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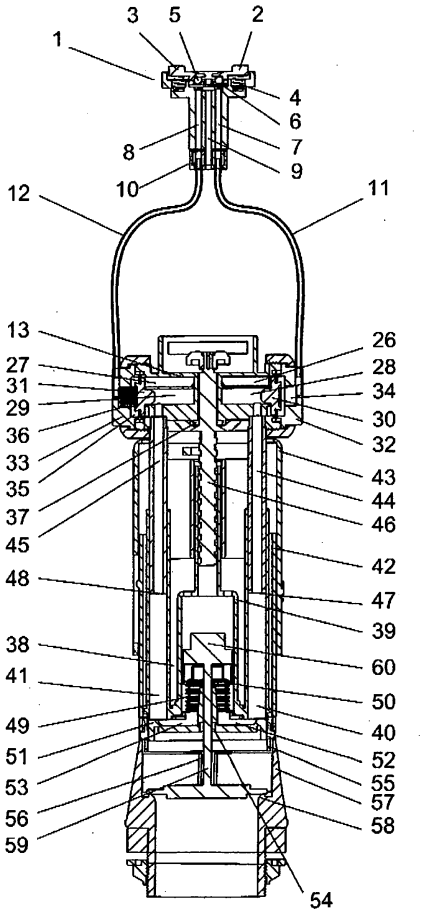
(54) CISTERN FILLING AND EMPTYING ASSEMBLY

(57) The invention relates to a cistern filling and emptying assembly including: a suitable structure (42) having independent water pulsing pipes (47 and 48) for partially or totally emptying the cistern, whereby the height of the structure can be adjusted with a single action which simultaneously adjusts all of the levels of the cistern; and a distributor (13) for distributing the water entering the cistern, having valves (19, 30 and 31) for the successive water filling and emptying operations. The water in the apparatus is used to produce a flow of water by means of a short slight pulse and said flow enables the selective partial or total emptying of the cistern.

FIG. 1



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Description

FIELD OF THE INVENTION

[0001] This invention refers to a cistern filling and emptying assembly, especially but not exclusively designed as an assembly for filling and emptying a toilet cistern.

BACKGROUND OF THE INVENTION

[0002] There exist apparatus for emptying cisterns in which a valve rod or stem incorporates at its lower operating end' a drain valve, for example a plugging seal, which normally sits in the cistern's drain outlet to shut off the water output. The valve stem is lifted by an operating system to separate the drain valve from the drain outlet and allow the liquid to flow out through the drain outlet; with the stem being maintained in its lifted position by the action of a float arm. When the level of liquid in the tank descends, the float arm descends and no longer acts on the stem, with the result that the stem descends by gravity and repositions the drain valve to seal off the drain outlet and thereby end the emptying.

[0003] A known development for a device of a specified kind allows the user to choose between different volumes of flow. In this case there are two float arms at different levels. The operating system allows the valve stem to be lifted selectively to two different heights. When the stem is lifted to the lower of the two heights a partial emptying of the water is achieved until the float arm located higher up releases it, with the result that the drain valve is reseated into the drain outlet. When the stem is lifted up higher than the two heights, it is acted upon by the lower float arm, which only releases and drops it down to reseat the drain valve when the cistern has emptied completely. A typical example of a system such as that specified is described in US patent 3421161.

[0004] Document ES 2113241 shows a two-stage emptying device with two levels of emptying and a single drain outlet consisting of a structure that includes a double push button mechanism, each with a different amount of travel as a result of stops that limit their movements; a system of traction operated by pressing and consisting of a third type of lever; a support with adjustable height formed by spindles, adjusting notches and retaining wedges; and an overflow tube connected to the drain outlet with a cover to which two separate tilting devices are joined for the partial or total emptying of the toilet. The greater or lesser height of the overflow tube determines the partial or total emptying of the cistern.

[0005] Document ES 2136547 describes a traction system also operated by levers, and introduces a spring-loaded depressor mechanism, with float balls coaxial with the overflow tube and the lower float ball in a cover with an air chamber that can be released by the depressor mechanism to achieve complete emptying. The greater or lesser height of the overflow tube determines the partial or total emptying of the cistern.

[0006] All the known operating systems make use of levers that operate swivels and are suitably connected in order to raise the valve stem and lift the drain valve from its seat at the start of emptying. The time needed for assembly and the jamming of the levers are evident drawbacks presented by these systems.

[0007] Document US 4809367 describes an emptying mechanism for cisterns consisting of an operatively upright stem, with a drain valve at the operatively lower end of the stem which is adapted, in a first lower position of the stem, to seat upon and shut off an outlet from the cistern, and in a second raised position of the stem, to clear the outlet and allow liquid to flow out of the cistern through the outlet; movable devices which can be selected to raise the stem from its first position to a determined position chosen from its two second positions corresponding to the volume of water to be emptied; and means for controlling the float which, when the stem is raised to its second position, hold it in that position until such time as a predetermined volume of liquid has emptied out of the cistern and then allows the stem to return to its first position; in which the movable devices for raising the stem from its first position to its second position are moved by a pressurised liquid. Although the number of levers is reduced compared with other known mechanisms, the emptying action requires pressing with acertain intensity. This mechanism does not include a means for simultaneously adjusting the water levels and the overflow or a height adjustment support for adapting them better in the cistern.

[0008] The systems described require the raising of the stem to two different heights in order to empty, with a resulting need for unwanted corrections.

AIM OF THE INVENTION

[0009] The technical challenge is that of designing a device for filling and emptying a cistern, requiring a slight push and very little travel to activate its operation, avoiding the use of electricity and employing the water present in the appliance drawn with every press to achieve the lifting of the stem and causing the selective emptying of the water contained in the cistern. In addition, the idea is for the apparatus to be easily adaptable to a required height in the cistern by means of a single action, which would in turn regulate the water levels in the cistern.

[0010] An aim of the invention is to provide an assembly for filling and emptying a cistern with an emptying activation that is water-driven and initiated by the user with a press that is very slight and with very little travel, making it especially suitable for people with disabilities. The successive fillings of water into the cistern envisage the same type of operation, although in this case initiated by the raising of the water level in the tank and the pushing up of a float ball attached to a lever fitted with a closing element.

[0011] The invention also envisages an assembly for filling and emptying a cistern that uses a height adjust-

ment structure in order to configure independent water pulses to achieve the selective partial or complete emptying of a cistern.

[0012] In addition, with this single adjustment, the invention also envisages the simultaneous regulation of water levels in the cistern and the height of overflow, i.e. adjusting the nominal volume of water in the cistern and the volume of the full and partial water empties with a single action.

DESCRIPTION OF THE INVENTION

[0013] The invention provides an assembly for filling and emptying a cistern, of the kind that can be located inside a cistern, for example in a cistern with water to be emptied for cleaning toilets, and which includes: An emptying initiator fitted on the outside of the cistern, for example on the cistern lid, with at least two push buttons whose selective operation causes the opening of the water flow in a respective pipe from a device distributing water from the mains water supply, with said distributor including devices that can be operated selectively by the initiator to cause a first or second emptying of the water contained in the cistern respectively, equivalent to a partial or complete emptying of the volume of water contained in the cistern, and a bottom nozzle designed to fit into the cistern drain outlet, in addition to a valve stem fitted with a drain valve or seal at its bottom end for plugging the cistern's drain outlet, and float balls that keep the valve stem raised and separated from the drain outlet while said first or second emptyings are occurring in the cistern; and also including a support structure that regulates the distance between the distributor device and said bottom nozzle and adjusts the apparatus at the required height in the cistern. In order to solve the technical problem raised, the assembly for the filling and emptying of a cistern has been developed to work to a stable pressure of between 0.5 and 10 bars in the water circulating in its interior, and this makes it necessary, among other factors, to achieve synchronisation between the components and their various actions, to incorporate a distributor for the mains water supply that includes housings that communicate with each other in an ordered way to ensure the water flow, and pipes fitted to the housings that enable the water to emerge and whose output is controlled by valves, membranes or diaphragms easily fitted by means of stoppers to the respective distributor housing. Two of the membranes are operated via capillary pipes connected to corresponding and respective buttons in order to achieve the partial and complete emptying of the water in the cistern, and the third one is also operated, via a narrow passage, by a lever activated by the only float envisaged in the assembly, to shut off the water pipe for filling the cistern. In this case, and in order to achieve a better synchronisation, the housings and the output pipes are adjusted with different volumes.

[0014] With the aim of achieving an operating assembly that can be easily fitted and adjusted in the required cistern, it has been decided to include two pipes in the support structure for independent and selective pulses of water, underneath the distributor. In the mains water supply input housing, a filter and water flow regulator are fitted to the top of the body to aid in stabilising the water pressure in the assembly.

[0015] Between the membranes and the caps that shut off the water distributor housings, small chambers are formed that are liable to flooding by the water that fills the distributor housings and penetrates into the chambers via the perforations in the periphery of the membranes. In accordance with the invention, each push button on the initiator is connected by a capillary pipe to a membrane, with each press ensuring that water is allowed to pass to the corresponding water output pipe in the distributor housing in which the membrane is fitted. The imbalance in each chamber required to produce the emptying is caused by the increase of the surface tension in the capillary pipe when the push button to which it is connected is pressed, and is revealed by a slight loss of water that is collected in the cistern, for example via a drain pipe in the initiator.

[0016] In accordance with the invention, this distributor consists of: a first housing, to which the water supply device to the cistern is connected and which includes a flow rate regulator, a second housing with a water output pipe to which a membrane is connected to be operated by a lever activated by a single float ball adjustable with the level of water present in the cistern in order to shut off the water flow from the water supply device to the cistern, a third and a fourth housing for respective membranes whose selective operation allows water to flow from the supply device to a respective water output pipe, and with the housings communicating in the direction of flow, laevorotatory or dextrorotatory, and with a central bottom pipe from which a flow of water coming from the feeding device fills the cistern. Communication between the last and the first housing is either inexistent or is closed.

[0017] In accordance with the invention, the support structure is adapted to form first and second independent pipes to be flooded by a water pulse under pressure from one or other of the water output pipes in third and fourth housings, in order to raise the valve stem, and as a consequence, to separate the drain valve from its seat in the cistern drain outlet.

[0018] In accordance with the invention, the support structure is envisaged, for example, with a top body from which the first and second independent connection pipes emerge, descending vertically and having a section adapted for its sliding assembly in corresponding vertical pipes that emerge upwards from a bottom body that is adapted to the lower nozzle threaded onto the cistern's drain outlet, in such a way that said first and second pipes in the support structure form a part or are respectively adapted to said first and second independent connection pipes descending from the top body and to its corresponding vertical pipes emerging from the bottom body.

[0019] In its case, in order to incorporate the distributor into the support structure and to regulate the height of the assembly and simultaneously regulate all the water levels in the cistern and of the overflow, it has been decided to fit a connecting element, for example a threaded rod fitted with a driving head or nut, in such a way that the rod runs through the distributor and the top body that carries it, and threads into a collar in the bottom body, with its head being accessible to the fitter or the user so that it can be turned in one direction or other to close up or separate said structures and simultaneously regulate all the levels in the cistern.

[0020] The raising of the valve stem and the separating of the drain valve from the cistern drain outlet in any of the emptyings performed, whether partial or complete, is brought about, for example, by the expansion of a piston fitted to the valve stem that includes an escape orifice in its top for slowing down the output of the water driven from the pipes, while it descends under gravity together with the valve stem, and the drain valve reseats in the cistern drain outlet.

[0021] All of this is designed so that, when a complete emptying of the water contained in the cistern is desired, it simply requires pressing the corresponding empty initiation push button, normally fitted on the outside of the cistern or close to it, so that an increase takes place in the surface tension in the capillary pipe, the water column in its interior rises, there is a slight loss of water at the top end of the capillary pipe, an imbalance occurs in the water chamber to which the bottom of the capillary pipe is connected leading to the immediate separation of the membrane from its seat in the opening of the water output pipe in the distributor housing, so that the pulse of pressurised water flow from the supply device begins its journey in the piping towards the piston in order to expand it vertically upwards, forcing with its expansion the raising of the stem that it carries, and therefore the separation of the drain valve from its seat in the opening of the nozzle threaded onto the cistern drain outlet in order to allow the complete emptying of the water contained in the cistern. With the emptying of the water in the cistern, the water inside the piston escapes slowly through the escape orifice next to its top and the valve stem descends under gravity, replacing the drain valve in the nozzle seat and shutting off the water cistern drain outlet; the piston returns to its previous position while the water again runs from the supply device since the float ball is no longer in contact with the lever on the adjacent membrane, and the water filling the cistern from the supply device halts when this membrane is again operated by the float ball.

[0022] When a partial emptying of the water contained in the cistern is desired, pressing the corresponding empty initiation button causes a leakage in the following capillary pipe and a consequent imbalance in the water chamber to which this is connected, with the result that the following membrane is separated from its seat, allowing the flow of the water pulse towards the interior of the piston in order to expand it vertically upwards and forcing with its expansion the raising of the valve stem and therefore the separation of the drain valve from its seat in the opening of the nozzle fitted to the cistern drain outlet, thereby allowing the emptying of water contained in the cistern up to a predetermined level. The draining of water from the cistern up to a predetermined level coincides with the descent of the float ball and the release of the lever on the membrane that shuts off the water output pipe for filling the cistern, with the result that the water begins to flow into the cistern through the pipe from the second housing to which the adjacent membrane is connected. The massive inflow of water to the second housing reduces the rate of water flow entering the fourth housing, and the membrane is almost immediately forced to close against the water output pipe from this fourth housing to halt the emptying. A spring with a determined tare tension helps to maintain the membrane in the closed position to compensate for possible pressure drops.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention will be even more understandable in the light of the detailed description that follows and of the drawings that accompany it by way of example, without their inclusion constituting any restriction of the present invention. In the drawings:

Figure 1 shows a view of the assembly for filling and emptying a cistern, corresponding to a longitudinal section of its height.

Figure 2, in correspondence with Figure 1, shows a view of the assembly for filling and emptying a cistern, corresponding to a partial longitudinal section of its profile.

[0024] On a larger scale and in correspondence with the previous figures, Figure 3 shows a transverse section of the distributor for the assembly for filling and emptying a cistern.

DESCRIPTION OF A PREFERRED IMPLEMENTATION OF THE INVENTION

[0025] In accordance with an implementation of the invention, shown in the figures that illustrate the proposed example, the assembly for the filling and emptying of a cistern includes:

- An emptying initiator (1) consisting of respective push buttons (2) and (3) designed respectively for the complete and partial emptying of the water in the cistern. The example shows tilting devices on springs (4) that push against balls (5) resting on the membrane (6) that closes the opening to the respective pipes (7) or (8), between which can be seen a drainage pipe (9) and in which, for example, are housed the capillary pipes (11) and (12) that join at their opposite end onto

- a distributor assembly (13) which includes, communicating in the same turning direction:
  - a first housing (14) in which is connected a device (15) supplying water from the mains water supply. Figures 2 and 3 provide a better view of the filter (62), the flow rate regulator (63) and a partition.
  - A second housing (17) containing a water output pipe (18) shut off by the membrane (19) attached by a threaded cap (20) to the opening of the housing (17) with which it forms a small chamber (21), and with the threaded cap (20) presenting a narrow passage (22) adapted to the closing element (23) to be fitted to one arm of the lever (24) whose other branch, shown in Figure 2, is in contact with the float ball (25);
  - third and fourth housings (26), each of which is fitted with a water output pipe (28) and (29) shut off by its respective membrane (30) and (31), which can be seen to be attached by their respective threaded caps (32) and (33),defining chambers (34) and (35), a spring (36), and
  - a central pipe (37) with a bottom output via which a flow of water from the supply device (15) reaches the cistern.
- a bottom body (38) attached onto the cistern's water emptying assembly nozzle (57) and forming a hollow central chamber (39) with two vertical pipes (40) and (41).
- a support structure (42) to adapt the emptying assembly to the required height in the cistern, including a connecting element, such as a threaded stem (46), to join the distributor assembly (13)in an adjustable way to the bottom body (38) in the support structure (42) and at least two independent pipes from connection (44) and (45) descending in parallel from the top body (43) in the support structure (42), and with each connection pipe (44) or (45) connected at its top end to the corresponding water output pipe (28) or (29) in housings (26) or (27) in the distributor (13), and at its bottom, connected with a close fit but able to slide into the corresponding vertical pipe (40) or (41) of the bottom body (38). These connecting pipes (44) and (45) are used to ensure that the flow of water from the distributor (13) is directed independently into one (40) or other (41) of the vertical pipes in the bottom body (38) when the emptying assembly is selectively activated, thereby achieving two independent pipes (47) and (48), to be used for the selective passage of the flow of pressurised water that will produce the partial or complete emptying of the cistern, from the distributor (13) to
- a tubular bellows piston (49) fitted vertically in the hollow central chamber (39) of the bottom body (38), with the cistern emptying nozzle(57) opening (58) valve stem (59) passing through and closed at the top by the head (60) of said valve stem (59).
- a disk-shaped body (51), fitted below this bottom body (38) and formed out of radial pipes (52) and (53) which connect each vertical pipe (40) and (41) on the bottom body (38) with the interior of the bellows piston (49) fitted between the bottom body (38) and the disk-shaped body (51); with the disk-shaped body (51) seated against the base (55) that shuts off the bottom body (38), and with holes (54) and (56) passing through the respective centres of the disk-shaped body (51) and the base (55) for the close-fitting passage of the valve stem (59).

[0026] Assuming that the emptying device has been adjusted in length in order to adapt it to the height of the cistern, and with the aforementioned adjustment simultaneously adjusting all the desired levels by means of the same and only action of manually turning the threaded stem (46) in its threaded collar in the central hollow central chamber (39) of the bottom body (38), and with the supply device (15) supplying water until the narrow passage (22) is shut off by the closing element (23) on the lever (24) when pushed by the float ball (25) as a result of the water level in the cistern, once the cistern is full at the predetermined water level, the functioning of the described emptying assembly for cisterns is as follows: when a "complete" emptying of the water contained in the cistern is required, activating the corresponding opening control for a complete empty (2) forces the spring (4) to contract and releases its pressure on the ball (5) and the membrane (6) portion moves back from its seat in the pipe opening (7) causing a slight loss of water in the capillary pipe (11) and an imbalance in the chamber (34), and leading to the separation of the membrane (30) from its seat in the water output pipe (28) opening in the distributor (13) and the water flow from the water supply device (15) begins its journey in the pipe (47)by entering the water output pipe (28), running through the connecting pipe (44) and continuing along the vertical pipe (40) in the bottom body (38), continuing through the radial pipe (52) in the disk-shaped body (51) and flowing up into the interior of the piston of bellows (49), which it expands vertically upwards to be guided inside the central hollow chamber (39) that contains it, and by expanding forcing up the head of the stem (60) and of the stem itself (59), and, therefore separating the drain valve (61) from its seat in the opening (58) of the nozzle (57) screwed onto the cistern drain outlet, thereby allowing the emptying of the water contained in the cistern.

[0027] After a water empty corresponding to a "complete" emptying of the water contained in the cistern, the water present inside the bellows piston (49) escapes via the orifice (50) and the stem (59) descends under gravity, reseating the drain valve (61) in the opening (58) of the nozzle (57) and closing the water cistern drain outlet. The bellows piston (49) returns to its previous position while the water begins to run from the supply device (15) since the float ball (25) has lost contact with the lever (24)

whose closing element (23) is separated from the mouth of the narrow passage (22), with the water filling the cistern from the supply device (15) halting when the closing element (23) on the lever (24) shuts off the narrow passage opening (22) on being once again pushed by the rising float ball (25).

[0028] Assuming that the cistern is once again full, when a "partial" emptying of the water contained in the cistern is to take place, activating the initiating button for a small empty (2) forces the spring (4) to contract and releases its pressure on the ball (5) so that the membrane portion (6) moves back from its seat in the pipe opening (8) causing a slight loss of water in the capillary pipe (12) and an imbalance in the chamber (35), and leading to the separation of the membrane (31) from its seat in the water output pipe opening(29) in the distributor (13) and the water flow from the water supply device (15) begins its journey along the pipe (48)by entering the water output pipe (29), running through the connecting pipe (45) and continuing along the vertical pipe (41) in the bottom body (38), continuing through the radial pipe (53) in the disk-shaped body (51) and flowing up into the interior of the bellows piston (49), which it expands vertically upwards to be guided inside the central hollow chamber (39) that contains it, and by expanding forcing up the head of the stem (60) and of the stem itself (59), and, therefore separating the drain valve (61) from its seat in the opening (58) of the nozzle (57) threaded onto the cistern drain outlet, thereby allowing the emptying of the water contained in the cistern. The emptying of the water is interrupted when the water level in the cistern descends to a predetermined height equivalent to the volume of water needed to be emptied. As the water level in the cistern falls, the float ball (25) descends and no longer presses against the lever (24), thereby releasing it and allowing the closing element (23) to separate from seat in the narrow passage (22), the membrane (19) to separate from the water output pipe opening (18) in the housing (17) and the water to refill the cistern. Once opened, and after flooding the first housing (14), the flow rate of the water flowing from the water supply device (15) to the second housing (17) is greater than that of the water in the fourth housing (27), thereby causing the early closing of the membrane (31) on the water output pipe opening (29), halting the water flow from the pipe (48) and causing the early closing of the drain valve (61). The manoeuvre allows a predetermined partial emptying to be achieved.

[0029] As the water flows into the cistern, the float ball (25) rises until it presses against the periphery of the lever (24), thereby causing it to tilt and causing the closing element (23) to reseat in the narrow passage (22), pushing the membrane (19) against the water output pipe opening (18) to shut off the flow of water filling the cistern.

[0030] It should be understood that the detailed description and specific examples only indicate a preferred implementation of the invention and are only for the purposes of illustration, and therefore the different changes and modifications carried out within the spirit and scope of the invention will be clear to any technical expert.

Claims

1. 1. CISTERN FILLING AND EMPTYING ASSEMBLY, which includes an emptying initiator (1) with at least two push buttons (2) and (3) whose selective pressing causes the opening or closing of the water flow in a respective output pipe (28) or (29) from a distributor (13) to cause the complete or partial emptying of the water contained in a cistern; a bottom nozzle (57) to be connected to the cistern drain outlet, a valve stem (59) fitted with a drain valve (61) which plugs the cistern drain outlet, and at least one float ball (25) that keeps the valve stem (59) raised and separates the drain valve (61) from the aforementioned drain outlet while said partial or complete emptying of water from the cistern takes place. It also includes a support structure (42) that regulates the distance between the aforementioned distributor (13) and said bottom nozzle (45) to adapt the assembly to the height required in the cistern, **characterised by** the fact that said support structure (42) includes at least a first (47) and a second (48) pipe that are independent and selectively floodable by the pressurised water that floods the output pipes (28) and (29) of the distributor (13), and whose pulse raises the valve stem (59) and separates the drain valve (61) from its seat in the cistern drain opening. Each of the push buttons (2) or (3) in the initiator (1) is fitted with a respective capillary pipe (11) or (12) to act on a corresponding membrane (30) or (31) that opens or closes the water flow in the output pipe (28) or (29) of the distributor (13) which said corresponding membrane (30) or (31) shuts off.

2. CISTERN FILLING AND EMPTYING ASSEMBLY, in accordance with the previous claim, **characterised by** the fact that the aforementioned support structure (42) includes a top body (43) that contains a first (44) and a second (45) vertical descending pipe of a diameter adapted to slide into and fit closely into corresponding vertical pipes (40) and (41) emerging from a bottom body (38) connected to the bottom nozzle (57), with said first (47) and second (48) pipes in said support structure (42) respectively adapted to said first (44) and second (45) vertical descending pipes and to the corresponding vertical pipes (40) and (41) emerging from the bottom body (38).

3. CISTERN FILLING AND EMPTYING ASSEMBLY, in accordance with the previous claims, **characterised by** the fact that the support structure (42) includes a vertically centred connecting element, such as a threaded rod (46), adapted to join the aforementioned distributor (13)in an adjustable way to the

aforementioned bottom body (38), so that the top body (43) and the bottom body (38) of the support structure (42) are joined by this threaded rod (46) which threads into the top portion of the central hollow chamber (39) in the bottom body (38), and with the head of said threaded rod (46)being manually accessible so that turning it in one or other direction closes up or opens up the separation between the two potions (43) and (38) and the simultaneous adjustment of all the levels in the cistern.

4. CISTERN FILLING AND EMPTYING ASSEMBLY, in accordance with previous claims, **characterised by** the fact that the distributor (13) includes a first housing (14) for connecting the device (15) supplying mains water to the cistern, and which includes a water flow rate regulator (63); the second housing (17) with a water output pipe(18) connected, via the membrane (19) and the narrow passage (22), to a closing element (23) fitted to a lever (24) to be driven by a float ball (25) adjustable to the level of water present in the cistern in order to shut off the flow of water from the supply device (15); the third (26) and fourth housings (27) shut off by corresponding membranes (30) and (31) whose selective operation allows water to flow from the supply device (15) to a respective water output pipe (28) and (29), with the housings (2), (28), (17) and (29) suitably connected to each other and with a bottom central pipe (37) through which the flow of water proceeding from the supply device (15) fills up the cistern. 5.CISTERN FILLING AND EMPTYING ASSEMBLY, in accordance with previous claims, **characterised by** the fact that the raising of the valve stem (59) and the separating of the drain valve (61) from the cistern drain outlet is brought about by the expansion of a piston (49) that includes an escape orifice in its top for slowing down the emergence of the driven water while the valve stem (59) descends and the drain valve (61) reseats in the opening (58) of the cistern emptying nozzle (57).

FIG. 1

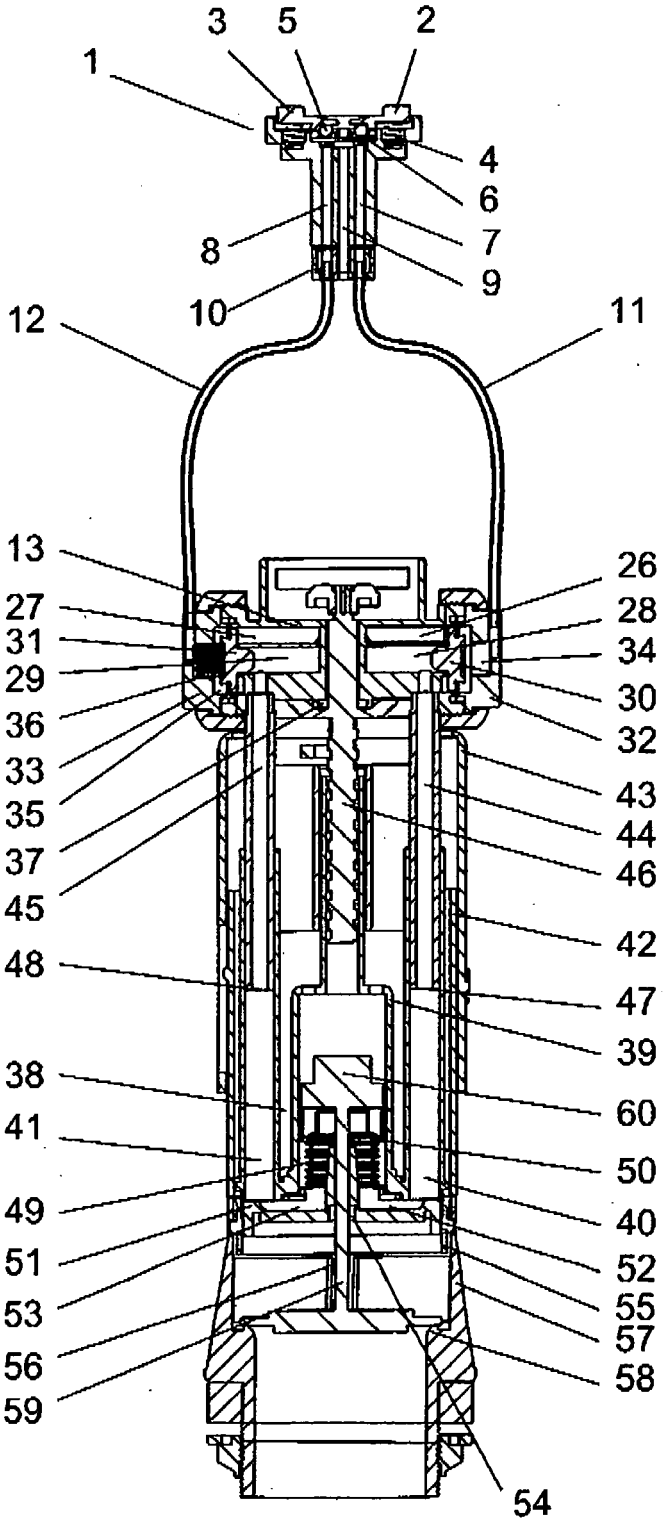
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FIG. 2

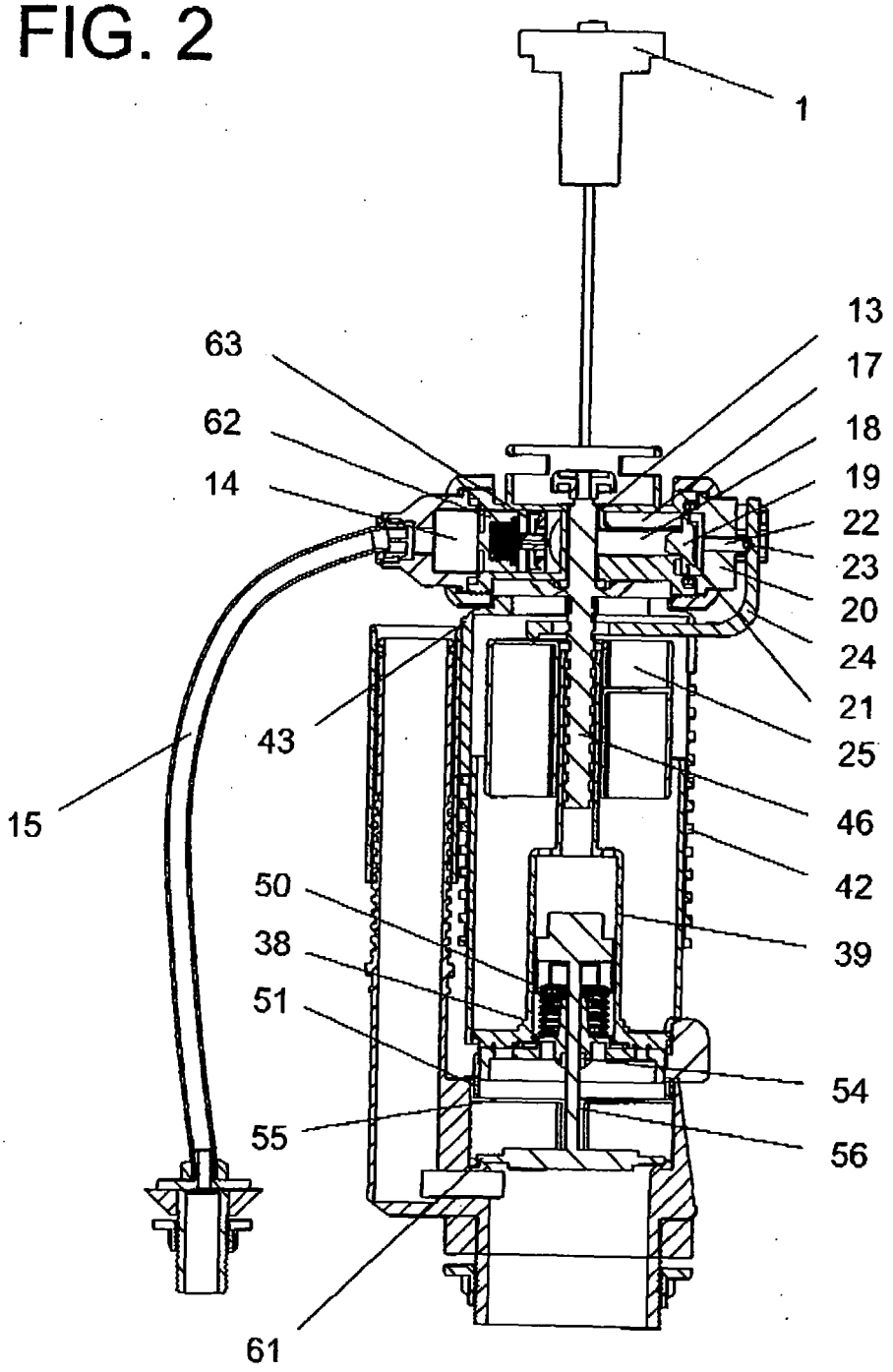
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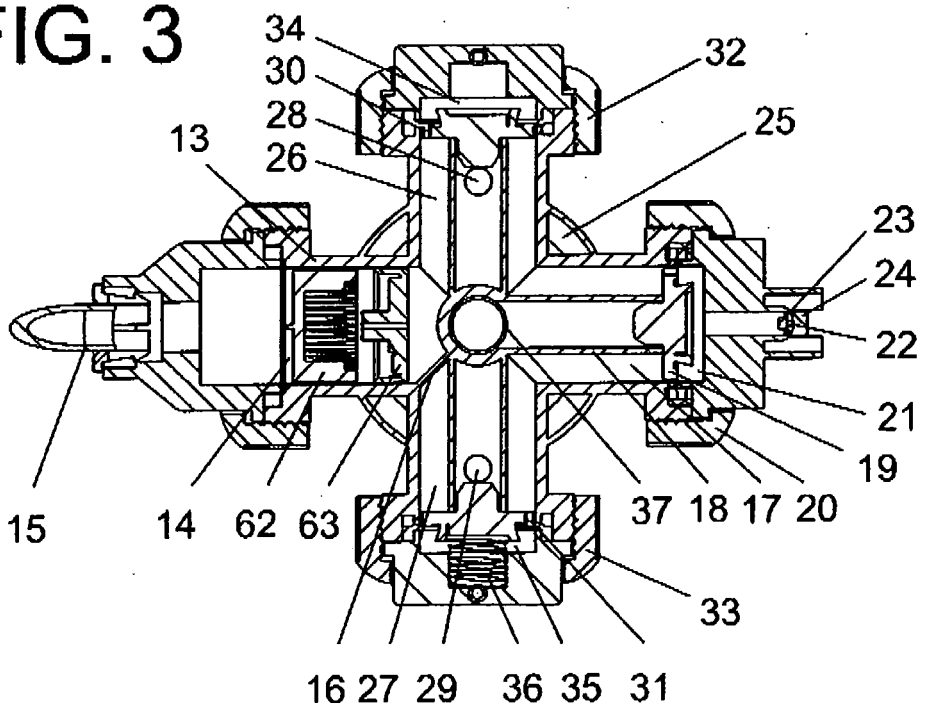
FIG. 3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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2008/070021

A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E03D+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT,EPODOC,WPI partial+, dual+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3918105 A (YOUNG et al.) 11.11.1975, abstract; column 5, lines 9-23; figure 1.	1
A	US 4809367 A (SCOTT et al.) 07.03.1989, abstract; column 4, lines 41-60; figure 1.	1
A	GB 2228499 A (IFOE SANITAER AB) 29.08.1990, abstract; figure 1.	1
A	FR 2492868 A1 (GEBERIT AG) 30.04.1982, abstract; page 6, lines 6-10; figure 1.	3
A	DE 10061615 A1 (GROHEDAL GMBH & CO KG) 13.06.2002, abstract; figures 1,2.	1,5
A	EP 1719846 A2 (GROHEDAHL SANITARSYSTEME GMBH) 08.11.2006, abstract; figure 1.	1,5

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"E" earlier document but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07 April 2008 (07.04.2008)	**(05/06/2008)**
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304	Authorized officer A. Martín Moronta Telephone No. +34 91 349 53 77

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ ES 2008/070021

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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FR 2492868 AB	30.04.1982	DE 3133650 A AT 372481 A DE 8124854 U AT 374529 B CH 649336 A DE 3153621 C DE 3153688 C DE 3153689 C DE 3153738 C	24.06.1982 15.09.1983 08.12.1983 10.05.1984 15.05.1985 29.05.1991 17.10.1991 27.10.1994 29.02.1996
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EP 1719846 A	08.11.2006	EP 20060113131 DE 102005020748 A	26.04.2006 09.11.2006

Form PCT/ISA/210 (patent family annex) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2008/070021

CLASSIFICATION OF SUBJECT MATTER

E03D 1/14 (2006.01)
E03D 5/09 (2006.01)

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REFERENCES CITED IN THE DESCRIPTION

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- US 3421161 A **[0003]**
- ES 2113241 **[0004]**
- ES 2136547 **[0005]**
- US 4809367 A **[0007]**