(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 428 313 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.09.2024 Bulletin 2024/37

(21) Application number: **23382227.9**

(22) Date of filing: **10.03.2023**

(51) International Patent Classification (IPC):
E03D 11/08 *(2006.01)* ***E03D 5/02*** *(2006.01)*
E03D 1/012 *(2006.01)* ***E03D 1/26*** *(2006.01)*
E03D 1/28 *(2006.01)* ***E03D 1/34*** *(2006.01)*
E03D 11/11 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E03D 11/08; E03D 1/012; E03D 1/26; E03D 1/28; E03D 1/34; E03D 5/026; E03D 11/11

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **Roca Sanitario, S. A.**
08029 Barcelona (ES)

(72) Inventor: **MUNAR SAURA, Miguel Angel**
Barcelona (ES)

(74) Representative: **Ponti & Partners, S.L.P**
Edifici PRISMA
Av. Diagonal núm. 611-613, Planta 2
08028 Barcelona (ES)

(54) **A TOILET FLUSH TANK, A TOILET FLUSHING DEVICE COMPRISING THE TOILET FLUSH TANK, AND A TOILET COMPRISING THE TOILET FLUSHING DEVICE**

(57) The present invention relates to a toilet flush tank (1) for insertion into a housing (2) of a toilet bowl (3), wherein the toilet flush tank (1) defines an overflow (4) exposed to air for protecting against eventual contamination of the flushing liquid in a main volume (V1) by backflow, wherein the overflow (4) is:
- spaced an air gap (G1) from an outlet (C1o) exposed to air of a flushing liquid discharge channel (C1) defined by the toilet flush tank (1), or
- spaced an air gap (G1) from a location intended to correspond with an outlet (C1o) exposed to air of a flushing liquid discharge channel (C1), when supported and at least partially housed by the toilet flush tank (1).

The present invention also relates to a toilet flushing device comprising the toilet flush tank of the invention, and to a toilet comprising the toilet flushing device. Fig.13.

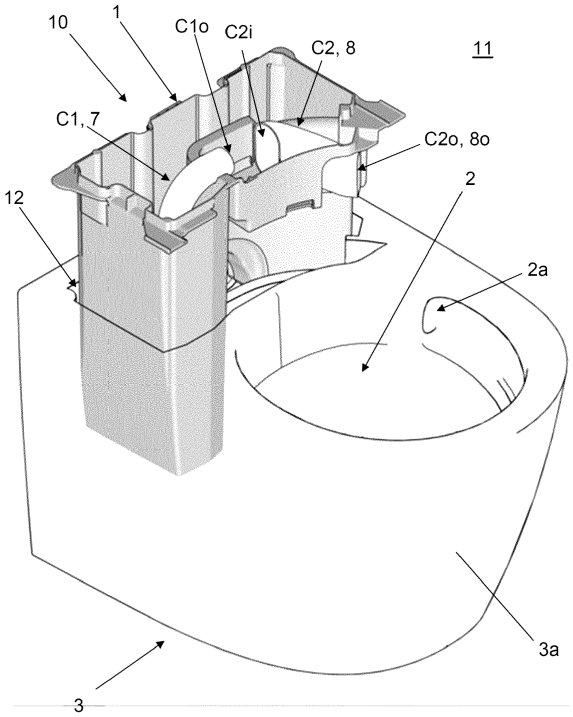

Fig. 13

EP 4 428 313 A1

Description

Field of the Invention

[0001] The present invention generally relates, in a first aspect, to a toilet flush tank for insertion into a housing of a toilet bowl, and more particularly to a toilet flush tank comprising an overflow exposed to air for protecting against eventual contamination by backflow.

[0002] In a second aspect, the present invention relates to a toilet flushing device comprising the toilet flush tank of the first aspect.

[0003] In a third aspect, the present invention relates to a toilet comprising the toilet flushing device of the second aspect.

Background of the Invention

[0004] Toilet flush tanks for insertion into a housing of a toilet bowl, which comprise the features of the preamble of claim 1 are known in the art.

[0005] That's the case of the toilet flush tank of the toilet device disclosed in patent EP3194670B1, which partially houses a discharge conduit defining a flushing liquid discharge channel with and output elbow-shaped segment protruding from the upper rim of the tank to direct the flushing liquid downwards towards a spillway defining a flushing liquid supply channel to discharge the flushed liquid into the bowl in order to clean it.

[0006] For the arrangement provided by the toilet device of EP3194670B1, eventual contamination of the flushing liquid in the main volume of the toilet flush tank by backflow cannot occur. This is due to the fact that the flushing liquid supply channel does not direct backflow towards the discharge conduit, and to the fact that the toilet flush tank is not fully housed into the housing defined in the toilet bowl, but partially protrudes therefrom, including the output elbow-shaped segment, so that if the toilet bowl clogged wastewater level would increase and overflow by the brim of the toilet bowl, thus not reaching the discharge conduit. Therefore, no overflow to prevent backflow in case of eventual contamination is defined by the the toilet flush tank of EP3194670B1.

[0007] Therefore, the toilet flush tank disclosed by EP3194670B1 has the drawbacks of having to considerably protrude from the toilet bowl housing, so that the output elbow-shaped segment also protrudes therefrom and thus no backflow enters therein. Besides, the toilet flush tank is limited to a very specific channel configuration, not being adapted or adaptable to other configurations, such as those disclosed in patent ES2922153A1.

[0008] In that patent ES2922153A1, no toilet flush tank is disclosed, but only a water tank, the flushing liquid discharge channel defined by a conduit directly fitted into the housing of the toilet bowl, and the flushing liquid supply channel by a conduit fitted into cavity of the body of the toilet bowl. In this case, there is an overflow exposed to air but defined by an upper edge of an inlet of the conduit defining the flushing liquid supply channel, which must be arranged so that the backflow outing therefrom is directed towards a flange or upper edge of that cavity of the toilet bowl, said flange thus acting also as a further overflow.

[0009] Therefore, for the device disclosed in ES2922153A1, to protect against eventual contamination of the flushing liquid in the water tank, the following constraints must be considered: a specific design of the inlet of the conduit defining the flushing liquid supply channel, of the upper edge thereof, of the cavity of the body of the toilet bowl, of the flange thereof, and of the interrelation of those features so that that inlet and that flange are mutually arranged to communicate those overflow and further overflow.

[0010] It is necessary to offer an alternative to the state of the art, which covers the gaps mentioned above, particularly by providing a toilet flush tank which does not have the above mentioned drawbacks and limitations of the tank of EP3194670B1, and where the tank itself is really made to protect against eventual contamination of the flushing liquid in the main volume thereof, therefore doing without the above mentioned constraints associated to the device of ES2922153A1.

Description of the Invention

[0011] To that end, the present invention relates, in a first aspect, to a toilet flush tank for insertion into a housing of a toilet bowl, wherein the toilet flush tank defines a main volume for containing a flushing liquid and defines, or is configured for supporting and at least partially housing, a flushing liquid discharge channel and a flushing liquid supply channel arranged so that, in use, flushing liquid outing said flushing liquid discharge channel enters into said flushing liquid supply channel and is supplied therefrom into a waste disposal basin of a toilet bowl.

[0012] In contrast to the toilet flush tanks known in the prior art, the toilet flush tank of the first aspect of the present invention defines an overflow exposed to air configured and arranged to provide a flow path out of the main volume for protecting against eventual contamination of the flushing liquid in the main volume of the toilet flush tank by backflow, wherein said overflow is:

- spaced an air gap from an outlet exposed to air of said flushing liquid discharge channel, when said flushing discharge channel is defined by the toilet flush tank, or
- spaced an air gap from a location intended to correspond with an outlet exposed to air of said flushing liquid discharge channel, when said flushing discharge channel is supported and at least partially housed by the toilet flush tank.

[0013] For an embodiment of the toilet flush tank of the first aspect of the present invention, in use position, the

above mentioned air gap includes a vertical distance component "dv" which is equal to or greater than 20 mm or a distance dimensioned to comply with regulation standards against eventual contamination of reflux drinking water by backflow.

[0014] According to an embodiment of the toilet flush tank of the first aspect of the present invention, the toilet flush tank comprises a tray portion defining a further volume demarcated by walls, with an aperture susceptible to act as an inlet for, in use in case of eventual contamination, receiving said backflow from the waste disposal basin of the toilet bowl, wherein said further volume is separated from said main volume. That aperture is also susceptible to act as an outlet for draining flushing liquid into the basin of the toilet bowl.

[0015] For an embodiment, the overflow is defined by a brim of the tray portion or by a through opening defined in at least one of said walls, to, in use in case of eventual contamination, discharge from the further volume a surplus of said backflow received therein, said air gap departing from said brim or from a lower edge of said through opening.

[0016] For another embodiment, the toilet flush tank of the first aspect of the present invention comprises a spillway constituted by a through hole defined at least at a base of the tray portion, said base being tilted towards said spillway to, in use, drain therethrough possible flushing liquid outing the flushing liquid discharge channel and not reaching the flushing liquid supply channel.

[0017] According to an embodiment of the toilet flush tank of the first aspect of the present invention, an upper edge of at least one of the walls of the tray portion defines a recess for fitting therein at least part of an end portion of a discharge conduit defining the flushing liquid discharge channel, said end portion being adjacent to said outlet exposed to air of the flushing liquid discharge channel.

[0018] For an embodiment, at least one of the walls of the tray portion has the above mentioned through aperture susceptible to act as an inlet for backflow and is also configured for passing therethrough a portion of a distribution conduit defining the flushing liquid supply channel, so that, in use, an outlet of said distribution conduit faces the waste disposal basin of the toilet bowl to directly supply the flushing liquid thereinto.

[0019] For another embodiment, at least one of the walls of the tray portion is shorter than the rest of the walls, an upper edge of said shorter wall constituting a further overflow to, in use in case of abnormal operation of a flushing liquid supply mechanism used for supplying flushing liquid to said main volume, discharge into the further volume a surplus of the flushing liquid contained in the main volume when a predetermined level is exceeded.

[0020] For an embodiment of the toilet flush tank of the first aspect of the present invention, at least one of the flushing liquid discharge channel and flushing liquid supply channel is defined by the toilet flush tank.

[0021] According to an embodiment, the toilet flush tank of any of the first aspect of the present invention is made in a single piece, obtained by any suitable fabrication process, such as by injection molding, rotomolding or by 3D additive manufacturing.

[0022] The present invention also relates, in a second aspect, to a toilet flushing device comprising the toilet flush tank of the first aspect, the flushing liquid discharge channel, the flushing liquid supply channel, a flushing liquid supply mechanism for supplying flushing liquid to the main volume of the toilet flush tank, and a flushing liquid discharge mechanism for propelling and discharging flushing liquid from that main volume to the flushing liquid discharge channel.

[0023] For an embodiment of the toilet flushing device of the second aspect of the invention, the flushing liquid discharge channel and the flushing liquid supply channel are both defined by the toilet flush tank.

[0024] For another embodiment, the flushing liquid discharge channel is defined by a discharge conduit and the flushing liquid supply channel is defined by a distribution conduit.

[0025] For another embodiment, the flushing liquid discharge channel is defined by the toilet flush tank and the flushing liquid supply channel is defined by a distribution conduit.

[0026] For another embodiment, the flushing liquid supply channel is defined by the toilet flush tank and the flushing liquid discharge channel is defined by a discharge conduit.

[0027] According to an embodiment, the toilet flushing device of the second aspect of the present invention comprises a further air gap between the outlet exposed to air of the flushing liquid discharge channel and an inlet of the flushing liquid supply channel, said further air gap having a horizontal distance component "dh", wherein the further air gap is at least partially located within the further volume defined by the tray portion of the toilet flush tank, and the distance component "dh" is dimensioned to comply with regulation standards against eventual contamination of drinking water by backflow.

[0028] For an embodiment of the toilet flushing device of the second aspect of the invention, the flushing liquid supply channel is defined by a distribution conduit configured and arranged partially inside the tray portion of the toilet flush tank so as to enable a vortex liquid flushing system on the basin of the toilet bowl, the inlet of said distribution conduit being configured and arranged to maintain the further air gap with the outlet exposed to air of the flushing liquid discharge channel.

[0029] The present invention also relates, in a third aspect, to a toilet comprising:

- a toilet bowl with a body defining a waste disposal basin and a housing; and
- the toilet flushing device of the second aspect of the invention, wherein the toilet flush tank is inserted into

said housing, and wherein an outlet of the flushing liquid supply channel is fluidically communicated with the waste disposal basin to supply the flushing liquid thereinto.

Brief Description of the Drawings

[0030] The previous and other advantages and features will be better understood from the following detailed description of embodiments, with reference to the attached drawings, which must be considered in an illustrative and non-limiting manner, in which:

Figure 1 shows a schematic perspective view of the toilet flush tank of the first aspect of the present invention, for an embodiment for which the tank does not define a flushing liquid discharge channel and a flushing liquid supply channel, but is configured for supporting and at least partially housing respective conduits defining those channels (not illustrated).

Figure 2 shows a side elevation view of the toilet flush tank of Figure 1.

Figure 3 shows a plan view of the toilet flush tank of Figure 1.

Figure 4 is a cross-section of the toilet flush tank of Figure 3, taken through a cutting plane represented by cutting plane lines P-P.

Figure 5 is a cross-section of the toilet flush tank of Figure 3, taken through a cutting plane represented by cutting plane lines R-R.

Figure 6 is a front elevation view of the toilet flush tank of Figure 1 inserted into the housing of the body of a toilet bowl.

Figure 7 is a cross-section of the toilet flush tank and toilet bowl of Figure 6, taken through a cutting plane represented by cutting plane lines X-X.

Figure 8 is a cross-section of the toilet flush tank and toilet bowl of Figure 6, taken through a cutting plane represented by cutting plane lines M-M.

Figure 9 shows a schematic perspective view of the toilet flushing device of the second aspect of the present invention, for an embodiment for which a flushing liquid supply mechanism and a flushing liquid discharge mechanism (both schematically represented) are housed within the toilet flush tank, and respective conduits defining a flushing liquid discharge channel and a flushing liquid supply channel are supported and partially housed within the toilet flush tank.

Figure 10 shows a side elevation view of the toilet flushing device of Figure 9.

Figure 11 shows a plan view of the toilet flushing device of Figure 9.

Figure 12 is a cross-section of the toilet flushing device of Figure 11, taken through a cutting plane represented by cutting plane lines U-U, and of a corresponding toilet bowl into which the toilet flushing device is mounted.

Figure 13 shows a schematic perspective view of an embodiment of the toilet of the third aspect of the present invention, showing the toilet flushing device being inserted into the housing of the body of the toilet bowl.

Detailed Description of Several Embodiments

[0031] For the embodiment illustrated in the appended Figures, the toilet flush tank 1 of the first aspect of the present invention defines a main volume V1 for containing a flushing liquid and is configured for supporting and partially housing respective discharge and distribution conduits 7, 8 (see Figures 9, 10 and 11) defining a flushing liquid discharge channel C1 and a flushing liquid supply channel C2 arranged so that, in use, flushing liquid outing the flushing liquid discharge channel C1 enters into the flushing liquid supply channel C2 and is supplied therefrom into a waste disposal basin 2 of a toilet bowl 3 (see Figure 13).

[0032] Alternatively, for non-illustrated embodiments, at least one of the flushing liquid discharge channel C1 and flushing liquid supply channel C2 are not defined by a conduit but by the toilet flush tank 1.

[0033] In Figures 9 to 12 the toilet flushing device 10 of the second aspect of the present invention is shown, for an embodiment for which the device comprises respective discharge and distribution tubes 7, 8, a flushing liquid supply mechanism M1 (schematically represented) for supplying flushing liquid to said main volume V1 of the toilet flush tank 1, and a flushing liquid discharge mechanism M2 (schematically represented), such as one based on a Venturi mechanism or an air injection device, for propelling and discharging flushing liquid from the main volume V1 to the flushing liquid discharge channel C1.

[0034] As shown especially in Figures 1, 4, 7, 8, 9, the toilet flush tank 1 defines an overflow 4 exposed to air configured and arranged to provide a flow path out of the main volume V1 for protecting against eventual contamination of the flushing liquid in the main volume V1 of the toilet flush tank 1 by backflow.

[0035] The overflow 4 is spaced an air gap G1 from a location intended to correspond with an outlet C1o exposed to air of the flushing liquid discharge channel C1, when said flushing discharge channel C1 is supported

and at least partially housed by the toilet flush tank 1 (see Figure 11).

[0036] That location is at the lower region of recess R shown in Figure 1, i.e. at which the lower region of the outlet C1o of the flushing liquid discharge channel C1 will be arranged, specifically, as shown in Figure 12 for the toilet flushing device 10 which already incorporates discharge conduit 7 defining that flushing liquid discharge channel C1 and fitted into that recess R.

[0037] As shown among others in Figure 1, the toilet flush tank 1 also comprises a tray portion 5 defining a further volume V2 demarcated by walls W1-W5, with an aperture V2i susceptible to act as an inlet for, in use (i. e. when inserted into the housing 12 of the toilet bowl 3) in case of eventual contamination, receiving the backflow from the waste disposal basin 2 of the toilet bowl 3, wherein that further volume V2 is separated from the main volume V1, as clearly shown in Figures 1, 3, 4, 5, 7 and 8.

[0038] Said through aperture V2i is specifically define by wall W3, and, as shown in Figures 9 and 10, is also configured for passing therethrough a portion of a distribution conduit 8 defining the flushing liquid supply channel C2, so that, in use, an outlet 8o of the distribution conduit 8 faces the waste disposal basin 2 of the toilet bowl 3 to directly supply the flushing liquid thereinto.

[0039] An upper edge of wall W2 of the tray portion 5 defines the above mentioned recess R, shown in Figure 1, for fitting therein part of an end portion of discharge conduit 7, said end portion being adjacent to the outlet C1o exposed to air of the flushing liquid discharge channel C1, as shown in Figure 9.

[0040] For the illustrated embodiment (see Figures 1, 4, 7, 8, 9 and 12), the overflow 4 is defined by a through opening 5a defined in wall W1, to, in use in case of eventual contamination, discharge from the further volume V2 a surplus of the backflow received therein, said air gap G1 departing from a lower edge of said through opening 5a, as indicated in Figure 12.

[0041] Figure 12 also shows that in use position (i.e. when the tank 1 is positioned as illustrated therein), the air gap G1 includes a vertical distance component "dv" which is equal to or greater than 20 mm or a distance dimensioned to comply with regulation standards against eventual contamination of reflux drinking water by backflow.

[0042] For the illustrated embodiment, the discharge conduit 7 injects a jet of washing liquid in a horizontal direction into the distribution conduit 8.

[0043] However, for a non-illustrated embodiment, the distribution conduit provides a water washing liquid in a direction substantially vertical or inclined up to 30° from the vertical. Preferably, according to this non-illustrated embodiment, the air gap G1 that includes the vertical distance "dv" is of the Family A - Type B type, dimensioned to comply with the associated regulation standards for protection against eventual contamination of drinking water by backflow.

[0044] The toilet flush tank 1, as shown in Figures 1, 2, 3, 9, and 10, also comprises a spillway 6 constituted by a through hole 5b defined at least at a base B of the tray portion 5, the base B being tilted towards the spillway 6 to, in use, drain therethrough possible flushing liquid outing the flushing liquid discharge channel C1 and not reaching the flushing liquid supply channel C2.

[0045] As shown in Figures 1, 5, 9, and 12, wall W4 of the tray portion 5 is shorter than the rest of the walls, an upper edge of that shorter wall W4 constituting a further overflow 9 to, in use in case of abnormal operation of a flushing liquid supply mechanism M1 (see Figures 9 and 11) used for supplying flushing liquid to the main volume V1, discharge into the further volume V2 a surplus of the flushing liquid contained in the main volume V1 when a predetermined level is exceeded.

[0046] Figures 1 and 7 also show protection walls P1 and P2, comprised by the tray portion 5 and arranged at both ends of through opening 5a, and which are intended to prevent either washing liquid from the further overflow 9 or washing liquid from outlet C1o from falling through overflow 4.

[0047] As shown in Figures 9 to 12, there is a further air gap G2 between the outlet C1o exposed to air of the flushing liquid discharge channel C1, i.e. of discharge conduit 7, and an inlet C2i of the flushing liquid supply channel C2, that further air gap G2 having a horizontal distance component "dh", wherein the further air gap G2 is partially located within the further volume V2 defined by the tray portion 5 of the toilet flush tank 1, and the distance component "dh" is dimensioned to comply with regulation standards against eventual contamination of drinking water by backflow, in this case, preferably those associated to the Family A - Type D.

[0048] As shown, among others, in Figures 9 and 13, the flushing liquid supply channel C2 is defined by a distribution conduit 8 configured and arranged partially inside the tray portion 5 of the toilet flush tank 1 so as to enable a vortex liquid flushing system on the basin 2 of the toilet bowl 3, the inlet C2i of the distribution conduit 8 being configured and arranged to maintain the further air gap G2 with the outlet C1o exposed to air of the flushing liquid discharge channel C1.

[0049] Figure 13 shows the toilet 11 of the third aspect of the present invention, which, for the illustrated embodiment, comprises:

- a toilet bowl 3 with a body 3a defining a waste disposal basin 2 and a housing 12; and
- the toilet flushing device 10, wherein the toilet flush tank 1 is inserted into the housing 12 (shown only partially inserted in Figure 13), and wherein an outlet C2o of the flushing liquid supply channel C2 is fluidically communicated with the waste disposal basin 2 to supply the flushing liquid thereinto, for example according to the above described configuration to enable a vortex liquid flushing system on the basin 2 of the toilet bowl 3, particularly through aperture 2a.

[0050] The above-mentioned backflow could enter into aperture 2a, and from then into distribution conduit 8 and/or aperture V2i, and then into the tray portion 5 to finally flow through the overflow 4 into the bottom of housing 12, from which it will be drained out of the bowl.

[0051] A person skilled in the art could introduce changes and modifications in the embodiments described without departing from the scope of the invention as it is defined in the attached claims.

Claims

1. A toilet flush tank (1) for insertion into a housing (2) of a toilet bowl (3), wherein the toilet flush tank (1) defines a main volume (V1) for containing a flushing liquid and defines, or is configured for supporting and at least partially housing, a flushing liquid discharge channel (C1) and a flushing liquid supply channel (C2) arranged so that, in use, flushing liquid outing said flushing liquid discharge channel (C1) enters into said flushing liquid supply channel (C2) and is supplied therefrom into a waste disposal basin (2) of a toilet bowl (3), **characterized in that** the toilet flush tank (1) defines an overflow (4) exposed to air configured and arranged to provide a flow path out of the main volume (V1) for protecting against eventual contamination of the flushing liquid in the main volume (V1) of the toilet flush tank (1) by backflow, wherein said overflow (4) is:

   - spaced an air gap (G1) from an outlet (C1o) exposed to air of said flushing liquid discharge channel (C1), when said flushing discharge channel (C1) is defined by the toilet flush tank (1), or
   - spaced an air gap (G1) from a location intended to correspond with an outlet (C1o) exposed to air of said flushing liquid discharge channel (C1), when said flushing discharge channel (C1) is supported and at least partially housed by the toilet flush tank (1).

2. The toilet flush tank (1) of claim 1, wherein, in use position, said air gap (G1) includes a vertical distance component "dv" which is equal to or greater than 20 mm or a distance dimensioned to comply with regulation standards against eventual contamination of reflux drinking water by backflow.

3. The toilet flush tank (1) of any of the previous claims, wherein the toilet flush tank (1) comprises a tray portion (5) defining a further volume (V2) demarcated by walls (W1-W5), with an aperture (V2i) susceptible to act as an inlet for, in use in case of eventual contamination, receiving said backflow from the waste disposal basin (2) of the toilet bowl (3), wherein said further volume (V2) is separated from said main volume (V1).

4. The toilet flush tank (1) of claim 3, wherein said overflow (4) is defined by a brim of the tray portion (5) or by a through opening (5a) defined in at least one (W1) of said walls (W1-W5), to, in use in case of eventual contamination, discharge from the further volume (V2) a surplus of said backflow received therein, said air gap (G1) departing from said brim or from a lower edge of said through opening (5a).

5. The toilet flush tank (1) of claim 4, comprising a spillway (6) constituted by a through hole (5b) defined at least at a base (B) of the tray portion (5), said base (B) being tilted towards said spillway (6) to, in use, drain therethrough possible flushing liquid outing the flushing liquid discharge channel (C1) and not reaching the flushing liquid supply channel (C2).

6. The toilet flush tank (1) of any of claims 3 to 5, wherein an upper edge of at least one (W2) of said walls (W1-W5) of the tray portion (5) defines a recess (R) for fitting therein at least part of an end portion of a discharge conduit (7) defining the flushing liquid discharge channel (C1), said end portion being adjacent to said outlet (C1o) exposed to air of the flushing liquid discharge channel (C1).

7. The toilet flush tank (1) of any of claims 3 to 6, wherein at least one (W3) of said walls (W1-W5) of the tray portion (5) has said through aperture (V2i) also configured for passing therethrough a portion of a distribution conduit (8) defining the flushing liquid supply channel (C2), so that, in use, an outlet (8o) of said distribution conduit (8) faces the waste disposal basin (2) of the toilet bowl (3) to directly supply the flushing liquid thereinto.

8. The toilet flush tank (1) of any of claims 3 to 7, wherein at least one (W4) of said walls (W1-W5) of the tray portion (5) is shorter than the rest of the walls, an upper edge of said shorter wall (W4) constituting a further overflow (9) to, in use in case of abnormal operation of a flushing liquid supply mechanism (M1) used for supplying flushing liquid to said main volume (V1), discharge into the further volume (V2) a surplus of the flushing liquid contained in the main volume (V1) when a predetermined level is exceeded.

9. The toilet flush tank (1) of any of the previous claims, wherein at least one of the flushing liquid discharge channel (C1) and flushing liquid supply channel (C2) is defined by the toilet flush tank (1).

10. The toilet flush tank (1) of any of the previous claims, wherein the toilet flush tank (1) is made in a single piece.

11. A toilet flushing device (10), comprising the toilet flush tank (1) of any of the previous claims, the flushing liquid discharge channel (C1), the flushing liquid supply channel (C2), a flushing liquid supply mechanism (M1) for supplying flushing liquid to said main volume (V1) of the toilet flush tank, and a flushing liquid discharge mechanism (M2) for propelling and discharging flushing liquid from said main volume (V1) to the flushing liquid discharge channel (C1).

12. The toilet flushing device of claim 11, wherein:

- at least one of the flushing liquid discharge channel (C1) and flushing liquid supply channel (C2) are defined by the toilet flush tank (1); and /or
- at least one of the flushing liquid discharge channel (C1) and flushing liquid supply channel (C2) are defined by a respective discharge or distribution conduit (7, 8).

13. The toilet flushing device of claim 12, when including the toilet flush tank (1) of any of claims 4 or 5, wherein there is a further air gap (G2) between said outlet (C1o) exposed to air of said flushing liquid discharge channel (C1) and an inlet (C2i) of the flushing liquid supply channel (C2), said further air gap (G2) having a horizontal distance component "dh", wherein said further air gap (G2) is at least partially located within the further volume (V2) defined by the tray portion (5) of the toilet flush tank (1), and said distance component "dh" being dimensioned to comply with regulation standards against eventual contamination of drinking water by backflow.

14. The toilet flushing device of claim 13, wherein the flushing liquid supply channel (C2) is defined by a distribution conduit (8) configured and arranged partially inside the tray portion (5) of the toilet flush tank (1) so as to enable a vortex liquid flushing system on the basin (2) of the toilet bowl (3), the inlet (C2i) of said distribution conduit (8) being configured and arranged to maintain the further air gap (G2) with the outlet (C1o) exposed to air of the flushing liquid discharge channel (C1).

15. A toilet (11), comprising:

- a toilet bowl (3) with a body (3a) defining a waste disposal basin (2) and a housing (12); and
- the toilet flushing device (10) according to any claims 11 to 14, wherein the toilet flush tank (1) is inserted into said housing (12), and wherein an outlet (C2o) of the flushing liquid supply channel (C2) is fluidically communicated with the waste disposal basin (2) to supply the flushing liquid thereinto.

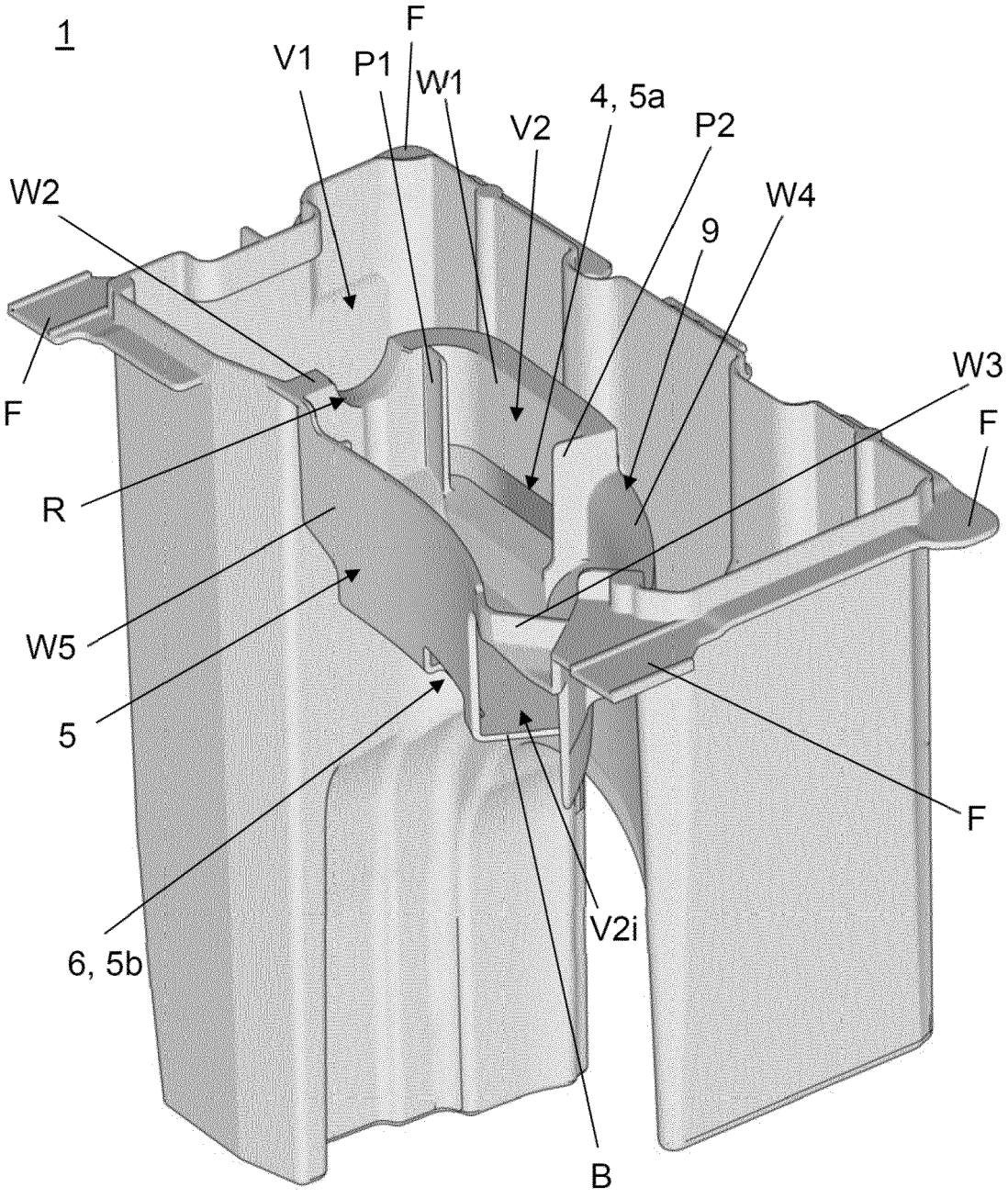

Fig. 1

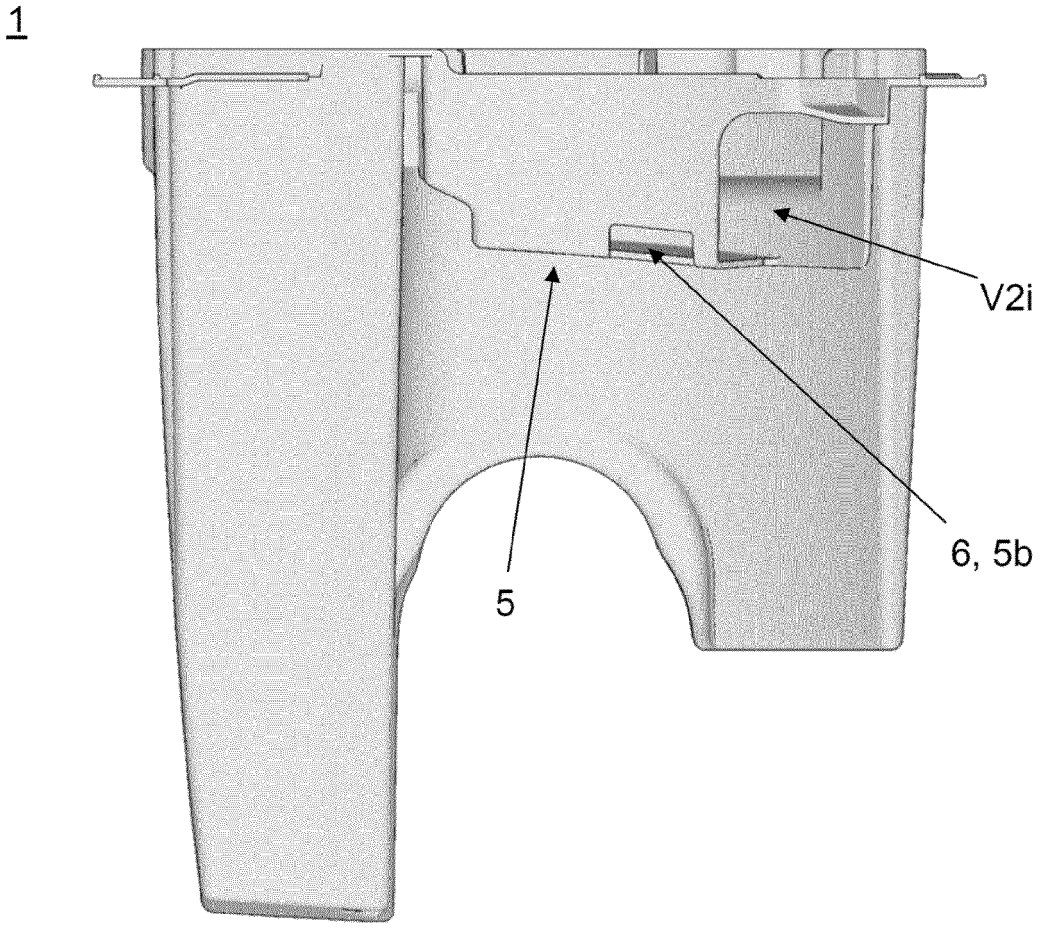

Fig. 2

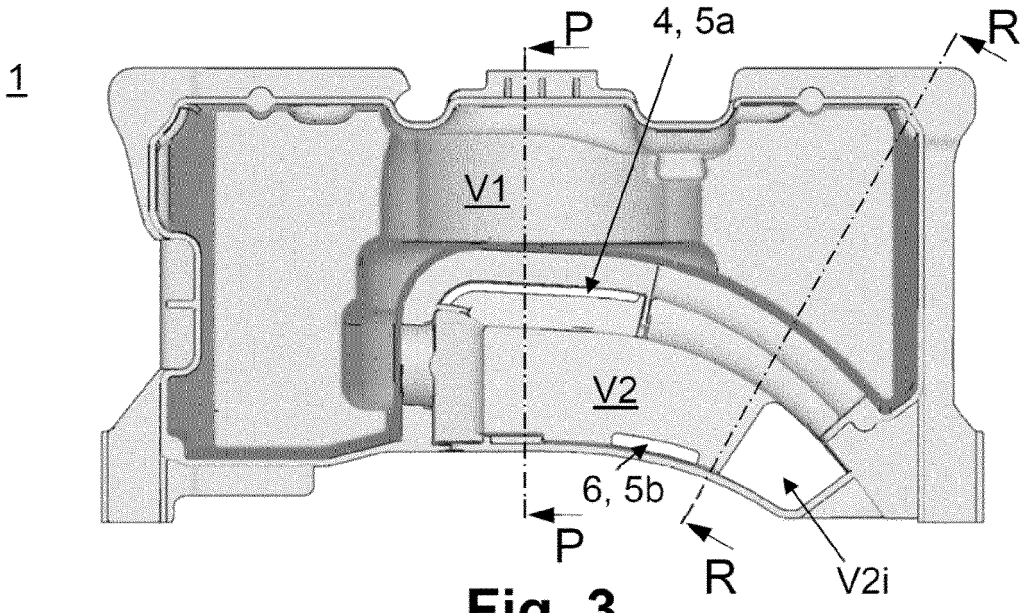

Fig. 3

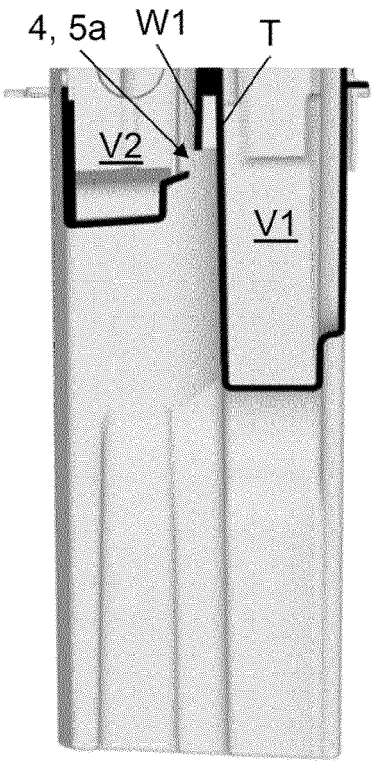

Fig. 4

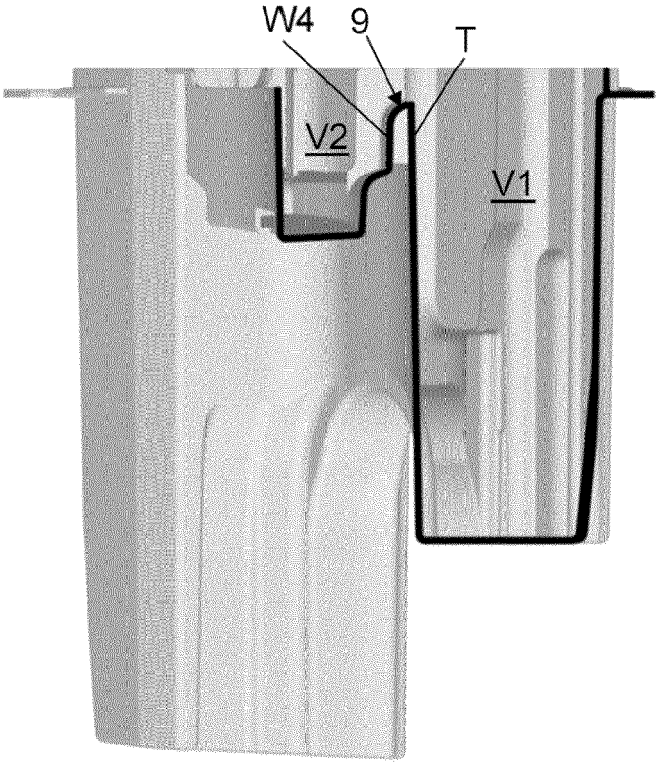

Fig. 5

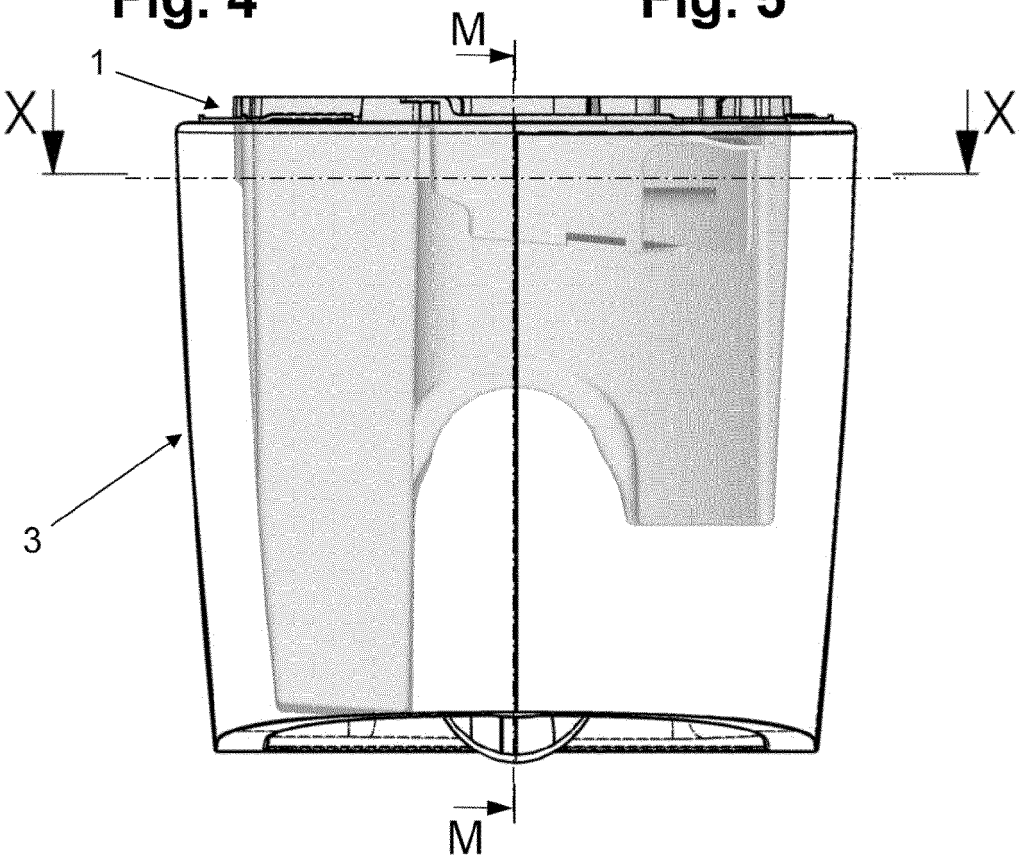

Fig. 6

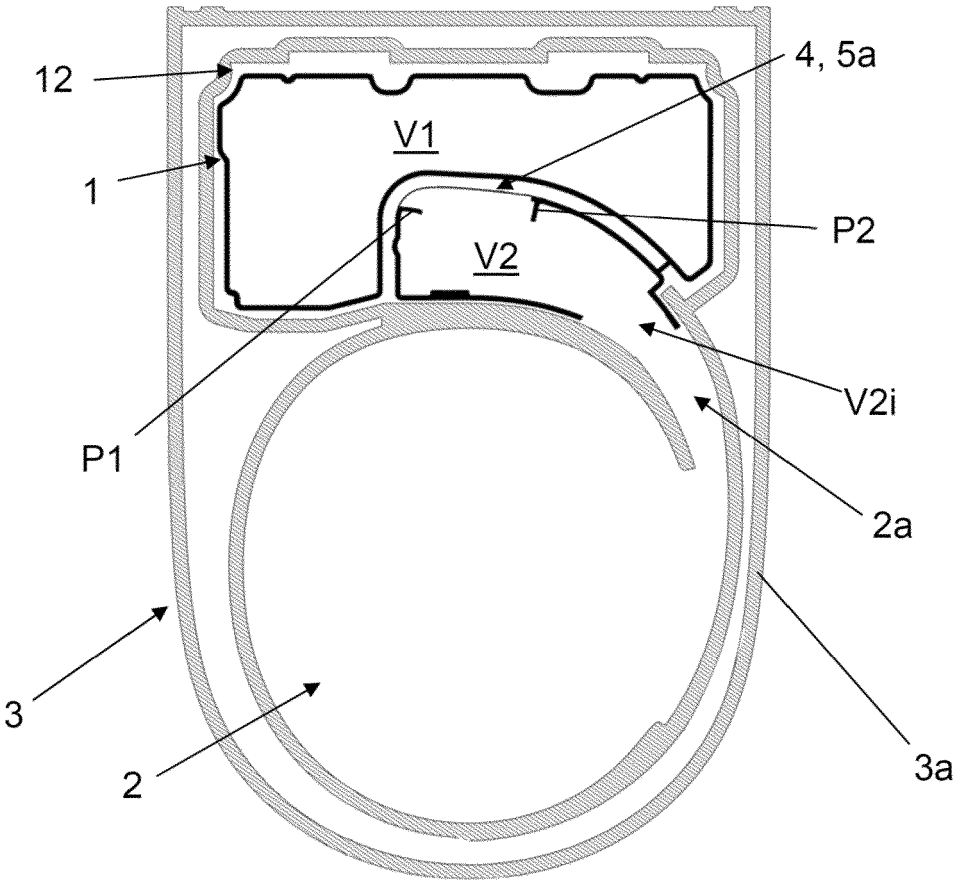

Fig. 7

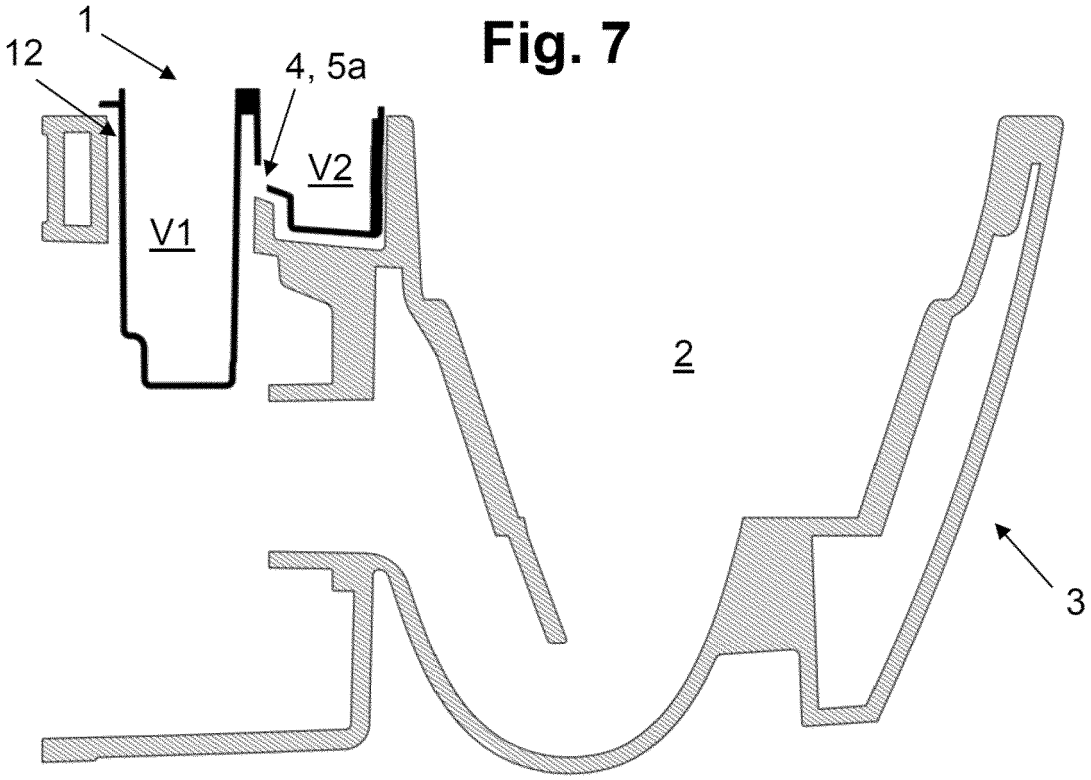

Fig. 8

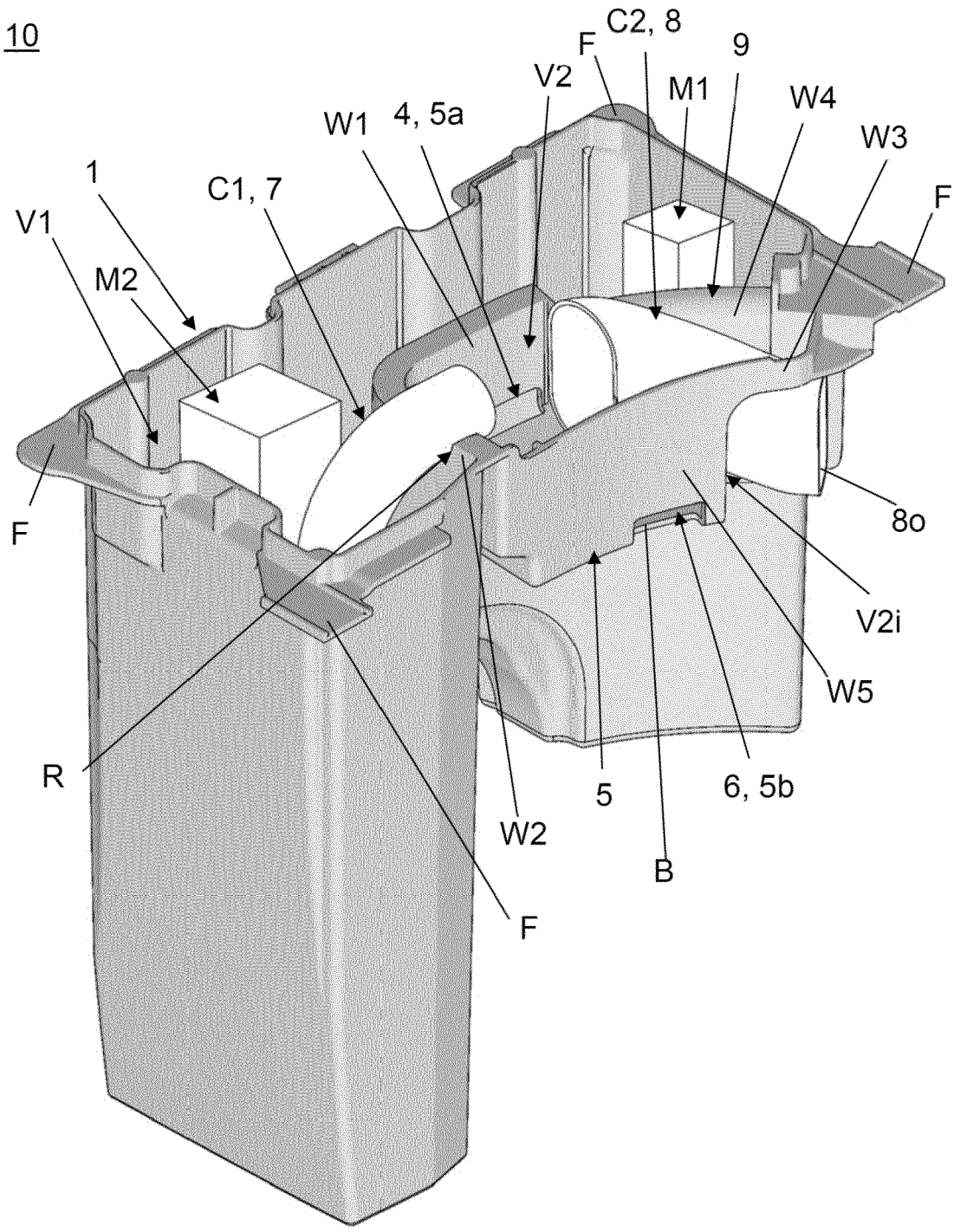

Fig. 9

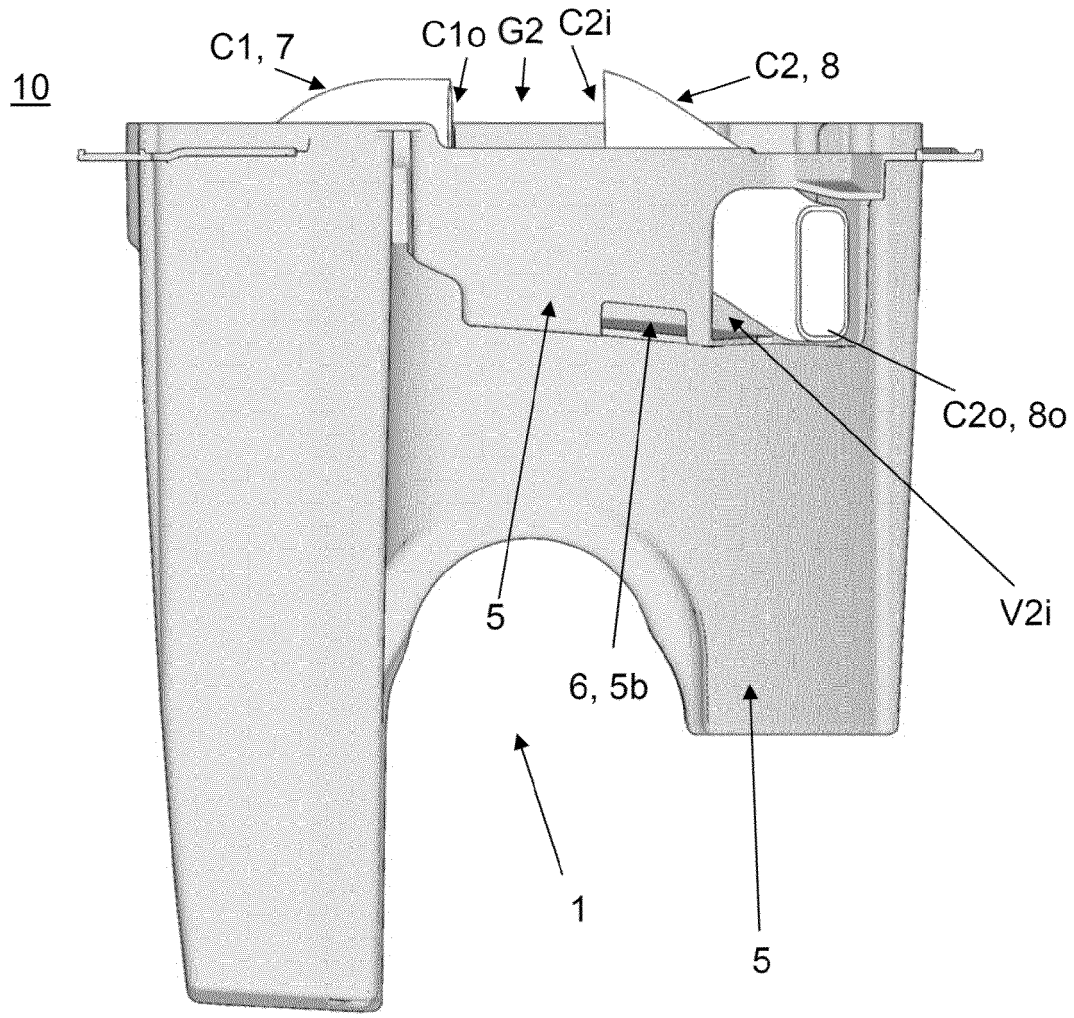
10
C1, 7
C1o
G2
C2i
C2, 8
C2o, 8o
V2i
5
6, 5b
1
5

Fig. 10

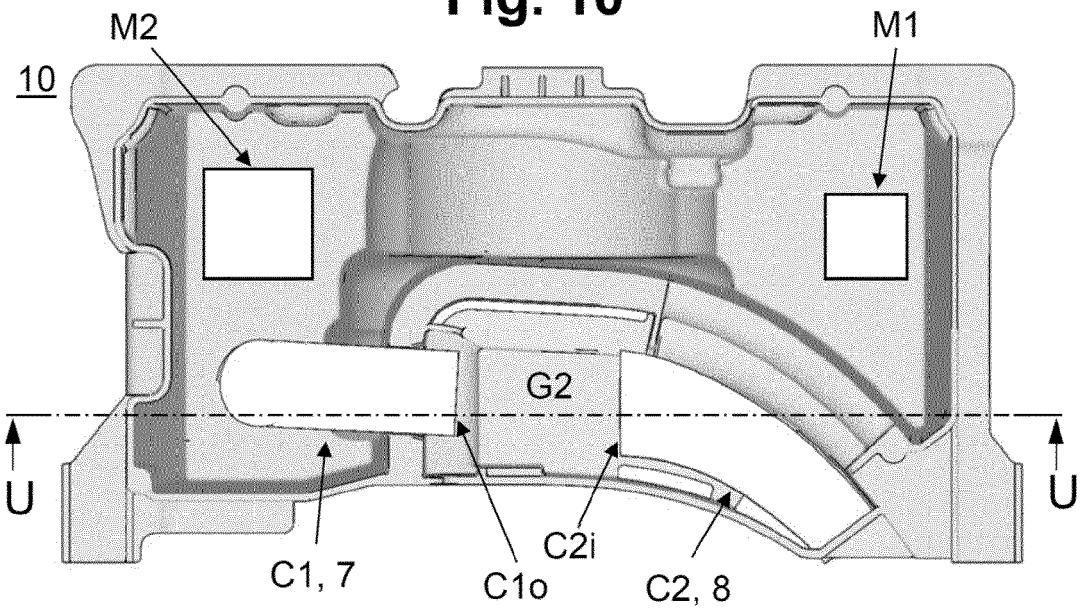
10
M2
M1
G2
U
U
C1, 7
C1o
C2i
C2, 8

Fig. 11

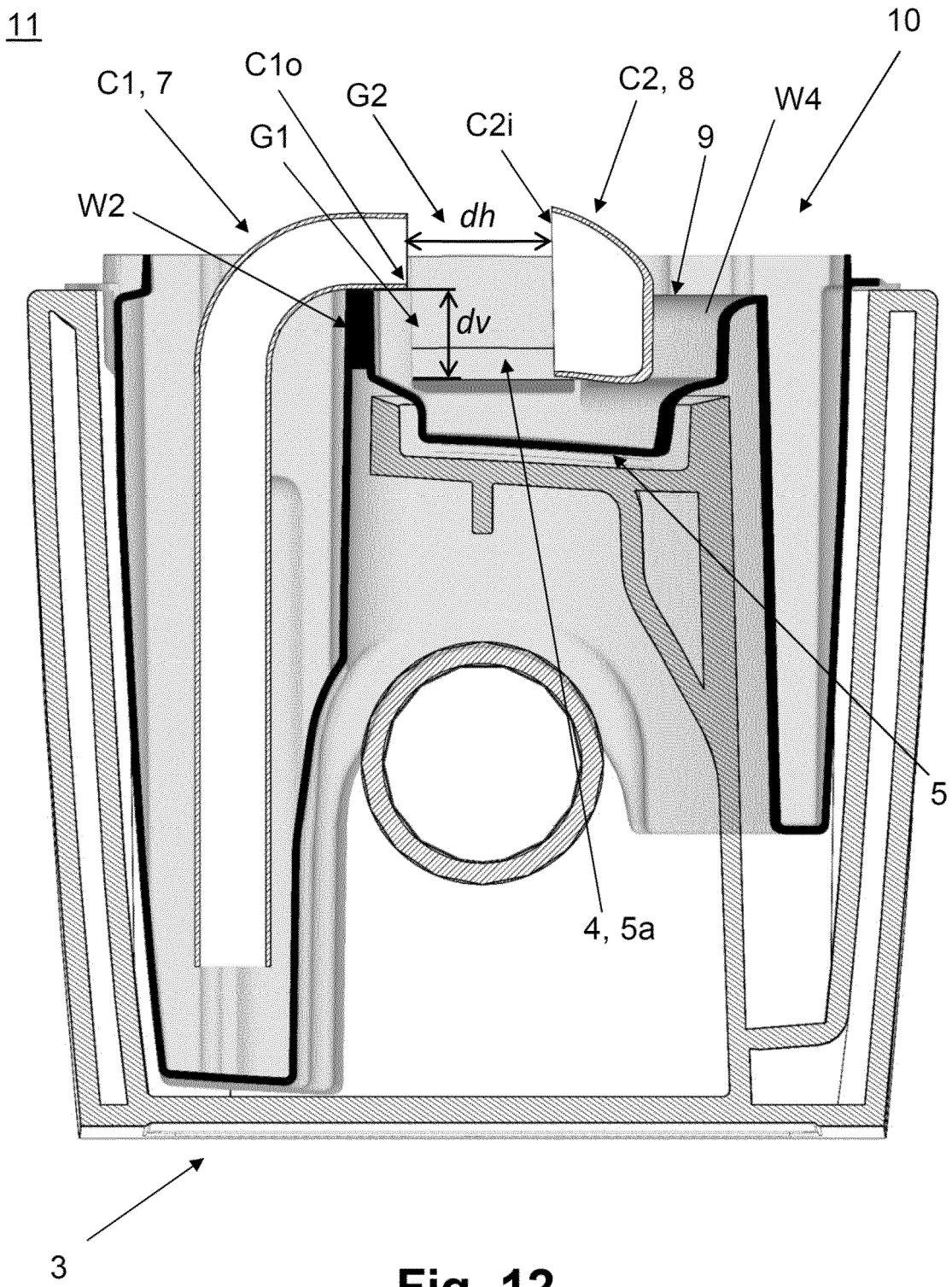

Fig. 12

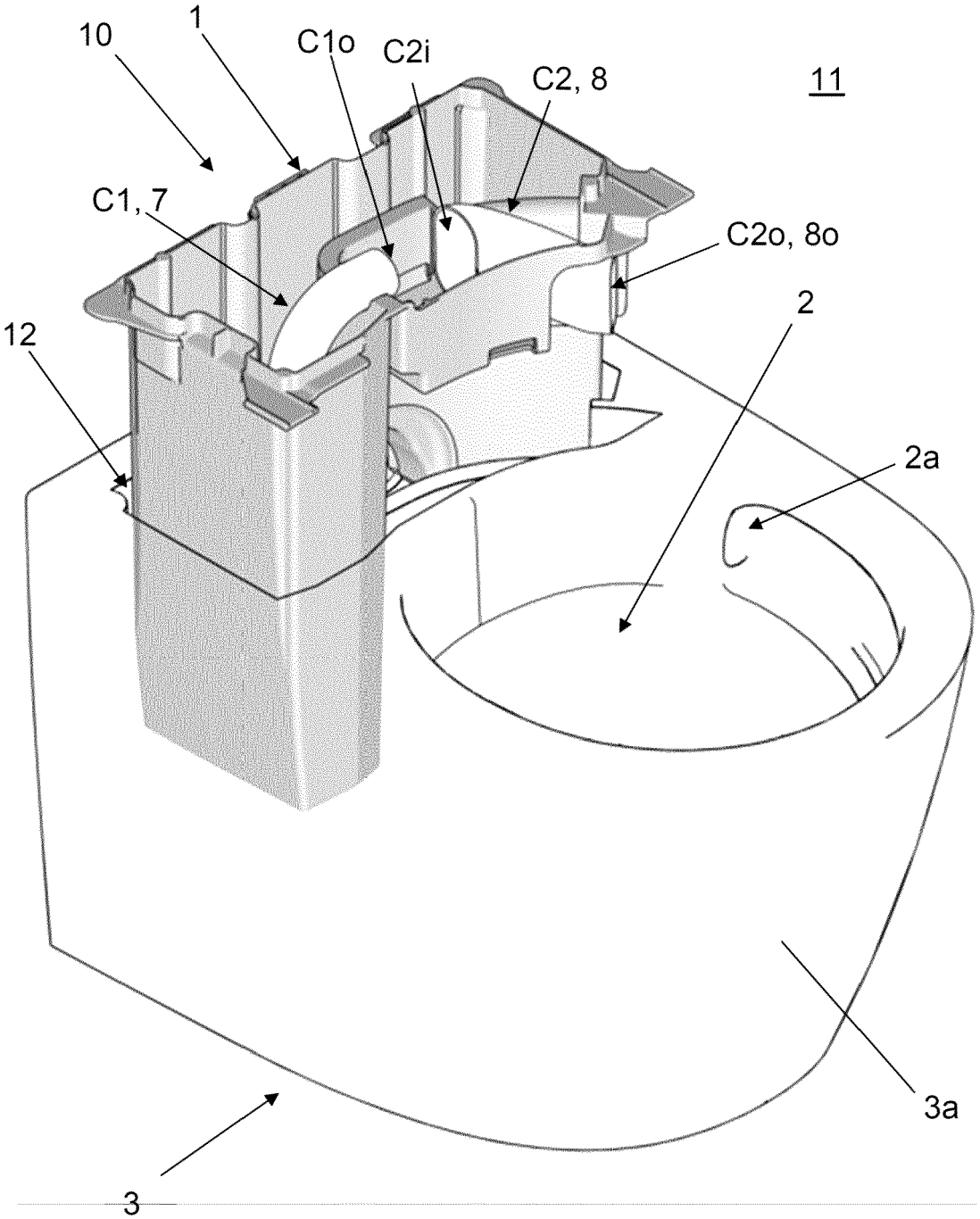

Fig. 13

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 38 2227

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 Y	EP 2 058 443 B1 (TOTO LTD [JP]) 17 May 2017 (2017-05-17) * paragraphs [0044], [0045], [0053], [0054], [0062], [0063]; figures 2-8,10-13 *	1,10-12, 15 1,2,11, 15	INV. E03D11/08 E03D5/02 E03D1/012 E03D1/26 E03D1/28 E03D1/34 E03D11/11
Y,D	ES 2 922 153 A1 (ROCA SANITARIO SA [ES]) 9 September 2022 (2022-09-09) * figures 1,2,8,12-14 *	1,2,11, 15	
Y,D	EP 3 194 670 B1 (SIAMP CEDAP REUNIES [MC]) 16 February 2022 (2022-02-16) * figures 1,4,5 *	1,11,15	
A	US 8 032 956 B2 (IDEAL STANDARD INT BVBA [BE]) 11 October 2011 (2011-10-11) * figures 2-4,6 *	1-15	
A	EP 3 816 356 A1 (PANASONIC IP MAN CO LTD [JP]) 5 May 2021 (2021-05-05) * figure 6 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

E03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 August 2023	Isailovski, Marko

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 38 2227

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-08-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2058443 B1	17-05-2017	CA 2661847 A1	06-03-2008
		CN 101517171 A	26-08-2009
		EP 2058443 A1	13-05-2009
		JP 4941900 B2	30-05-2012
		JP WO2008026633 A1	21-01-2010
		KR 20090061625 A	16-06-2009
		TW 200811340 A	01-03-2008
		US 2010077544 A1	01-04-2010
		WO 2008026633 A1	06-03-2008
ES 2922153 A1	09-09-2022	NONE	
EP 3194670 B1	16-02-2022	AU 2015295219 A1	23-02-2017
		BR 112017001985 A2	06-03-2018
		EA 201790245 A1	30-06-2017
		EP 3194670 A1	26-07-2017
		ES 2913068 T3	31-05-2022
		FR 3024475 A1	05-02-2016
		JP 2017523332 A	17-08-2017
		PL 3194670 T3	06-06-2022
		PT 3194670 T	13-05-2022
		US 2017254058 A1	07-09-2017
		WO 2016016471 A1	04-02-2016
US 8032956 B2	11-10-2011	US 2007113331 A1	24-05-2007
		WO 2007061740 A2	31-05-2007
EP 3816356 A1	05-05-2021	CN 112189071 A	05-01-2021
		EP 3816356 A1	05-05-2021
		JP 7228757 B2	27-02-2023
		JP 2020002578 A	09-01-2020
		WO 2020003913 A1	02-01-2020

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 3194670 B1 **[0005] [0006] [0007] [0010]**
- ES 2922153 A1 **[0007] [0008] [0009] [0010]**