

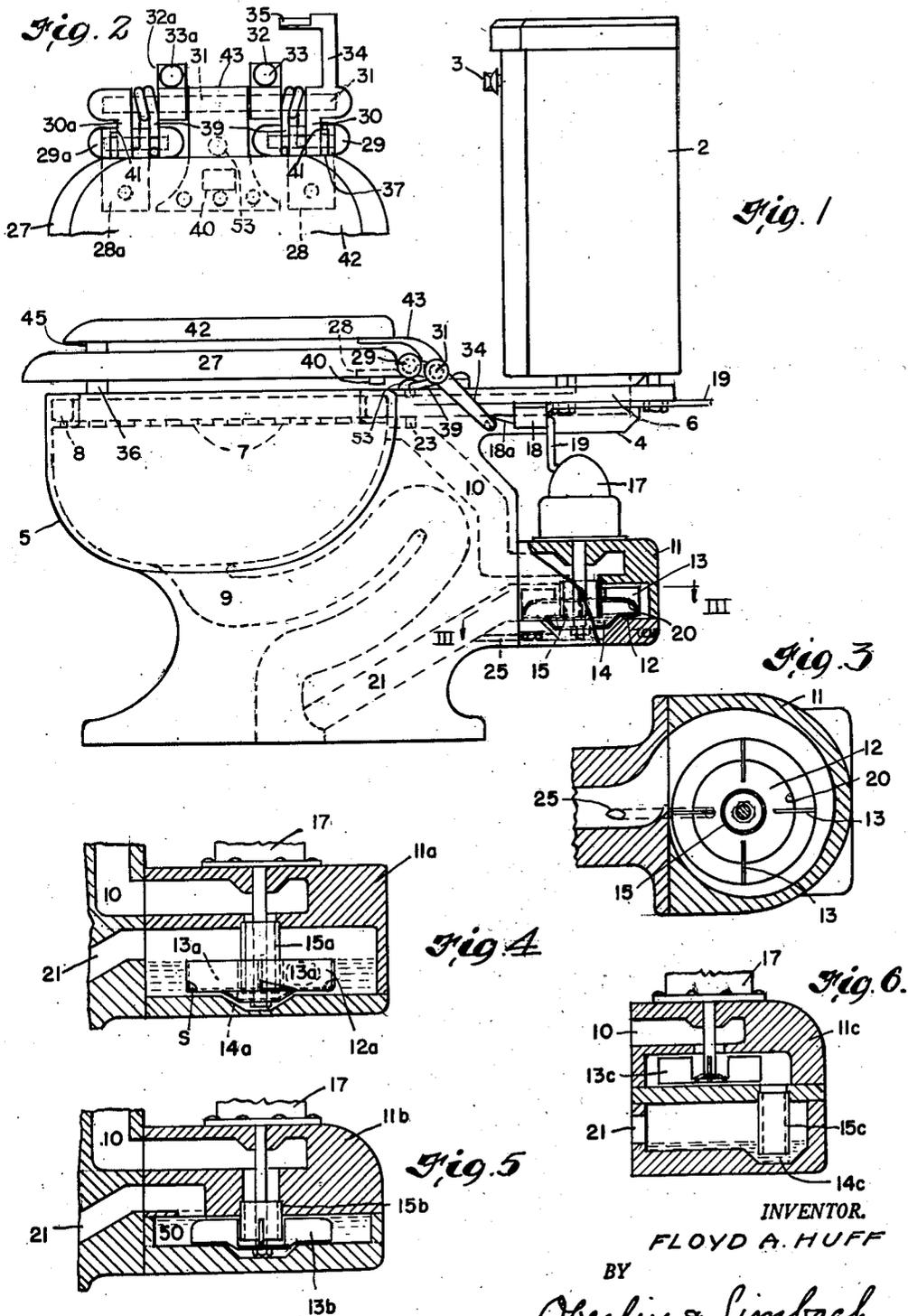
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VENTILATING TOILET

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## VENTILATING TOILET

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This invention relates to water closets, and more particularly to an air ventilating system for such devices.

An important object of the invention is to provide a construction which will remove the waste air from the closet bowl.

A further object of the invention is to provide a water closet having a by-pass around the main outlet trap, and means associated with said by-pass for causing the air to move in a forward direction only, through the by-pass.

A further object of the invention is to provide means for forcing the movement of air from the bowl through a by-pass channel and a valve associated therewith, which automatically opens for air flow only when means for forcing the movement of the air is in operation.

A still further object of the invention is to provide a construction having a means for replenishing the fluid in the sealing valve in the by-pass.

A still further object of the invention is to provide a water closet with air-circulating means to start and stop on predetermined conditions.

Another object also is the provision of a ventilating sealing means wherein liquid is retained, and the principal loss requiring replenishing is that due to slight evaporation.

A still further object of the invention is to provide ventilating means wherein there is a gentle movement of air, and no material air pressure is required to open the valve.

A further object also is the provision of simple and fool-proof construction, and particularly in the valve or sealing means involved.

Another object is the provision of a sealing valve wherein a non-evaporating liquid can be used in the sealing means, replacement not being required on account of the liquid retaining construction.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims; the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing, wherein for the purpose of illustration I have shown my invention as applied to a water closet of standard design:

Fig. 1 is a side elevational view of a water closet embodying my invention, part being in section;

Fig. 2 is a fragmentary detail plan view of the rear portion of the lid structure;

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Fig. 3 is a transverse sectional detail on slightly larger scale taken on a plane substantially indicated by line III—III, Fig. 1; and

Figs. 4, 5, and 6 are fragmentary vertical sections of modifications also on a larger scale.

Referring now more particularly to the drawing, the numeral 2 designates a water flush tank with handle 3 for conventional operation of flush mechanism therein. The flush tank 2 is carried on a projection 4 at the rear of the bowl 5 and has a port 6 for discharging water to the bowl 5 through the distributing openings 7 in the rim-duct 8. As the purpose of this invention is to remove the waste air from the bowl 5 and it is necessary that water remain in the outlet trap 9, a by-pass including a duct 10 is provided from the upper part of the bowl to the sewer by way of a compartment 11 holding a fan valve 12. This fan valve is provided with fan blades 13 and is of generally cupped shape, and may have a depression or well 14, with sufficient water normally held within itself to form a valve with the fixed central tube 15 which extends into the water. Preferably the upper edge of the cupped body of the fan is turned in as at 20. The fan is connected with a drive motor 17 and is controlled by a switch 18 interposed in the wiring leads 19 which may extend from a wall plug or other suitable connection. The control switch is operated by means hereinafter described. Thus, when the fan valve is not revolving, the water in the fan valve 12 seals off the bottom of tube 15 as a valve in the passageway from the bowl via the duct 10 and the discharge duct 21 leading to the vent. But when the fan revolves, the water will be thrown centrifugally outward within its peripheral cup rim 20 enough to uncover the bottom of tube 15 and allow free passage of air through the tube 15, and on to the vent duct 21, the fan blades driving the air forwardly, and as the trap 9 is always closed with water the waste air proceeds only to vent to the sewage pipe. The inner surface of the fan body may be roughened to further favor the gathering of the water in the periphery of the fan valve within its inturned rim 20. If desired, the outlet trap may be increased in size where the duct 21 joins thereto, as a further safeguard in obviating interference with the siphon action of the outlet. A small opening 23 serves to always insure adequate replenishing water to the fan valve compartment when the closet is flushed, as it connects between the bowl distributing supply and the duct 10 to supply water through the tube 15. A drain 25 may be provided for draining the space under the fan valve.

To the rear portion of the seat 27 is attached at opposite sides thereof plates 28, 28a, these being forked at the rear thereof to be hinged by means of bolts 29, 29a to the arms 30, 30a which are attached to the shaft 31 at its outer ends, the shaft being hinge-mounted in the anchor lugs 32, 32a which are secured to the flush bowl by bolts 33, 33a. Extending from the arm 30 to the rear is a lever 34 with a right angle extension 35 which is positioned to swing into engagement with switch trip-arm 18a when weight is applied to the seat 27, the front end of which rests on buffers 36 while the rear is normally held up a predetermined distance as controlled by the mating stop offsets or lugs 37, 41, projecting on the opposed surfaces of the arms and plates and by springs 39, the latter yielding under weight until the buffer 40 contacts the rim of the bowl. In such movement, the trip-lever 34 operates the switch arm 18a and starts the motor. When the weight pressure is released from the seat, the spring 39 raises the rear thereof and the lever 34 comes to position to release the switch arm 18a and the switch stops the motor. Preferably a time-delay type of switch is employed, in order to insure removal of all waste air before the fan stops. Over the seat is a lid 42 which has attached to its rear an arm 43 hinged to shaft 31. As the lid buffers 45 are aligned over the seat buffers 36, and not to the rear thereof, it is seen that weight pressure applied to the lid is prevented from causing operation of the switch-control lever 34 such as to start the motor.

Where the flushing water is supplied directly by an appropriate supply valve instead of from a flush tank, the operation of the present construction is of course the same.

In the form of the fan valve shown in Fig. 4, the fan 12a is generally of cylindrical cupped form closed below and having radial blades 13a. The fixed sealing tube 15a again extends as a passage-way connecting from duct 10, and is slightly spaced up from the depressed bottom of the cupped fan body, whereby water therein may seal the lower end of the tube 15a. The fan body is provided with small openings s which coincide with openings in the fan blades and allow passage of water, the openings being so designed as to open away from the direction of the fan rotation. When the motor 17 is energized, the centrifugal action in the fan throws the liquid out through the openings s and also especially through the open top of the cupped fan into the space or reservoir surrounding the fan, and the lower end of the tube 15a being freely exposed allows passage of air from the duct 10 through the fan to the discharge duct 21. As the fan is stopped water will begin to flow back through openings s into the fan cup, and its depression below the tube 15a is filled and re-seals the lower end of the tube 15a to prevent upward passage of air. Due to the circular shape of the fan body without externally projecting blades, it turns with very small resistance in the liquid.

In the modification shown in Fig. 5 the construction again includes the motor 17 and the fan with blades 13b, and the fixed central tube 15b therewithin to seal by its lower end in water. The centrifugal force of the fan in rotation causes the liquid in the chamber 50 to swirl outwardly thereby exposing the lower end of the tube 15b and allowing free passage of air as drawn by the fan down through the tube and into the vent duct 21. Upon the stopping of the fan, the water flows back to the center and re-seals the

lower end of the tube, and passage of air is prevented.

Instead of using water as the sealing liquid, other liquids of non-evaporating character can be used, as for example mercury, and since there is normally no occasion for loss of liquid in its series of movements to the periphery and back, a charge of liquid can last indefinitely, and such a valve is of especially wide usefulness.

In the form shown in Fig. 6, the motor 17 is again arranged to drive the fan having the fan blades 13c. The fixed sealing tube 15c is positioned such that its lower end dips into the depression or well 14c for but a slight distance, and the water in the reservoir adjacent thereto extends but slightly above well 14c; consequently only a slight pressure is required to force air down through said tube by the fan; however, considerable pressure is required to force air up through said tube as the entire amount of liquid in the reservoir above the lower end of the tube must be forced up through the tube before any air can pass through. This differential of pressure required is thus of particular advantage.

In all forms of the invention, as seen, when weight is applied to the lid 42 the fan is prevented from operating, but when weight is applied to the seat 27 the fan is operated and its water seal is simultaneously opened for free draw-off of air from the bowl to the vent pipe. But when the fan stops after removal of weight from the seat, the water again flows back center-wise and closes the fan seal as a valve, and passage of air back from the sewer side is prevented.

By the provision of a supply opening and closure plug 53 over the opening 23 (see Fig. 1), anti-freeze material may be supplied through the opening 23 and duct 10 to the fan valve compartment for protection thereof in the event of any occasion requiring such.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a ventilating water closet, a seat, a lid, a flush bowl and flushing means, a fan and valve by-pass compartment, a passage-way connecting thereto from the upper part of the bowl and a passage-way connecting therefrom to vent below the bottom of the bowl, valving means in said by-pass including a fan having a generally cupped shape liquid-holding body and blades thereon, a sealing tube normally dipping into liquid in said liquid-holding body, a motor for driving said fan, a motor-switch, spring means normally holding the rear of the seat slightly elevated, an arm connected to the seat to operate said motor-switch when weight is applied to the seat, and mounting for the lid independent of said seat and switch-operating arm.

2. In a ventilating water closet, a seat, a flush bowl and flushing means, a fan and valve by-pass compartment, a passage-way connecting thereto from the upper part of the bowl and a passage-way connecting therefrom to vent below the bottom of the bowl, a fan in said by-pass cup-shaped for containing sealing liquid, a sealing tube dipping thereinto, a motor for driving said fan, and a motor-switch actuated by weight on the seat.

3. In a ventilating water closet, a seat, a lid, a flush bowl and flushing means, a fan and valve

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by-pass compartment, a passage-way connecting thereto from the upper part of the bowl and a passage-way connecting therefrom to vent below the bottom of the bowl, valving means in said by-pass including a deepened depression at the bottom of a surrounding liquid-holding means which receives and returns liquid temporarily displaced from said depression, a sealing tube normally dipping into the liquid in said depression, means centrifugally displacing such liquid, a motor for driving said fan, a motor-switch actuated by weight on the seat, and means preventing weight on the lid from actuating the motor-switch.

4. In a ventilating water closet, a seat, a flush bowl and flushing means, air bypass means for evacuating the air-space of the bowl to the sewer including liquid-valving construction having a sealing tube with open lower end normally submerged in a liquid holding depression in a liquid holding means, said means forming a receiving space about said depression for receiving and gravitationally returning an anti-freeze liquid which is contained therein, said bypass including a fan whose operation displaces such liquid from said depression for effecting said air bypass through said tube, and an opening to the upper end of the air bypass for directing a liquid to the air bypass and the fan.

5. In a ventilating water closet having a flush bowl and flushing means, a by-pass compartment, a passage-way connecting thereto from the upper part of the bowl and a passage-way connecting therefrom to the sewer below the bottom of the bowl, a fan in said by-pass compartment comprising a cup-like body having fan blades associated therewith, a tube extending into liquid in said cup-like body, a drive motor and control switch for said fan, the motor in turning the fan causing the liquid to be centrifugally thrown toward the perimeter of the cup-like body thereby exposing the lower end of said tube for passage of air, and the liquid returning to again seal the tube against passage of air when the fan stops, the only means for passage of air through the by-pass compartment being through said tube.

6. In a ventilating water closet having a flush bowl and flushing means, a by-pass communicating between the upper part of the bowl and the sewer, a fan in said by-pass having a cupped body with a liquid-propelling surface, said by-pass including means extending into liquid in said cupped body for sealing against the passage of air therethrough when quiescent and permitting the passage of air when the fan is in motion.

7. In a ventilating water closet, a seat, a lid, a flush bowl and flushing means, a by-pass compartment with a passage-way connecting thereto from the upper part of the bowl and a passage-way connecting therefrom to the sewer below the bowl, a fan in said by-pass compartment comprising a liquid-holding body and fan blades, said by-pass including means extending into liquid in said body for normally sealing against passage of air therethrough, a motor for driving said fan and throwing liquid peripherally to expose said sealing means, and a motor-switch actuated by weight on the seat.

8. In a ventilating closet having a flush bowl and flushing water supply means, a by-pass communicating between the upper part of said bowl and the sewer, a fan in said by-pass and a liquid-holding depression in association, a sealing tube as part of said by-pass dipping into liquid in said depression, means whereby the fan when in

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motion displaces liquid to expose the lower end of said sealing tube, and a connection between the flushing water supply means and said by-pass to provide water for said liquid-holding depression.

9. In a ventilating water closet, a seat, a flush bowl and flushing means, a by-pass communicating between the upper part of said bowl and the sewer, a fan in a liquid-holding depression in association, a sealing tube as part of said by-pass dipping into liquid in said depression, a motor for driving said fan, and a time-delay switch for said motor actuated by weight on the seat and allowing the motor to run for an interval after removal of such weight.

10. In a ventilating water closet, a fan and valve by-pass communicating with the upper part of the flush bowl and the sewer, a fan in said by-pass, and a sealing tube concentric inside the fan-blades to dip into a liquid-holding depression.

11. In a ventilating water closet, a fan and valve by-pass communicating with the upper part of the flush bowl and the sewer, and valving means in said bypass including a depression at the bottom of a surrounding liquid-holding means which receives and returns liquid temporarily displaced from said depression, a sealing tube whose open lower end normally dips into the liquid in said depression, a fan whose operation displaces the liquid from said depression and effects the bypass through the tube, a motor for driving said fan, and an opening to the upper end of the air bypass for directing a liquid to the air bypass and the fan.

12. In mechanism of the character described, a fan and valve by-pass communicating between the upper part of the flush bowl and the sewer, a fan having a cupped body, a sealing tube dipping therein, blades in said fan body, and openings in the lower portion of the body directed opposite to the direction of rotation of the fan.

13. In mechanism of the character described, a fan and valve by-pass communicating between the upper part of the flush bowl and the sewer, and a fan in said by-pass having blades and containing liquid as a seal when quiescent and throwing the liquid out to uncover the seal when in motion.

14. Combined fan and seal mechanism, including fan blades in a cupped body, a non-evaporating liquid therein, and a sealing tube dipping into the liquid.

15. Combined fan and seal mechanism, including fan blades in a body for holding a sealing liquid, and a sealing tube dipping into the liquid.

16. Combined fan and seal mechanism, including a compartment with a body of sealing liquid, a sealing tube dipping therein, and fan blades operating at least in part in the liquid to displace the sealing liquid sufficiently to open such seal.

17. A fan-valve comprising a cup-like body with fan blades, a tube extending into liquid therein for sealing the end of the tube when the fan is quiescent and the liquid being centrifugally moved for unsealing when the fan is in motion.

18. In water-close mechanism of the character described, a by-pass compartment communicating between the upper part of the flush bowl and the sewer, including a liquid-valving construction having a sealing tube with open ends and a liquid-holding depression cooperating therewith for normally submerging the lower end of the tube, a liquid holding space thereabouts which receives and gravitationally returns liquid temporarily displaced from the depression, said bypass including a fan whose operation displaces such

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liquid from the depression to effect said bypass through said tube, and an opening to the upper end of the air bypass for directing a liquid to the air bypass and the fan.

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