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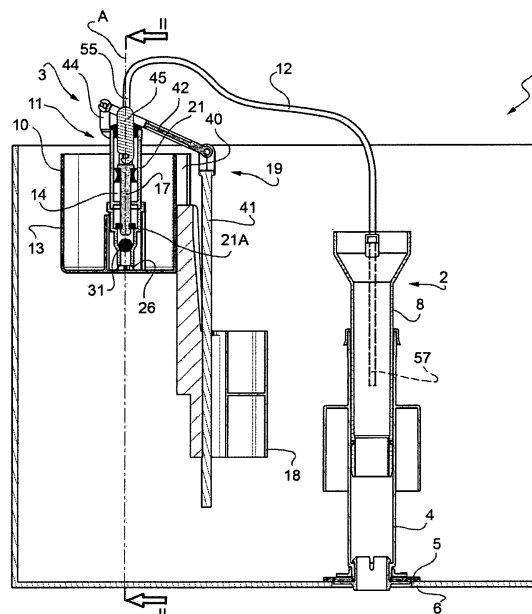
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(54) **Dosing device of a service liquid for a flushing tank, and flushing tank provided with said device**

(57) A dosing device (3) for dosing a service liquid in a water stream discharged from a flushing tank, comprises a reservoir (10) containing a service liquid, a pumping system (11) and a supply tube (12); the pumping system (11) has a tubular dosing chamber (14), a piston (17) slidable in the chamber (14) and operated by a float (18) via a lever system (19), and a lateral delivery conduit (20) communicating with the chamber (14); the piston (17) is movable, operated by the float (18), with an upward movement, in which the piston (17) draws service liquid from the reservoir (10) in the chamber (14), and a downward movement, in which the piston (17) discharges service liquid from the chamber (14) in the supply tube (12).

FIG. 1



Description

[0001] The present invention relates to a dosing device for dosing a service liquid in the water stream discharged from a flushing tank for bathroom appliances, and to a flushing tank provided with such device.

[0002] In general, a flushing tank for bathroom appliances (toilets, urinals, etc.) is provided with a flush valve, which is operated in order to discharge the water contained in the tank in the bathroom appliance to be flushed, and a supply mechanism, which provides for filling the tank, up to a pre-established level, after every activation of the flush valve.

[0003] Some flushing tanks are provided with detergent and/or disinfection systems, by means of which a detergent liquid is added to the water of the tank which is flushed in the bathroom appliance.

[0004] The known systems have margins of improvement, especially in terms of efficiency, reliability and simplicity of production and use.

[0005] An object of the present invention is to provide a dosing device for a flushing tank which is simple, effective and reliable.

[0006] Therefore, the present invention relates to a dosing device for dosing a service liquid in a water stream discharged from a flushing tank, and a flushing tank provided with such a device, as defined in essential terms in the appended claims 1 and 8, respectively, as well as for the preferred additional features in the dependent claims.

[0007] The device according to the invention allows, in a particularly simple, effective and reliable manner, to ensure a suitable water disposal capacity.

[0008] The invention is described in detail in the following non-limiting exemplary embodiment, with reference to the accompanying diagrams wherein:

- figure 1 is a partial diagrammatic view in longitudinal section, with parts not in scale, of a flushing tank for bathroom appliances provided with a dosing device for a service liquid according to the invention;
- figure 2 is a section view according to the outline plane II-II in figure 1;
- figure 3 is a perspective view of a detail of the dosing device of the invention.

[0009] Figure 1 diagrammatically and partially shows, with parts not in scale, a flushing tank 1 for bathroom appliances.

[0010] The tank 1 comprises a flush valve 2 and a dosing device 3 for dosing a service liquid, for example (but not necessarily) a detergent and/or disinfection liquid or other type of water treatment liquid, in the water stream which is discharged from the flushing tank 1 by means of the flush valve 2.

[0011] The flush valve 2 is of a known type and is shown only diagrammatically and partially in figure 1; in general terms, the flush valve 2 comprises a vertically slidable

tubular body 4, which is provided below with a shutter 5 cooperating with a sealing seat 6 for closing a drain hole of the tank 1; the tubular body 4, which also constitutes an overflow tube 8, is raised by means of a known actuating mechanism (not shown).

[0012] With reference also to figures 2 and 3, the dosing device 3 comprises a reservoir 10 containing the service liquid, a pumping system 11 and a supply tube 12.

[0013] The reservoir 10 comprises a cup-shaped body 13 open at the top, housed inside the tank 1 and positioned and shaped so as the water contained in the tank 1 does not enter inside the reservoir 10.

[0014] The pumping system 11 comprises: a tubular dosing chamber 14, extending along a substantially vertical axis A between an upper axial end 15 and a lower axial end 16 and housed inside the reservoir 10 and integral with the reservoir 10; a piston 17 slidable in the chamber 14 along the axis A and operated by a float 18 by means of a lever system 19, and a lateral delivery conduit 20 communicating with the chamber 14.

[0015] The chamber 14 is delimited by a lateral wall 21 and is joined below to a support piece 21A which projects from a bottom wall of cup-shaped body 13; the support piece 21A and the chamber 14 comprise a lower compartment 22 and an upper compartment 23, respectively, arranged along the axis A and separated by a transverse partition 24 provided with an opening 25 through which the piston 17 is arranged, with radial clearance.

[0016] The lower compartment 22 of the chamber 14 has at least one inlet opening 26 arranged at the lower axial end 16 and communicating with the reservoir 10 to allow service liquid to enter from the reservoir 10 inside the chamber 14.

[0017] The upper compartment 23 of the chamber 14 has a delivery opening 27, formed for example by means of the lateral wall 21 of the chamber 14 and set higher than the inlet opening 26; the delivery opening 27 connects the chamber 14 and precisely the upper compartment 23 with the delivery conduit 20.

[0018] The chamber 14 is provided with a non-return valve 31, arranged at the lower axial end 16 of the chamber 14 in the lower compartment 22 above the inlet opening 26 and which allows the passage of fluids from the bottom upwards, but not vice versa; for example, the valve 31 comprises a sphere 32 which is vertically movable in the chamber 14 and cooperates with a sealing seat 33 formed inside the chamber 14.

[0019] The piston 17 is provided with a radial sealing main gasket 34, which is arranged close to an upper head 35 of the piston 17, above the delivery opening 27, and is radially forced coupled and slidingly cooperates with an inner surface of the chamber 14 and precisely of the upper compartment 23; and with an auxiliary gasket 36, arranged at a lower end 37 of the piston 17 opposite the head 35 and axially cooperating, when the piston 17 is raised vertically, with a sealing seat 39 defined by a peripheral edge of the opening 25 to close the opening 25; when the piston 17 is lowered, on the other hand, it rests

on an axial shoulder 38 formed in the lower compartment 22, above the non-return valve 31, and delimiting an opening which is not closed by gasket 36.

[0020] The float 18 is arranged outside the reservoir 10 and is supported by the reservoir 10 by means of the lever system 19; the float 18 is slidable vertically along a guide 40 formed on a wall of the cup-shaped body 13 and projects downwards from the reservoir 10 so as to be movable, in use, by effect of level changes of the water contained in the tank 1.

[0021] The lever system 19 comprises a substantially vertical stem 41 connected to the float 18, an arm 42 having opposite longitudinal ends which are hinged, respectively, to an upper head 43 of the stem 41 and to a support 44 which projects from the upper axial end 15 of the chamber 14, and a traction bar 45 hinged above to the arm 42 and connected below to the head 35 of the piston 17.

[0022] The delivery conduit 20 comprises a portion 50 which projects laterally from the chamber 14 and a portion 51 which is substantially parallel to the chamber 14 and the axis A; the portion 50 communicates with the chamber 14 by means of the delivery opening 27; the portion 51 is provided with a non-return valve 52 which allows the passage of fluids from the bottom upwards, but not vice versa; for example, the valve 52 comprises a sphere or a pair of overlapping spheres 53 which are vertically movable in the portion 51 and cooperate with a sealing seat 54 formed inside the portion 51.

[0023] The supply tube 12, for example constituted by a flexible tube, has an end 55 which is connected, for example by means of a connection 56, to the delivery conduit 20, and an end 57 arranged inside the overflow tube 8 (i.e. the tubular body 4).

[0024] In use, during the filling of the tank 1, the float 18 of the pumping system 11 moves upwards to an upper position, and also moves piston 17 in the same direction (upwards) so favouring the filling of the dosing chamber 14 with the service liquid which is drawn from the reservoir 10 through the inlet opening 26; the movement of the piston 17 opens the sealing seat 38 and the service liquid specifically fills the lower compartment 22 and, through the opening 25, the upper compartment 23. During the upward movement of the piston 17, the piston 17 therefore draws service liquid from the reservoir 10 in the chamber 14.

[0025] When the float 18 is in the upper position, the piston 17 closes the auxiliary opening 25 with the gasket 36, ensuring the anti-siphoning.

[0026] When the flushing of water from the tank 1 is carried out by actuating the flush valve 2, the water level inside the tank 1 descends sharply, whereby the float 18 also descends rapidly as far as a lower position, moving the piston 17 downwards; the descending movement of the piston 17 causes an injection of liquid, through the delivery conduit 20 and the supply tube 12, into the overflow tube 8 and, therefore, into the water discharged from the tank 1.

[0027] The service liquid mixes with the water of the tank 1 only at the moment of the flush without contaminating the inside of the tank 1.

[0028] Finally, it is evident that numerous modifications and variations may be made to the dosing device described and illustrated herein, without departing from the scope of the appended claims.

10 Claims

1. A dosing device (3) for dosing a service liquid in a water stream discharged from a flushing tank, the device (3) comprising a reservoir (10) containing a service liquid, a pumping system (11) and a supply tube (12); the pumping system (11) comprising a substantially tubular dosing chamber (14), extending along a substantially vertical axis (A), a piston (17) slidable in the chamber (14) along the axis (A) and operated by a float (18) via a lever system (19), and a lateral delivery conduit (20) communicating with the chamber (14); the piston (17) being movable, operated by the float (18), with an upward movement, in which the piston (17) draws service liquid from the reservoir (10) in the chamber (14), and a downward movement, in which the piston (17) expels service liquid from the chamber (14) in the supply tube (12).
2. A device according to claim 1, wherein the chamber (14) has at least one inlet opening (26), set at a lower axial end (16) of the chamber (14) and communicating with the reservoir (10) for allowing service liquid to enter from the reservoir (10) inside the chamber (14); and at least one delivery opening (27), set higher than the inlet opening (26) and communicating with the delivery conduit (20).
3. A device according to claim 2, wherein the piston (17) is provided with a radial sealing main gasket (34), set above the delivery opening (27) and slidably cooperating with an inner surface of the chamber (14).
4. A device according to claim 2 or 3, wherein the chamber (14) has an upper compartment (23) delimited inferiorly by a transverse partition (24) provided with an opening (25) through which the piston (17) is arranged, with radial clearance; and the piston (17) is provided with an auxiliary gasket (36) axially cooperating, when the piston (17) is raised vertically, with a sealing seat (39) defined by a peripheral edge of the opening (25) for closing the opening (25).
5. A device according to one of the preceding claims, and comprising a first non-return valve (31) set at a lower axial end (16) of the chamber (14) and that allows the passage of fluid from the bottom upwards,

but not vice versa.

6. A device according to one of the preceding claims, wherein the float (18) is set outside the reservoir (10) and is supported by the reservoir (10) via the lever system (19); the float (18) being slidable vertically along a guide (40), formed on the reservoir (10), and projecting downwards from the reservoir (10) so as to be movable, in use, by effect of level changes of the water contained in the tank. 5 10
7. A device according to one of the preceding claims, wherein the delivery conduit (20) is provided with a second non-return valve (52) that allows the passage of fluid from the bottom upwards, but not vice versa. 15
8. A flushing tank (1) comprising a flush valve (2) and a dosing device (3) for dosing a service liquid in a water stream discharged from the flushing tank (1) by means of the flush valve (2); the flushing tank being **characterized by** comprising a dosing device (3) according to one of the preceding claims. 20
9. A tank according to claim 8, wherein the reservoir (10) comprises a cup-shaped body (13) open at the top, housed inside the tank (1) and positioned and shaped so as the water contained in the tank (1) does not enter inside the reservoir (10). 25
10. A tank according to claim 8 or 9, wherein the supply tube (12) has a first end (55) connected to the delivery conduit (20) and a second end (57) set inside an overflow tube (8) of the flush valve (2). 30

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FIG. 1

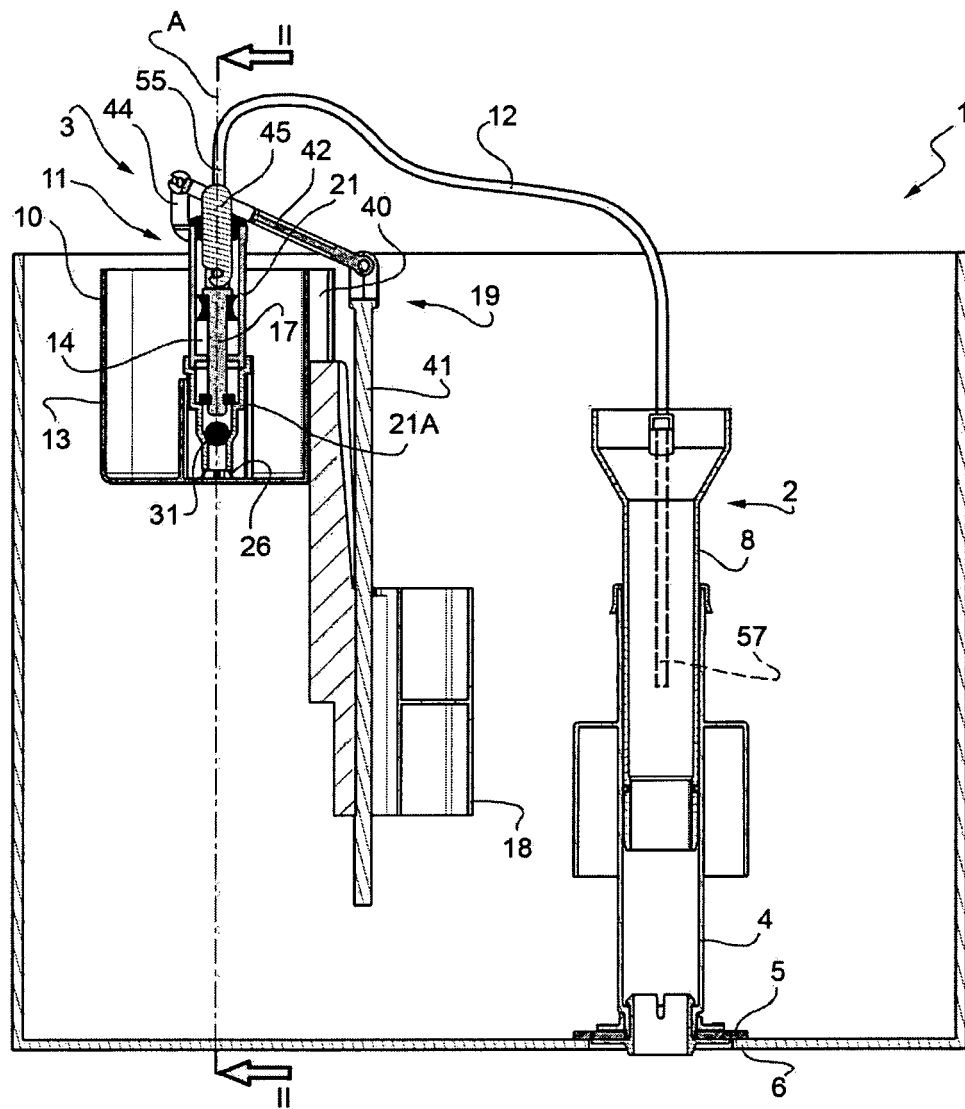


FIG. 2

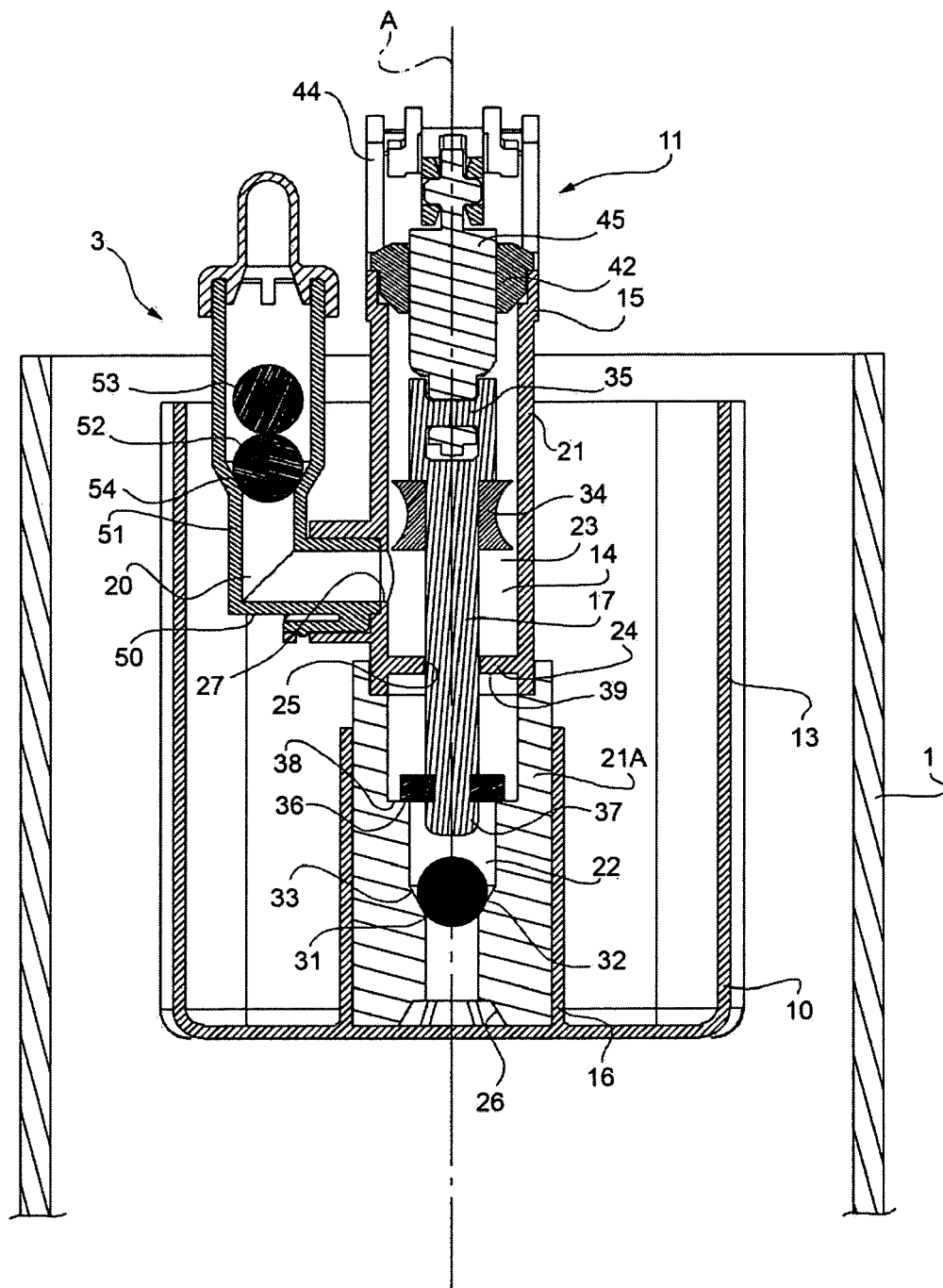
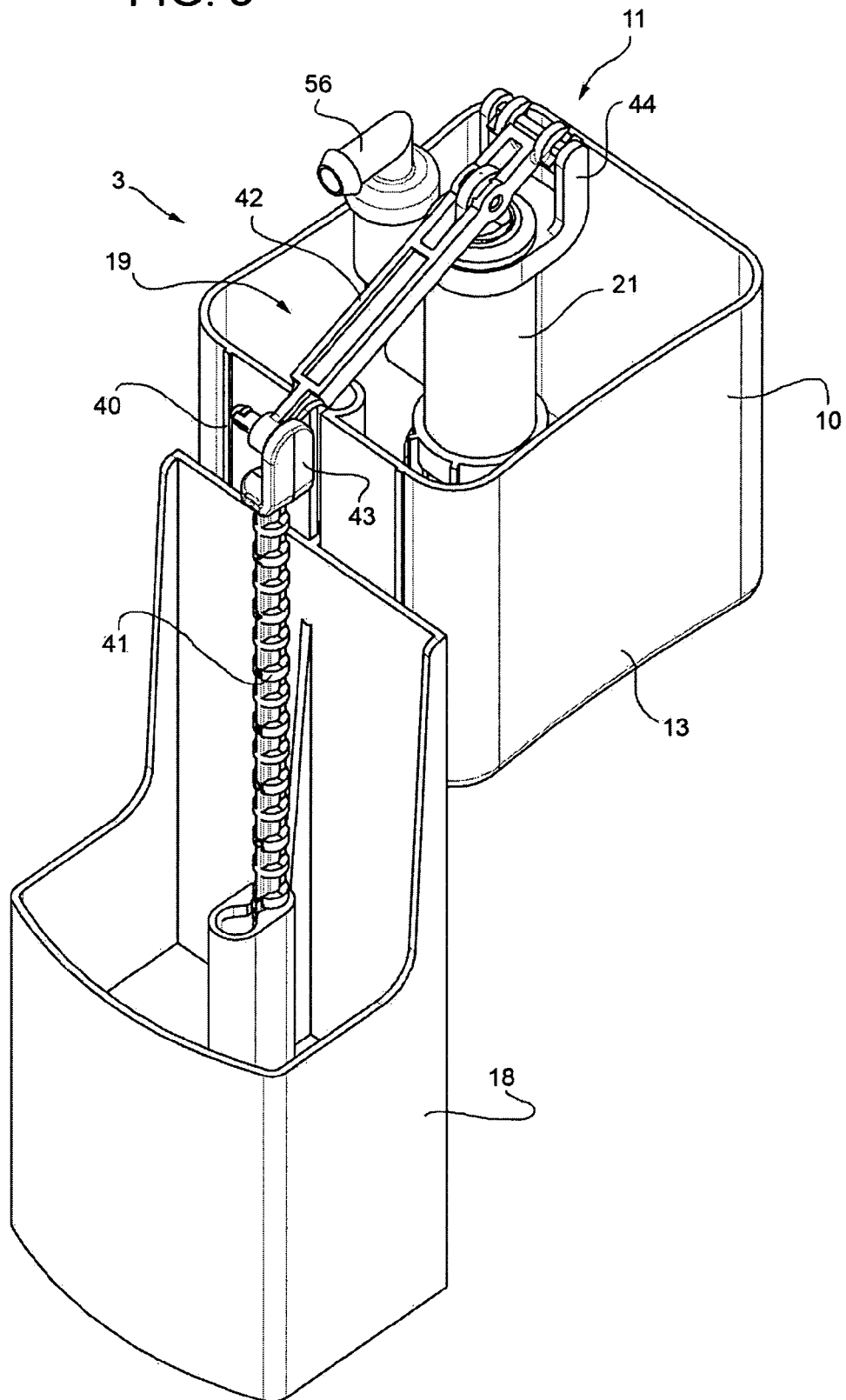


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 12 39 8007

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	GB 1 364 063 A (UNI HYGEA LTD) 21 August 1974 (1974-08-21) * page 2, lines 51-97 * * page 4, line 55 - page 5, line 52 * * figures 1-3 *	1,6,8-10	INV. E03D9/03
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			TECHNICAL FIELDS SEARCHED (IPC)
			E03D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 January 2013	Examiner Urbahn, Stephanie
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 39 8007

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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24-01-2013

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