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(54) Flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like.

(57) The flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like includes a flush tank or container (1) which has a water inlet (2) arranged adjacent to the upper part and connected to the water mains, automatic means for controlling a lower port (3) defined in the tank (1) bottom for feeding water into the flush tank. The port (3) can be closed by a plug (4) and is connected to a toilet bowl. A sealed traction element (5) is inserted in the port (3), extends upward and has, on its free terminal end (7), lifting means (8,18) which are connected by means of lever systems (10-12, 14-17; 21-23) to external actuation means (13,24). The lifting means (8,18) comprise adjustment means (26) for the complete or partial discharge of the water of the cistern, so as to allow controlled discharges of washing water according to the different requirements.

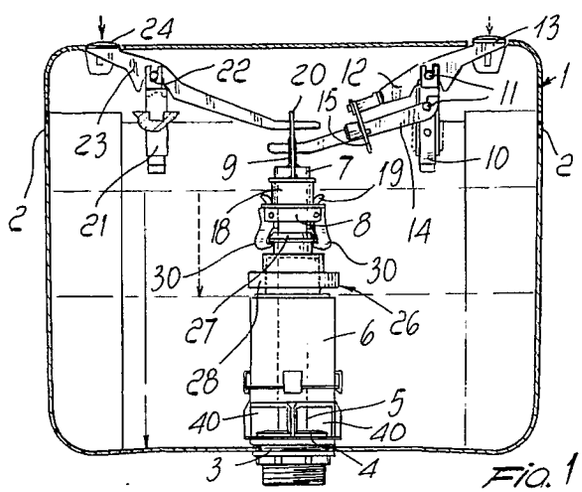

Fig. 1

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The present invention relates to a flush tank or cistern structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like.

Various types of flush cisterns or tanks for cleaning toilet bowls are currently known and used, and are usually constituted by a water container which is connected to the water mains, has automatic means for controlling the supply from the mains to the container and is provided with a duct, defined on the bottom of the container, for discharging the water toward toilet bowls. The duct is connected to a bowl by means of a pipe, and the discharge of water is controlled by means of a plug which can be disengaged by means of lever systems which are actuated manually from the outside every time the toilet bowl is washed.

Cisterns which perform the differentiated washing of toilet bowls are also known; said cisterns have differentiated controls for the discharge of preset amounts of water as a consequence of the use of one or more external controls. Said cisterns constitute a considerable improvement with respect to the preceding ones, said improvement being essentially related to the water saving achieved by rationing the discharge of the water.

Devices with discharge controlled by means of multiple controls are currently affected by constructive difficulties and most of all by maintenance difficulties which are indeed related to the constructive difficulties.

Known devices usually have a discharge control structure which has an overflow pipe which is connected directly to the duct of the cistern, and on which two ports are defined at differentiated heights; said ports are opened and closed by means of respective plugs, each of which is actuated by lever systems connected to external manual actuation means.

Other disadvantages are related to the lack of precision in controlling the discharge, or rather the amounts of water discharged, and to the quietness of the system.

The aim of the present invention is to eliminate or substantially reduce the disadvantages described above in known types of cisterns by providing a flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like, which reduces mechanical complexity in assembly and consequently eliminates difficulties in maintenance, and which also improves water saving.

Within the scope of the above aim, an object of the present invention is to provide a flush tank structure which is highly reliable in operation and is much quieter and more precise in discharge control than currently installed and mounted cisterns.

Not least object of the present invention is to provide a flush tank structure which is relatively easy to manufacture and at competitive costs.

This aim, these objects and others which will become apparent hereinafter are achieved by a flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like, according to the invention, which comprises a flush tank or container having a water inlet which is arranged adjacent to the upper part and is connected to the water mains, automatic means for controlling the feeding of water into said flush tank and a port which is defined in the bottom, can be closed by a plug and is connected to a toilet bowl, characterized in that a sealed traction element is inserted in said port, extends upward and has, on its free terminal end, lifting means which are connected by means of lever systems to external actuation means, said lifting means comprising adjustment means for the complete or partial discharge of the water of the cistern, so as to allow controlled discharges of washing water according to the different requirements.

More in particular, said lifting means are constituted, for partial discharge, by an annular body which is inserted on said traction element, which has means for detachable engagement with said adjustment means, said annular body being connected to a respective first lever system by means of a first bracket, said annular body being suitable for lifting said traction element in order to open said port. Complete discharge is performed by a ring which can slide on said traction element and is suitable for engaging release tabs for said engagement means so as to release said adjustment means, and thus lift said traction element to open said port, said ring being connected to a respective second lever system by means of a second bracket.

Said adjustment means are furthermore constituted by an annular weight which is slidingly inserted on said traction element.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of a flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like, according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a partially sectional front elevation view of a flush tank structure according to the invention;

figure 2 is a plan view of a lever system for the partial discharge of the water;

figure 3 is a partially sectional front view of the lifting means for partial discharge;

figure 4 is a partially sectional cutout side eleva-

tion view of a flush tank structure according to the invention;

figure 5 is a partially sectional front view of the lifting means for complete discharge;

figure 6 is a partially sectional front view of the lifting means for partial discharge, in which the traction element is opening the port;

figure 7 is a partially sectional front view of the lifting means for complete discharge, in which the traction element is opening the port; and

figures 8, 9, 10 and 11 are elevation views of a removable supporting hook which is comprised within the lever system for partial discharge.

With reference to the above figures, a flush tank structure particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like comprises a flush tank or container 1 which has a water inlet 2 adjacent to the upper part thereof which is connected to the water mains, a known automatic means for controlling the inflow of water into the flush tank 1, for example means with a cock controlled by a floater (not illustrated), and a port 3 which is defined in the bottom, which is closed by a plug 4, and which is connected to a toilet bowl (not illustrated).

A traction element 5 is inserted in the port 3 and supports the sealing plug 4; the traction element 5 extends upward, passing through a compensation chamber 6, and has, on its free terminal end 7, lifting means which are connected to external actuation means by means of lever systems. The lifting means comprise adjustment means for the complete or partial discharge of the water from the cistern, so as to allow controlled emissions of washing water according to the different requirements. The compensation chamber 6 has, at its base, a plurality of pathways 40 for the unobstructed free flow of water toward the port 3.

The lifting means for partial discharge are constituted by an annular body 8 which is inserted and fixed on the traction element 5, which has means for detachable engagement with the adjustment means. The annular body 8 is connected to a first lever system by means of a first bracket 9.

The first lever system is composed of a support 10 which is fixed on an inner wall of the flush tank 1 and has a plurality of supporting seats 11. A first lever 12 is pivoted on one of the supporting seats 11 and is directly connected to the external actuation means, for example an actuation pushbutton 13 which protrudes from the flush tank 1.

The first lever 12 bears a removable engagement means for a second lever 14 which is pivoted, at an end portion, in another one of the supporting seats 11, which is inserted within the first bracket 9 with its other terminal portion, and which bears guiding means for the removable engagement means.

The removable engagement means is constituted by a hook 15 which is mounted so as to rotate angularly on the free end portion of the first lever 12 and is kept in position by means of a snap ring 16.

The guiding means of the second lever 14 are constituted by an inclined segment 17 which rises from the second lever 14 at the hook 15 which is mounted on the first lever 12, so as to facilitate the engagement of said hook 15 with the second lever 14.

The lifting means for complete discharge are constituted by a sliding ring 18 which is inserted on the traction element 5. The ring 18 is connected to a respective second lever system by means of a second bracket 20, and such ring has a bracket-shaped base perimeter within which grip seats 25 for the tabs 19 are defined.

The second lever system is composed of a support 21 which is fixed on an internal wall of the flush tank 1 and which has a plurality of supporting seats 22. A third lever 23 is pivoted on one of said supporting seats 22 and is connected directly to external actuation means, for example an actuation pushbutton 24 which protrudes from the flush tank 1. The free end portion of said third lever 23 is inserted within the second bracket 20.

The adjustment means for partial or complete discharge are constituted by an annular weight 26 which is slidingly inserted on the traction element 5 and rests on the chamber 6. The weight 26 has raised engagement portions 27 for detachable engagement means which will be described hereinafter, and an annular containment compartment 28 for water in order to increase its own weight. A plurality of water discharge holes 29 is defined in the lower surface of the annular compartment 28 so as to avoid creating water stagnation regions in the flush tank 1.

The detachable engagement means are constituted by levers 30, each of which has, on a terminal portion, an abutment 31 for engaging the annular weight 26 and, on its other terminal portion, an opposite tab 19 engaged by the sliding ring 18 upon its upward movement thereof. The levers 30 are pivoted within the annular body 8 and can perform an angular rotation.

The traction element 5 is constituted by an overflow pipe which, if the water exceeds the overflow level of the flush tank 1, discharges the excess water into the port 3.

The operation of the invention is briefly as follows:

in the case of complete discharge, by pressing the pushbutton 24 the third lever 23 is actuated, lifting the ring 18 by means of the second bracket 20. The ring 18 releases the levers 30 from the weight 26 by means of the seats 25, which press the tabs

19 against the traction element 5. The ring 18 thus raises the traction element 5, thus lifting the plug 4 and opening the port 3, from which the water flows out and discharges into the toilet bowl (not illustrated) by gravity.

In case of partial discharge, instead, by acting on the pushbutton 13, the first lever 12 is actuated and, by means of the hook 15, raises the second lever 14. The lifting of the second lever 14 entails the lifting of the traction element 5 by means of the first bracket 9, thus lifting the plug 4 and opening the port 3. The duration of the partial discharge, i.e. the amount of water discharged, is adjusted by the release of the hook 15 from the second lever 14.

The hook 15 unhooks from the second lever 14, since by rotating about the lever 12 it disengages from the lever 14. Once unhooking has occurred, the second lever 14 is free, and the weight 26 causes the immediate closure of the port 3 by means of the plug 4, pushing the traction element 5 downward, due to the greater weight of the weight 26, which can be made of a much heavier material than the traction element, and also due to the water stored in the annular compartment 28.

The holes 29 are required in order to avoid prolonged storing of water within the annular compartment 28.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept. All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Flush tank structure, particularly for the controlled and differentiated washing of toilet bowls in sanitary fittings and the like, comprising a flush tank or container (1) having a water inlet (2) which is arranged adjacent to the upper part and which is connected to the water mains, automatic means for controlling the feeding of water into said flush tank, and a port (3) which is defined in the bottom thereof, which can be closed by a plug (4) and which is connected to a toilet bowl, characterized in that a sealed traction element (5) is inserted in said port (3), extends upward and has, on its free terminal end (7), lifting means (8;18) which are connected to external actuation means (13;24) by means of lever systems (10-12, 14-17; 21-23), said lifting means comprising adjustment means (26) for the complete or partial discharge of the water of the cistern, so as to allow controlled discharges of washing water according to the different requirements.

2. Flush tank structure according to claim 1, characterized in that said lifting means comprise, for partial discharge, an annular body (8) which is inserted on said traction element (5), which has means (30,31) for detachable engagement with said adjustment means (26), said annular body (8) being connected to a respective first lever system (10-12, 14-17) by means of a first bracket (9), said annular body (8) being suitable for lifting said traction element (5) in order to open said port (3).

3. Flush tank structure according to claim 2, characterized in that said first lever system is composed of a support (10) which is fixed to an inner wall of said flush tank (1), said support (10) having a plurality of supporting seats (11), a first lever (12) being pivoted on one of said supporting seats (11) and being connected directly to an actuation pushbutton (13) which protrudes from said flush tank (1), said first lever (12) bearing a removable engagement means (15) for a second lever (14), said second lever (14) being pivoted, at a terminal portion, in another one of said supporting seats (11), being inserted within said first bracket (9), with its other terminal portion, and bearing guiding means (17) for said removable engagement means (15).

4. Flush tank structure according to one or more of the preceding claims, characterized in that said removable engagement means is constituted by a hook (15) which is fitted so as to rotate angularly on a free end portion of said first lever (12).

5. Flush tank structure, according to one or more of the preceding claims, characterized in that it further comprises guiding means which are constituted by an inclined segment (17) which rises from said second lever (14) at said hook (15) mounted on said first lever (12), so as to facilitate the engagement of said hook (15) to the second lever (14).

6. Flush tank structure, according to one or more

of the preceding claims, characterized in that said lifting means are constituted, for complete discharge, by a ring (18) which can slide on said traction element (5) and is suitable for engaging release tabs (19) for said detachable engagement means (30,31) so as to release said adjustment means (26) and thus lift said traction element (5) so as to open said port (3), said ring (18) being connected to a respective second lever system (21-23) by means of a second bracket (20).

7. Flush tank structure, according to one or more of the preceding claims, characterized in that said second lever system is composed of a support (21) which is fixed on an internal wall of said flush tank (1), said support having a plurality of supporting seats (22), a third lever (23) being pivoted on one of said supporting seats, said third lever being connected directly to an actuation pushbutton (24) which protrudes from said flush tank and is inserted, with its other free end portion, within said second bracket (20).

8. Flush tank structure according to one or more of the preceding claims, characterized in that said sliding ring (18) has a substantially bracket-shaped lower perimeter within which grip seats (25) for said tabs (19) are defined.

9. Flush tank structure, according to one or more of the preceding claims, characterized in that said adjustment means are constituted by an annular weight (26) which is slidingly inserted on said traction element (5).

10. Flush tank structure, according to one or more of the preceding claims, characterized in that said weight (26) has raised portions (27) for engagement for said detachable engagement means (30,31) and has an annular water containment compartment (28) in order to increase its own weight.

11. Flush tank structure, according to one or more of the preceding claims, characterized in that said annular compartment (28) has a plurality of water discharge holes (29) defined on its lower surface so as to avoid creating water stagnation regions in the flush tank.

12. Flush tank structure, according to one or more of the preceding claims, characterized in that said detachable engagement means are constituted by levers (30), each of which has an abutment (31) for engagement to said annular weight (26) and a tab (19) which is opposite to said abutment (31).

13. Flush tank structure, according to one or more of the preceding claims, characterized in that said hook (15) is suitable for disengaging from said second lever (14) by rotating about said first lever (12) and is suitable for engaging said second lever (14) by virtue of the action of said inclined segment (17).

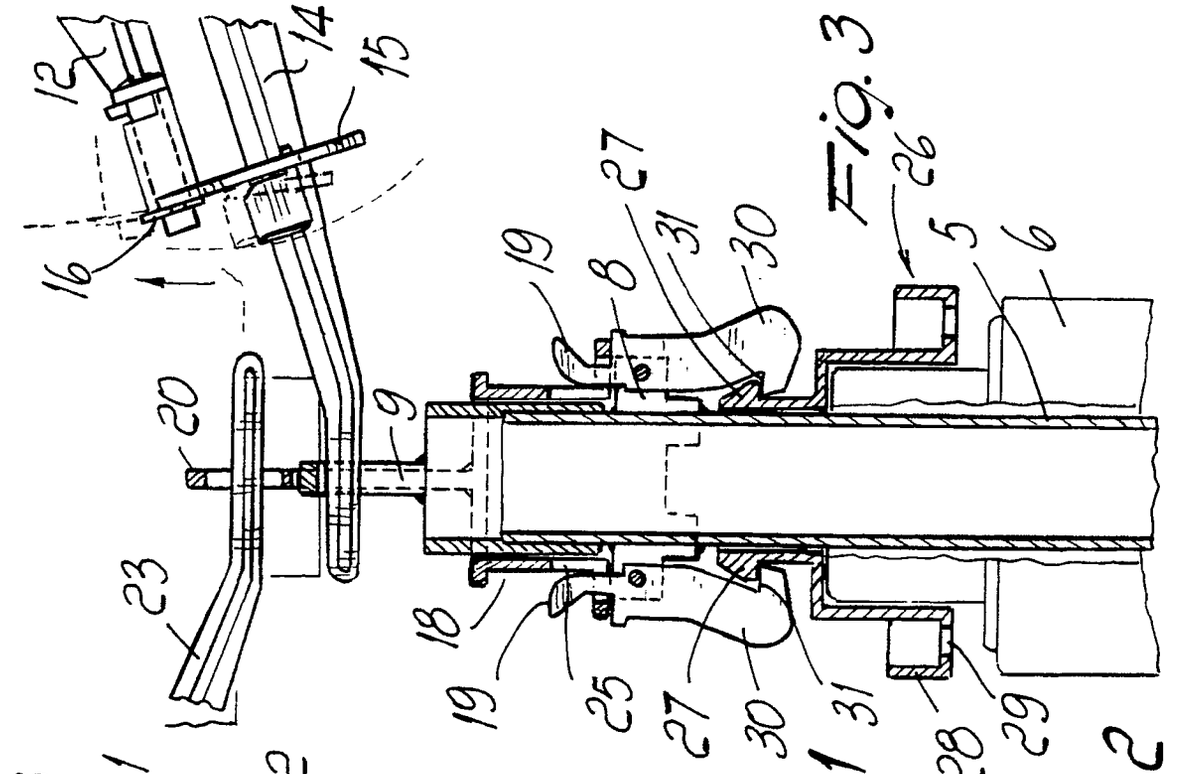

Fig. 1

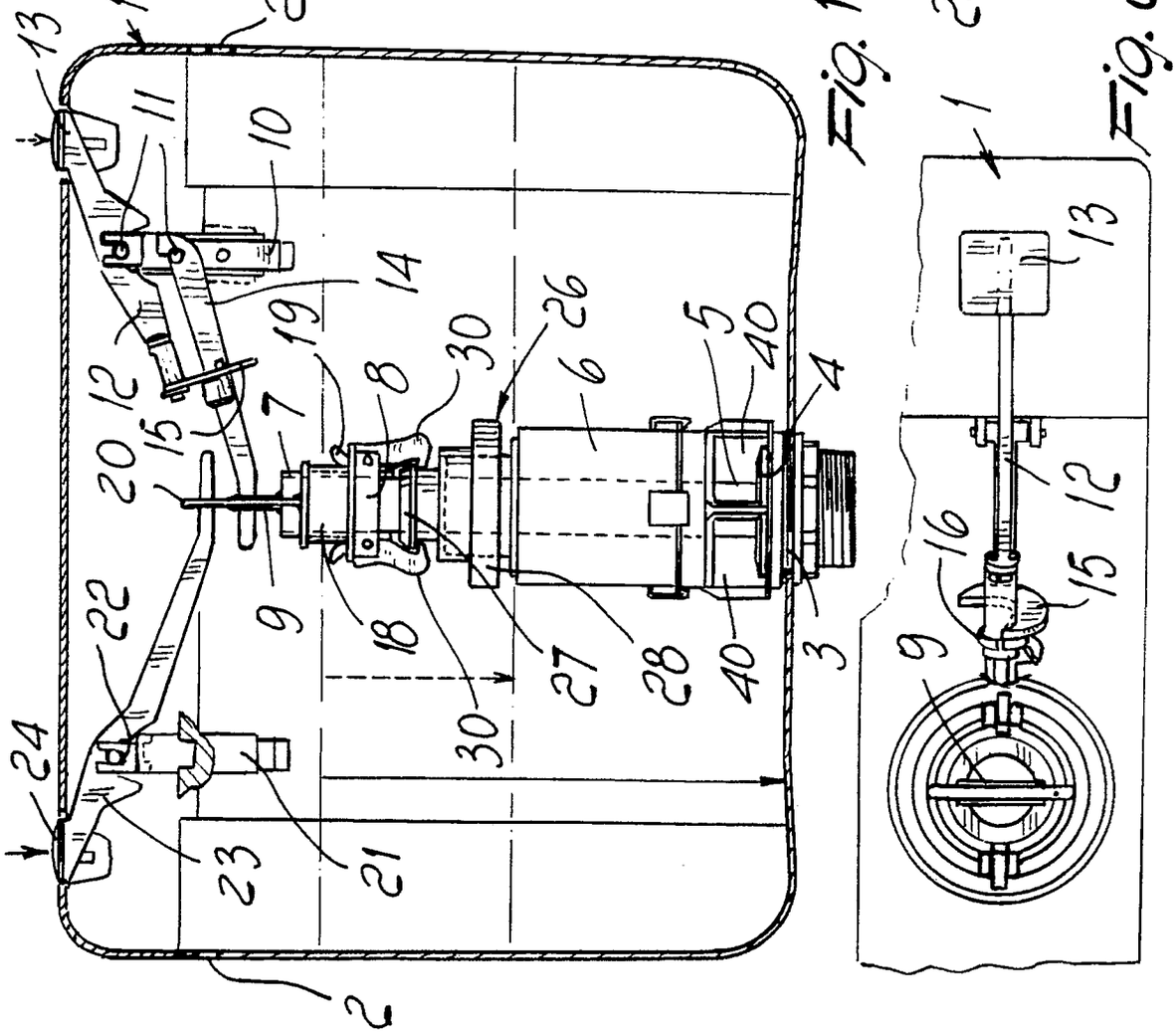

Fig. 2

Fig. 3

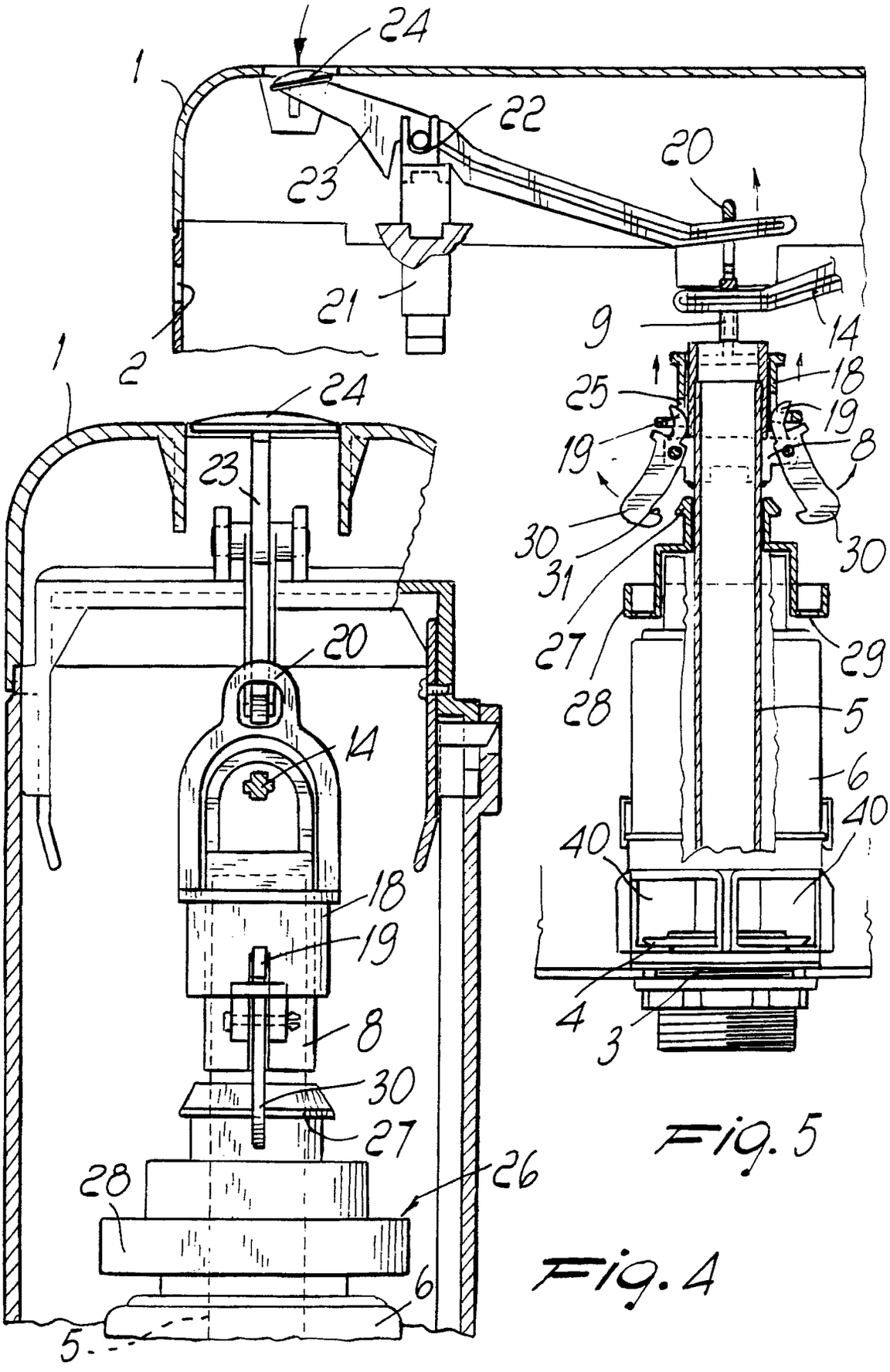
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Fig. 5

Fig. 4

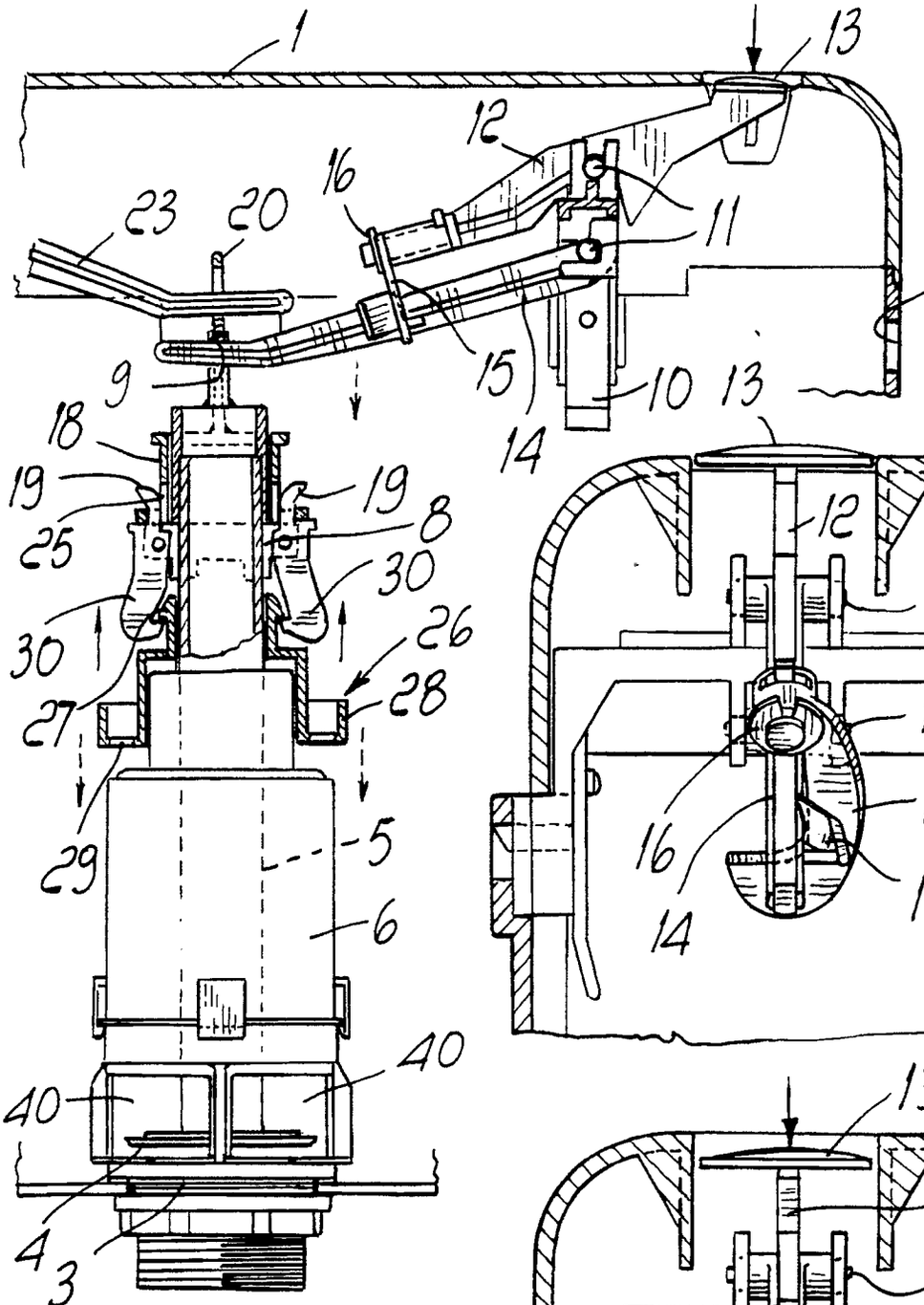


Fig. 6

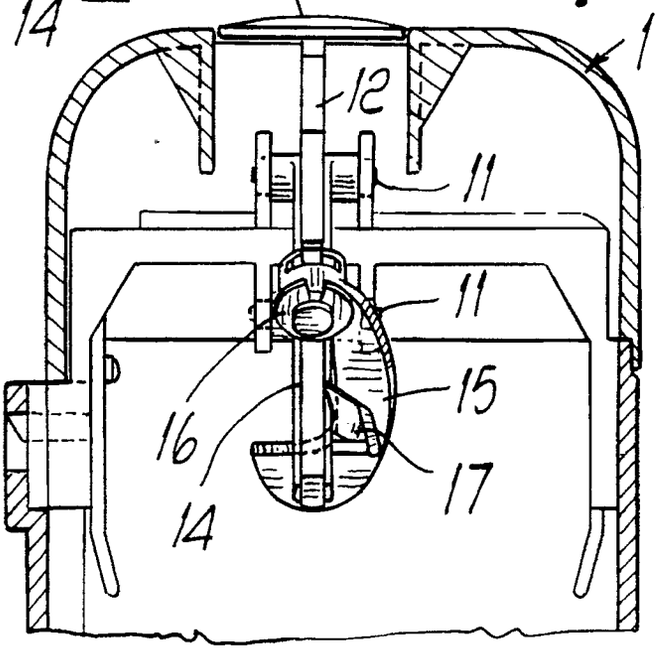


Fig. 8

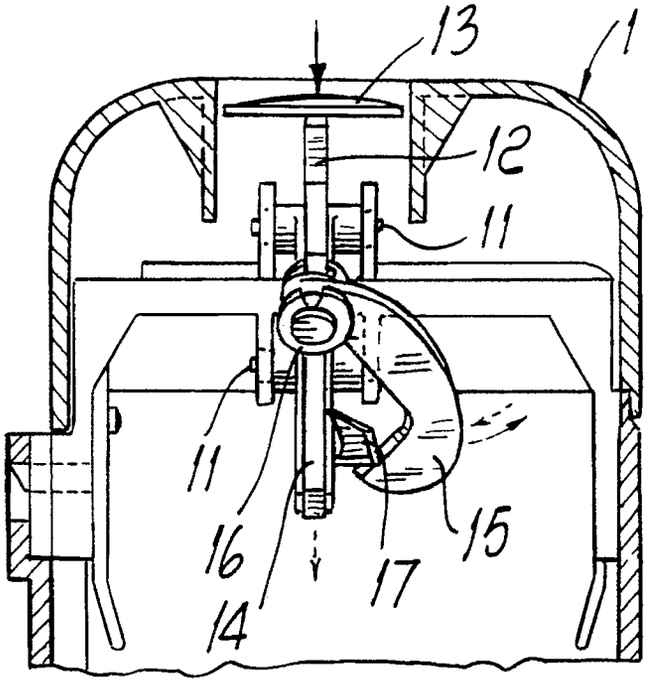


Fig. 9

Fig. 7

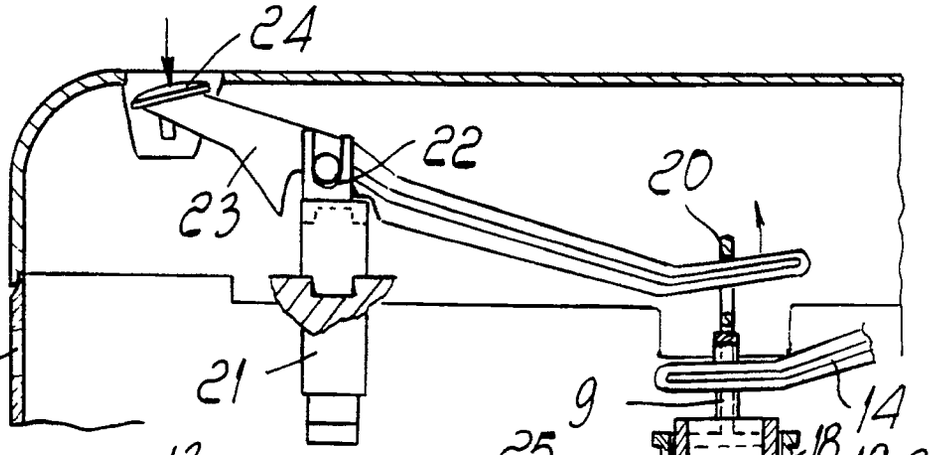
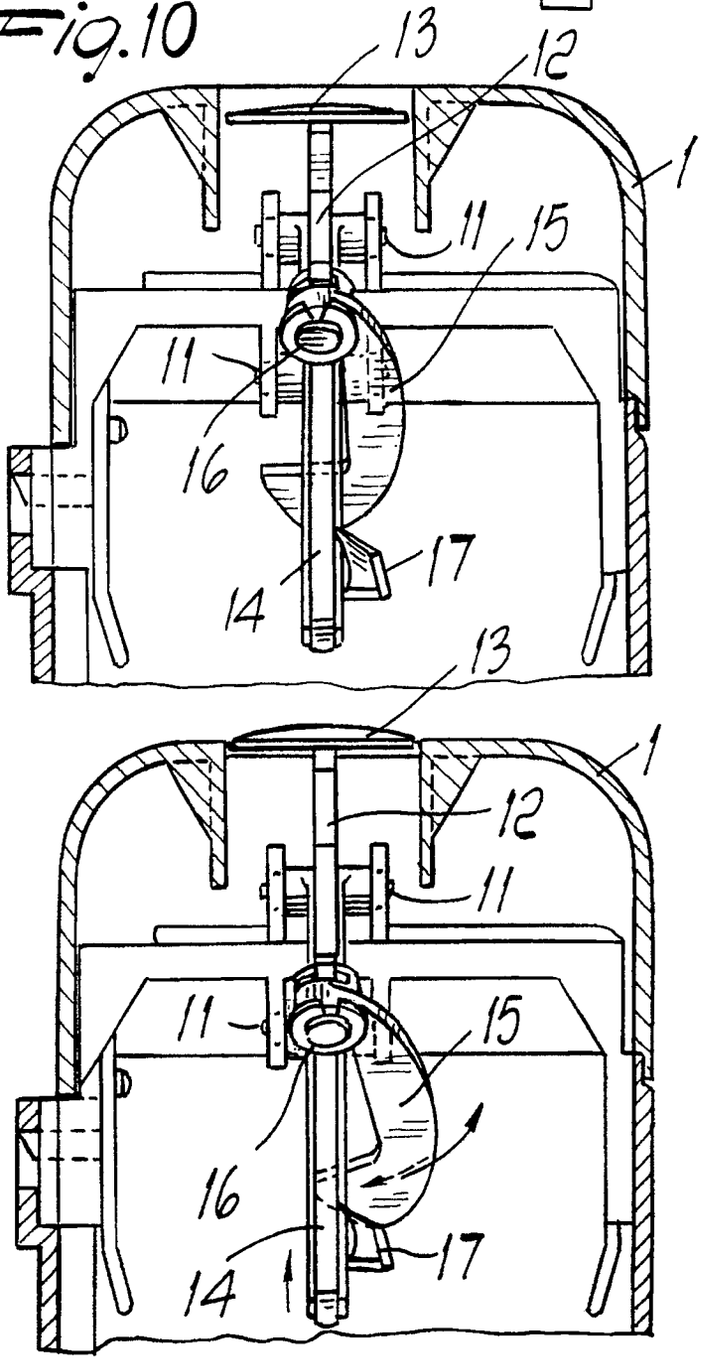


Fig. 10



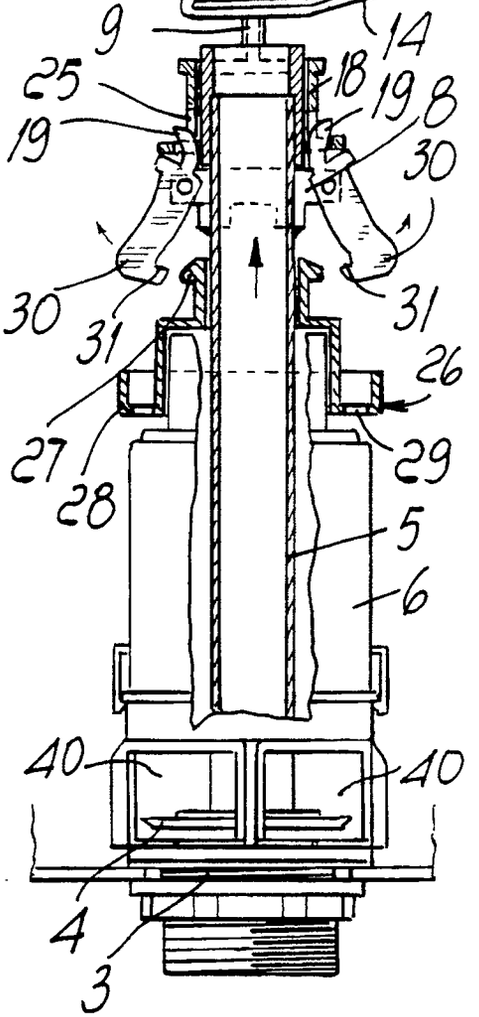


Fig. 11

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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 4420

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X,Y,A	DE-A-2 601 282 (ZECHER) * page 10 - page 11; figures 1-3 *	1,2,7,9, 12,10,11, 3,4,6,8	E 03 D 1/14
Y	DE-A-3 228 443 (SCHLEMMINGER) * page 11, line 19 - line 23; figure 1 *	10,11	
A	GB-A-2 077 790 (TEN-SUNG) * abstract; figures 1-5 *	1,9,10,12	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 03 D

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	20 June 91	VAN BEURDEN J.J.C.A.

CATEGORY OF CITED DOCUMENTS

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