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Allander et al.

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[54] **VACUUM WATER-CLOSET**

[75] Inventors: **Claes G. Gustaf Allander, Lars E. Bengtsson,** both of Stockholm, Sweden

[73] Assignee: **AB Gustabsbergs Fabriker,** Gustavsberg, Sweden

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[52] **U.S. Cl.** **4/41,** 4/17, 4/76

[51] **Int. Cl.** **E03d 1/36**

[58] **Field of Search**.....4/17, 41, 67, 76, 4/77, 79, 81, 92

[56] **References Cited**

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Primary Examiner—Kenneth W. Sprague

Attorney—Eric H. Waters et al.

[57] **ABSTRACT**

A vacuum water-closet, wherein a buffer receptacle is connected to a flush-water feed pipe between an inlet valve and a flushing nozzle, said buffer receptacle delivering a predetermined quantity of water to the water-closet after each closing of said inlet valve.

3 Claims, 2 Drawing Figures

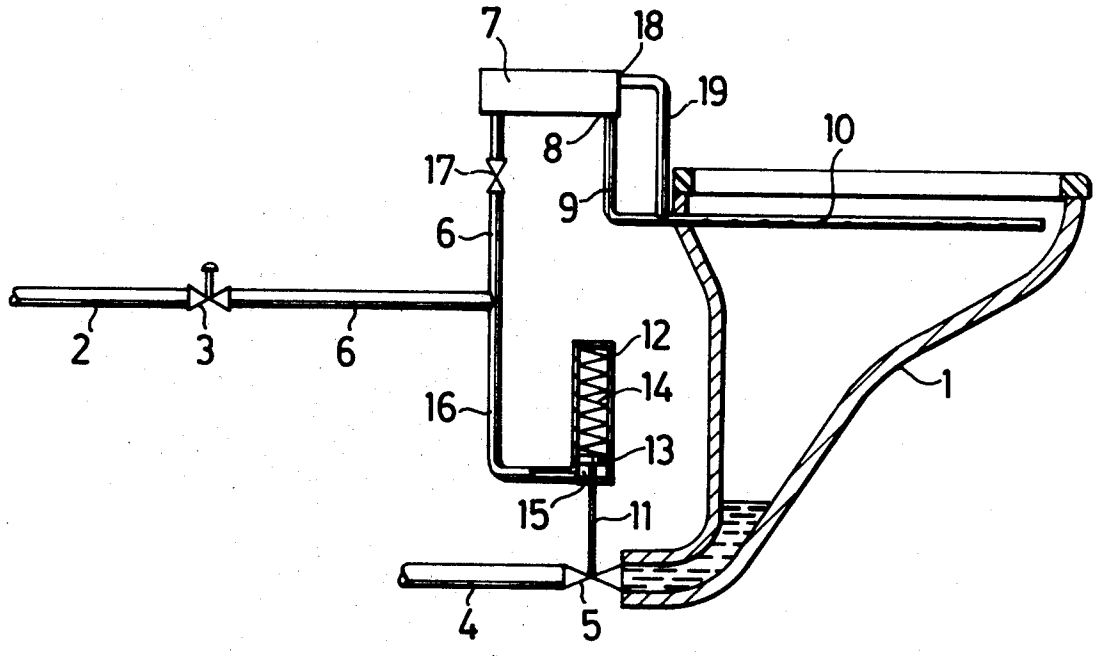


Fig. 1

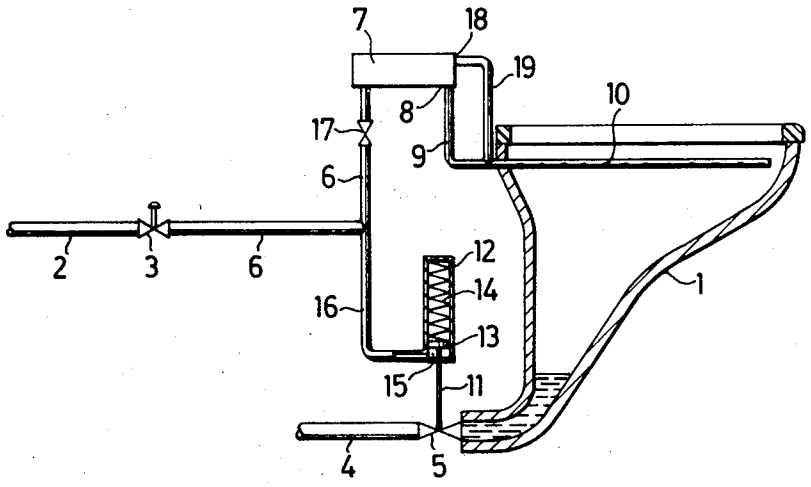
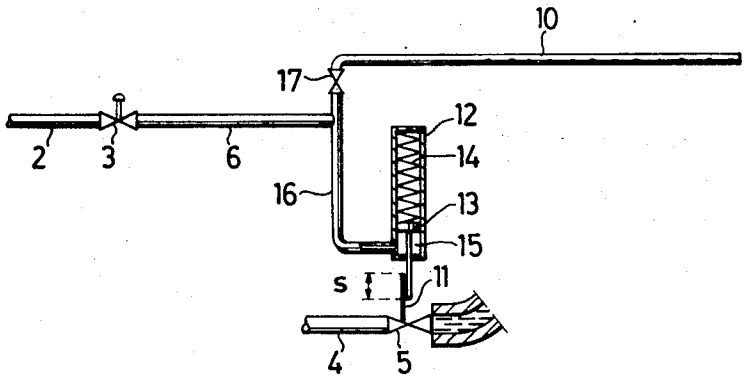

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Fig. 2


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VACUUM WATER-CLOSET

The present invention relates to a vacuum water-closet provided with an inlet valve in a flush-water feed pipe connected to a flushing nozzle and a discharge valve in a discharge pipe, which valves are operated in mutual relationship under the influence of a timed resetting mechanism.

A vacuum water-closet is so operated, that after opening of an inlet valve in the flush-water feed pipe the discharge valve is automatically opened, and then the flushing is continued during a predetermined time period, after which the flushing is interrupted at the same time as the discharge valve closes. After each flushing operation, however, a small quantity of water suitably shall remain in the bottom of the water-closet. For this purpose it is known to arrange the closing of the discharge valve so that closing is obtained a short moment before the closing of the inlet valve. An accurate synchronizing of the operating of the inlet valve and the discharge valve, however, is very difficult to achieve in a simple way and, thus, the quantity of water remaining in the bottom of the water-closet will vary considerably from time to time.

The object of the invention is to achieve a vacuum water-closet, which is provided with a simple and reliable mechanism for performing the intended flushing operation. According to the invention this has been achieved in that said valves are arranged to close substantially simultaneously, and in that the outlet of said inlet valve is connected to a buffer receptacle which is filled up with water during each flushing period and delivers a predetermined quantity of flush-water after the closing of the inlet valve. Due to the fact that the predetermined quantity of flush-water is supplied from a buffer receptacle and not directly from the flush-water feed pipe the demands as to synchronization of the valves have been reduced and, in addition, the complete flushing mechanism has become less complicated. An especially simple synchronization of the opening and closing of the valves can be obtained in that the outlet of said inlet valve is connected to a pressure operated control mechanism of the discharge valve. Thus, opening of the discharge valve is also prevented in case the inlet valve is actuated but no flushing is obtained, e.g. due to absence of water pressure at the inlet side of the inlet valve. Suitably the pressure operated control mechanism may consist of a plunger movable in a chamber of a cylinder against the action of a return spring, which plunger after the closing of the discharge valve is returned along a portion of said cylinder chamber constituting said buffer receptacle.

The invention will appear as the specification proceeds, as illustrated by the drawing of which

FIG. 1 schematically illustrates an embodiment of a water-closet according to the invention and

FIG. 2 illustrates a modification of the flushing mechanism shown in FIG. 1.

The water-closet 1 shown in FIG. 1 is connected to a flush-water feed pipe 2 via an inlet valve 3 and to a vacuum discharge pipe 4 via a discharge valve 5.

Valve 3 is by a pipe 6 connected to a closed buffer receptacle 7 attached to the water-closet, which buffer receptacle holds for instance 0.3 liters and which via a bottom discharge opening 8 and a pipe 9 is connected to a flushing nozzle 10 fixedly mounted in the water-closet.

Valve 3 constitutes a valve known per se which is opened by depressing a push-button and which is reset to closed position after a predetermined time period by a mechanism not shown. Also the discharge valve 5 is of a type known per se, e.g. a diaphragm valve, which can be opened and closed by an operating rod 11.

The operating rod 11 is attached to a plunger 13 movable in a cylinder 12 for operating the discharge valve 5. The discharge valve 5 is positioned in a closed position by a compression spring 14 located in the cylinder and acting upon one side of the plunger 13. The other side of the plunger 13 forms a movable wall of a cylinder chamber 15 of the cylinder 12, which chamber by a pipe 16 is connected to a branch pipe of pipe 6.

In the bottom of the water-closet 1 a predetermined, small quantity of water is located. When the valve 3 opens water is pressed, possibly via a check valve 17, to the receptacle 7 and further to the flushing nozzle 10. During the flushing period the receptacle is filled up with water. To permit air outlet from the receptacle an overflow channel 18 is provided which via a pipe 19 opens into the flushing nozzle 10.

Further, at the opening of valve 3 water is pressed into the cylinder chamber 15, so that the plunger 13 is displaced against the action of the compressed spring 14, the discharge valve 5 is opened, and the water present in the bottom of the water-closet as well as the water supplied during the flushing period is sucked out through the discharge pipe 4.

After that — when the inlet valve 3 automatically closes after the lapse of the predetermined time period — the flushing operation, in proper sense, is interrupted and the water pressure in the cylinder chamber 15 ceases. Thus, the plunger 13 is pressed by the spring 13 into its closed position and at the same time the water in cylinder chamber 15 escapes via the pipes 16 and 6, the receptacle 7 and the pipe 9 to the nozzle 10 and out through the still open discharge valve 5. When the valve 5 closes the plunger 13 comes to a standstill in the cylinder chamber 15. In this moment the bottom of the water-closet 1 is empty but due to the fact that the receptacle 7 is filled with water when the valve 5 closes the water content, about 0.3 liters, of the receptacle flows down to the bottom of the water-closet via the nozzle 10.

The embodiment sown in FIG. 2 is not provided with a receptacle 7. In this case a corresponding operation is obtained by the valve 13 being arranged to continue its movement a predetermined distance after the closing of valve 5, so that the predetermined quantity of water, 0.3 liters, is passed from the cylinder chamber 15 to the nozzle 10 after closing of the valve discharge valve 5. For this purpose the plunger 13 is attached to the operating rod 11 with a play s corresponding to the necessary additional movement of the plunger 13.

The invention is not limited to the embodiments shown but different modifications are possible within the scope of the invention as claimed. Thus, spring loaded flexible bellows may be used in the receptacle 7. Moreover, spring loaded bellows or a membrane may be used in substitute for the pressure operated mechanism 12 to 15. The synchronizing of the opening and closing of the valves 3 and 5 alternatively can be obtained in a mechanical or electrical way in which case, however, the advantage of the pressure operation of the valve 5 cannot be obtained, which advantage, as mentioned, consists in that the discharge valve 5 in the

embodiments shown is prevented from being opened by the valve 3 if, for any reason, the pressure in the pipe 2 should have ceased.

What we claim is:

1. A vacuum water-closet comprising a bowl having a bottom discharge opening, a vacuum discharge pipe connected to said discharge opening by way of a discharge valve, nozzle means for introducing flush-water into said bowl, a second pipe for feeding the flush-water to said nozzle means by way of an inlet valve, the latter having an outlet, a timed re-setting mechanism associated with means for operating said inlet valve and said discharge valve in mutual relationship under the influence of said re-setting mechanism, and a buffer receptacle, wherein said operating means close said valves substantially simultaneously, and said buffer receptacle is connected to said second pipe, said buffer

receptacle being filled up with the flush-water during each flushing period for delivering a predetermined quantity thereof to said nozzle means after each closing of said valves.

2. The vacuum water-closet as defined in claim 1, further comprising a pressure-operated control mechanism for said discharge valve, said outlet of the inlet valve being connected to said control mechanism.

3. The vacuum water-closet as defined in claim 2, further comprising a cylinder with a chamber which constitutes said buffer receptacle, and wherein said control mechanism includes a plunger movable in said chamber against the action of a return spring, said plunger being returned along a portion of said chamber after the closing of said discharge valve.

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