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(54) **Device for controlling the drain valve of a flush tank and flush tank comprising such a device**

(57) A device (1) for controlling the drain valve (2) of a flush tank (3) has at least one button (15) operating on a pneumatic pulse generator (16), and a pneumatic actuator (9) connected to the pneumatic pulse generator

(16) and acting on a movable shutter (6) of the drain valve; a distributor (17) is interposed between the button (15) and the actuator (9), and is connected to the button (15) and the actuator (9) by respective pipes (42, 43; 46, 47).

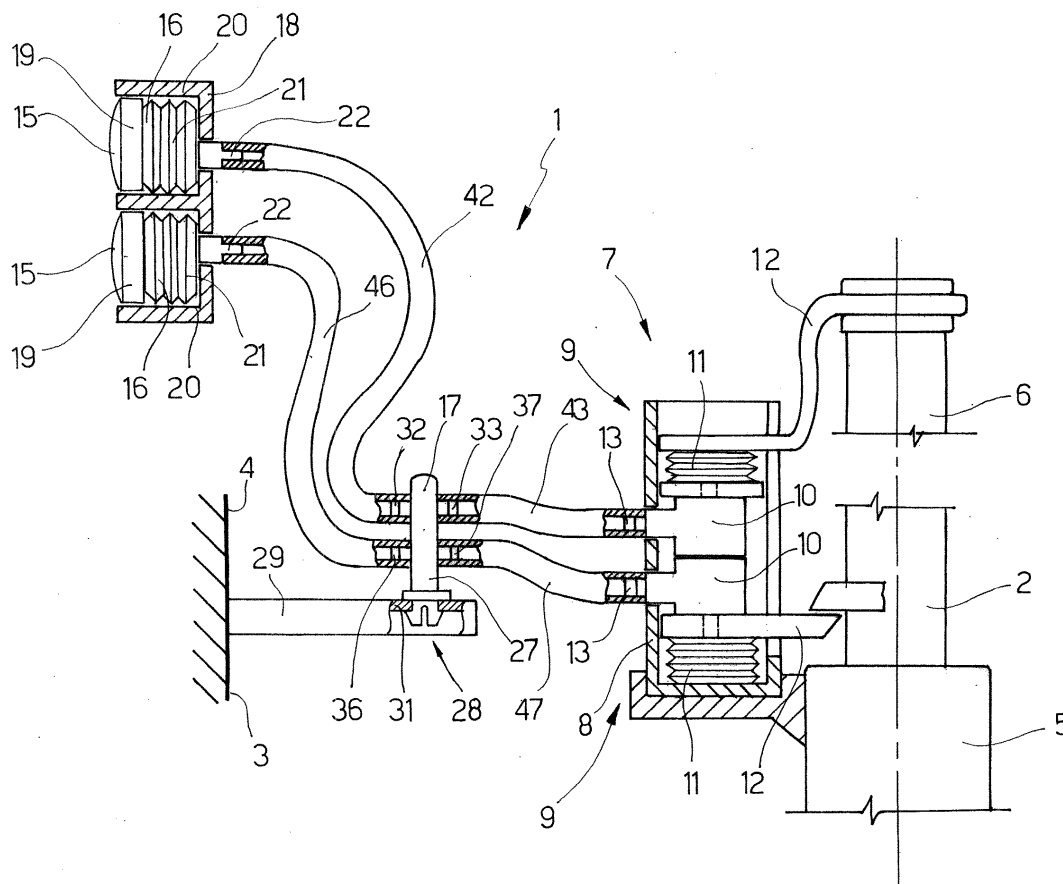


Fig. 1

Description

[0001] The present invention relates to a device for controlling the drain valve of a flush tank, and to a flush tank comprising such a device.

[0002] Lavatory flush tanks are known comprising drain valves operated by pneumatic actuators. A flush tank of this type normally comprises a control device, in turn comprising a button fitted to a control plate and acting on a pneumatic pulse generator; and a pneumatic actuator connected to the pneumatic pulse generator and acting on a movable shutter of the drain valve.

[0003] The pneumatic actuator is connected directly to the pneumatic pulse generator by a hose fixed at the ends to respective fittings on the pneumatic pulse generator and pneumatic actuator. When installing the tank, the pneumatic actuator must therefore be connected to the pneumatic pulse generator by fitting the ends of the hose to the fittings. Since the pneumatic actuator, however, is normally difficult to reach, this is an awkward operation in which the fitter may even damage parts of the device.

[0004] It is an object of the present invention to provide a device for controlling the drain valve of a flush tank, designed to eliminate the aforementioned drawbacks of the known art. More specifically, it is an object of the invention to provide a device which is practical and easy to install, while at the same time being functional and fully reliable.

[0005] According to the present invention, there is provided a device for controlling the drain valve of a flush tank, comprising at least one button operating on a pneumatic pulse generator, and a pneumatic actuator connected to the pneumatic pulse generator and acting on a movable shutter of the drain valve; the device being characterized by comprising a distributor interposed between the button and the actuator and connected to the button and the actuator by respective pipes.

[0006] In addition to being functional, straightforward and reliable, the device according to the invention is therefore also extremely practical and easy and fast to install. The device according to the invention, in fact, provides for separately connecting the pneumatic actuator to the distributor, and the distributor to the pneumatic pulse generator, so that, unlike solutions in which the pneumatic actuator is connected directly to the pneumatic pulse generator, the device is much easier to install, involves no access to hard-to-reach parts, and so also reduces the risk of damage.

[0007] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view of a device for controlling the drain valve of a flush tank in accordance with the invention;

Figure 2 shows a view in perspective of an air distributor forming part of the Figure 1 device;

Figure 3 shows a front view of the Figure 2 distributor;

Figure 4 shows a section along line IV-IV in Figure 3.

[0008] Number 1 in Figure 1 indicates as a whole a device for controlling a drain valve 2 of a known lavatory flush tank 3, of which only a portion of a wall 4 is shown.

[0009] Drain valve 2 is a substantially known pneumatically operated drain valve, e.g. of the type described in Italian Patent Application n. MI2004A-000044. In the non-limiting example in Figure 1, drain valve 2 is a dual-function drain valve, i.e. for selectively activating full drain or partial drain of tank 3.

[0010] Generally speaking, drain valve 2 comprises a supporting structure 5 fixed integrally to tank 3; a movable shutter 6 cooperating (in known manner not shown for the sake of simplicity) with a fluidtight seat over a drain hole in tank 3; and a pneumatic control assembly 7.

[0011] Assembly 7 comprises a casing 8 fitted to structure 5; and two pneumatic actuators 9, which act on shutter 6 to selectively activate the full-drain or partial-drain function. Each actuator 9 comprises a manifold 10 connected to an expandable bellows 11; and a connecting member 12 acting on shutter 6. Bellows 11 are located one over the other inside casing 8, and manifolds 10 have respective inlet sleeves 13 projecting outwards of casing 8.

[0012] Device 1 comprises two buttons 15 acting on respective pneumatic pulse generators 16 connected to actuators 9; and an air distributor 17 interposed between pneumatic pulse generators 16 and actuators 9.

[0013] Buttons 15 are fitted, for example, to a plate 18 fitted to a wall of tank 3 or in a remote location, on any wall of the room in which the lavatory is installed; each pneumatic pulse generator 16 comprises a piston 19 operated by a button 15 and movable inside a seat 20, formed in plate 18, to compress a bellows 21 (possibly in opposition to a return spring not shown); and each bellows 21 is connected to an outlet sleeve 22.

[0014] With reference also to Figures 2 to 4, distributor 17 comprises a base body 27 having fastening means 28 for assembly to a support 29 carried by tank 3. More specifically, fastening means 28 are releasable fast-fit, e.g. click-on, fastening means comprising flexible retaining teeth 30 for engaging a seat 31 formed in support 29.

[0015] Distributor 17 comprises a first pair of fittings 32, 33 projecting from base body 27 and connected by a channel 34 formed through base body 27. Fittings 32, 33 are located on opposite sides of base body 27, and extend in line with each other and in substantially opposite directions from base body 27.

[0016] Distributor 17 also comprises a second pair of fittings 36, 37 projecting from base body 27 and connected by a channel 38 formed through base body 27. Fittings 36, 37 are located on opposite sides of base

body 27, parallel to fittings 32, 33, and extend in line with each other and in substantially opposite directions from base body 27. Channels 34, 38 are independent (i.e. do not communicate with each other).

[0017] Preferably, base body 27 is a one-piece body molded from plastic material, and fittings 32, 33, 36, 37 are formed integrally in one piece with base body 27.

[0018] Device 1 comprises a first pair of pipes 42, 43 and a second pair of pipes 46, 47 for connecting pneumatic pulse generators 16 to respective actuators 9 via distributor 17.

[0019] More specifically, fittings 32, 36 of distributor 17 are connected by pipes 42, 46 to outlet sleeves 22 of pneumatic pulse generators 16; and fittings 33, 37 are connected by pipes 43, 47 to inlet sleeves 13 of actuators 9.

[0020] Pipes 42, 43, 46, 47 are defined by hoses made of polymer material, and have respective deformable ends, which fit onto the outside of a fitting 32, 33, 36, 37 or a sleeve 13, 22; each pipe 42, 43, 46, 47 is fitted at the ends to a fitting 32, 33, 36, 37 and a sleeve 13, 22 respectively; and fittings 32, 33, 36, 37 and sleeves 13, 22 have outer retaining collars or segments 50.

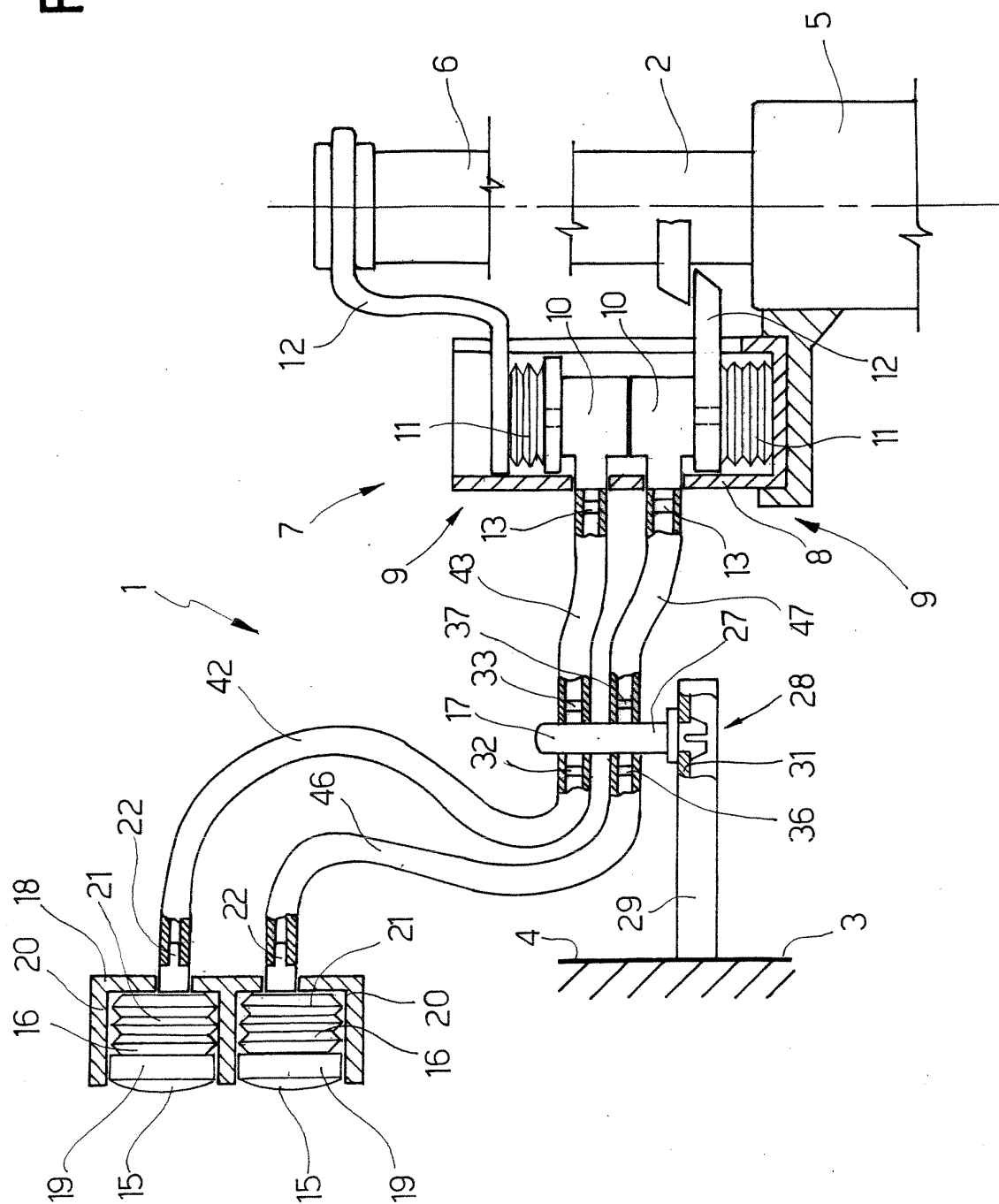
[0021] Once installed, device 1 operates substantially in the same way as a similar known device, in which the pneumatic actuators are connected directly to the buttons. Dividing the connection between actuators 9 and buttons 15 into two separate portions by means of distributor 17 simplifies installation and provides for more reliable operation of device 1.

[0022] Distributor 17 may also be used on a single-drain flush tank 3, in which drain valve 2 has only one operating mode; in which case, distributor 17 is connected to one pneumatic pulse generator 16 (i.e. to one button 15) and to one actuator 9 by one pair of pipes 42, 43 or 46, 47.

Claims

1. A device (1) for controlling the drain valve (2) of a flush tank (3), comprising at least one button (15) operating on a pneumatic pulse generator (16), and a pneumatic actuator (9) connected to the pneumatic pulse generator (16) and acting on a movable shutter (6) of the drain valve; the device being **characterized by** comprising a distributor (17) interposed between the button (15) and the actuator (9) and connected to the button (15) and the actuator (9) by respective pipes (42, 43; 46, 47).
2. A device as claimed in Claim 1, **characterized in that** the distributor (17) comprises at least a first pair of fittings (32, 33; 36, 37) connected by a channel (34; 38); said pipes (42, 43; 46, 47) being fitted to respective fittings (32, 33; 36, 37).
3. A device as claimed in Claim 2, **characterized in that** the distributor (17) comprises a base body (27), and the fittings (32, 33; 36, 37) project from the base body (27).
4. A device as claimed in Claim 3, **characterized in that** the fittings (32, 33; 36, 37) are located on opposite sides of the base body (27).
5. A device as claimed in Claim 3 or 4, **characterized in that** the fittings (32, 33; 36, 37) extend in substantially opposite directions from the base body (27).
6. A device as claimed in one of Claims 3 to 5, **characterized in that** the fittings (32, 33; 36, 37) are connected by a channel (34; 38) formed through the base body (27).
7. A device as claimed in one of Claims 3 to 6, **characterized in that** the base body (27) is a one-piece body molded from plastic material, and the fittings (32, 33; 36, 37) are formed integrally in one piece with the base body (27).
8. A device as claimed in one of the foregoing Claims, **characterized in that** the distributor (17) comprises fastening means (28) for assembly to a support (29).
9. A device as claimed in Claim 8, **characterized in that** the fastening means (28) are releasable, fast-fit fastening means, in particular click-on fastening means (30) cooperating with a seat (31) formed in the support (29).
10. A device as claimed in one of the foregoing Claims, **characterized in that** the distributor (17) comprises a first and a second pair of fittings (32, 33; 36, 37) connected by respective independent channels (34; 38).
11. A device as claimed in one of the foregoing Claims, **characterized in that** the pipes (42, 43; 46, 47) are hoses.
12. A flush tank (3) comprising a drain valve (2) and a device (1) for controlling the drain valve; the tank being **characterized by** comprising a control device (1) as claimed in any one of the foregoing Claims.

Fig. 1



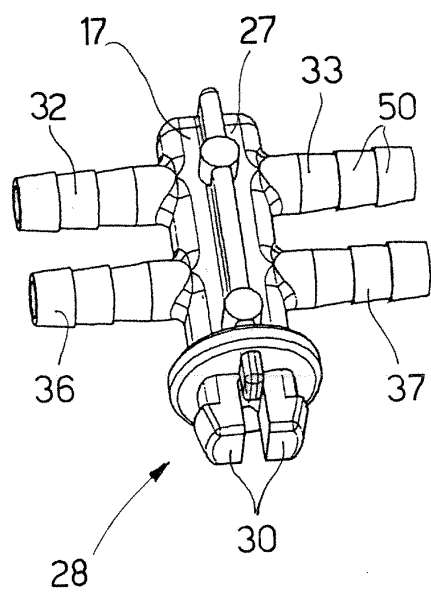


Fig. 2

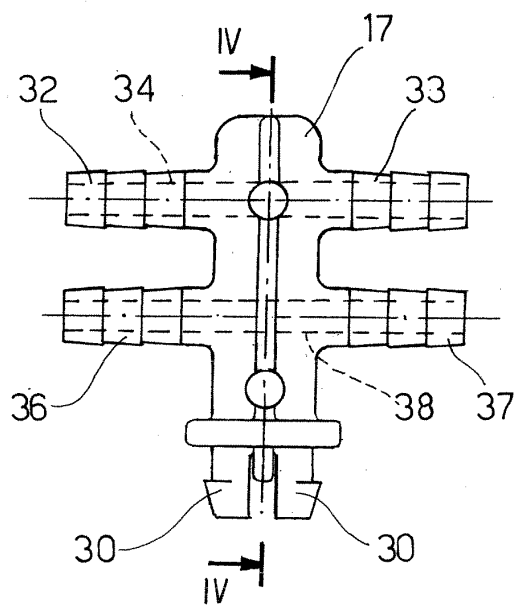


Fig. 3

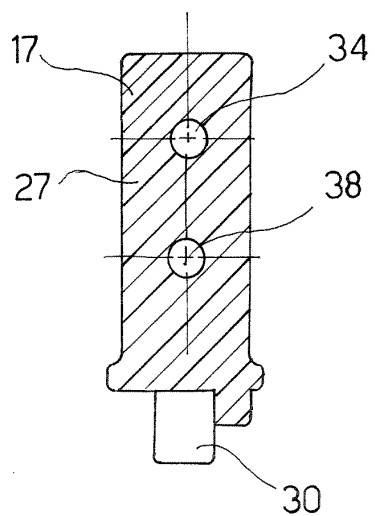


Fig. 4