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(72) Inventor: **Varotti, Mario**
25078 Vestone (IT)

(74) Representative: **Boggio, Luigi et al**
STUDIO TORTA S.r.l.,
Via Viotti, 9
10121 Torino (IT)

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(71) Applicant: **VALSIR S.p.A.**
25078 Vestone (BS) (IT)

(54) **Modular system for forming lavatory flush tanks with different operating modes, and lavatory flush tank forming part of such a modular system**

(57) A modular system (1) for forming lavatory flush tanks (2) with different operating modes, and including at least one water tank (3) having an opening (13) formed through one wall (4); at least one flush device

(14) housable inside the water tank; and a number of control assemblies (15) of different interchangeable types, each of the control assemblies (15) being partly insertable through the opening (13), and having releasable fastening means (21) for connection to the wall (4).

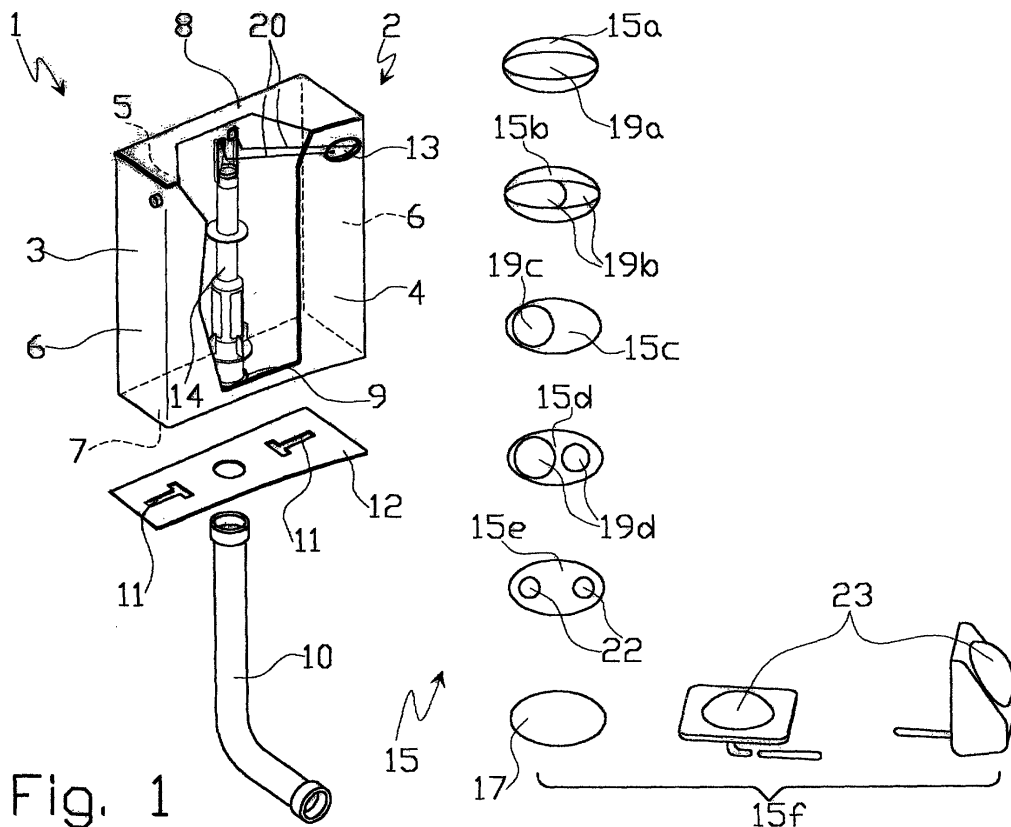


Fig. 1

Description

[0001] The present invention relates to a modular system for forming lavatory flush tanks with different operating modes, and to a lavatory flush tank forming part of such a modular system.

[0002] As is known, lavatory flush tanks are equipped with different types of flush devices controlled by numerous different types of control assemblies. For example, the most commonly used alone include single-flush devices (for simply draining all the water from the tank) which also provide for interrupting flushing if necessary; dual-flush devices (for draining all or only part of the water from the tank); manual, e.g. mechanical or pneumatic, control assemblies; and automatic, e.g. electronic, control assemblies.

[0003] At present, flush tanks are designed exclusively for a specific type of flush device and relative control assembly, thus limiting the tank to one particular operating mode, i.e. that for which the control assembly on the tank is designed, and preventing the tank from being converted to other operating modes. In other words, to change the operating mode of the tank, the whole tank must be replaced.

[0004] Moreover, each tank being designed for one specific operating mode, and therefore comprising a large number of specific component parts, calls for handling (manufacture, storage and spare-part distribution) a wide range of different component parts.

[0005] It is an object of the present invention to eliminate the aforementioned drawbacks of the known state of the art by providing a modular system for forming lavatory flush tanks with different operating modes.

[0006] According to the present invention, there is provided a modular system for forming lavatory flush tanks with different operating modes, and comprising at least one water tank having an opening formed through one wall; and at least one flush device housable inside the water tank; the system being characterized by also comprising a number of control assemblies of different interchangeable types, each of said control assemblies being partly insertable through said opening, and having releasable fastening means for connection to said wall.

[0007] The present invention also extends to a lavatory flush tank forming part of the above modular system; that is, to a lavatory flush tank comprising a water tank, through one wall of which is formed an opening; a flush device housed in the water tank; and a control assembly for controlling said flush device; the flush tank being characterized in that said control assembly is at least partly inserted through said opening, and comprises releasable fastening means for connection to said water tank, so as to be interchangeable with another control assembly of a different type.

[0008] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows, schematically, a modular system for forming lavatory flush tanks in accordance with the invention;

Figure 2 shows a larger-scale, schematic view in perspective of a component part of the Figure 1 system.

[0009] Number 1 in Figure 1 indicates as a whole a modular system for forming lavatory flush tanks 2 with different operating modes. Modular system 1 comprises a water tank 3 of any shape - in the example shown, substantially prismatic - having a substantially rectangular front wall 4, a substantially rectangular rear wall 5, two substantially rectangular lateral walls 6 of a much smaller surface area than front and rear walls 4 and 5, a bottom wall 7, and a top wall 8 defining a lid of tank 3.

[0010] Bottom wall 7 has a central through hole 9, to which is connected a known elbow pipe 10; and tank 3 has known connecting means for connection to a supporting wall (to wall-mount tank 2) or directly to a lavatory fixture (for on-fixture installation of tank 2). In the latter case, tank 3 may be provided with two guides 11 carried by bottom wall 7 (guides 11 may be formed directly on bottom wall 7 or on a plate 12 fitted to bottom wall 7).

[0011] A through opening 13 of any shape - in the example shown, substantially oval - is formed in front wall 4, close to the top edge joining front wall 4 to top wall 8.

[0012] Modular system 1 also comprises at least one flush device 14 (known and therefore not described or illustrated in detail for the sake of simplicity) housable inside tank 3; and a number of control assemblies 15 for operating flush device 14, and which are of different interchangeable types to form a number of flush tanks 2 with different operating modes.

[0013] For which purpose, as shown in Figure 2, each control assembly 15 comprises a body 16 defined by a cover portion 17 placed, in use, on the outside of front wall 4 of tank 3 to cover opening 13, and by a connecting portion 18 shaped to fit through opening 13. Each control assembly 15 also comprises one or more buttons or switches 19 (shown schematically in Figure 2) for operating flush device 14, and which are connectable in known manner to respective actuating members 20 of flush device 14 (e.g. levers or other movable members of any known type, as shown schematically in Figure 1). Each control assembly 15 also comprises releasable fastening means 21 carried by respective body 16 to fix body 16 releasably to front wall 4. More specifically, fastening means 21 are fast-fit, preferably click-on fastening means of any known type, and, in the purely non-limiting example shown in Figure 2, comprise two flexible, diametrically opposite teeth, which click on to the edge of opening 13 or inside respective seats formed in front wall 4, on either side of opening 13.

[0014] Interchangeable control assemblies 15 comprise control assemblies of different types, which, as shown by way of example in Figure 1, may comprise two

or more of the following:

- a manual control assembly 15a with one mechanical button for draining all the water from tank 3 and interrupting flushing if necessary; control assembly 15a comprises one toggle button 19a fitted to cover portion 17 and connected mechanically (in known manner not shown) to a corresponding actuating member 20 of flush device 14;
- a manual control assembly 15b with two mechanical buttons; control assembly 15b comprises two toggle buttons 19b for respectively draining all and part of the water from tank 3, and both of which are fitted to cover portion 17 and connected mechanically (in known manner) to respective actuating members 20 of flush device 14;
- a manual control assembly 15c with one pneumatic button for draining all the water from tank 3; control assembly 15c comprises one push-button 19c fitted to cover portion 17, and which controls a known pneumatic circuit (not shown for the sake of simplicity) connected to an actuating member 20 of flush device 14;
- a manual control assembly 15d with two pneumatic buttons; control assembly 15d comprises two push-buttons 19d for respectively draining all and part of the water from tank 3, and which are fitted to cover portion 17 and control respective known pneumatic circuits (not shown) connected to respective actuating members 20 of flush device 14;
- an electronic control assembly 15e comprising a known electronic board (not shown) housed in body 16, and one or more position sensors 22 (e.g. photoelectric-cell sensors) carried by cover portion 17 to detect the presence of a user in front of flush tank 2;
- a remote control assembly 15f comprising at least one remote-control button 23 (shown in Figure 2 in the two known floor and wall embodiments) separate from tank 3; in this case, body 16 of the control assembly serves to close opening 13, and cover portion 17 has no buttons.

[0015] The advantages of the invention will be clear from the foregoing description. Using only a small number of component parts, modular system 1 provides cheaply and easily for forming flush tanks 2 with different operating modes. That is, to form a flush tank 2 with a given operating mode, tank 3 - housing the flush device 14 designed for the required operating mode - is simply fitted with the appropriate control assembly selected from the range of interchangeable control assemblies 15 forming part of modular system 1, and which is simply inserted through opening 13 and connected to tank 3 by fastening means 21.

[0016] Once flush tank 2 is installed, its operating mode can be changed, without changing or making any major alterations to the flush tank itself, by simply chang-

ing control assembly 15 (and possibly also flush device 14), which, given the interchangeable nature of control assemblies 15, can be done quickly and easily, so that the same flush tank 2 can easily be converted to different operating modes.

[0017] The modular system according to the invention also provides for reducing the number of different component parts required to produce a range of flush tanks with different operating modes, thus greatly reducing production, storage and spare part costs.

[0018] Clearly, changes may be made to the flush tank as described herein without, however, departing from the scope of the accompanying Claims.

[0019] In particular, opening 13 may be formed in a wall other than the front wall, and be of a different shape from that described. Also, bodies 16 of control assemblies 15 may have no cover portions 17, and may therefore be defined solely by respective connecting portions 18, in which buttons 19 (if not remote-operated) will be housed.

[0020] The modular system according to the present invention may also comprise a number of tanks 3 of different shapes and/or sizes, and with the same openings 13 for insertion of any one of control assemblies 15, thus further extending the range obtainable using the modular system according to the invention.

Claims

1. A modular system (1) for forming lavatory flush tanks (2) with different operating modes, and comprising at least one water tank (3) having an opening (13) formed through one wall (4); and at least one flush device (14) housable inside the water tank; the system being **characterized by** also comprising a number of control assemblies (15) of different interchangeable types, each of said control assemblies (15) being partly insertable through said opening (13), and having releasable fastening means (21) for connection to said wall (4).
2. A modular system as claimed in Claim 1, **characterized in that** said control assemblies (15) comprise respective bodies (16) insertable through said opening (13) and having respective cover portions (17) for closing said opening (13) while remaining accessible to a user from outside said water tank (3).
3. A modular system as claimed in Claim 2, **characterized in that** said control assemblies (15) comprise respective button means (19; 23) connectable to and for operating said flush device (14).
4. A modular system as claimed in Claim 3, **characterized in that** said number of interchangeable control assemblies (15) comprises manual mechanical-

ly operated control assemblies (15a, 15b) and/or manual pneumatically operated control assemblies (15c, 15d) and/or electronic control assemblies (15e) and/or remote control assemblies (15f).

5. A modular system as claimed in Claim 4, **characterized in that** said number of interchangeable control assemblies (15) comprises two or more assemblies selected from the following:

- a manual control assembly (15a; 15c) with one button (19a; 19c) for draining all the water from the water tank and interrupting flushing if necessary; said button (19a; 19c) being carried by said cover portion (17) of the control assembly;
- a manual control assembly (15b; 15d) with two buttons (19b; 19d) for respectively draining all and part of the water from the water tank; said buttons (19b; 19d) being carried by said cover portion (17) of the control assembly;
- an electronic control assembly (15e) comprising an electronic board housed in said body (16) of the control assembly, and, possibly, at least one position sensor (22) carried by said cover portion (17) to detect the presence of a user;
- a remote control assembly (15f) comprising at least one remote-control button (23) separate from said water tank (3); said body (16) of the control assembly serving to close said opening (13), and said cover portion (17) having no buttons.

6. A modular system as claimed in Claim 5, **characterized in that** said manual control assemblies are mechanically operated (15a; 15b), wherein said buttons (19a; 19b) are connected mechanically to respective actuating members (20) of the flush device (14), or are pneumatically operated (15c, 15d), wherein said buttons (19c; 19d) control respective pneumatic circuits connected to respective actuating members (20) of the flush device (14).

7. A modular system as claimed in any one of the foregoing Claims, **characterized in that** said opening (13) is formed in a front wall (4) of said water tank (3).

8. A modular system as claimed in any one of the foregoing Claims, **characterized in that** said releasable fastening means (21) are fast-fit, preferably click-on fastening means.

9. A lavatory flush tank (2) comprising a water tank (3), through one wall (4) of which is formed an opening (13); a flush device (14) housed in the water tank; and a control assembly (15) for controlling said flush device; the flush tank being **characterized in that**

said control assembly (15) is at least partly inserted through said opening (13), and comprises releasable fastening means (21) for connection to said water tank (3), so as to be interchangeable with another control assembly of a different type.

10. A flush tank as claimed in Claim 9, **characterized in that** said control assembly (15) comprises a body (16) insertable through said opening (13) and having a cover portion (17) for closing said opening (13) and accessible to a user from outside said water tank.

11. A flush tank as claimed in Claim 10, **characterized in that** said control assembly (15) comprises button means (19) connectable to and for operating said flush device (14).

12. A flush tank as claimed in Claim 11, **characterized in that** said control assembly (15) is selected from a group comprising:

- a manual control assembly (15a) with one mechanical button (19a) for draining all the water from water tank and interrupting flushing if necessary; said button (19a) being carried by said cover portion (17) of the control assembly, and being connected mechanically to an actuating member (20) of the flush device (14);
- a manual control assembly (15b) with two mechanical buttons (19b) for respectively draining all and part of the water from the water tank (3); said buttons (19b) being carried by said cover portion (17) of the control assembly, and being connected mechanically to respective actuating members (20) of the flush device (14);
- a manual control assembly (15c) with one pneumatic button (19c) for draining all the water from water tank (3); said button (19c) being carried by said cover portion (17) of the control assembly, and controlling a pneumatic circuit connected to an actuating member (20) of the flush device (14);
- a manual control assembly (15d) with two pneumatic buttons (19d) for respectively draining all and part of the water from the water tank (3); said buttons (19d) being carried by said cover portion (17) of the control assembly, and controlling respective pneumatic circuits connected to respective actuating members (20) of the flush device (14);
- an electronic control assembly (15e) comprising an electronic board housed in the body (16) of the control assembly, and, possibly, at least one position sensor (22) carried by said cover portion (17) to detect the presence of a user;
- a remote control assembly (15f) comprising at least one remote-control button (23) separate

from said water tank (3); the body (16) of the control assembly serving to close said opening (13), and said cover portion (17) having no buttons.

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13. A flush tank as claimed in one of Claims 9 to 12, **characterized in that** said opening (13) is formed in a front wall (4) of said water tank (3).

14. A flush tank as claimed in one of Claims 9 to 13, **characterized in that** said releasable fastening means (21) are fast-fit, preferably click-on fastening means.

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