimeter edge of the shell (100) which houses the gasket.
4. Leakage protection device (1) according to any one of the preceding claims, wherein the closing panel comprises means for fixing the tank (123) to enable the tank (2) to be fixed to the closing panel (12).
5. Leakage protection device (1) according to claim 4, wherein the tank fixing means (123) comprise one or more screw fixing seats (1232, 1233) applied on or obtained in the closing panel (12) and suitable to receive a screw or a bolt (1230) for screwing.
6. Leakage protection device (1) according to claim 5, wherein the tank fixing means (123) comprise a seat body (123') sealingly applied on the closing panel (12) on a face (12') of the closing panel (12) on the opposite side with respect to the chamber (11).
7. Leakage protection device (1) according to any one of the preceding claims, comprising flush fixing means (14) suitable for anchoring the flush pipe (21) to the closing panel (12).
8. Leakage protection device (1) according to any one of the preceding claims, comprising an upper frame (15), comprising upper frame side walls (151) projecting from the closing panel (12) and disposed around the upper opening (121).
9. Leakage protection device (1) according to claim 8, wherein the upper frame side walls (151) project from the closing panel (12) for an upper frame depth (P), such that when the protection device (1) is installed on the bathroom wall (4), said upper frame side walls (151) extend through the bathroom wall (4) to an upper internal vertical surface (41) of said bathroom part (4), facing towards the inside of the bathroom.
10. Leakage protection device (1) according to any one of the preceding claims, comprising a lower frame (16), comprising lower frame side walls (161) pro-

jecting from the closing panel (12) and disposed around the upper opening (122).

11. Leakage protection device (1) according to claim 10, wherein the lower frame side walls (161) project from the closing panel (12) for a lower frame depth (P2), for example equal to the upper frame depth (P), such that when the protection device (1) is installed on the bathroom wall (4), said lower frame side walls (161) extend through the bathroom wall (4) to an upper internal vertical surface (41) of such bathroom part (4), facing towards the inside of the bathroom. 5 10
12. Leakage protection device (1) according to any one of claims 8 to 11, wherein the upper frame side walls (151) and/or the lower frame side walls (161) are inclined with respect to a plane ( $\pi$ ) perpendicular to the bathroom wall (4), so as to favor the outflow of a possible water leak towards the inside of the chamber (11) rather than towards the inside of the bathroom. 15 20
13. Leakage protection device (1) according to any one of claims 8 to 12, wherein the upper frame (15) is shaped in a truncated pyramid shape and the lower frame (16) is shaped in a truncated conical shape. 25
14. Leakage protection device (1) according to any one of the preceding claims, comprising wall fixing means (125, 126, 127, 128) suitable for anchoring the protection device (1) to the wall (4), on a rear surface (42) of the bathroom wall (4) not facing the inside of the bathroom. 30
15. Leakage protection device (1) according to claim 14, wherein the wall fixing means (125, 126, 127, 128) are configured to keep the closing panel (12) spaced from the rear surface (42) of the bathroom wall (4). 35
16. Leakage protection device (1) according to any one of the preceding claims, wherein the shell (10) is a single body, for example obtained by injection molding, having only one access opening defined by the perimeter edge of the shell (100). 40 45
17. Leakage protection device (1) according to any one of claims 1 to 15, wherein the shell (10) is a single body, for example obtained by injection molding, comprising a bottom wall (10'), from which protrudes a shell side wall (10'') having a height such as to define a chamber space sufficient to contain the flush tank (2), said shell (10) comprising an access opening defined by the shell perimeter edge (100) and closed by the closing panel (12) and an inspection opening (102), formed on the shell side wall (10''), and a cover (103) closing such inspection opening (102). 50 55

18. Tank assembly comprising a leakage protection device (1) according to any one of the preceding claims and a flush tank (2) housed in the chamber (11) in a manner spaced from a bottom wall (10') and a side wall (10'') of the shell (10).

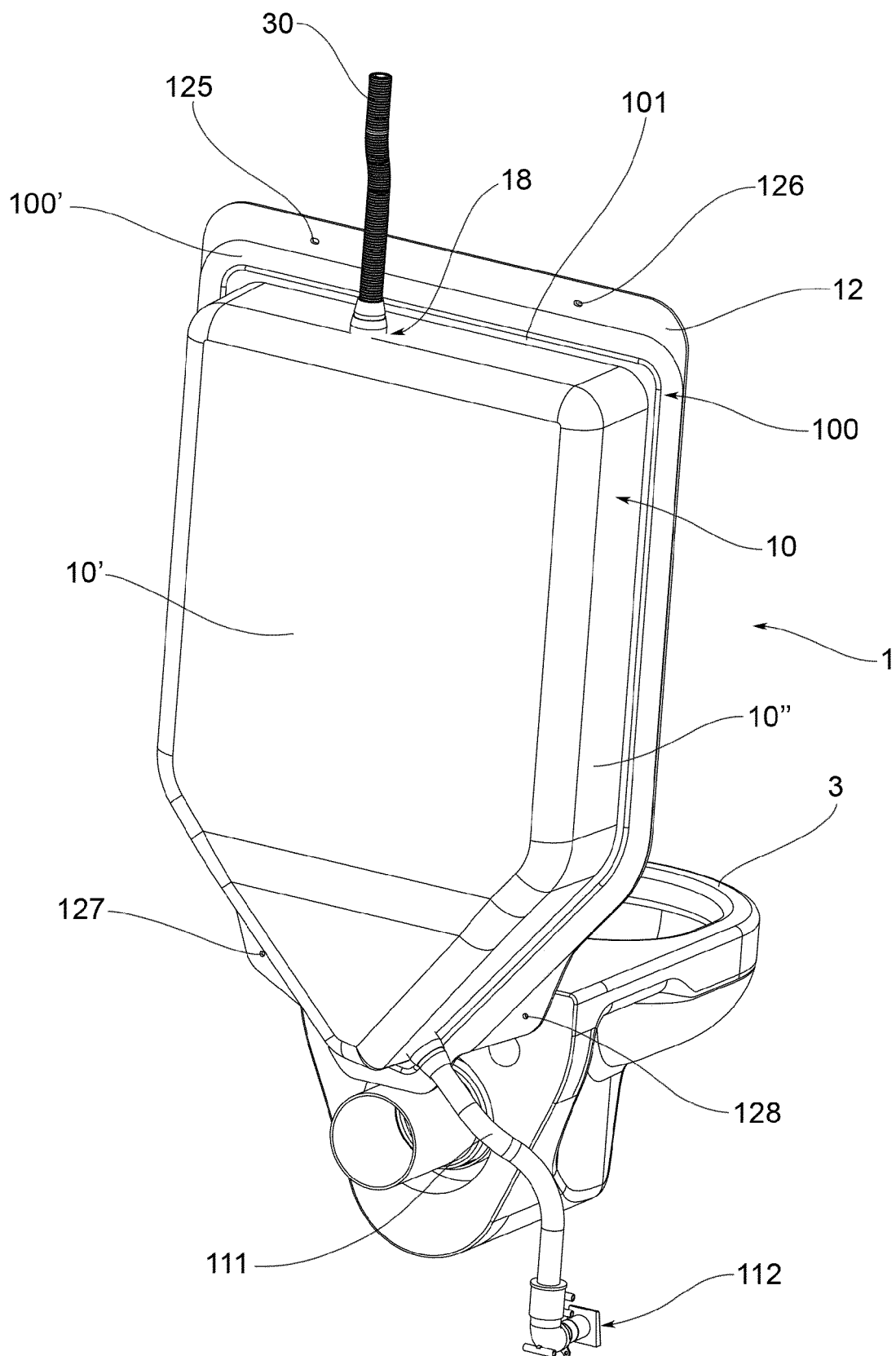


FIG.1

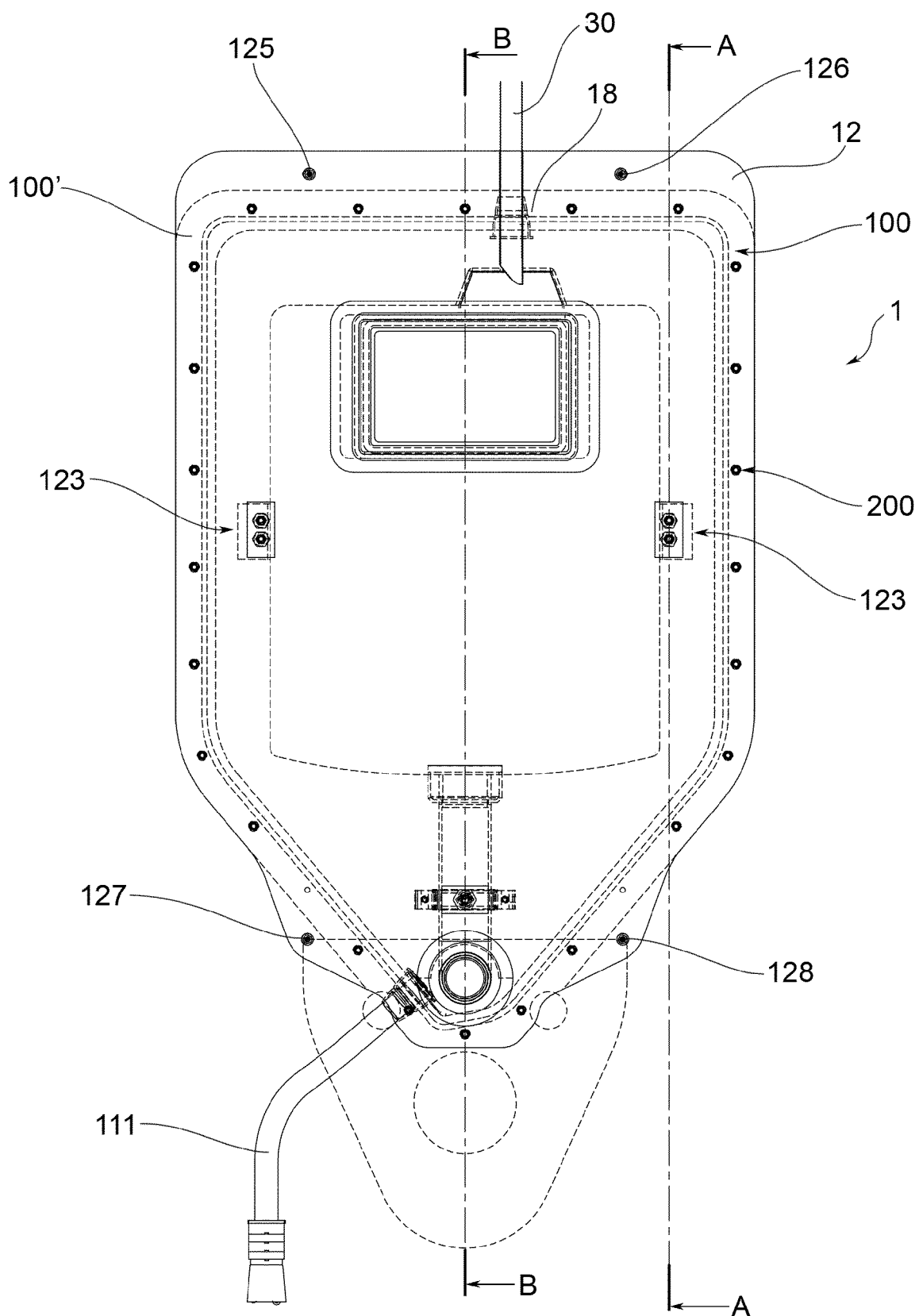


FIG.2

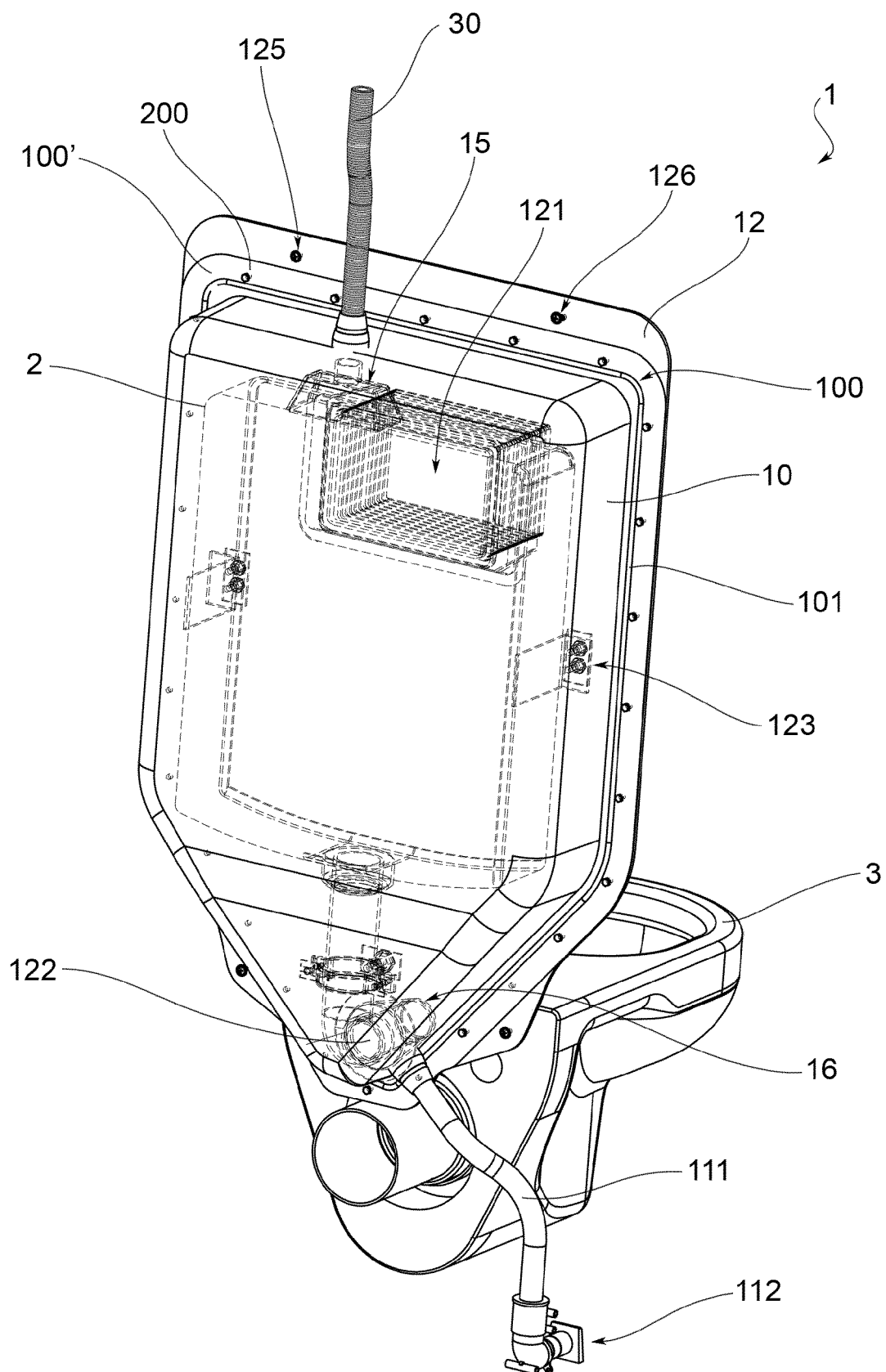


FIG.2a

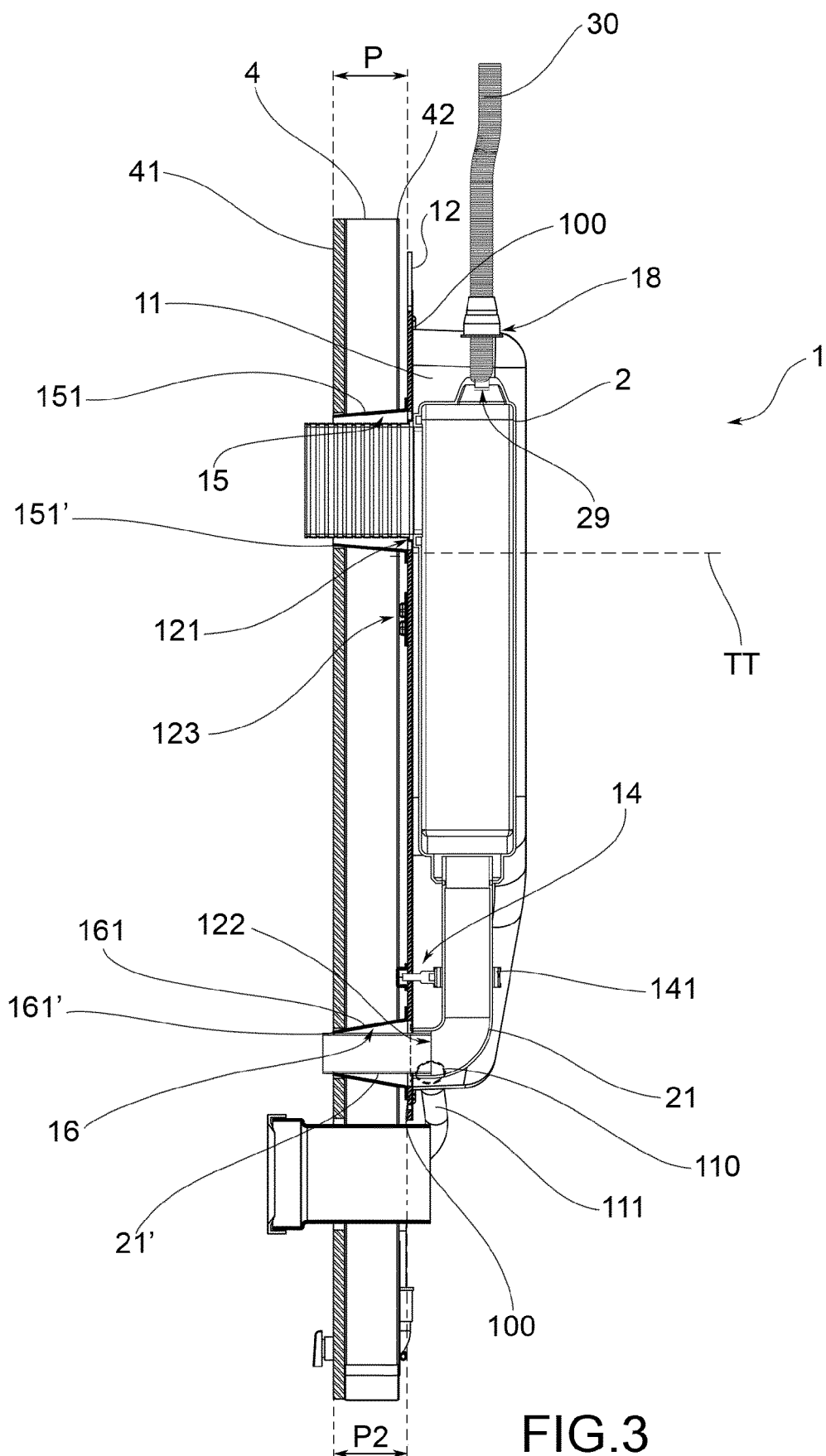
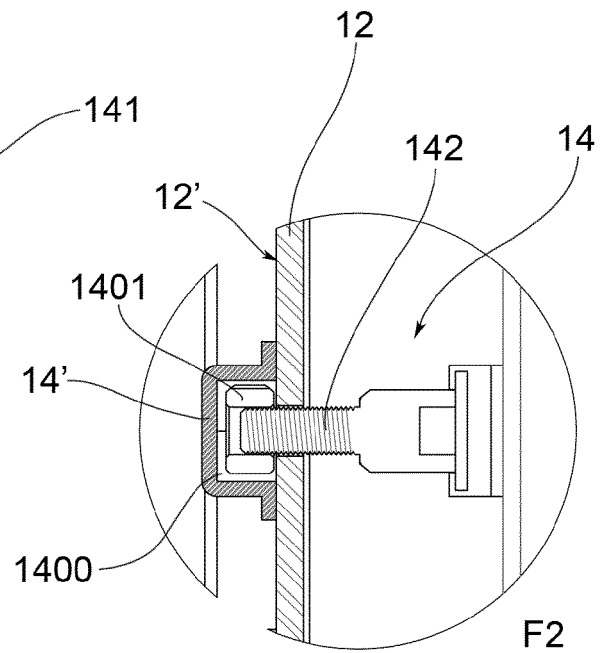
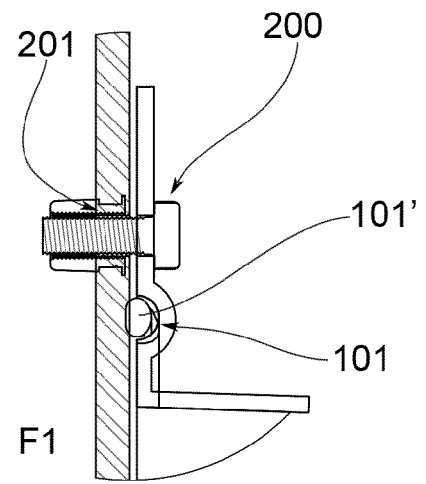
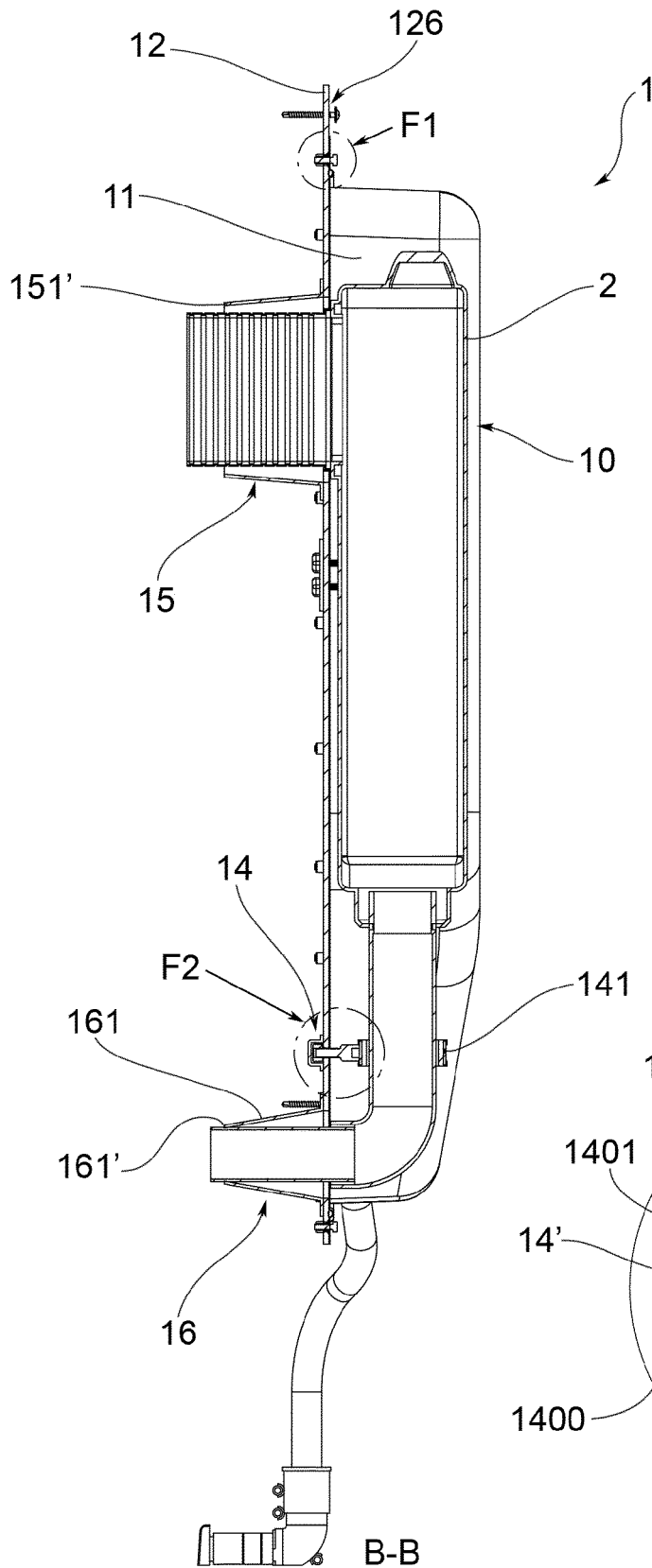
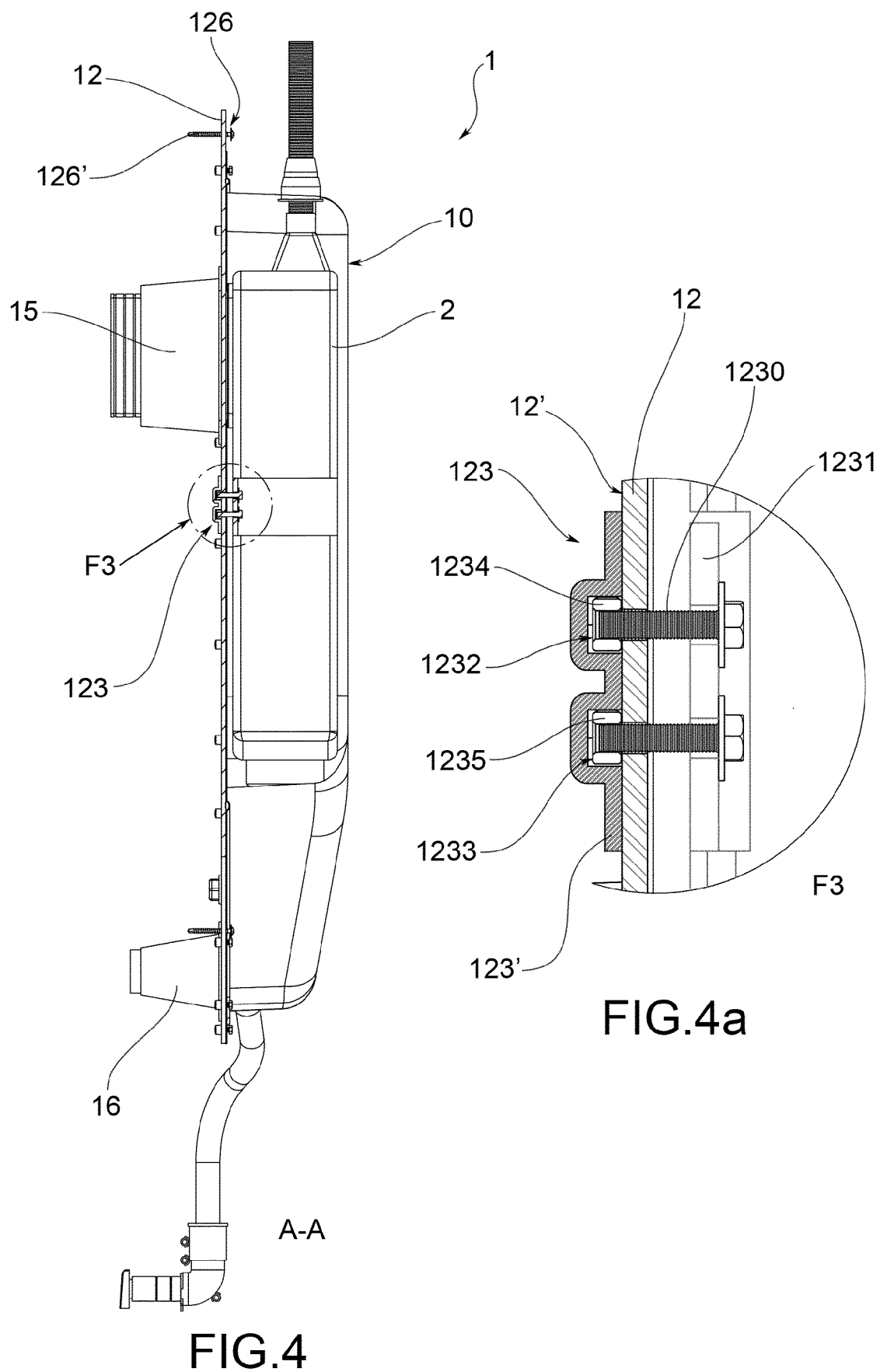


FIG.3





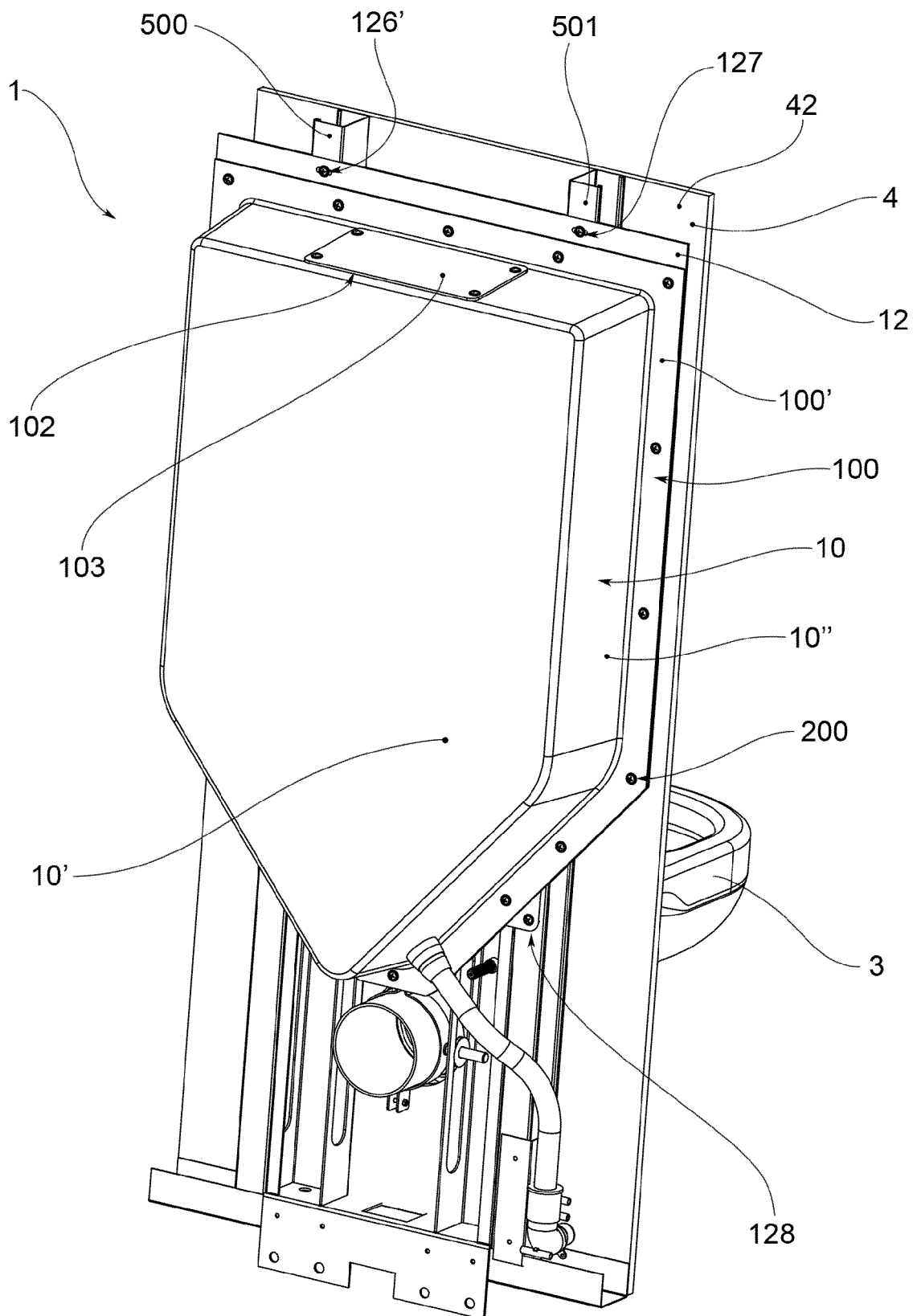


FIG.5



## EUROPEAN SEARCH REPORT

Application Number  
EP 19 15 4563

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>11 June 2019</b>	Examiner <b>Isailovski, Marko</b>
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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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 19 15 4563

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 2821557 A1 [0006] [0007]