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(54) **Device for controlling the discharge of water from the tank of a flushing system**

(57) A device and a process are described for controlling the discharge of water from the tank of a flushing system provided with a siphon and actuated by a movable shutter, actuatable on command, which opens/closes a priming port of the discharge of water. An auxiliary valve

is actuated by the rod of a movable shutter between an open position, in which air is introduced at atmospheric pressure within the siphon, and a closed position in which the establishment of a depression condition in the siphon is allowed.

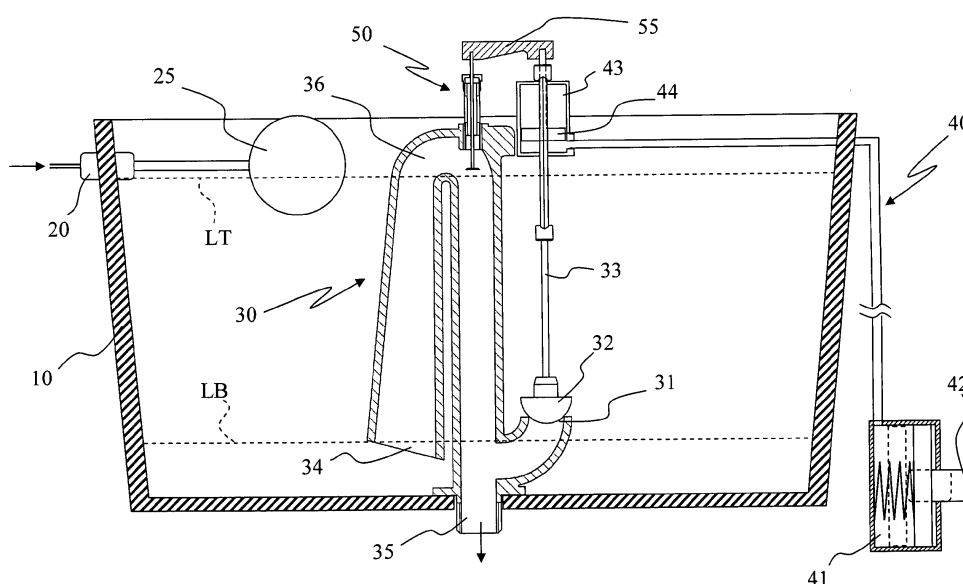


Fig. 1

Description

Field of the invention

[0001] The present invention relates to the control of the discharge of water from the tank of a flushing system, for example a flushing system for sanitary fixtures and, in particular, a device which allows to stop the discharge of water, once initiated, even before the complete emptying of the flushing system tank.

State of the art

[0002] Flushing systems are currently already known and widespread on the market, providing the possibility to adjust the amount of water that is needed to be used for the expulsion of the waste from the sanitary fixtures. In most cases, flushing systems of a known type envisage two activation buttons: a first button is intended to the complete emptying of the tank without the possibility of an intermediate stop, while a second button, generally alongside the first, activates the discharge after it has been pressed but stops it at the time of its release.

[0003] Old generation flushing systems are however still very popular, marketed and installed in many homes and public buildings, which do not provide the possibility of voluntarily stopping the discharge of the tank before it becomes completely emptied. A flushing system for the discharge of water in a sanitary fixture of this type is described for example in French patent application n. FR-A-1194321, wherein the flushing system comprises a tank, means for feeding a predetermined volume of water in the tank and a siphon housed inside the tank. The siphon has a priming port obstructed by a movable shutter, a free extraction port, an upper bend arranged between said two ports and a discharge port. The movable shutter is controlled by a rod between a priming port open position, in which the priming port is open to start the discharge of water from the tank, and a priming port closed position.

[0004] At the moment in which the movable shutter opens the priming port, the depression condition that establishes in the siphon starts the water flow, by suction, also from the free extraction port; once the priming port is opened, also if the movable shutter returns to the closed position thereof, the water flow from the free extraction port continues until the complete emptying of the tank.

[0005] This involves a considerable waste of water since the tank is always completely emptied, even in cases where it would be sufficient to use a smaller amount of water for the expulsion of the waste contained in the sanitary fixture.

[0006] Therefore particularly felt is the need for being able to minimize the water wastage that occurs with these types of known, or "old generation" discharge systems.

Summary of the invention

[0007] The object of the present invention is to propose a device which allows to control the discharge of water from the tank of a flushing system provided with a siphon and, in particular, to stop the discharge of water before the complete emptying of the tank. Another object of the present invention is to propose a device of the type mentioned above which is structurally simple and easy to assemble even on flushing systems already installed.

[0008] A further object of the present invention is to propose a flushing system which provides, already in the production step, the possibility of controlling the discharge of water from the tank.

[0009] These objects are achieved by the present invention thanks to a device for controlling the discharge of water from the tank of a flushing system according to claim 1 and by a flushing system for the expulsion of the waste from a sanitary fixture according to claim 6. It is also proposed a process for controlling the discharge of water from a flushing system according to claim 8. Further features of the present invention are set forth in the respective dependent claims.

[0010] According to a first aspect of the present invention, a device for controlling the discharge of water from the tank of a flushing system is proposed, wherein the flushing system comprises a siphon housed in the tank and wherein the siphon has a priming port obstructed by a movable shutter, a free extraction port, at least one upper bend arranged between said two ports and a discharge port; the movable shutter is controlled by a rod between an opening position of the priming port, in which the priming port is open to start the discharge of water from the tank, and a closed position of the priming port.

[0011] The device according to the invention advantageously comprises an auxiliary valve actuated by the movable shutter between an open position, in which air is introduced at atmospheric pressure into the upper bend of the siphon, and a closed position in which the establishment of a depression condition is allowed in the upper bend of the siphon, at the time of discharge.

[0012] In this way, even if the movable shutter returns to the closed position, and thus of the priming port obstruction, after activating the discharge, the auxiliary valve is dragged by the movable shutter rod in the open condition. In this position the auxiliary valve is open and then brings the inside of the siphon back to atmospheric pressure, thus interrupting the water flow from the tank through the free extraction port of the siphon in the moment in which the opening actuation of the movable shutter is interrupted.

[0013] The device simply comprises a pipe mounted on the upper bend of the siphon to put in fluid communication the inner space of the siphon with the atmosphere.

[0014] The auxiliary valve intended to control the fluid communication between the siphon and the atmosphere comprises a stem axially sliding within the pipe. One or more elements for guiding the sliding stem can be ad-

vantageously arranged in the pipe. As any guide elements may obstruct the passage of air, the pipe preferably comprises one or more through holes along its lateral wall to allow communication between the inside of the siphon and the outside atmosphere.

[0015] The device preferably comprises at least one element of rigid connection between the rod of the movable shutter and the stem of the auxiliary valve to move in an integral manner the auxiliary valve and the movable shutter. The rigid connecting element can be made of any material, whether plastic or metal, provided that it retains the characteristics of rigidity of the connection. The choice of the material may however depend on various factors, for example the resistance to rust and corrosion, its weight or other considerations related to cost, ease of processing or the like.

[0016] The invention further relates to a flushing system for the discharge of water, comprising a tank, means for feeding a predetermined volume of water in the tank and a siphon housed in the tank; the siphon has a priming port obstructed by a movable shutter, a free extraction port, at least one upper rod arranged between said two ports and a discharge port. The movable shutter is controlled by a rod between an open position of the priming port, in which the priming port is open to start the discharge of water from the tank, and a closed position of the priming port; and means to actuate the movement of the movable shutter between the two opening and closing positions of the priming port.

[0017] The flushing system is advantageously provided with a device for controlling the discharge of water from the tank which comprises an auxiliary valve actuated by the movable shutter between an open position, in which air is introduced at atmospheric pressure in the upper bend of the siphon, and a closed position in which the establishment of a depression condition is allowed in the upper bend of the siphon at the time of discharge.

[0018] According to a possible embodiment of the present invention, the means for actuating the movement of the movable shutter comprise a pneumatic circuit comprising a pump actuable by a button and a cylinder in which a piston slides bound to the movable shutter rod.

[0019] In another aspect of the present invention a process for controlling the discharge of a flushing system is provided, the flushing system comprising a tank, means for feeding a predetermined volume of water in the tank and a siphon housed in the tank; the siphon has a priming port obstructed by a movable shutter, a free extraction port, at least one upper bend arranged between these two ports and a discharge port. The movable shutter is controlled by a rod between an open position of the priming port, in which the priming port is open to start the discharge of water from the tank, and a closed position of the priming port; and means to actuate the movement of the movable shutter between the two positions. The process comprises the steps of:

a) filling the flushing system tank with water to a pre-

determined maximum level;

b) activating the means for controlling the movement of the movable shutter in the priming port open position, so as to activate the water flow from the priming port and from the free extraction port towards the discharge port;

c) interrupting the activation of the means for actuating the movement of the movable shutter in the priming port closed position.

[0020] The process advantageously comprises the step of:

d) stopping the water flow from the free extraction port by introducing air at atmospheric pressure in the upper bend of the siphon at the moment when the activation of the means for actuating the movement of the movable shutter is interrupted.

Brief description of the drawings

[0021] Further advantages and features of the present invention will be more apparent from the following description, given by way of illustration and not as a limitation, with particular reference to the accompanying schematic drawings wherein:

- Figure 1 is a section view of a flushing system according to a possible embodiment of the present invention;
- Figure 2 is an enlarged view of a detail of Figure 1 in which a device for controlling the discharge of water from the flushing system, according to the present invention, is shown;
- Figure 3 is an enlarged view in elevation of a detail of the device shown in Figure 2;
- Figure 4 is an enlarged view of a detail of the flushing system of Figure 1, in which the movable shutter obstructs the siphon priming port; and
- Figure 5 is a view similar to that of Figure 4 with the movable shutter in the siphon priming port open condition.

Detailed Description

[0022] Shown in Figure 1 is a flushing system comprising a tank 10 in which water is supplied through a valve 20 being controlled in a known manner by a float 25. The valve 20 is adjusted so as to stop the incoming water flow from the water supply when the water reaches a maximum level LT to maintain a predetermined volume of water in the tank 10.

[0023] Inside the tank 10 a siphon 30 is housed which comprises a priming port 31 obstructed by a movable shutter 32, e.g. a half sphere shutter controlled by a rod 33. The siphon 30 also comprises a free extraction port 34, arranged at the opposite end of the channel defined by the siphon with respect to the priming port 31, and a

discharge port 35.

[0024] The siphon 30 is shaped so as to define at least one upper bend 36 between the priming port 31 and the free extraction port 34.

[0025] In the embodiment here represented, the means for actuating the movement of the movable shutter 32 include for example a pneumatic circuit 40 comprising a pump 41 actuatable by a button 42 and a cylinder 43 in which a piston 44 slides bound to the rod 33 of the movable shutter 32.

[0026] The flushing system advantageously comprises a device 50 for controlling the discharge of water from the tank 10 so as to be able to stop the water flow from the free extraction port 34 at the moment when the pressure is released on the button 42 of the pump 41 to actuate the movement of the movable shutter 32.

[0027] The device 50, shown in more detail in Figure 2, comprises an auxiliary valve 51 actuated by the rod 33 of the movable shutter 32; the auxiliary valve 51 includes a stem 52 that is axially slidable within a pipe 60 represented in greater detail in Figure 3.

[0028] A rigid linking member 55 connects the rod 33 of the movable shutter 32 with the stem 52 of the auxiliary valve 51 to move the auxiliary valve 51 and the movable shutter 32 in an integral manner.

[0029] The pipe 60 is mounted on the upper bend 36 of the siphon 30 and allows to put in fluid communication the inner space of the siphon 30 with the atmosphere. Through holes 61 along its side wall are in fact provided so that, when the valve 51 is in the position of Figure 2, the atmospheric pressure can be ensured inside the siphon 30 and, more particularly, in the vicinity of the upper bend 36 of the siphon.

[0030] The pipe 60 comprises a threaded bottom end 62 which is screwed into a threaded hole 37 obtained in the siphon 30 and a threaded upper end 63 which receives a threaded plug 64, the latter preferably also provided with a guide element 65 for facilitating the sliding movement of the stem 52.

[0031] The operation of the device and of the flushing system according to the present invention is illustrated below with reference to Figures 4 and 5.

[0032] In the condition of Figure 4, corresponding to that shown in Figure 1 of a tank filled to the top level LT, the movable shutter 32 obstructs the priming port 31 of the siphon 30. In this condition, the auxiliary valve 51 is open, thus allowing to maintain the upper bend 36 of the siphon 30 at atmospheric pressure.

[0033] The moment the button 42 of the pump 41 is pressed to start the discharge (represented with dashed lines in Figure 1), the movable shutter 32 is lifted thereby opening the priming port 31. This condition is represented in Figure 5, with the arrow P which indicates the entry of pressurized air into the cylinder 43 which allows to raise the piston 44. The inner walls of the cylinder 43 and of the pump 41 can be advantageously lubricated, for instance with vaseline, to facilitate not only the sliding, but also the sealing of the movable components of the pneu-

matic circuit 40. The piston 44 is integral with the control rod 33 of the movable shutter 32. In the moment in which the piston 44 controls the elevation of the movable shutter 32 by way of the rod 33, the rigid linking member 55 drags the stem 52 of the auxiliary valve 51 therewith by bringing this latter in closing position. In this way, the siphon 30 is in a depression condition, generated by the water flow passing through the priming port 31, and is therefore permitted the intake of water also through the free extraction port 34. Both water flows from the ports 31 and 34 thus reach the discharge port 35; in known flushing systems of this type, i.e. free from a control device 50, the water flow from the free extraction port 34 continues even if the pressure is released on the button 42, and therefore also when the movable shutter 32 returns to the closed condition of the priming port 31. The water withdrawal from the tank 10 then only stops at the complete emptying of the tank 10, i.e. when the lower level of the water in the tank 10 reaches the level LB (Figure 1) in which air at atmospheric pressure can enter again into the siphon 30 through the free extraction port 34.

[0034] According to the present invention, at the moment when the pressure is released on the button 42 of discharge activation, the piston 44 descends again towards the lower position, such as that represented in Figures 1 and 4, consequently dragging the movable shutter 32 in the closing condition of the priming port 31. However, unlike the flushing systems of a known type, at the moment when the pressure is released on the button 42, the auxiliary valve 51, whose stem 52 is rigidly connected to the rod 33, turns back in the open condition and restores the atmospheric pressure inside the siphon 30. Therefore, by re-establishing in the siphon the pressure condition equal to that of the external environment, the water flow through the free extraction port 34 is automatically stopped.

[0035] Various modifications may be made to the embodiments here represented, without departing from the scope of the present invention. For example the actuating means may also be made in the form of mechanical means, by way of suitable lever systems and/or joints, instead of the means represented here in the form of a pneumatic circuit 40.

Claims

1. A device for controlling the discharge of water from the tank of a flushing system, wherein the flushing system comprises a siphon housed in said tank and wherein the siphon has a priming port obstructed by a movable shutter, a free extraction port, at least one upper bend arranged between said two ports and a discharge port, wherein said movable shutter is controlled by a rod between an open position of the priming port, in which said priming port is open to start the discharge of water from the tank, and a closed position of the priming port, the device being char-

acterized in that it comprises an auxiliary valve actuated by the rod of said movable shutter between an open position, in which air is introduced at atmospheric pressure in the upper bend of said siphon, and a closed position in which the establishment of a depression condition is allowed in the upper bend of the siphon at the time of discharge.

2. The device according to claim 1, comprising a pipe mounted on the upper bend of said siphon to put the inner space of the siphon in fluid communication with the atmosphere. 50
3. The device according to claim 2, wherein said auxiliary valve comprises a stem axially slidable within said pipe. 15
4. The device according to any preceding claims, wherein said pipe comprises one or more through holes along its side wall. 20
5. The device according to any preceding claims, comprising at least one element of rigid connection between the rod of said movable shutter and the stem of said auxiliary valve to move in an integral manner said auxiliary valve and said movable shutter. 25
6. A flushing system for the discharge of water, comprising a tank, means for feeding a predetermined volume of water in the tank, a siphon housed in said tank and having a priming port obstructed by a movable shutter, a free extraction port, at least one upper bend arranged between said two ports and a discharge port, wherein said movable shutter is controlled by a rod between an open position of the priming port, in which said priming port is open to start the discharge of water from the tank, and a closed position of the priming port; and means for actuating the movement of said movable shutter between said two positions, **characterized by** comprising a device for controlling the discharge of water from the tank according to any of claims 1 to 5. 30 35 40
7. The flushing system according to claim 6, wherein said means for actuating the movement of said movable shutter comprises a pneumatic circuit comprising a pump actuable by a button and a cylinder in which a piston slides bound to the rod of said movable shutter. 45 50
8. A process for controlling the discharge of water from a flushing system, the flushing system comprising a tank, means for feeding a predetermined volume of water in the tank, a siphon housed in said tank and having a priming port obstructed by a movable shutter, a free extraction port, at least one upper bend arranged between said two ports and a discharge port, wherein said movable shutter is controlled by 55

a rod between an open position of the priming port, in which said priming port is open to start the discharge of water from the tank, and a closed position of the priming port; and means for actuating the movement of said movable shutter between said two positions, the process comprising the steps of:

- a) filling the flushing system tank with water to a predetermined maximum level;
- b) activating said means for controlling the movement of said movable shutter in the open position of said priming port so as to activate the water flow from said priming port and from said free extraction port towards said discharge port;
- c) interrupting the activation of said means for actuating the movement of said movable shutter in the closed position of said priming port, **characterized by** comprising the step of:
- d) stopping the water flow from said free extraction port by introducing air at atmospheric pressure in the upper bend of said siphon at the moment when the activation of said means for actuating the movement of said movable shutter is interrupted.

9. The process according to claim 8, wherein said step d) is carried out by rigidly bounding the movement of the control rod of said movable shutter to the stem of an auxiliary valve that is thus actuated by the rod of said movable shutter between an open position, in which air is introduced at atmospheric pressure in the upper bend of said siphon, and a closed position in which it is allowed the establishment of a depression condition in the upper bend of the siphon at the time of discharge.

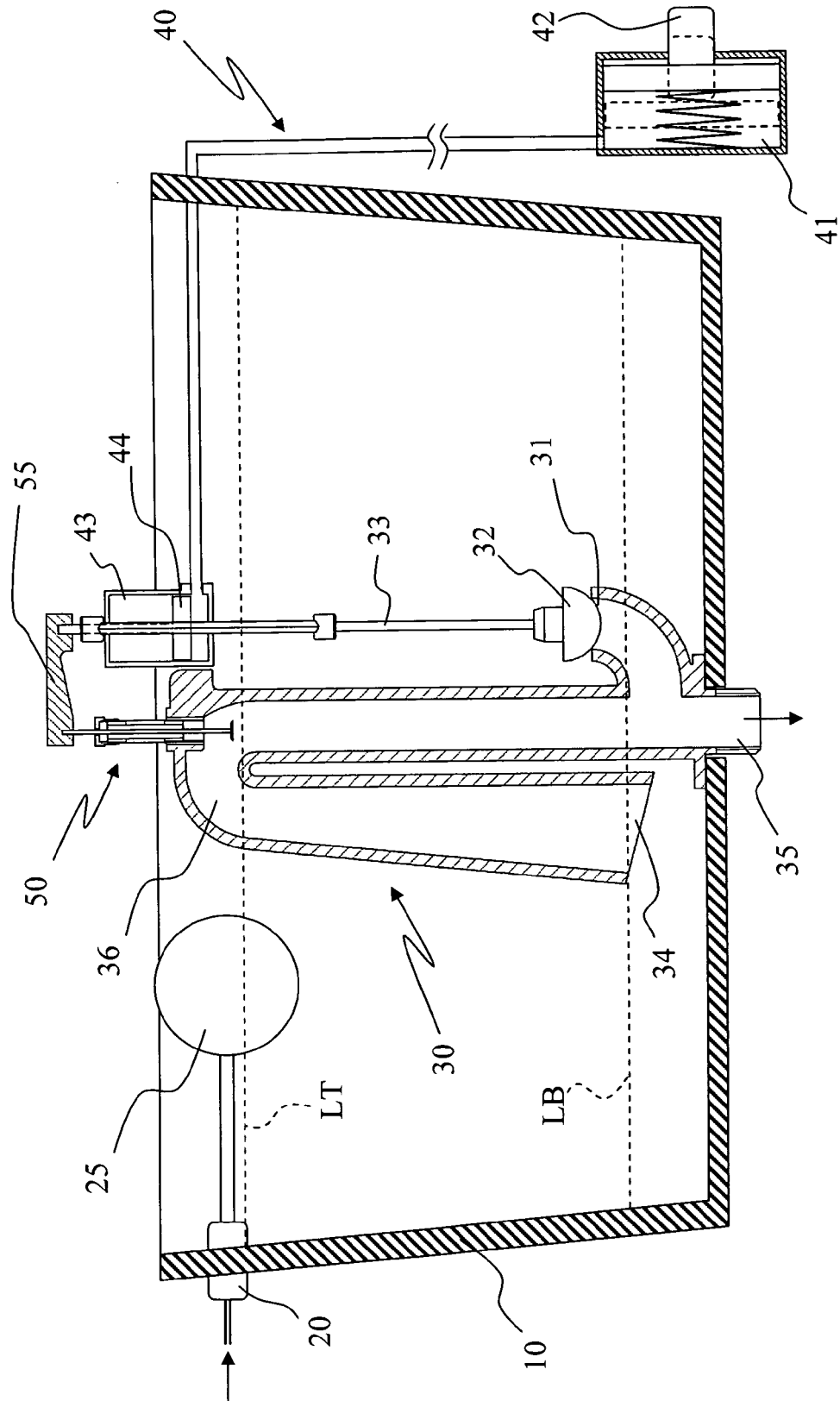


Fig. 1

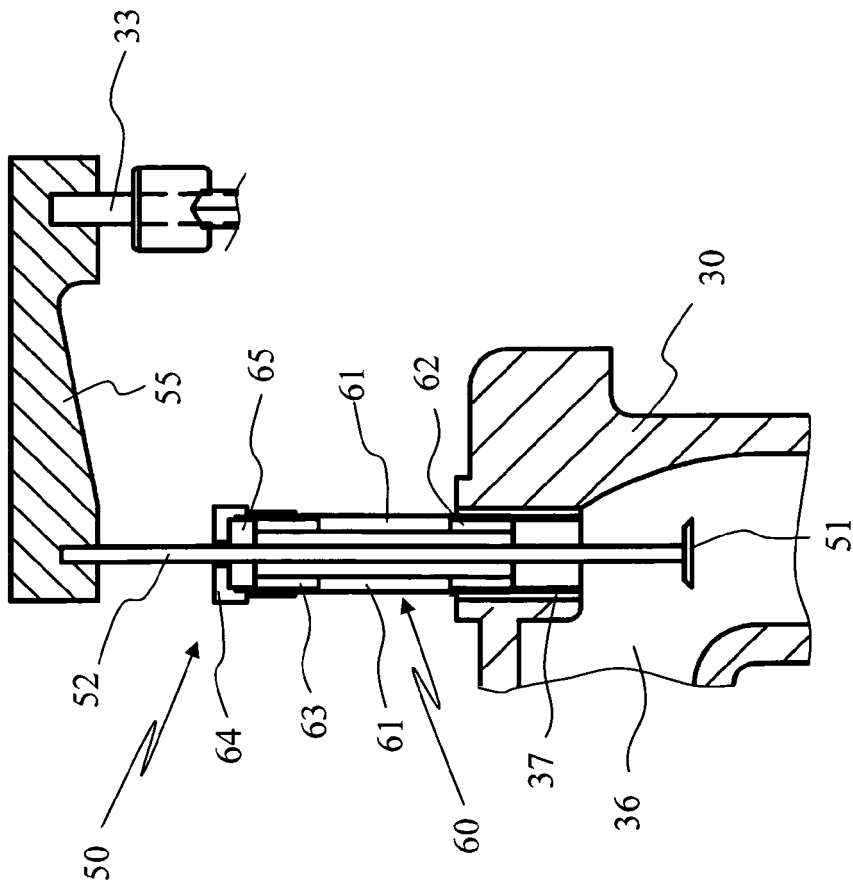


Fig. 2

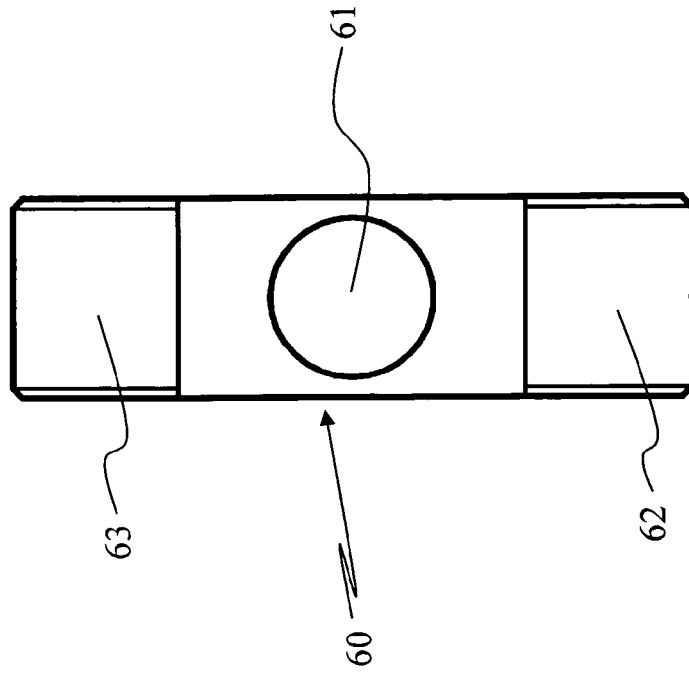


Fig. 3

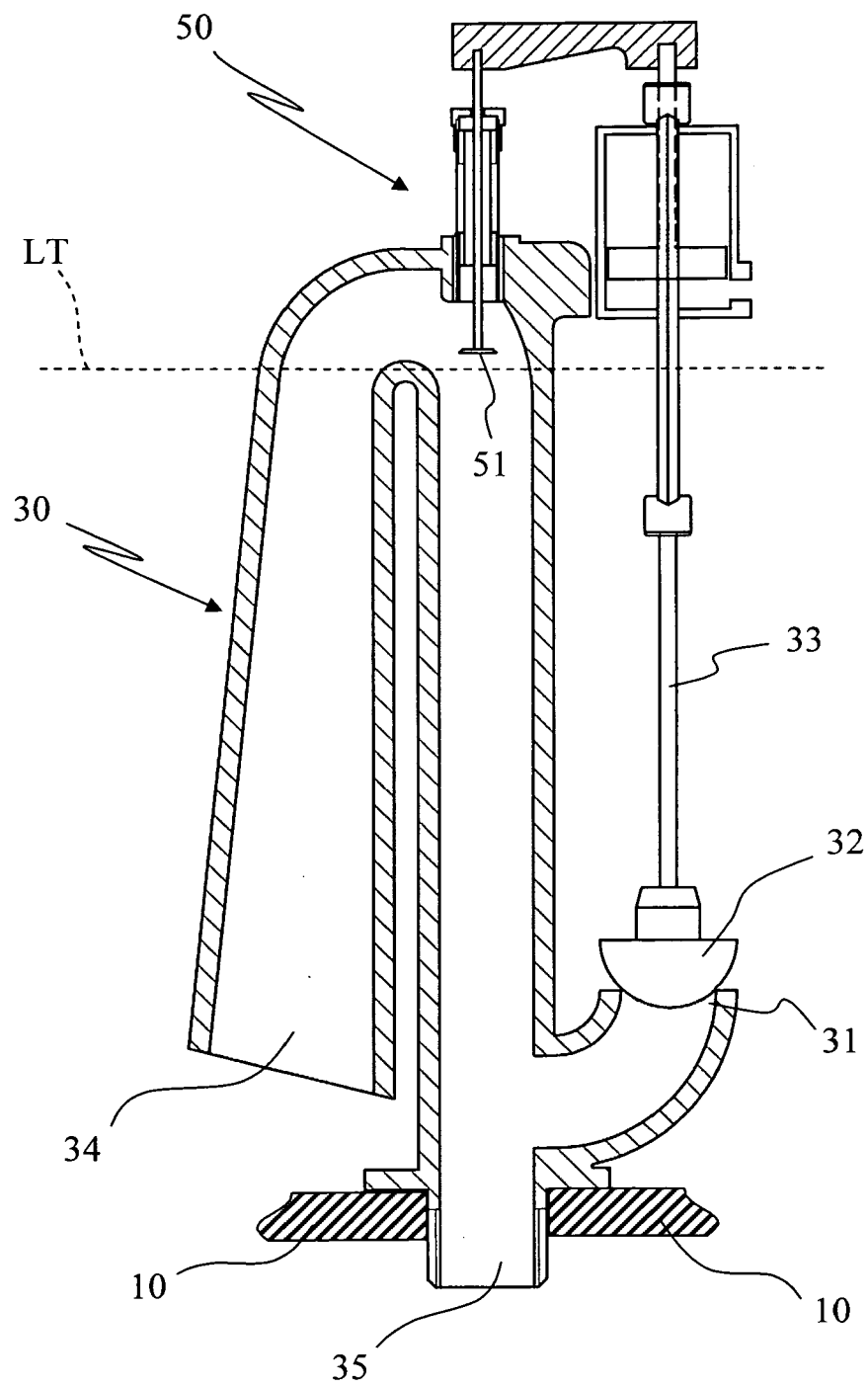


Fig. 4

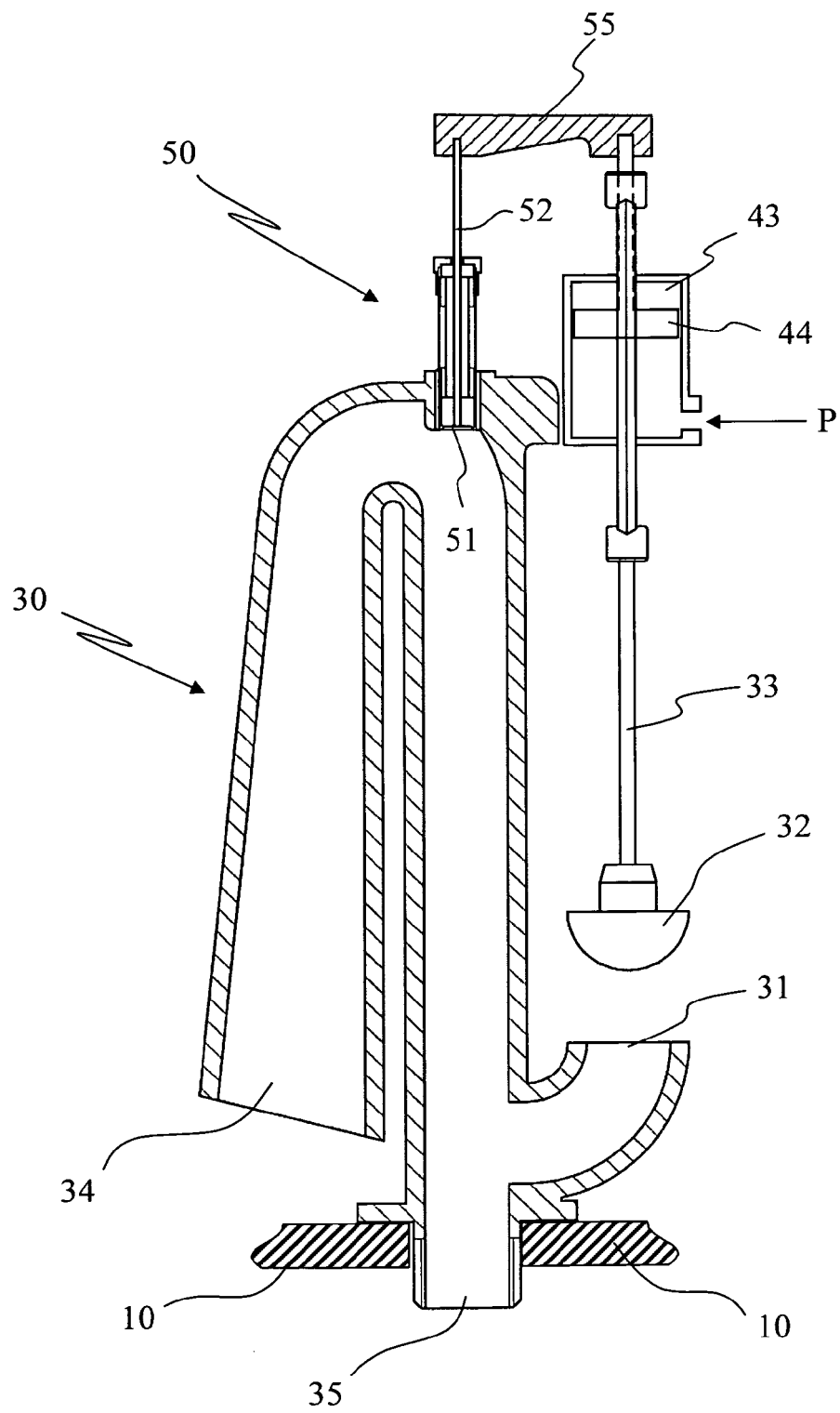


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 13 00 0111

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 1 194 321 A (QUEIROLO D.&D.) 9 November 1959 (1959-11-09) * figures 1,2 *	1,8	INV. E03D1/06 E03D1/08 E03D5/02 E03D1/14
A	GB 2 346 159 A (MAY JOHN HENRY [GB]; FLUID CONTROLS U K LIMITED [GB]) 2 August 2000 (2000-08-02) * figure 2 *	1,8	
A	FR 1 518 439 A (FOMINAYA A.) 22 March 1968 (1968-03-22) * figures *	1,8	
A	US 5 301 375 A (OSMOND JOHN S [US]) 12 April 1994 (1994-04-12) * figures *	1,8	
A	US 2 957 182 A (SANCHEZ SUAREZ PEDRO) 25 October 1960 (1960-10-25) * figures *	1,8	
A	US 2 615 173 A (LESLIE PEGLER JOSEPH) 28 October 1952 (1952-10-28) * figures *	1,8	TECHNICAL FIELDS SEARCHED (IPC) E03D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 March 2013	Examiner Isailovski, Marko
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 00 0111

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The members are as contained in the European Patent Office EDP file on
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20-03-2013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 1194321	A	09-11-1959	NONE	
GB 2346159	A	02-08-2000	NONE	
FR 1518439	A	22-03-1968	NONE	
US 5301375	A	12-04-1994	GB 2276397 A US 5301375 A	28-09-1994 12-04-1994
US 2957182	A	25-10-1960	NONE	
US 2615173	A	28-10-1952	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- FR 1194321 A [0003]