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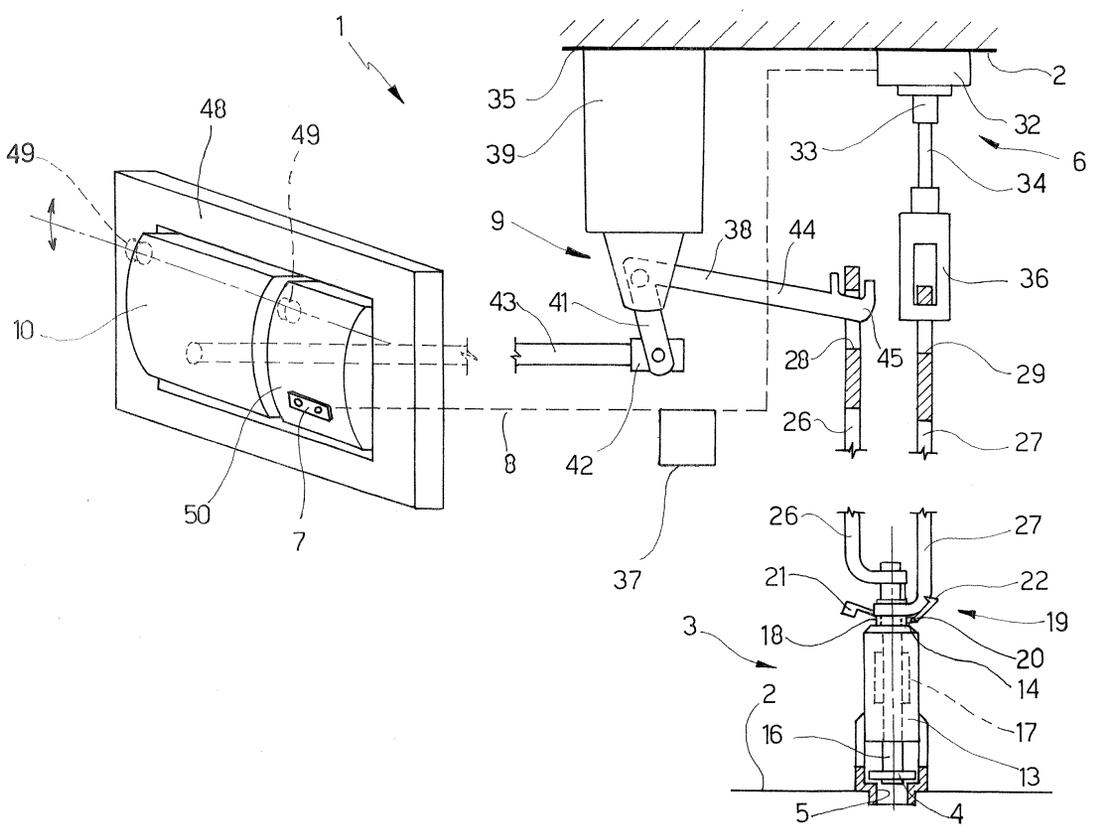
(54) Device for activating a flush tank drain valve assembly

(57) There is provided a flush tank flush activating device (1); a flush valve (3), having a movable shutter (4) cooperating with a drain hole (5), is designed to selectively provide two different flush modes, and has two ties (26, 27) for moving the shutter and selectively opening and closing the flush valve; the ties (26, 27) are connected respectively to a mechanical actuator (9) controlled by a hand-operated button (10), and to an electromechanical actuator (6) activated by at least one sensor (7) by means of an electronic control circuit (8); and the mechanical actuator (9) and electromechanical actuator (6) act independently of each other on the shutter (4).



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Description

[0001] The present invention relates to a flush tank flush activating device.

[0002] Automatic flush activating devices are known which, as opposed to flushing being controlled by the user operating buttons or levers, feature electromechanical actuators controlled by contact or presence sensors.

[0003] Obviously, devices of this sort require electric current, and so have the major drawback of failing to operate, thus preventing flushing, in the event of power failure.

[0004] Moreover, when different flushing (in particular, full flush and partial flush) modes are required, known automatic devices are fairly complex and expensive, by requiring specially designed component parts, the same flush valves used for conventional mechanical controls normally not being usable.

[0005] It is therefore an object of the present invention to provide a flush tank flush activating device designed to eliminate the aforementioned drawbacks, and which in particular is cheap and easy to produce and of straightforward, reliable operation.

[0006] According to the present invention, there is provided a flush tank flush activating device comprising a flush valve having a movable shutter cooperating with a drain hole; and an electromechanical actuator activated by at least one sensor by means of an electronic control circuit to move the shutter and selectively open and close the flush valve; the device being characterized by comprising a mechanical actuator controlled by a hand-operated button and acting on the shutter independently of the electromechanical actuator.

[0007] The device according to the invention can therefore be operated either automatically, by means of the sensor controlling the electromechanical actuator, or manually, by means of the user-operated control button, thus ensuring flushing even in the event of power failure. Moreover, the device according to the invention is extremely cheap and easy to produce, by employing, among other things, a conventional mechanical flush valve, with no major alterations or design features required.

[0008] A preferred, non-limiting embodiment of the invention will be described purely by way of example with reference to the accompanying drawing, which shows a schematic view, with parts in section and parts removed for clarity, of a flush tank flush activating device in accordance with the invention.

[0009] Number 1 in the accompanying drawing indicates as a whole a device for activating flushing of a known flush tank 2 (not shown in detail for the sake of simplicity) of a sanitary fixture (WC or urinal).

[0010] Device 1 comprises a flush valve 3 having a shutter 4 cooperating with a drain hole 5; an electromechanical actuator 6 activated by at least one sensor 7 by means of an electronic control circuit 8 to move shutter 4 and selectively open and close flush valve 3; and a mechanical actuator 9 controlled by a hand-operated button 10 and acting on shutter 4 independently of electromechanical actuator 6.

[0011] Flush valve 3 is substantially known, and is designed to selectively provide two different flush modes, in particular, a full flush mode and a partial flush mode to drain all or part of the water from tank 2 respectively. For example, flush valve 3 is of the type illustrated in European Patent Application EP-A-1245744, the content of which is included herein by way of reference as required for a clear understanding of the present invention.

[0012] While referring the reader to EP-A-1245744 for further details, flush valve 3 substantially comprises a supporting structure 13 having drain hole 5 at the bottom, and closed at the top by a cover 14 having a central through hole; a movable member (overflow tube) 16 fitted at the bottom end with shutter 4 and housed to slide inside supporting structure 13 and through the hole in cover 14; a toroidal float 17 fitted integrally to movable member 16 and housed inside supporting structure 13; and a substantially tubular additional member 18 fitted coaxially and sliding freely about movable member 16 and selectively connectable/disconnectable to/from movable member 16 by reversible connecting means 19. Reversible connecting means 19 comprise a rocking body 20 hinged to additional member 18 and having, at opposite ends, an auxiliary float 21, and a hook 22 for hooking onto movable member 16; flush valve 3 comprises a tie 26 connected integrally to a top end of movable member 16, and a tie 27 connected integrally to additional member 18; and ties 26, 27 have respective end eyes 28, 29.

[0013] Shutter 4 is carried by movable member 16 to selectively assume a closed position and an open position closing and opening drain hole 5 respectively; movable member 16 and float 17 are designed to provide a first flush mode; and additional member 18 is selectively connectable to movable member 16 to provide a second flush mode. More specifically, float 17 is connected to movable member 16 to delay return of shutter 4 to the closed position (and so drain all the water from tank 2); and additional member 18 is connectable to movable member 16 to accelerate return of shutter 4 to the closed position (and so drain part of the water from the tank).

[0014] Electromechanical actuator 6 is substantially known, and comprises a solenoid valve 32 activated by circuit 8; and a piston device 33, e.g. hydraulically operated, having an axially-sliding piston 34. Piston device 33 is fitted, for example, to a top wall or cover 35 of tank 2, and piston 34 has a bottom end 36 connected to eye 29 of tie 27. Circuit 8 comprises a known control unit 37 (e.g. a chip or electronic board) which receives signals from sensor 7 and, on the basis of stored operating programs, controls operation of electromechanical actuator 6.

[0015] Mechanical actuator 9 comprises a square le-

ver 38 hinged to a support 39 fixed to tank 2 (e.g. to the top wall or cover 35). Lever 38 comprises a first arm 41 connected to button 10 by a rotary articulated joint 42 and a connecting rod 43; and a second arm 44 terminating with a hook 45 engaging eye 28 of tie 26.

[0016] Device 1 also comprises a control plate 48 fixable (in known manner) to a wall of tank 2 or, in the case of a walled-in or recessed tank 2, to a wall of the room in which tank 2 is installed. Plate 48 is fitted with button 10 and sensor 7, which, in particular, is a known contact and/or proximity sensor.

[0017] Button 10 is fitted movably - either in rocking or sliding manner - to plate 48 (in the example shown, button 10 is hinged to plate 48 by two pins 49), and sensor 7 is installed in a dummy button 50 fitted to plate 48 and adjacent to button 10. Button 10 is therefore located apart from sensor 7; and dummy button 50 supporting sensor 7 is smaller than button 10 and fixed with respect to plate 48.

[0018] In actual use, control unit 37, on the basis of the signals from sensor 7 and the stored operating programs, controls operation of electromechanical actuator 6 to activate partial drainage of the water from tank 2.

[0019] Operation of electromechanical actuator 6 may be activated, for example, by the user touching sensor 7, or automatically upon sensor 7 detecting the presence and withdrawal of the user.

[0020] Whichever the case, when control unit 37 activates electromechanical actuator 6, circuit 8 activates solenoid valve 32 to raise piston 34 and, therefore, tie 27. As explained in detail in EP-A-1245744, tie 27 pulls up additional member 18, rocking boxy 20, movable member 16 with float 17, and shutter 4, which moves into the open position. Return of shutter 4 to the closed position is accelerated by the weight of additional member 18, which weighs down on movable member 16, to which it is connected by hook 22 of rocking body 20.

[0021] To activate manual flushing (e.g. in the event of electrical power failure to electromechanical actuator 6), the user presses button 10 to raise tie 26 and movable member 16, together with float 17 and shutter 4, by means of lever 38. Tie 27, additional member 18 and rocking body 20 remain stationary, and the buoyancy of the water sustaining float 17 prevents shutter 4 from returning to the closed position until flushing is completed.

[0022] Electromechanical actuator 6 may be used to also provide for different flush modes, by appropriately programming control unit 37. For example, control unit 37 may be programmed to command full flush, or, depending on the parameter settings, full or partial flush.

Claims

1. A flush tank flush activating device (1) comprising a flush valve (3) having a movable shutter (4) cooperating with a drain hole (5); and an electromechanical actuator (6) activated by at least one sensor (7) by means of an electronic control circuit (8) to move the shutter and selectively open and close the flush valve; the device being **characterized by** comprising a mechanical actuator (9) controlled by a hand-operated button (10) and acting on the shutter (4) independently of the electromechanical actuator (6).

2. A device as claimed in Claim 1, **characterized in that** said button (10) is located apart from said sensor (7).

3. A device as claimed in Claim 1 or 2, **characterized by** comprising a control plate (48) supporting said button (10) and said sensor (7).

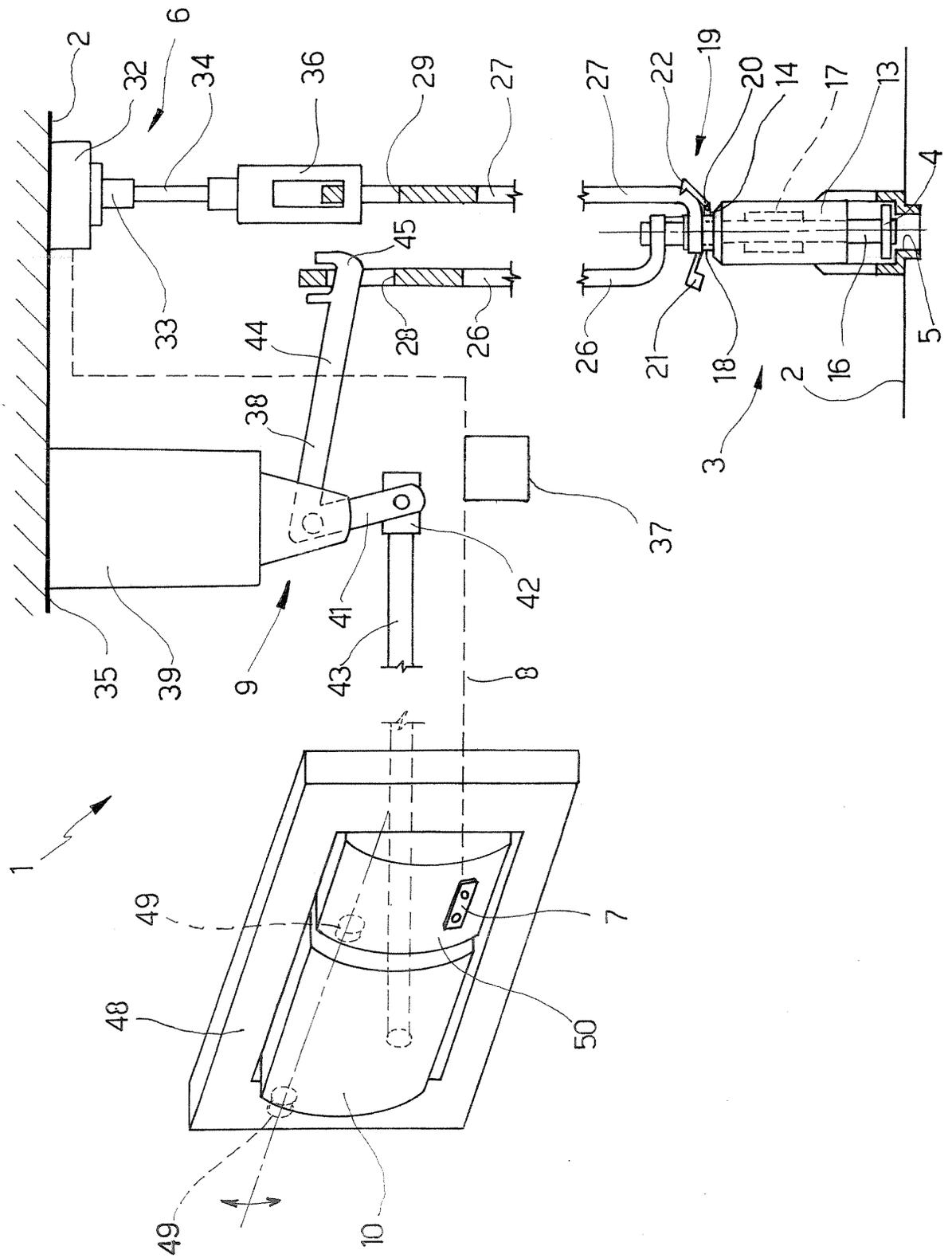
4. A device as claimed in one of the foregoing Claims, **characterized in that** said sensor (7) is a contact and/or proximity sensor.

5. A device as claimed in one of the foregoing Claims, **characterized in that** said button (10) is fitted movably, either in rocking or sliding manner, to the plate (48), and said sensor (7) is installed in a dummy button (50) fitted to the plate and adjacent to the button.

6. A device as claimed in one of the foregoing Claims, **characterized in that** said flush valve (3) is designed to selectively provide two different flush modes; the mechanical actuator (9) and the electromechanical actuator (6) acting on respective ties (26, 27) of the flush valve (3) so as each to activate a respective flush mode.

7. A device as claimed in one of the foregoing Claims, **characterized in that** said flush valve (3) comprises a movable member (16) fitted with the shutter (4) and designed to provide a first flush mode; and an additional member (18) selectively connectable to the movable member (16) to provide a second flush mode; the mechanical actuator (9) and the electromechanical actuator (6) acting on respective ties (26, 27) connected to the movable member (16) and to the additional member (18) respectively.

8. A device as claimed in one of the foregoing Claims, **characterized in that** said flush valve (3) is designed to provide selectively for full flush and partial flush; said button (10) activates the full flush by means of said mechanical actuator (9); and said sensor (7) activates partial flush by means of said electromechanical actuator (6).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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 4389

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 258 569 A (VALSIR S.P.A) 20 November 2002 (2002-11-20) * claim 5; figures * * paragraph [0014] *	1-8	E03D5/09 E03D5/10 E03D1/14
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 July 2005	Isailovski, M

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 10 4389

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82