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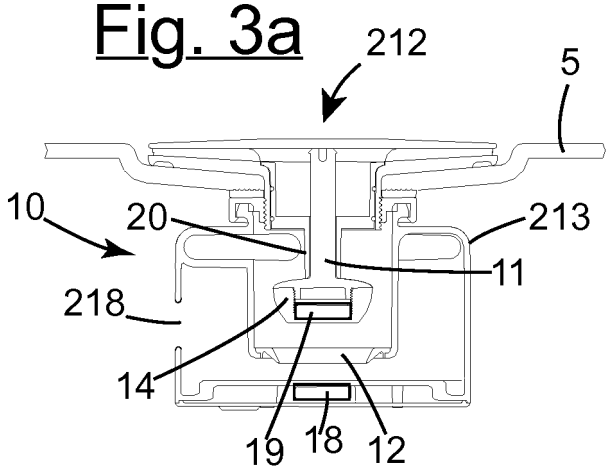
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(54) Discharge closure set for sanitary facilities and a sanitary facility using the same

(57) The present invention concerns discharge closure set for sanitary facilities and a sanitary facility using the same. More in particular, the present invention refers to a discharge closure set for sanitary facilities of reduced wear and easy to make comprising a plug (11) free to move between a first open position and a second closed position, and opening/closing means (15) adapted to co-operate with said plug (11) in order to move it to one of said two open or closed positions, said opening/closing means (15) comprising at least an element (18) moving between a first coupling position with said plug (11) and a second disconnection position characterised in that in said first coupling position, said moveable element (18) and said plug (11) are magnetically coupled.

Fig. 3a



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Description

[0001] The present invention refers to a discharge closure set for sanitary facilities. More in particular, the present invention refers to discharge closure set for sanitary facilities of reduced wear and easy to make, as well as a sanitary facility using the same. Discharge systems for sanitary facilities such as for example sinks, washtubs, bidets, showers and bath tubs, generally have a closure set comprising a plug free to move between a first raised discharge opening position and a second lowered discharge closing position, and opening/closing means which operate on the plug in order to move it to one of the two such positions.

[0002] Currently known closure sets are generally provided with mechanical opening/closing means, such as levers, which, in order to move the plug to its opening position, come into contact with the base of the same pushing it upwards, while in closing they are moved to a non-interfering position with the base of the plug thus letting it fall due to gravity until the head of the plug closes the discharge mouth completely. Such opening/closing means are moved manually by a user.

[0003] Closure sets based on mechanical actuation require special attention in use by the user in that they break easily.

[0004] As a matter of fact, being that usually the plug is always maintained at an open position when the sanitary facilities are not used, mechanical means are substantially always subject to stress given that they have to support the weight of the plug constantly in order to maintain it at a raised position.

[0005] Furthermore, in case the user inadvertently presses the open plug, the actuation means are generally subject to deformation and thus they can no longer guarantee sufficient raising of the plug.

[0006] Last but not least, the mechanical opening/closing means are subject to quick wear, especially the hydraulic seals which the levers have to be provided with, such elements coming constantly into contact with water.

[0007] In other currently known discharge closure sets, the plug is moved to closing and opening position by electromagnetic means such as for example solenoids, which, when supplied with power, generate a magnetic field capable of moving an actuating core which thus comes into contact with the base of the plug and exerts mechanical force upwards with respect to the same.

[0008] Such electromagnetic closing/opening means ensure greater reliability over time and higher resistance to pressure with respect to the mechanical means. However, they also have considerable disadvantages. The electrical parts supplying the solenoid with power and the solenoid itself are generally housed in an environment with high risks of contact with liquids, thus exposing the user to danger in case of failure or short-circuit.

[0009] In addition, the manufacturing process of such opening/closing means is quite complicated and costly with respect to their mechanical counterparts.

[0010] It is the object of the present invention to overcome the abovementioned drawbacks and in particular to make a discharge closure set for sanitary facilities capable of offering high reliability over time.

[0011] Another object of the present invention is to provide a discharge closure set for sanitary facilities, easy to make and at a low cost.

[0012] Further object of the present invention is to make a discharge closure set for sanitary facilities, which does not expose the user to any danger.

[0013] Last but not least, it is the object of the present invention to provide a sanitary facility using a discharge closure set according to the present invention.

[0014] These and other objects according to the present invention are attained by making a discharge closure set for sanitary facilities as described in claim 1. Furthermore, such objects are attained by a sanitary facility using a discharge closure set according to claim 7.

[0015] Further characteristics of the discharge closure set for sanitary facilities and of the sanitary facility using the same are subject of the dependent claims.

[0016] The characteristics and advantages of the discharge closure set for sanitary facilities according to the present invention and those of the sanitary facility using the same shall be more evident from the following description given as exemplifying and nonlimiting with reference to the attached schematic drawings, in which:

- Figure 1 is a section view of a first sanitary facility using a first embodiment of a discharge closure set for sanitary facilities according to the present invention;
- Figure 2a is a section schematic view of the discharge closure set for the sanitary facilities of figure 1 at a closed position;
- Figure 2b is a partial top view of the actuation means of the discharge closure set for the sanitary facilities of figure 1 at a closed position;
- Figure 3a is a section schematic view of the discharge closure set for the sanitary facilities of figure 1 at an open position;
- Figure 3b is a partial top view of the actuation means of the discharge closure set for the sanitary facilities of figure 1 at an open position;
- Figure 4a is a section schematic view of a second embodiment of the discharge closure set for sanitary facilities according to the present invention at an open position;
- Figure 4b is a section schematic view of the discharge closure set for the sanitary facilities of figure 4a at a closed position;
- Figure 5 is a section view of a second sanitary facility using a discharge closure set for the sanitary facilities according to the present invention;
- Figure 6 illustrates a structural detail of the sanitary facility according to the present invention. With reference to the figures, a discharge closure set for sanitary facilities is shown and indicated in its entirety

with 10.

[0017] The discharge closure set 10 comprises a plug 11 free to move between a first raised opening position and a second lowered closing position.

[0018] Such plug 11 is provided with at least one portion complementary to a discharge mouth 12, which, at a closed position, cooperates with such mouth 12 closing it completely.

[0019] Advantageously, the complementary portion is provided with a gasket 14 adapted to maintain a watertight closure of the discharge mouth 12, which prevents the discharge of the water present in the sanitary facility 50 in a discharge pipe 13.

[0020] In addition, the discharge closure set 10 is provided with opening/closing means 15 which cooperate with the plug 11 in order to move it into either the open or closed position.

[0021] The opening/closing means comprise an element 18 which can be moved between a first coupling position with said plug 11 and a second uncoupled position. According to the present invention, when the moveable element 18 is in the first coupling position, such moveable element 18 and the plug 11 are coupled magnetically.

[0022] Preferably, the moveable element 18 is a first permanent magnet and the plug 11 comprises a second permanent magnet 19 of the same polarity, thus generating a repulsion effect with the moveable element 18.

[0023] In addition, guide and stop means 20 are provided for which cooperate with the plug 11, in order to define and delimit the distance which can be covered by the same.

[0024] Such guide and stop means 20 cooperate with the lower portion of the plug 11 in order to provide a stop for the opening movement of the plug 11.

[0025] The moveable element 18 of the opening/closing means 15 is preferably connected to actuation means 16 outside the sanitary facility 50 and arranged such that they can be activated by a user.

[0026] The external actuation means 16 operate on the moveable element 18 to control its movement through suitable motion transmission means 17, such as for example a rigid rod connected to a lever 21 which, constrained to rotate around a pin 22, moves the moveable element 18 between the two positions. Advantageously, the moveable element 18 is positioned outside the discharge pipe 13; therefore, the motion transmission means 17 do not have to come into contact with water.

[0027] According to a preferred aspect, the plug 11 of the discharge closure set according to the present invention and the discharge mouth 12 are housed in a quick-mounting water discharge group 210.

[0028] Such water discharge group 210 comprises a first element 212 which can be pre-coupled in a non-removable manner with the sanitary facility 50, and a second element 213 which can be rapidly coupled with the first 212 during the assembly step of the same group 210, for example during the installation of a sanitary facility 50.

[0029] According to a preferred aspect, the first element 212 of the discharge group is mushroom-shaped and can be applied in a hole 54 present in a lower portion of the sanitary facility 50.

[0030] As illustrated in figure 6, the first element 212 comprises a head portion 215 which, when said first element is pre-assembled onto the sanitary facility 50, cooperates with the internal wall of such sanitary facility 50, substantially completely covering the hole 54 provided for at the base of the same, and extending beyond it for a short section.

[0031] Furthermore, the first element 212 also comprises a tubular portion 216 for coupling with the hole 54 which extends from the head portion 215 up to beyond the lower wall of the sanitary facility 50 through the hole 54.

[0032] In order to maintain the first element 212 firmly constrained in such position, a lower closure ring 240 is provided for, preferably equipped with interlocking teeth 230, which laterally operates against the tubular portion 216 and on the upper side against the external lower wall of the sanitary facility 50.

[0033] Such lower closure ring 240 can be advantageously screwed onto a lower portion of the tubular portion 216 projecting below the sanitary facility 50. In such case, complementary threaded surfaces 246, 247 are provided for both on the external tubular portion 216 and on the internal surface of the lower closure ring 240.

[0034] In addition, the portions 215 and 216 of the mushroom-shaped element 212 can be integrally made, as previously described, or they can be two separate elements such as a conical body 216 equipped with a lower threaded end 246, and an upper covering cap 215.

[0035] The second element 213 of the water discharge group 210 can be coupled with the first element 212 below the sanitary facility 50.

[0036] In particular, such second element 213 is a box-shaped element internally defining two compartments selectively communicating through the discharge mouth 12.

[0037] The second element 213 comprises a first upper opening 217 and at least a second opening 218 towards the water discharge pipe 13, the latter positioned downstream of the discharge mouth 12 cooperating with the plug 11.

[0038] When assembling the discharge group 210, the first upper opening 217 is stably coupled with the lower closure ring 240 constrained to the tubular portion 216 of the first element 212 projecting below the wall of the sanitary facility 50.

[0039] The bond between the two elements, first 212 and second 213, of the discharge group 210 is such that the lower part of the first element 212 is directed towards the inside of the second element 213 itself.

[0040] Preferably, the first upper opening 217 and the related contact portion of the lower closure ring 240 can

be snap-coupled due to the presence of an annular projection 241 equipped with a tooth-shaped end 220 capable of interlocking with the annular seat 245 made on the external surface of the opening 217.

[0041] Once the tooth-shaped end 220 is coupled, a water passage is formed starting from the first element 212 through to the second element 213 and, more generally, from inside the sanitary facility 50 to the discharge pipe 13.

[0042] Figure 1 shows a bath tub 50 provided with the discharge closure set 10 for sanitary facilities according to the present invention as well as a quick-mounting water discharge 210.

[0043] In an entirely analogous manner, such discharge closure set 10 and/or quick-mounting water discharge group 210 can also be employed for sinks, washtubs, showers, bidets or other similar sanitary facilities. As shown in figure 5, such sanitary facilities 50 are also preferably provided with a filling limiting device 110 which comprises a first pipe 111 connectable at a first end 112 thereof to the base of a filling tank 51 of a sanitary facility 50 for example through the discharge group 210, and connected at a second end 113 thereof to a second pipe 114 for water drainage.

[0044] The first pipe 111 is shaped in a manner such that its second end 113 is positioned at a higher elevation with respect to its first end 112.

[0045] The second pipe 114 comprises a first end 115 connected to the second end 113 of the first pipe 111 and a second end 116 positioned at a lower elevation than the first end 112 of the first pipe 111. Preferably, the second pipe 114 is connected at its second end 116 to the discharge pipe 13 of the sanitary facility 50, for example through the discharge group 210.

[0046] In such case, the discharge group 210 is additionally provided with a third 233 and a fourth 234 opening respectively connected to the first 111 and to the second 114 pipe of the filling limiting device 110.

[0047] At the connection between the second end 113 of the first pipe 111 and the first end 115 of the second pipe 114, a vent pipe 117 towards the environment is provided for. At the open end 118 of such vent pipe 117, a vent control valve 119 is arranged and provided with a membrane 120 which allows exit and/or entry of air into the filling limiting device 110.

[0048] According to a preferred aspect, the membrane has at least one coupling seat with the end 118 of the vent pipe 117 open and is made of elastically deformable material in order to selectively make a sealed coupling with such end.

[0049] In addition, the membrane is provided with a centrally-arranged cross-shaped cut and it is advantageously of negligible weight.

[0050] Advantageously, the vent control valve 119 faces a wall of the sanitary facility 50 at the external actuation means 16. In such a manner, such valve 119 is concealed from sight and protected against clogging due to accumulation of dirt or any other sediment material.

[0051] Below is a description of how the discharge closure set for sanitary facilities operates according to the present invention.

[0052] When the external actuation means 16 are guided to closure position, the moveable element 18 is brought by the motion transmission means 17 to a distal position with respect to the plug 11 so that there is substantially no coupling between the permanent magnet 19 provided for on the plug and the moveable element 18 itself.

[0053] In such configuration, illustrated in figures 2a, 2b, and 4b substantially no force is exerted on the plug 11 which consequently falls due to gravity, guided by the guide and stop means 20, until the plug is positioned on the discharge mouth 12.

[0054] When in closure position, the plug 11 is at least partially inserted in the discharge mouth 12 and completely closes it in a substantially watertight manner.

[0055] The discharge mouth section 12 is preferably frustoconically shaped, with the larger base turned upwards, like the section of the plug portion complementary to the same. In such a manner, on one hand, greater interference and thus sealing between the plug 11 and such mouth 12 is ensured, while on the other hand, the mouth 12 acts as a stop for the closing movement of the plug 11.

[0056] In such configuration, and in the presence of the filling limiting device 110, the filling tank 51 collects water up to a first maximum filling level delimited by the elevation at which the first and the second pipe 111, 114 of the filling limiting device are joined. The water reaches such level also in the first pipe 111 of the filling limiting device 110. Once such level has been reached, the excess water tends to flow, pushed by the weight of the water present in the filling tank 51, from the first pipe 111 of the filling limiting device 110 to the second pipe 114 of the same, thus flowing towards the discharge pipe 13, connected downstream of the second pipe 114 through the discharge group 210.

[0057] In such circumstances, if water continues to flow into the filling tank 51 at a greater flow rate than the flow rate with which the water flows from the second pipe 114, the water level in the filling tank 51 and in the first and second pipes 111, 114 tends to rise. This leads to higher pressure inside the first and the second pipe 111, 114 which slightly lifts the membrane 120, in such a manner permitting the excess air to exit through the vent control valve 119.

[0058] When the filling tank 51 reaches a second filling level, in which the pipes 111, 114 are completely emptied of air the communicating vessels effect is triggered and the filling tank 51 tends to empty up at the maximum flow rate.

[0059] If, in such condition, the additional inflow of water ceases, the filling tank 51 continues emptying until a third predetermined filling level is reached, in which a depression is created in the pipes 111, 114 such to induce the membrane 120 to open its cross-shaped cut. This

leads to a small inflow of air which compensates for the depression created in the pipes 111, 114 and disables the communicating vessels effect.

[0060] However, when the external actuation means 16 are guided to open, the moveable element 18 is moved by the motion transmission means 17 to a position overlapping with the plug 11, as shown in figures 3a, 3b and 4a.

[0061] In such position, the permanent magnet 19 of the plug 11 and the permanent magnet of the moveable element 18 magnetically repel each other, since they have been deliberately chosen of the same polarity.

[0062] Thus, there is a magnetic force acting on the plug 11, which pushes it upwards.

[0063] Subsequently, the plug 11 rises, guided by the guide and stop means 20, until it interferes with the same, thus leaving the discharge mouth 12 at least partially open. Hence the water can flow directly into the discharge pipe 13.

[0064] The descriptions above clearly show the characteristics and related advantages of the device subject of the present invention.

[0065] The discharge closure set for sanitary facilities according to the present invention has a simple structure which can be compared with the currently known closure sets using mechanical opening/closing means, thus also maintaining the costs of production low.

[0066] However, these discharge closure set offer considerable reliability over time being that they are substantially not subject to mechanical wear due to the weight of the plug, not even if such plug is pressed inadvertently when it is in its raised opening position.

[0067] Last but not least, the discharge closure set for sanitary facilities according to the present invention does not require electrical power supply which could, in case of failure, expose the user to danger.

[0068] Finally, it is obvious that the device thus conceived is susceptible to various modifications and variants, all within the scope of the invention; moreover, all details can be replaced by other technically equivalent elements. In practice, any type and size of material can be used depending on the technical requirements.

Claims

1. Discharge closure set (10) for sanitary facilities (50) comprising a plug (11) free to move between a first opening position and a second closing position, and opening/closing means (15) adapted to cooperate with said plug (11) in order to move it to one of said two opening or closing positions, said opening/closing means (15) comprising at least an element (18) moving between a first coupling position with said plug (11) and a second disconnection position **characterised in that** in said first coupling position, said moveable element (18) and said plug (11) are coupled magnetically.

2. Discharge closure set (10) for sanitary facilities (50) according to claim 1 **characterised in that** said plug (11) comprises at least a first permanent magnet (19) and said moveable element (18) comprises at least a second permanent magnet, said first and second permanent magnets having the same polarity.

3. Discharge closure set (10) for sanitary facilities (50) according to claim 1 or 2 **characterised in that** it comprises guide and stop means (20) for the definition and delimitation of the travel of said plug (11).

4. Discharge closure set (10) for sanitary facilities (50) according to one of the preceding claims **characterised in that** said guide and stop means (20) cooperate in abutment with a lower portion of said plug (11).

5. Discharge closure set (10) for sanitary facilities (50) according to one of the preceding claims **characterised in that** said opening/closing means (15) comprise actuation means (16), accessible from outside, connected to said moveable element (18) through motion transmission means (17).

6. Discharge closure set (10) for sanitary facilities (50) according to claim 5 **characterised in that** said motion transmission means (17) comprise a rod connected downstream to a lever (21) constrained to rotate around a pin (22), said lever (21) transmitting a translational motion to said moveable element (18).

7. Sanitary facility (50) comprising a filling tank (51) provided on its lower part with a discharge mouth (12) which can be selectively blocked, **characterised in that** it comprises a discharge closure set according to any one of the preceding claims.

8. Sanitary facility (50) according to claim 7 **characterised in that** it comprises a filling limiting device (110) comprising a first pipe (111) connectable at a first end (112) thereof to the base of a filling tank (51) of said sanitary facility (50) and connected at a second end (113) thereof to a second pipe (114) for water drainage, the first pipe (111) being shaped in a manner such that its second end (113) is positioned at a greater elevation with respect to its first end (112), said second pipe (114) comprising a first end (115) connected to said second end (113) of said first pipe (111) and a second end (116) positioned at a lower elevation than said first end (112) of said first pipe (111), at the connection between said second end (113) of said first pipe (111) and said first end (115) of said second pipe (114), a vent pipe (117) being provided for towards the environment, provided with, at an open end (118) thereof, a vent control valve (119) for the exit and/or entry of air into said filling limiting device (110).

9. Sanitary facility (50) according to claim 8 **characterised in that** said vent control valve (119) comprises a membrane (120) provided with a cut.

10. Sanitary facility (50) according to claim 9 **characterised in that** said cut of said membrane (120) is cross-shaped and arranged centrally with respect to the same.

11. Sanitary facility (50) according to claim 9 or 10 **characterised in that** said membrane (120) is made of elastically deformable material and comprises a coupling seat with said open end (118) of said vent pipe.

12. Sanitary facility (50) according to one of the claims 9 - 11 **characterised in that** said membrane (120) is of negligible weight.

13. Sanitary facility (50) according to one of the claims 8 - 12 **characterised in that** said vent control valve (119) is positioned at actuation said means (16) accessible from outside.

14. Sanitary facility (50) according to one of claims 7 - 13 **characterised in that** it comprises a quick-mounting water discharge group (210) comprising a lower closure ring (240) and a first and second element (212, 213), in which said first element (212) is mushroom-shaped and can be coupled with a hole (54) of said sanitary facility (50) and comprises a head portion (215), which can be coupled to the internal wall of said sanitary facility (50) and shaped to substantially cover said hole (54), and a hollow tubular portion (216) which can be coupled with said hole (54) and which extends from said head portion (215), said second element (213) being a box-shaped element and comprising a first upper opening (217) and at least a second water discharge opening (218), said lower closure ring (240) being constrainable along an internal portion (242) in a lower portion of said hollow tubular portion (216) and in an external portion (241) snap-coupled with said first upper opening (217), so to create a water passage from said first element (212) to said second element (213) when said group (210) is mounted in said hole (54) of said sanitary facility (50).

15. Sanitary facility (50) according to claim 14 **characterised in that** said snap-coupling is achieved by a tooth-shaped end (220) of said external portion (241) of said ring and a related annular seat (245) made in an upper portion of said first opening (217).

16. Sanitary facility (50) according to claim 14 or 15 **characterised in that** said water discharge group (210) comprises a third and fourth opening (233, 234), said third opening (233) being connected to said first end (112) of said first pipe (111) and said fourth opening (234) being connected to said second end (116) of said second pipe (114).

17. Sanitary facility (50) according to one of the claims 14 - 16 **characterised in that** said plug (11) is arranged in said second element (213), said second element (213) defining internally two compartments selectively communicating through said discharge mouth (12).

18. Sanitary facility (50) according to claim 17 **characterised in that** said second opening (218) is positioned downstream of said discharge mouth (12), said third opening (233) is positioned upstream the discharge mouth (12) and said fourth opening (234) is positioned downstream of the discharge mouth (12).

Fig. 1

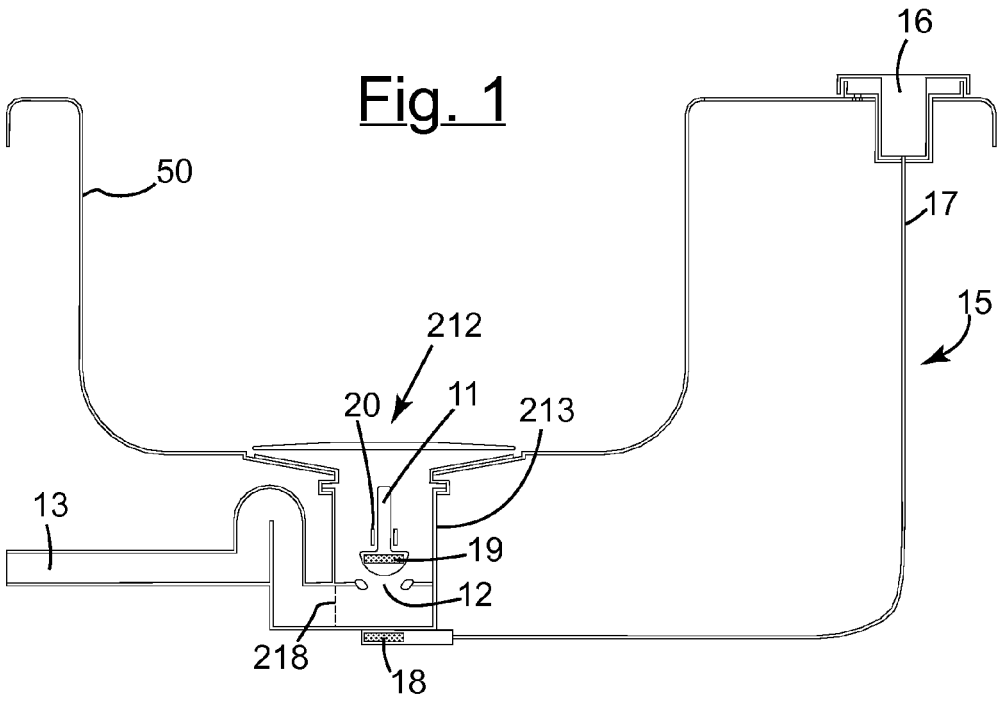


Fig. 2a

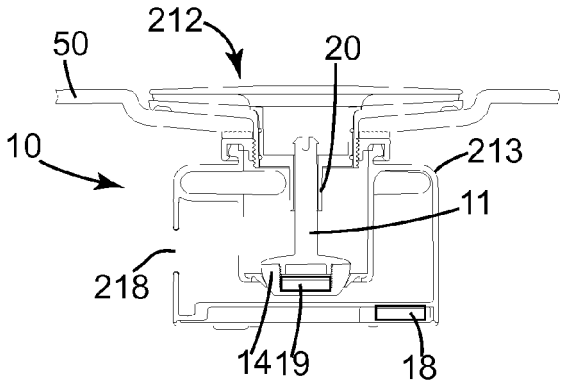


Fig. 2b

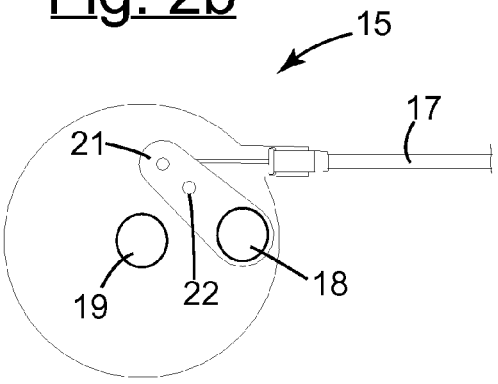


Fig. 3a

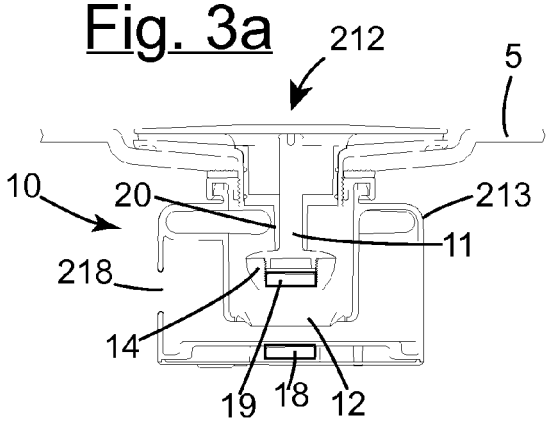


Fig. 3b

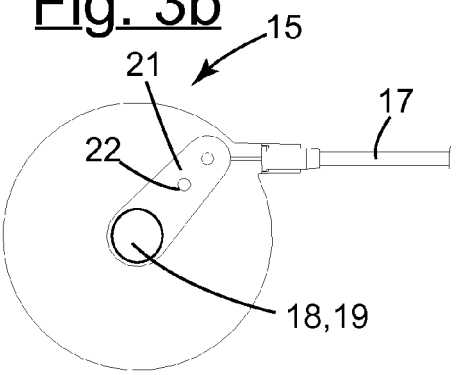


Fig. 4a

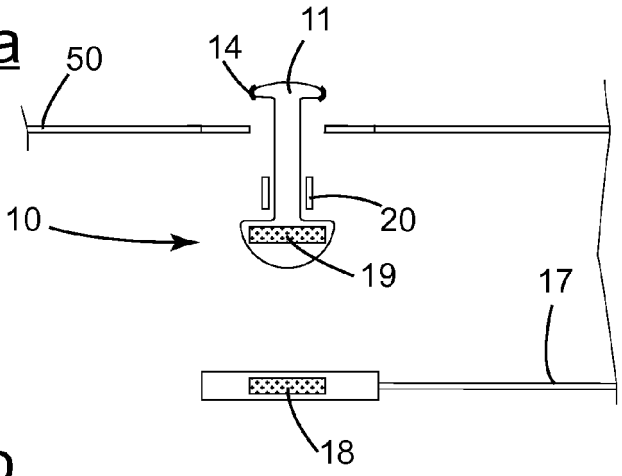


Fig. 4b

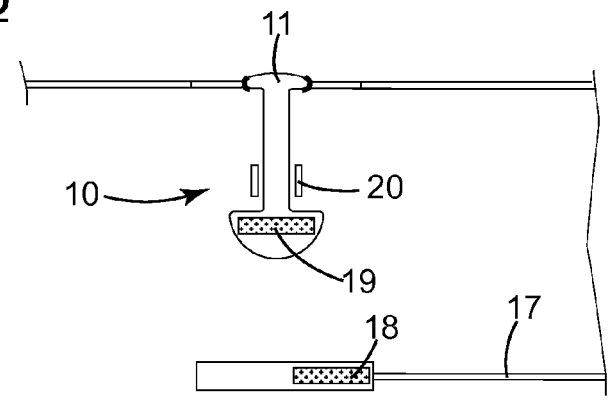
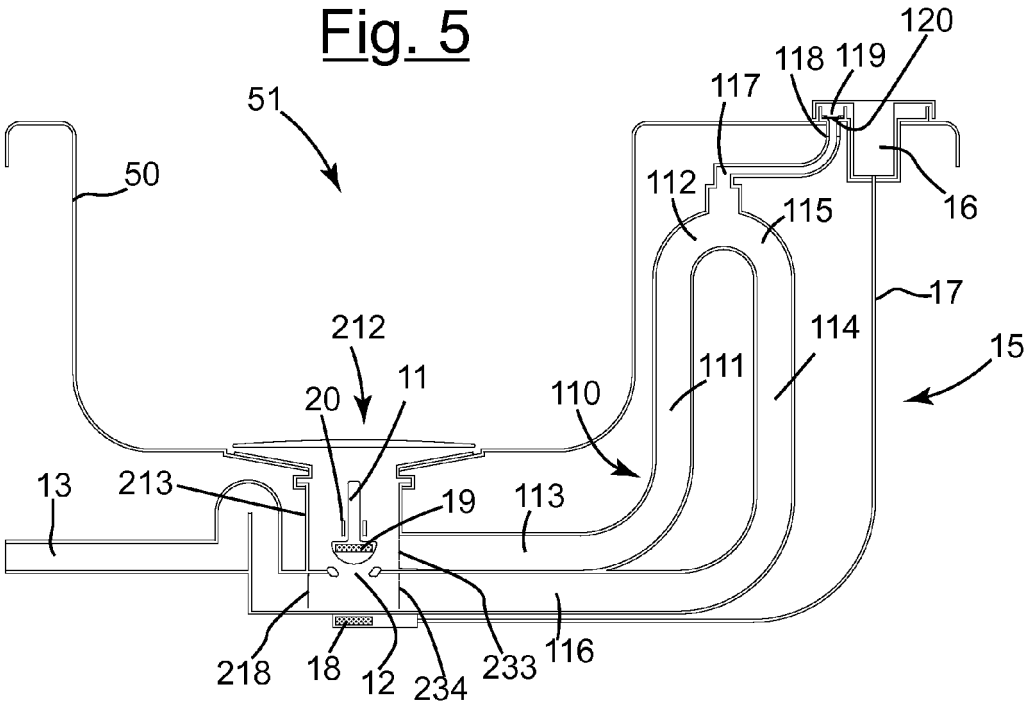


Fig. 5



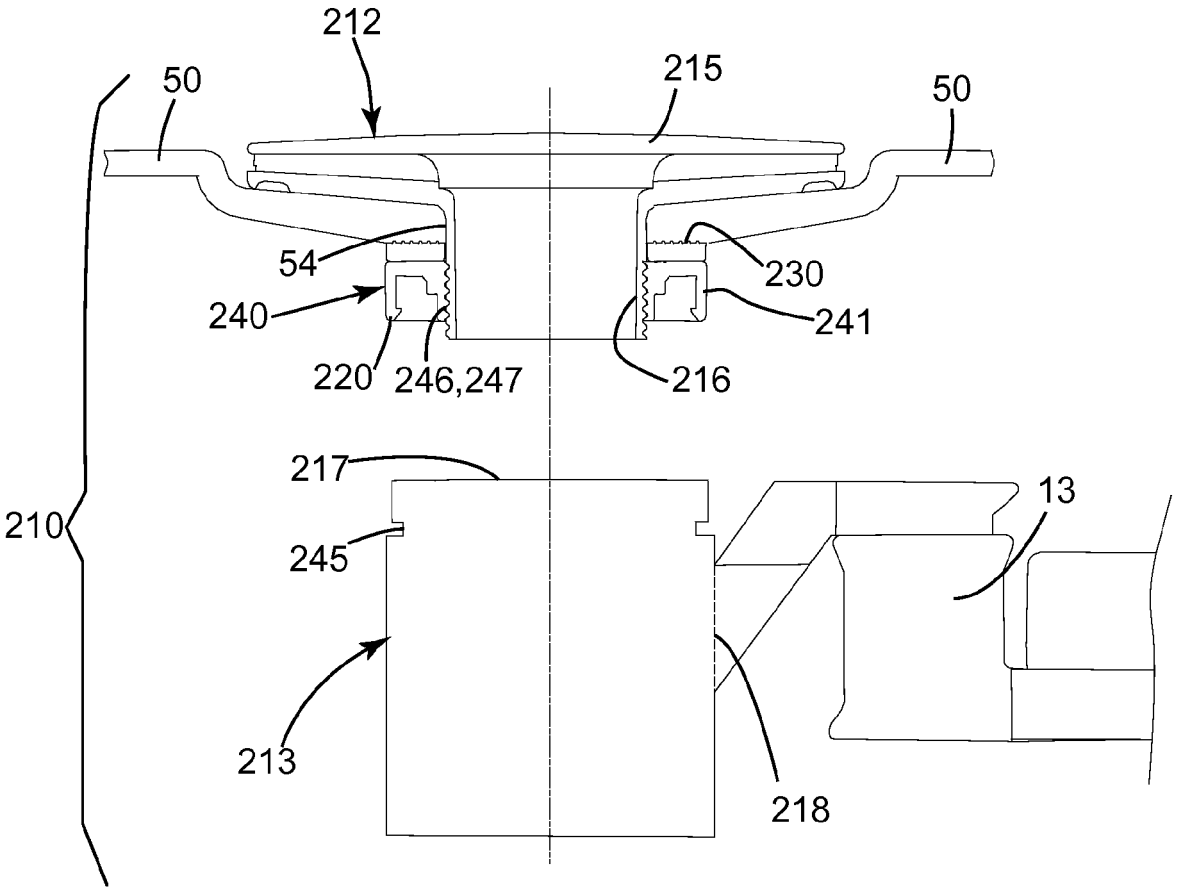

212
50
215
50
54
230
240
241
220
246,247
216
217
13
210
245
213
218

Fig. 6

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 3474

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	JP 07 317118 A (INAX CORP) 5 December 1995 (1995-12-05) * abstract * * paragraph [0005] - paragraph [0009] * * paragraph [0018] - paragraph [0022] * * paragraph [0033] - paragraph [0034] * * paragraph [0040] * -----	1-5,7	INV. E03C1/23 ADD. E03C1/232
X	US 6 282 730 B1 (DUNCAN SCOTT [US]) 4 September 2001 (2001-09-04) * figures 2,3 * * column 3, line 1 - line 29 * -----	1,7	

TECHNICAL FIELDS SEARCHED (IPC)

E03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 January 2009	Flygare, Esa

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons
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1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 12 3474

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-01-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82