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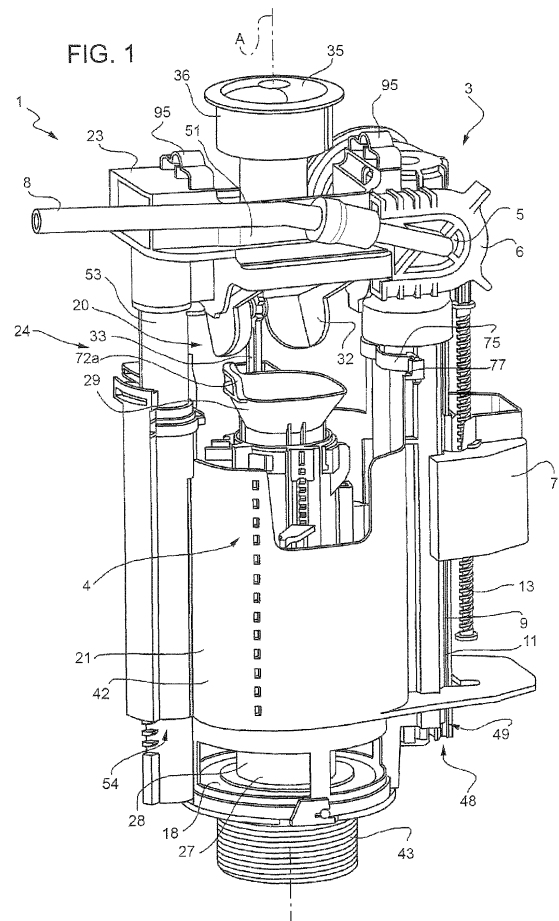
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(54) **Integrated feed and flush assembly**

(57) An integrated feed and flush assembly (1) for a flushing tank, extending substantially along an axis (A), including a feed group (3), a flushing valve group (4), a base body (21) and a support (23), movable with respect to each other along the axis (A) by means of an adjusting mechanism (24), and a releasable locking mechanism (52) that selectively couples the support (23) to the base body (21) and releases the support (23) from the base body (21); the support (23) integrally supports the feed group (3) and a plug operating mechanism (20) of the flushing valve group (4), so that the support (23) and the feed group (3) are movable integrally with respect to the base body (21) by means of the adjusting mechanism (24) after releasing the locking mechanism (52).



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## Description

**[0001]** The present invention relates to an integrated feed and flush assembly for a flushing tank.

**[0002]** As is known, toilet flushing tanks are normally fitted with a flushing valve group, which serves to discharge a preset amount of water from the tank to the toilet, and a feed group, which serves to refill the tank after each flushing.

**[0003]** In general, the two groups are manufactured and installed separately from one another; in consequence, during installation, the operator must carry out numerous operations on each group to install both of them in the tank. In addition, if the flushing valve group is also equipped with a height adjusting mechanism (which allows adaptation to tanks of different sizes), the operator must also regulate this mechanism and adjust the position of the feed group separately.

**[0004]** An object of the present invention is that of providing an integrated feed and flush assembly for a flushing tank that is particularly simple and inexpensive to manufacture and install, as well as being fully effective; in particular, an object of the invention is that of providing an assembly comprising a feed group and a flushing valve group, and which enables both the position of the feed group and that of the flushing valve group to be adjusted in a simple, rapid and effective manner.

**[0005]** In accordance with these objects, the present invention relates to an integrated feed and flush assembly for a flushing tank as basically defined in the attached claim 1 and, for its preferred aspects, in the dependent claims.

**[0006]** The invention is described in detail in the following non-limitative example of embodiment with reference to the attached figures, where:

- Figure 1 is a perspective view of an integrated feed and flush assembly for a flushing tank in accordance with the invention,
- Figure 2 is a longitudinal cross-sectional view of the assembly in Figure 1,
- Figure 3 and 4 are large-scale perspective views, with parts removed for clarity, of a detail of the assembly in Figure 1 shown in respective operating positions, and
- Figure 5 is an exploded partial perspective view of a detail of the assembly in Figure 1.

**[0007]** In Figures 1 and 2, an integrated feed and flush assembly for a flushing tank (known and not shown for simplicity) is indicated as a whole by reference numeral 1.

**[0008]** The assembly 1 extends substantially along an axis A (vertical in use) and comprises a support structure 2 that supports a feed group 3 and a flushing valve group 4.

**[0009]** The feed group 3 comprises a filler valve 5 housed in a casing 6 and controlled by a float 7; the filler valve 5 is connected to an inlet pipe 8, connectable in a

known manner to a water mains to deliver water to the filler valve 5, and to a filler pipe 9 that extends substantially parallel to axis A to deliver water from the filler valve 5 to the tank.

**[0010]** The float 7 is slidably mounted on a guide 11 substantially parallel to axis A and is mechanically connected in a known manner, for example, by means of a rod 13 and a lever system 14, to the filler valve 5 to selectively open/close the filler valve 5 depending on the position of the float 7, that is to say the level of the water in the tank.

**[0011]** The flushing valve group 4 comprises a movable plug 18 cooperating with a sealing seat 19, a plug operating mechanism 20 mechanically connected to the plug 18, a base body 21 forming part of the support structure 2 and internally defining a container 22 in which the plug 18 is slidably housed and provided with a sealing seat 19, and a support 23 that supports the mechanism 20 and, through the mechanism 20, the plug 18, and is connected to the base body 21 by means of an adjusting mechanism 24 to vary the distance between the support 23 and the base body 21.

**[0012]** The plug 18 is carried by a lower end 27 of an overflow pipe 28; an upper end 29 of the overflow pipe 28, opposite to the lower end 27, is instead connected to the mechanism 20.

**[0013]** The plug operating mechanism 20 is of an essentially known type and so for simplicity is neither described nor shown in detail. In basic terms, the mechanism 20 comprises a horizontally pivoted lever 32 hinged to the support 23 and connected, by means of a rod 33 equipped with a hook, to the upper end 29 of the overflow pipe 28; the lever 32 is operated by one or more movable rods 34, movable parallel to axis A for example, and connected to respective buttons 35 carried by a button body 36, which is fixed to the support 23 in a releasable manner.

**[0014]** The overflow pipe 28 is slidably housed along the axis A in a seat 38 formed in the base body 21; preferably, as shown in the figures, the overflow pipe 28 is constituted by an inner tube 39 and an outer tube 40, one inserted coaxially inside the other and telescopically coupled to each other, and internally houses a water sanitization or treatment device 41. The inner tube 39, which protrudes from the top of the outer tube 40, carries an eye for connection to rod 33 and thus the mechanism 20, and is interference fitted to the outer tube 40; the outer tube 40 carries the plug 18 at the bottom.

**[0015]** The base body 21 comprises a substantially tubular hollow portion 42 holding the container 22 in which the overflow pipe 28 is arranged, and a connection portion 43 arranged beneath portion 42 and provided with fastening members 44 (for example, a threaded sleeve) to engage with a bottom wall of the tank; the sealing seat 19 cooperating with the plug 18 is arranged, for example, on a lower end of portion 42.

**[0016]** The base body 21 can be fixed to the bottom wall of the tank by means of the connection portion 43;

portion 43 is preferably connected to portion 42 in a releasable manner, for example (Figure 5) by means of a pair of pins carried by portion 42 and insertable in respective couplings formed in portion 43 by turning portion 42 with respect to portion 43.

**[0017]** Portion 42 has a substantially cylindrical, radially inner lateral wall 45 that defines the seat 38 of the overflow pipe 28 and thus of the plug 18, and a radially outer lateral wall 46, which together with the radially inner lateral wall 45 delimits an annular chamber closed at the bottom by a bottom wall.

**[0018]** The base body 21 is also provided laterally with an auxiliary seat 48, in which the filler pipe 9 is housed, which is thus side by side with the base body 21. In particular, the auxiliary seat 48 has a lateral wall 50 that extends from the base body 21 and only partially surrounds the filler pipe 9; the filler pipe 9 projects laterally outside of the auxiliary seat 48 through a longitudinal opening 49, parallel to axis A and formed in the lateral wall 50, and from which the filler pipe 9 runs.

**[0019]** The support 23 comprises a plate 51 on which the casing 6 of the filler valve 5 is integrally mounted and which supports the mechanism 20 as previously described.

**[0020]** With reference to Figures 3 and 4 as well, the support 23 is connected to the base body 21 by means of an adjusting mechanism 24 and is movable with respect to the base body 21 in parallel with axis A; the assembly 1 also comprises a releasable locking mechanism 52 that selectively constrains (axially) the support 23 to the base body 21 and releases the support 23 from base body 21 to enable movement (parallel to axis A) of the support 23 (and therefore integrally of the feed group 3) with respect to the base body 21 by means of the adjusting mechanism 24.

**[0021]** In the case in point, the adjusting mechanism 24 comprises at least one upright 53 that is supported by the support 23 and extends along a longitudinal axis B parallel to axis A and can slide in a sliding seat 54, formed substantially parallel to axis A in the base body 21 (or in one of its lateral appendages); the locking mechanism 52 axially constrains the support 23 to the base body 21. In the example shown, the upright 53 is axially fixed to the support 23 and extends below the latter, in particular from the plate 51 towards the base body 21, and is slidably housed in sliding seat 54.

**[0022]** The filler pipe 9, axially and slidably housed in the auxiliary seat 48 (formed in the base body 21 and parallel to sliding seat 54, i.e. to axis A), constitutes a second upright 63 that, together with upright 53, supports the support 23. The two uprights 53 and 63 are arranged substantially parallel to each other on opposite sides of the base body 21. The auxiliary seat 48 also constitutes a sliding seat 59 for upright 63.

**[0023]** An elastic element 75, for example a spring, is arranged at an upper end 76 of the auxiliary seat 48 in which the filler pipe 9 is inserted; the elastic element 75 is axially connected to the base body 21 and cooperates

with the filler pipe 9 to axially support the filler pipe 9 (and therefore the support 23). In the example shown, the elastic element 75 rests on the top of an edge 77 of end 76 and is at least partially fitted around the filler pipe 9 and radially clips onto the filler pipe 9; in particular, the elastic element 75 has an arc or ring shape and is equipped with a radially inner projection 78 that engages a notch 79 selected from a series of notches 79 formed on an outer lateral surface of the filler pipe 9 and axially spaced from one another parallel to axis A.

**[0024]** The locking mechanism 52 comprises a locking member 55, which is supported by the support 23 and movable (in particular, rotatable) to selectively assume a locking position, in which it locks the adjusting mechanism 24, preventing the support 23 from sliding along axis A with respect to the base body 21 and renders the support 23 integral with the base body 21, and a release position, in which the support 23 can slide with respect to the base body 21.

**[0025]** In the example shown, the locking member 55 comprises a rod 56 constituted by upright 53 (and therefore extending along the longitudinal axis B) and an upper end head 57 that projects from the plate 51; the head 57 has a manually operated lateral lever 58. The locking member 55 is mounted to rotate on the plate 51 around the longitudinal axis B and is axially constrained to the plate 51.

**[0026]** Rod 56 (i.e. upright 53) is slidably inserted in sliding seat 54; rod 56 and sliding seat 54 are shaped such that rod 56 can slide in sliding seat 54 and can also turn around the longitudinal axis B in sliding seat 54.

**[0027]** Rod 56 has a series of radially outer teeth 64 longitudinally spaced apart along the longitudinal axis B, apt to engage a coupling seat 65 carried by the base body 21.

**[0028]** The locking member 55 can turn around the longitudinal axis B (manually operated by an operator by means of the head 57) to selectively assume the locking position, shown in Figure 3, in which a selected tooth 64 engages the coupling seat 65 and locks the sliding of rod 56 in sliding seat 59 (and therefore the support 23 is integrally fixed to the base body 21), and the release position, shown in Figure 4, in which none of the teeth 64 engages the coupling seat 65 and rod 56 can slide axially in sliding seat 59 (and therefore the support 23 and the base body 21 can slide with respect to each other and their mutual distance can be varied).

**[0029]** The locking mechanism 52 also comprises a hooking device 69 for releasably connecting the locking member 55 (and therefore also upright 53) to the overflow pipe 28 and/or the plug 18. In particular, the hooking device 69 comprises at least one hook 71, carried or operated by the locking member 55 and specifically by rod 56, apt to releasably engage a corresponding engagement element 72 carried by the overflow pipe 28.

**[0030]** In the example shown, the hooking device 69 is shaped to releasably engage both tubes 39 and 40 that constitute the overflow pipe 28 (and slide one in in-

side the other); in detail, the hooking device 69 is shaped to connect, during adjustment of the assembly 1 by means of the adjusting mechanism 24, tube 39 equipped with the eye (and therefore connected to the mechanism 20) to rod 56, to integrally move with rod 56, and at the same time to anchor tube 40, which carries the plug 18, to the base body 21.

**[0031]** The hooking device 69 engages the overflow pipe 28 (and, in detail, both its constituent tubes 39 and 40) when the locking member 55 assumes the release position (Figure 4) and vice versa disengages the overflow pipe 28 when the locking member 55 assumes the locking position (Figure 3).

**[0032]** In particular, the hooking device 69 comprises a pair of hooks 71a and 71b, carried by respective lateral arms 73a and 73b that respectively project from rod 56 and from a connection element 70 mounted on rod 56, and apt to releasably engage respective engagement elements 72a and 72b, each carried by one of the tubes 39 and 40.

**[0033]** An upper section of rod 56, positioned below the plate 51 and outside of sliding seat 59, is provided with a radially outer arm 73a terminating in a hook 71a shaped to releasably engage the corresponding engagement element 72a (a slot for example) carried on an upper end of the inner tube 39 (defining the upper end 29 of the overflow pipe 28) that projects above the outer tube 40.

**[0034]** The connection element 70 is integrally carried by rod 56 in a way that it can be turned around the longitudinal axis B together with rod 56; arm 73b extends radially from the connection element 70 and has a free end equipped with hook 71b that snap fits into engagement element 72b (for example, a C-shaped seat) carried by the outer tube 40.

**[0035]** In the installation phase of the assembly 1, the operator turns the locking member 55, by means of the head 57, to move the locking member 55 from the locking position to the release position; in this position, the support 23 can slide with respect to the base body 21 and the operator can adjust the position of the support 23 with respect to the base body 21 by making upright 53 slide in sliding seat 54 and, in consequence, also upright 63 in the sliding seat defined by the auxiliary seat 48.

**[0036]** Advantageously, the operator starts by fixing the base body 21 to the bottom wall of the tank, first of all fixing just the connection portion 43 to the bottom wall of the tank, by means of the fastening members 44, and then mounting portion 42 on portion 43.

**[0037]** With the locking member 55 in the release position, the support 23 can slide with respect to the base body 21 if force is applied in the axial direction, but it is still axially supported (even if not locked) by the elastic element 75. The operator consequently extends the adjusting mechanism 24, moving the support 23 to the maximum distance from the base body 21; by then applying a vertically downward force on the support 23, the support 23 is moved to the desired position with respect to the

base body 21, thereby adapting the assembly 1 to the size of the tank in which it is installed. For example, but not necessarily, positioning of the support 32 can be carried out by pressing the lid of the tank directly on the support 23 (without the button body 36), preferably cooperating with the elastic elements 95 that project above the support 23; when the lid closes the tank, the support 23 is in the correct position.

**[0038]** At this point, the operator (after removing the lid) locks the adjusting mechanism 24 by means of the locking mechanism 52.

**[0039]** The feed group 3 is integrally carried by the support 23 and is also integrally movable with the support 23 with respect to the base body 21 after releasing the locking mechanism 52.

**[0040]** The same rotation of the locking member 55 (i.e. of rod 56) causes hooks 71a and 71b to engage respective engagement elements 72a and 72b: the locking member 55 engages the inner tube 39 which is consequently moved together with rod 56 and the support 23, while the connection element 70 engages the outer tube 40, which thus remains anchored, together with the plug 18, to the base body 21.

**[0041]** With reference to Figures 1, 2 and 5, according to a further aspect of the invention, the sanitization device 41 comprises an internally hollow reservoir 81, housed in the overflow pipe 28 and containing a cartridge or a dose of an active water-treatment substance (not shown), and a support 82 having a seat 83 in which a section 84 of the lower end of the reservoir 81 is inserted.

**[0042]** The reservoir 81 has an upper supply mouth 85, preferably upwardly and outwardly flared, and lateral and/or lower openings 86 formed, for example, in a lateral wall of the reservoir 81 and/or a lower end of the reservoir 81, which allow the passage of water through the reservoir 81 so as to release an active substance having disinfectant and/or sanitizing and/or deodorizing properties etc. into the flow of water discharged from the tank.

**[0043]** In the example shown, the reservoir 81 has a cage-like form and extends substantially along an axis (for example, axis A or an axis parallel to it); the reservoir 81 has an open upper end, provided with a mouth 85, and a lower end provided with a bottom 87 optionally provided with other openings 86.

**[0044]** The support 82 is connected to the support structure 2 and, in detail, to the connection portion 43 of the base body 21; in particular, the support 82 is arranged radially inside the connection portion 43 and is joined to it by radial ribbing 88.

**[0045]** The reservoir 81 and the support 82 are releasably coupled to each other by means of a coupling device 90. For example, the reservoir 81 has a radially outer ring 91 that delimits the section 84 of the reservoir 81 that can be inserted in the support 82 and rests in contact with an upper edge 92 of the support 82; the ring 91 carries engagement teeth 93 that, following angular rotation of the reservoir 81 with respect to the support 82, engage respective reference members 94 formed on the

edge 92 of the support 82.

**[0046]** The sanitization device 41, being housed inside the overflow pipe 28 that, with the tank full and with the plug 18 cooperating with the sealing seat 19, does not contain water, only comes into contact with water when flushing is performed.

**[0047]** It remains understood that changes and variants may be made to that described and shown herein without departing from the scope of the invention as defined in the attached claims.

## Claims

1. An integrated feed and flush assembly (1) for a flushing tank, extending substantially along an axis (A) and comprising a feed group (3), a flushing valve group (4), a base body (21) and a support (23), movable with respect to each other along the axis (A) by means of an adjusting mechanism (24), and a releasable locking mechanism (52) that selectively couples the support (23) to the base body (21) and releases the support (23) from the base body (21), wherein the support (23) integrally supports the feed group (3) and a plug operating mechanism (20) of the flushing valve group (4) so that the support (23) and the feed group (3) are integrally movable with respect to the base body (21) by means of the adjusting mechanism (24) after releasing the locking mechanism (52).
2. The assembly according to claim 1, wherein the locking mechanism (52) comprises a locking member (55) supported by the support (23) and movable for selectively assuming a locking position, in which the locking member (55) blocks the adjusting mechanism (24) preventing the support (23) from sliding along the axis (A) with respect to the base body (21) and makes axially integral to each other the support (23) and the base body (21), and a release position, in which the support (23) is slidable with respect to the base body (21) along the axis (A).
3. The assembly according to claim 2, wherein the locking member (55) rotates for selectively assuming the locking position and the release position.
4. The assembly according to claim 2 or 3, wherein the locking member (55) comprises a rod (56) that extends along a longitudinal axis (B) and is provided with a series of radially outer teeth (64) longitudinally spaced apart from one another along said longitudinal axis (B), apt to engage a coupling seat (65) carried by the base body (21).
5. The assembly according to one of claims 2 to 4, wherein the locking member (55) comprises a rod (56) axially fixed to the support (23) and that also defines a first upright (63) that holds the support (23) and is slidably housed in a sliding seat (54) formed in the base body (21).
6. The assembly according to claim 5, wherein the feed group (3) includes a filler pipe (9) that extends substantially parallel to the axis (A) and also defines a second upright (63) housed axially slidable in an auxiliary seat (48) formed in the base body (21) and holds, together with the first upright (53), the support (23).
7. The assembly according to claim 6, wherein an elastic element (75), located at a top end (76) of the auxiliary seat (48), is axially connected to the base body (21) and radially locks onto the filler pipe (9) for axially supporting the filler pipe (9).
8. The assembly according to claim 7, wherein the elastic element (75) is provided with a radially inner projection (78) that engages a notch (79) selected from a series of notches (79) formed on an outer lateral surface of the filler pipe (9) and axially spaced from one another parallel to the axis (A).
9. The assembly according to one of claims 2 to 8, wherein the locking mechanism (52) also comprises a hooking device (69) for releasably connecting the locking member (55) to an overflow pipe (28) and/or to a plug (18) of the flushing valve group (4).
10. The assembly according to claim 9, wherein the hooking device (69) engages the overflow pipe (28) when the locking member (55) assumes the release position, and vice versa disengages the overflow pipe (28) when the locking member (55) assumes the locking position.
11. The assembly according to claim 9 or 10, wherein the hooking device (69) comprises at least one hook (71), carried or operated by the locking member (55), apt to releasably engage a corresponding engagement element (72) carried by the overflow pipe (28).
12. The assembly according to one of claims 9 to 11, wherein the overflow pipe (28) comprises a first tube (39) and a second tube (40), coaxially inserted one inside the other and telescopically coupled to each other and respectively connected to the plug operating mechanism (20) and to a plug (18) of the flushing valve group (4), and wherein the hooking device (69) is shaped so as to releasably engage both tubes (39, 40).
13. The assembly according to claim 12, wherein the hooking device (69) is shaped so as to connect, during adjustment of the assembly (1) by means of the adjusting mechanism (24), the first tube (39) to the

locking member (55) in such a way to integrally move the first tube (39) and the locking member (55), and also to fasten the second tube (40) to the base body (21).

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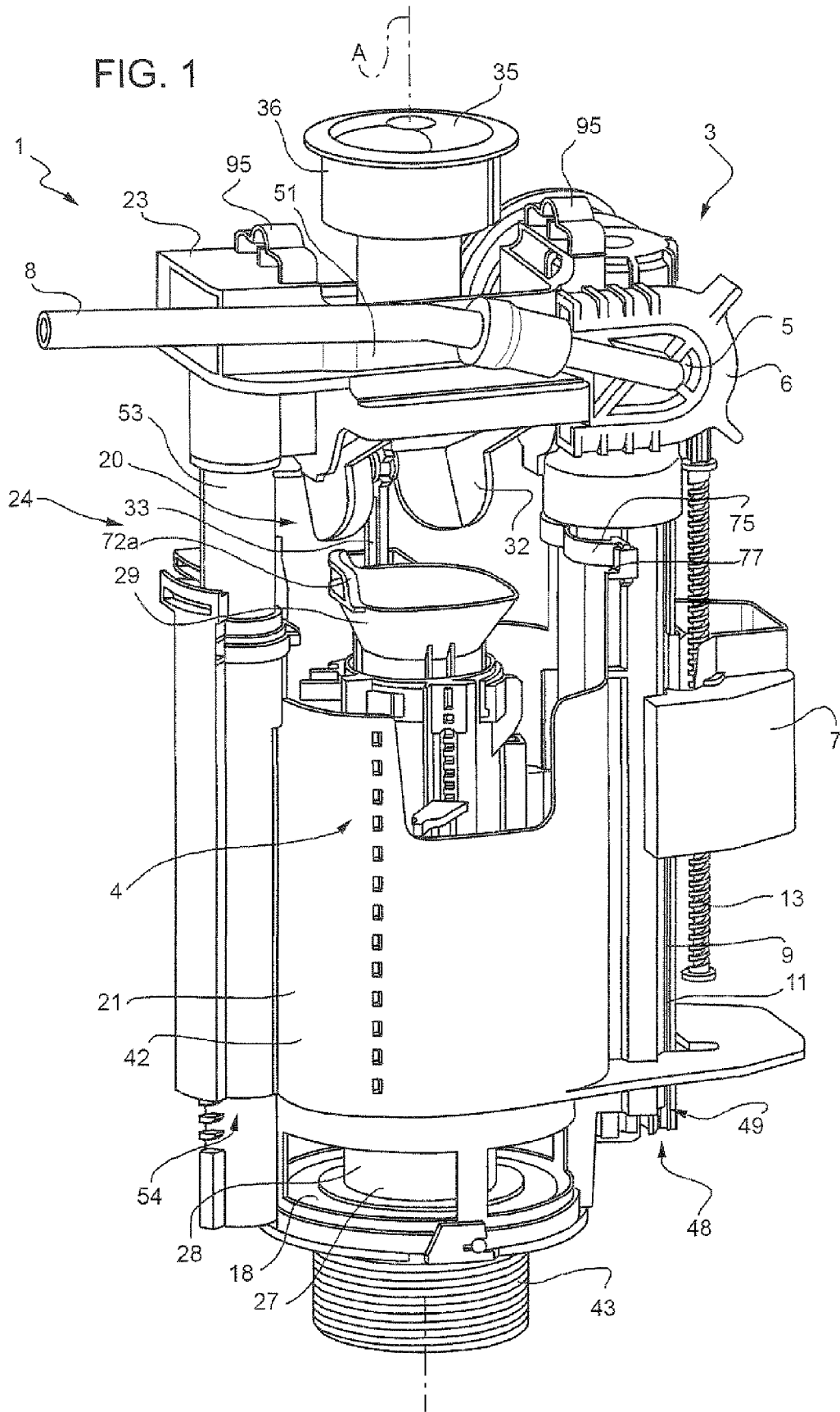
14. The assembly according to claim 12 or 13, wherein the hooking device (69) comprises a pair of hooks (71), carried by respective lateral arms (73) that respectively project from the locking member (55) and from a connection element (70) operated by the locking member (55), and apt to releasably engage respective engagement elements (72), each carried by one of the tubes (39, 40). 10
15. The assembly according to one of the preceding claims, wherein the feed group (3) includes a filler pipe (9) that extends substantially parallel to the axis (A) and the base body (21) is provided laterally with an auxiliary seat (48), in which the filler pipe (9) is housed. 15 20
16. The assembly according to claim 15, wherein the auxiliary seat (48) has a lateral wall (50) that projects from the base body (21) and only partially surrounds the filler pipe (9), the filler pipe (9) protruding laterally outside the auxiliary seat (48) through a longitudinal opening (49) parallel to the axis (A) and formed in the lateral wall (50). 25
17. The assembly according to one of the preceding claims, comprising an overflow pipe (28) and a water sanitization or treatment device (41) housed inside the overflow pipe (28), the water sanitization or treatment device (41) comprising an internally hollow reservoir (81) containing a cartridge or a dose of an active water-treatment substance, and a support (82) having a seat (83) in which a lower end portion (84) of the reservoir (81) is releasably inserted, the reservoir (81) and the support (82) being releasably coupled to each other by a coupling device (90). 30 35 40

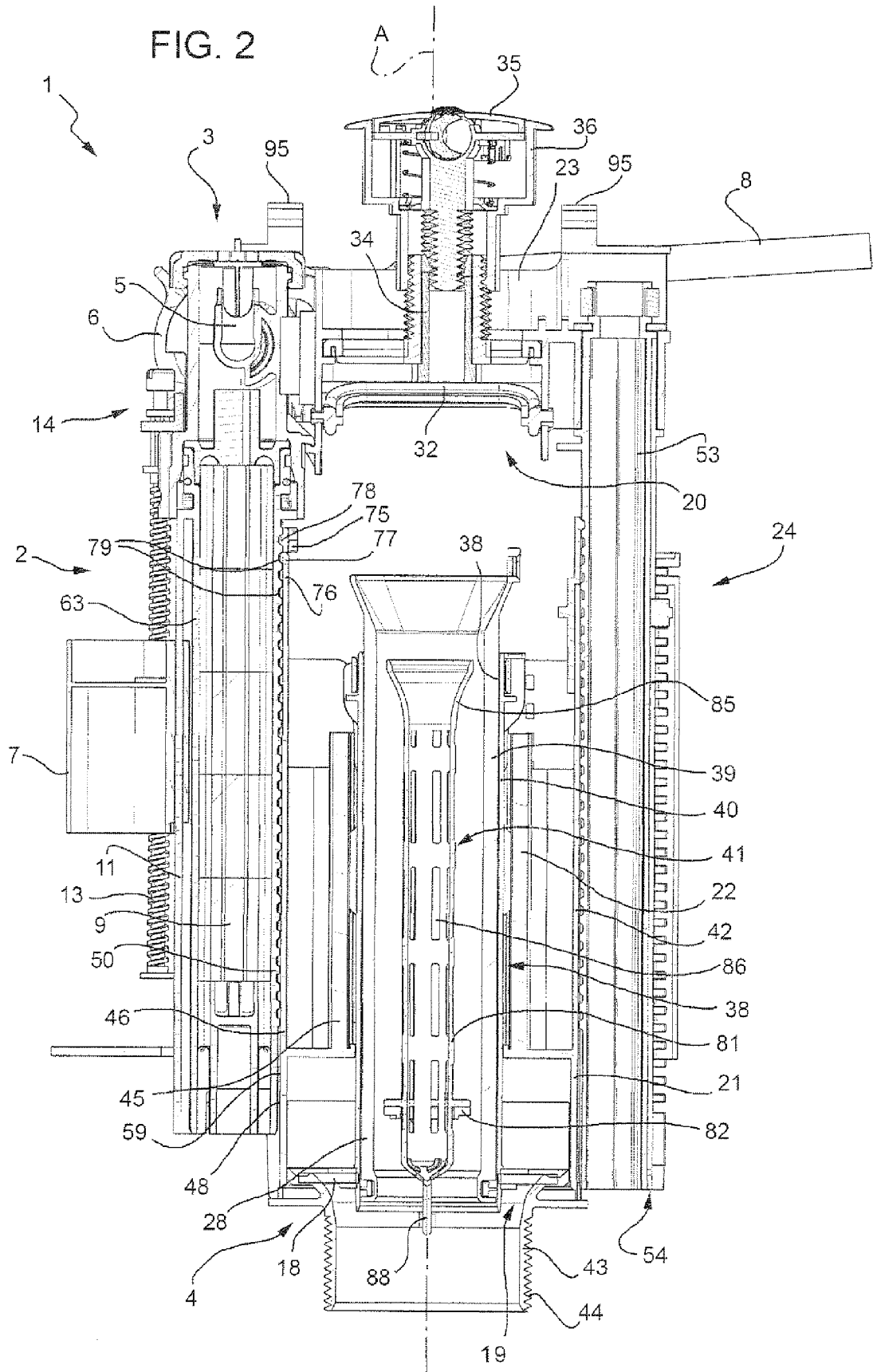
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FIG. 1





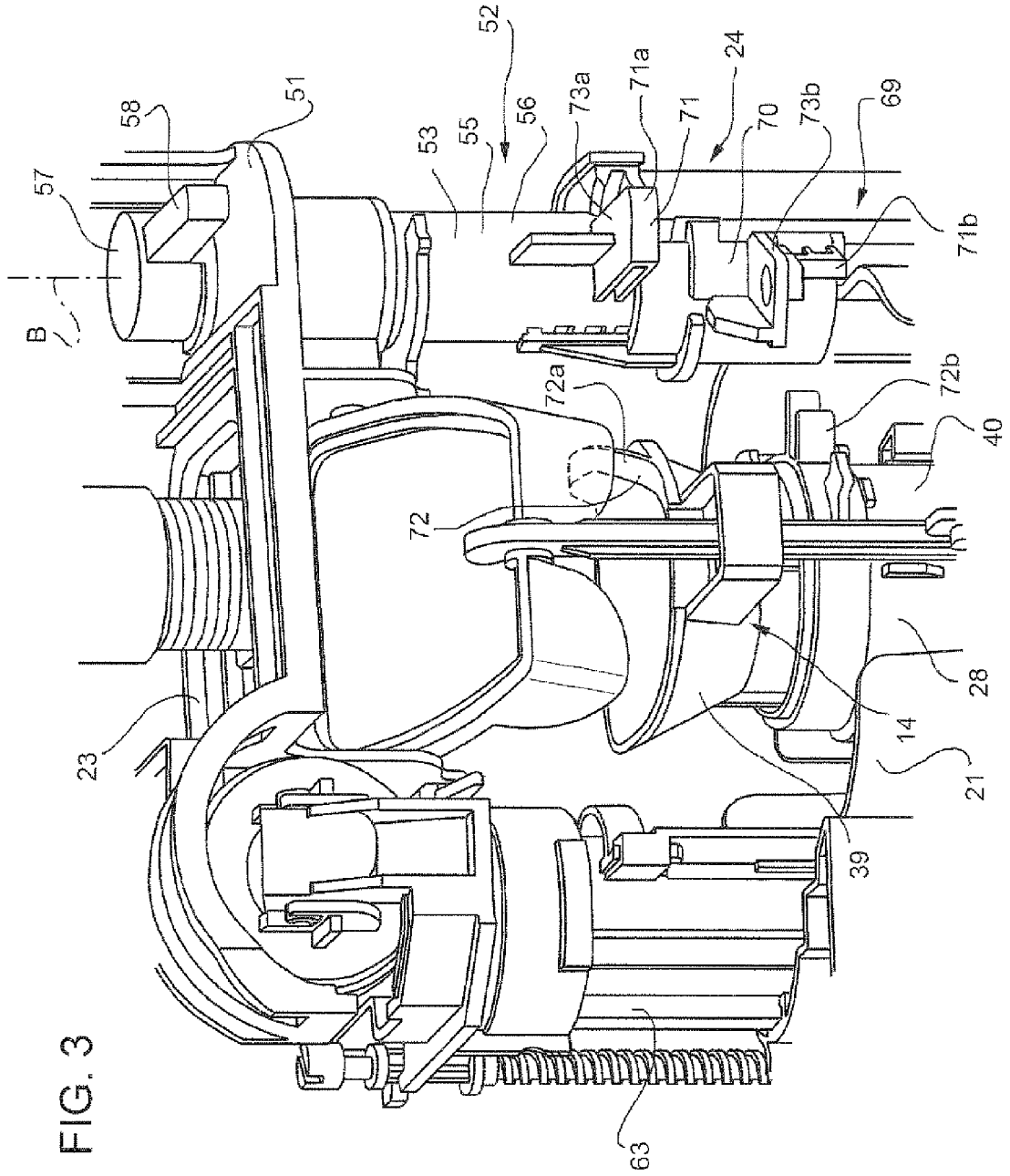


FIG. 3

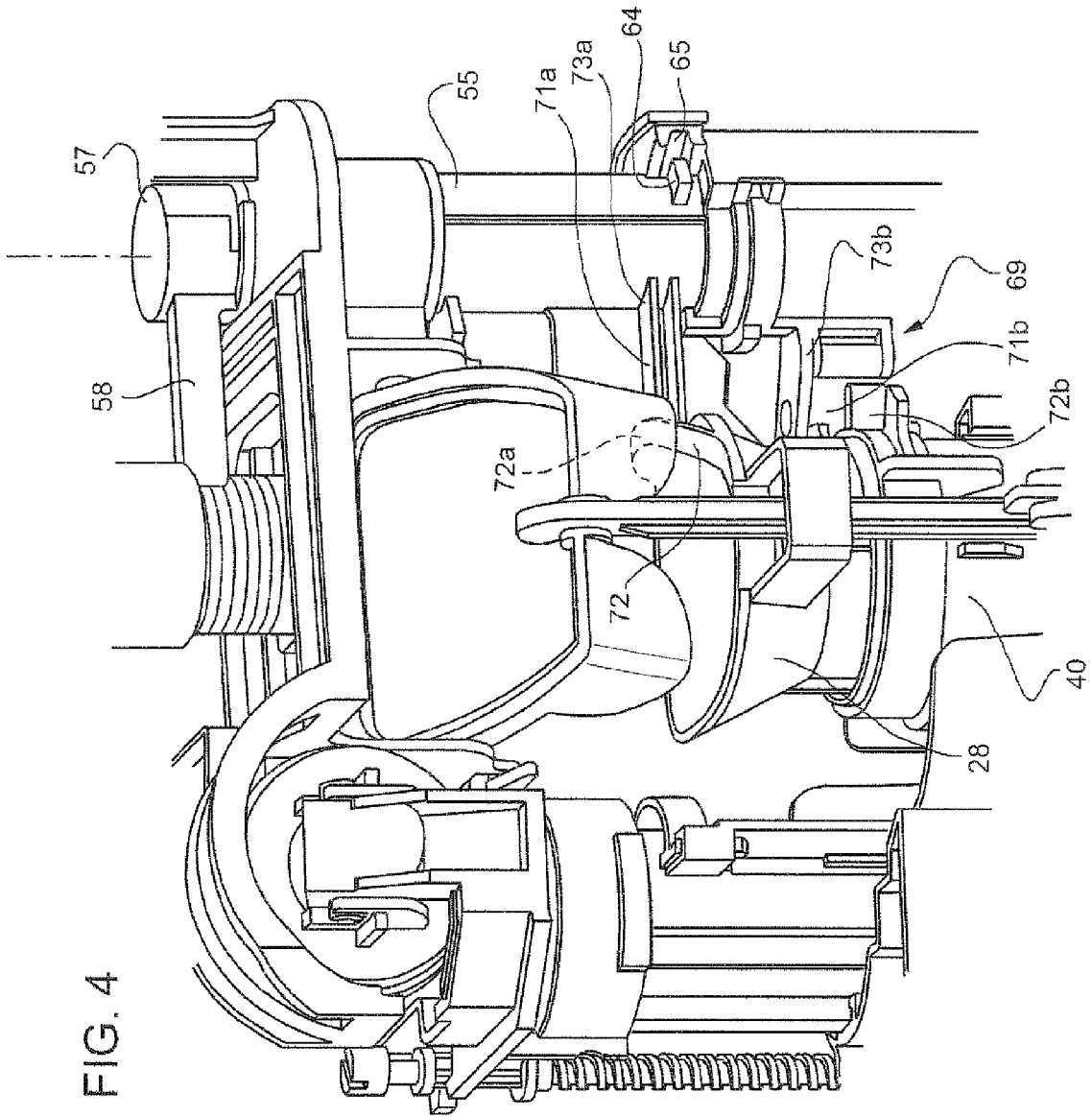
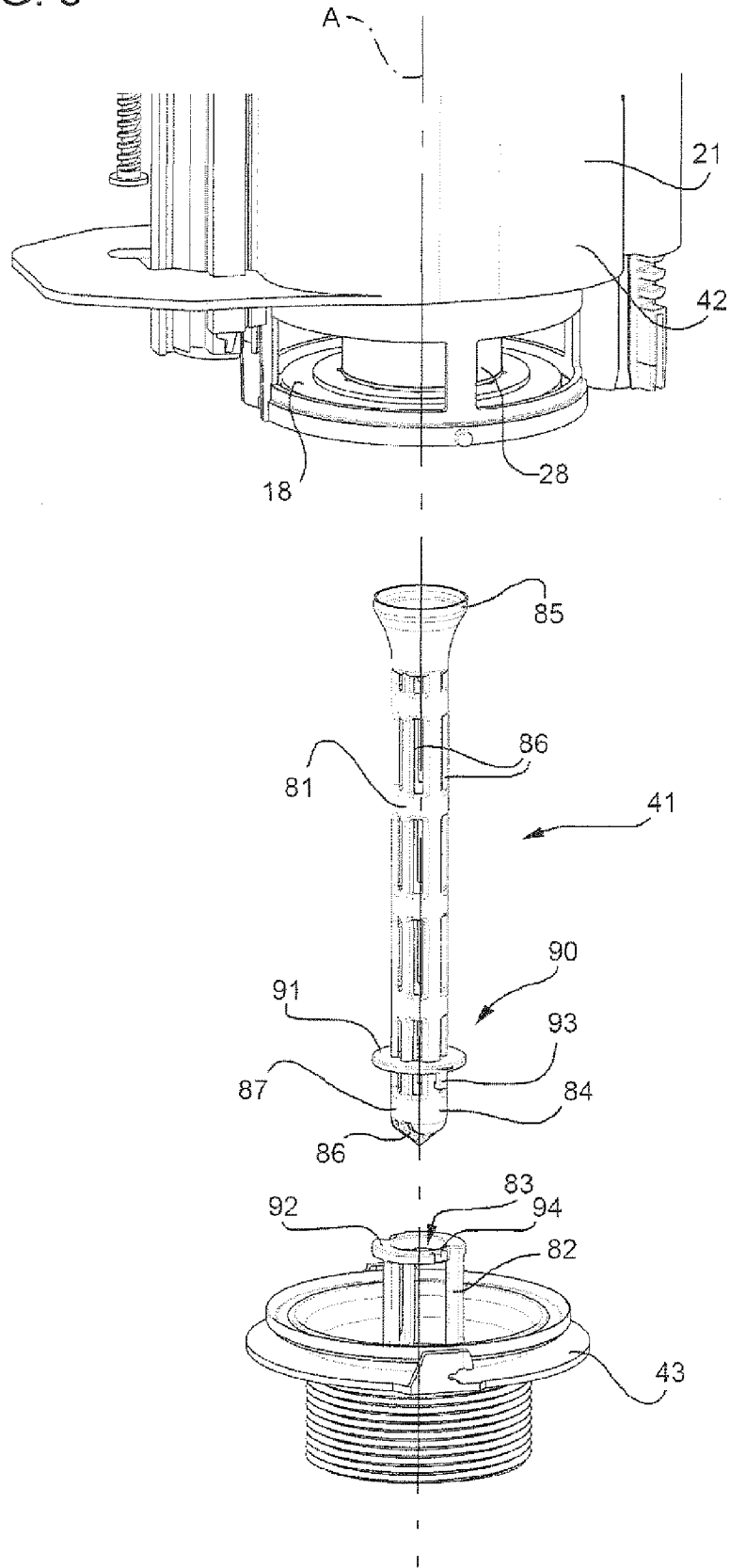


FIG. 5





EUROPEAN SEARCH REPORT

Application Number  
EP 10 19 5861

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	FR 2 770 547 A1 (WIRQUIN PLASTIQUES SA [FR]) 7 May 1999 (1999-05-07)	1-3,5	INV. E03D1/36
Y	* page 4, line 12 - page 5, line 18; figures *	4	
Y	----- EP 1 359 261 A2 (OLIVEIRA & IRMAO SA [PT]) 5 November 2003 (2003-11-05) * sentence 16, paragraph 14; figures * -----	4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E03D
Place of search		Date of completion of the search	Examiner
The Hague		24 March 2011	Urbahn, Stephanie
CATEGORY OF CITED DOCUMENTS		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 10 19 5861

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24-03-2011

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