May 11, 1954 C. H. ALLEN ET AL 2,677,830

VENTILATING MEANS FOR TOILET BOWLS

Filed March 9, 1950

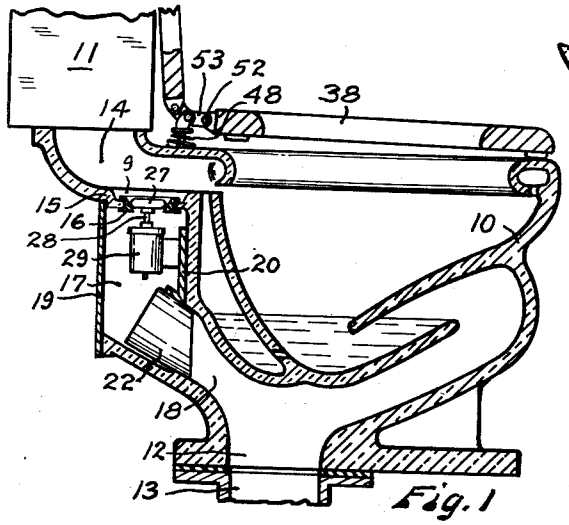


Fig. 1

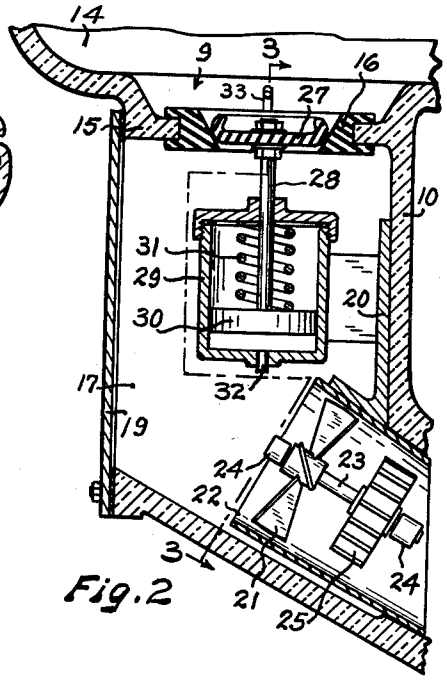


Fig. 2

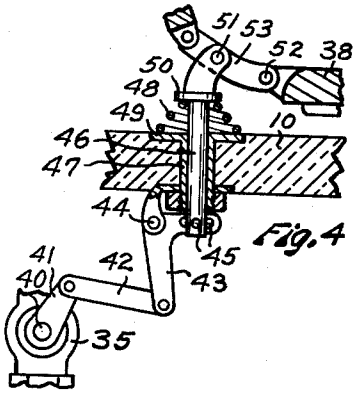


Fig. 4

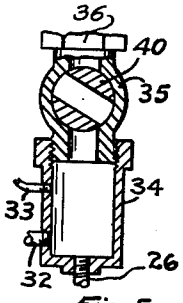


Fig. 5

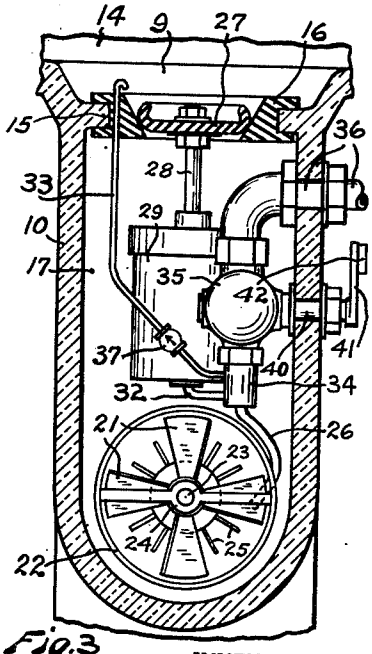


Fig. 3

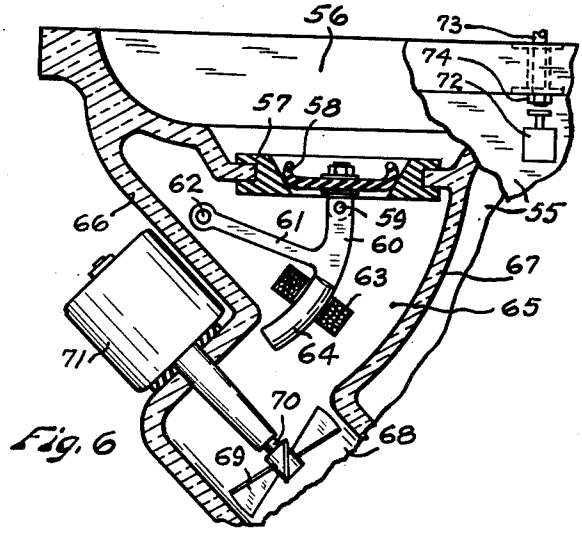


Fig. 6

INVENTORS
Clyde H. Allen
Leon G. Mc Kay
BY Fred C. Matheny
ATTORNEY

Patented May 11, 1954

2,677,830

UNITED STATES PATENT OFFICE

2,677,830

VENTILATING MEANS FOR TOILET BOWLS

Clyde H. Allen and Leon G. McKay,
Seattle, Wash.

Application March 9, 1950, Serial No. 148,534

1 Claim. (Cl. 4—214)

1

This invention relates to ventilating means for toilet bowls and an object of this invention is to provide a ventilating means which will operate automatically to draw off air from a toilet bowl and discharge the same down a sewer pipe.

Another object of this invention is to provide toilet bowl ventilating means which is rendered operative by the presence of weight on the seat of the toilet bowl and which is rendered inoperative by the removal of weight from said toilet bowl seat.

Another object of this invention is to provide power actuated toilet bowl ventilating means which may be driven by water pressure.

Another object of this invention is to provide toilet bowl ventilating means comprising power operated air impeller means connected by valve controlled suction conduit means with the interior of a toilet bowl and by air discharge conduit means with the usual sewer pipe into which the bowl discharges and to further provide in the air suction conduit means an air valve and water seal means for said air valve.

Another object is to provide toilet bowl ventilating means which may be electrically controlled and operated.

Other objects of this invention are to provide toilet bowl ventilating means which is simple in construction, reliable, efficient and relatively quiet in operation, not expensive to manufacture, not costly to operate, not liable to get out of order and require service but which is arranged in such a manner as to make it readily available in the event it does require service and one which is sanitary and will help to minimize the spread of communicable disease.

Other objects of this invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings Figure 1 is a vertical sectional view, with parts in elevation, showing a toilet bowl which is provided with ventilating means constructed in accordance with this invention.

Fig. 2 is a fragmentary sectional view, on a larger scale than Fig. 1, showing parts of the toilet bowl and toilet bowl ventilating means shown in Fig. 1.

Fig. 3 is a view partly in section and partly in elevation taken substantially on broken line 3—3 of Fig. 2.

Fig. 4 is a detached fragmentary view partly in section and partly in elevation illustrating means connected with a toilet seat for opening and closing a valve.

Fig. 5 is a detached fragmentary sectional view

2

showing a water control valve and manifold chamber connected therewith.

Fig. 6 is a fragmentary sectional view with parts shown diagrammatically and illustrating toilet bowl ventilating means which is electrically controlled and electrically operated.

Like reference numerals indicate like parts throughout the several views.

Referring to Figs. 1 to 5 inclusive, 10 indicates a toilet bowl which may be of substantially any desired conventional construction and which may be provided with an ordinary flush tank 11 or may have connection with any other source of supply of water for flushing purposes. Also the bowl 10 is provided with a discharge opening 12 which is connected in the usual manner with a sewer pipe 13.

The rear portion of the bowl 10 has a communicating passageway or chamber 14 through which water for flushing purposes flows into said bowl and this chamber 14 is provided with a bottom wall 15. The parts 10 to 14 inclusive are of conventional construction. The wall 15 is modified to the extent of providing therein a depressed valve basin 9 having a suitable opening which is provided with a valve seat 16. The valve seat may be formed of rubber.

The portion of the bowl 10 below the chamber 14 is provided with a suction compartment 17 which communicates by way of an opening 18 with the discharge opening 12 of the toilet bowl 10. The suction compartment 17 may be formed integral with the bowl at the time the bowl is molded or it may consist of a separable receptacle attached to the bowl. This suction compartment 17 has a removable closure member 19 which seals said compartment 17 against leakage and said compartment 17 is adapted to receive air suction and ventilating means as hereinafter described.

Preferably the air suction and ventilating means is constructed and assembled in such a manner that the parts thereof may be readily inserted into or removed from the compartment 17. Any suitable frame or bracket means, such as the bracket means 20 may be used to support the several parts within the suction chamber 17.

The air suction and ventilating means shown in Figs. 1 to 5 comprises an air impeller fan 21 which is capable of drawing air into the upper portion of the suction compartment 17 and discharging such air through the passageways 18 and 12 into the sewer pipe 13. The air impeller fan 21 is disposed within a downwardly inclined tubular housing 22, the direction of downward

incline of the housing 22 being toward the sewer pipe 13. The fan 21 is secured to a shaft 23 which is journaled in anti-friction bearings 24 carried by the housing 23. A water turbine wheel 25 is also secured to the shaft 23 and at least one water delivery tube 26 is positioned so as to deliver a jet of water onto the turbine wheel 25. The delivery of one or more jets of water onto the turbine wheel 25 will drive this turbine wheel 25 and the shaft 23 and fan 21 at relatively high speed and this will draw air from the toilet bowl and discharge said air down the sewer pipe 13 under circumstances as hereinafter explained.

One end portion of the inclined housing 22 fits within the upper end portion of the inclined opening 18 in the toilet bowl, as shown in Figs. 1 and 2.

An air valve 27 is provided for cooperation with the valve seat 16 to open or to close the passageway through the wall 15 which communicates between the flush chamber 14 and suction compartment 17. Preferably this air valve 27 is made of fairly soft rubber so that it may be passed through the opening of valve seat 16 at the time of installation or removal of the same. The valve 27 is secured to a stem 28 which extends into a hydraulic cylinder 29 and is secured to a piston 30. A spring 31 yieldingly urges the piston 30 into a lowered position and holds the valve 27 closed in the absence of hydraulic pressure below the piston 30. When water under pressure is admitted to the bottom end portion of the cylinder 29 through a conduit 32 it lifts the piston 30 against the pressure of the spring 31 and opens the air control valve 27.

The conduit 32 and jet tube 26 together with another tube 33 are all communicatively connected with a short manifold chamber or pipe 34 to which water is admitted by way of a valve 35 from a water supply pipe 36. The tubes 26 and 32 and 33 are all of relatively small size and for this reason a substantial water pressure will be built up and maintained in the manifold chamber 34 when the valve 35 is open. Preferably a check valve 37 is provided in the conduit 33 and said conduit 33 extends to and is positioned to deliver water into the depressed valve basin 9 to insure a positive water seal around the air valve 27 when said air valve is in a closed position. The check valve 37 prevents water around the valve 27 from draining down through the tube 33 in the event the upper end portion of said tube 33 is positioned below the level of the water in the depressed valve basin 9. This precludes all danger of sewer gas passing upwardly through the housing 17 and escaping by way of the air valve 27.

The valve 35 is adapted to be connected with a toilet bowl seat 38 in such a manner as to cause said valve 35 to be opened when a person sits down on the seat and to be closed when the person gets up off of the seat. Obviously this can be accomplished by different mechanical devices. One way to accomplish this is shown in Figs. 3 and 4, and comprises providing on the stem 40 of the valve 35 a lever 41 which is connected by a link 42 with a bell crank 43. The bell crank 43 is mounted on a pivot 44 and is connected as by slot and pin means 45 with a vertically movable seat supporting pin 46. The pin 46 is guided in a sleeve 47 which is supported by the toilet bowl 10. A cone shaped compression spring 48 is interposed between a head flange 49 of sleeve 47 and a flange 50 of the pin 46 and urges the pin 46 upwardly. The spring 48, being of conical shape is capable of being compressed so that its length is only equal to substantially the diameter of the wire of which it is formed. The toilet bowl seat 38 is connected as by pivots 51 and 52 and link 53 with the upper end portion of the pin 46. When the seat 38 is free of weight the spring 48 will hold the rear portion of said seat in an elevated position, as shown in Figs. 1 and 4, and the valve 35 will be closed. When the seat 35 is subjected to a weight the spring 48 will be compressed, the pin 46 will be moved downwardly and the lever 43, link 42 and lever 41 will be moved so as to open the valve 35.

The opening of the valve 35 supplies water under pressure from the pipe 36 to open the air valve 27 and drive the air impeller fan 21. This induces a suction of air through the toilet bowl and into the receptacle 17 and drives this air down through the sewer pipe 13. The fan continues to operate until the toilet seat is relieved of weight whereupon the spring 48 operates to close the valve 35. At the time the valve 35 is closed the piston 30 in the cylinder 29 will be raised and the lower end portion of said cylinder will be filled with water. This water which thus remains in the cylinder 29 will be expelled by the force of the spring 31 through conduit 32 and while it is being thus expelled this water will keep the fan 21 operating. Thus a short period of operation or over run of the fan after the closing of the valve 35 is provided. This over run of the fan is desirable in providing for a short period of operation of the fan after the toilet seat has been relieved of weight. Also some of the water which is thus expelled from the cylinder 29 during and after the closing of the air valve 27 will be discharged from the upper end portion of the tube 33 onto the valve 27 and this will always supply enough water to the depressed valve basin 9 to insure water sealing said valve 27 when said valve is closed. The valve 27, being of fairly soft rubber, will close before the downward movement of the piston 30 ceases.

For purpose of illustration the valve 35 has been shown to be a rotary valve which is opened and closed by rotary movement but it will be understood that a type of valve which moves toward and away from a valve seat may be used.

Fig. 6 illustrates a form of this invention in which the opening of an air valve and the operation of an air impeller are controlled and accomplished by electrical means. In said Fig. 6 the numeral 55 indicates a toilet bowl which is provided with an inlet chamber 56 for flushing water corresponding to the chamber 14 shown in Figs. 1 to 3. The bottom wall of the chamber 56 has a valve seat 57 provided therein corresponding to the valve seat 16 of Figs. 1 to 3. An air valve 58 is adapted to be moved into open and closed relation to the seat 57. The valve 58 is connected by a pivot 59 with a curved valve stem 60. The stem 60 is connected by an arm 61 with a pivot 62 and is movable in an arc about pivot member 62 to open and close the valve 58. An armature section 64 on the stem 60 is movable through an electromagnet coil 63. When electric current is supplied to the coil 63 the armature section 64 will be moved upwardly and the valve 58 will be opened. When the coil 63 is de-energized the valve 58 will be closed by gravity.

The parts 60 to 64 just described are positioned in a suction chamber 65 which is formed in the toilet bowl 55 by two walls 66 and 67. An inclined air discharge passageway 68 corresponding to the passageway 18 of Figs. 1 and 2 is provided

at the lower end of the suction chamber 65. An air impeller fan 69 is positioned in the passageway 68 and is secured to the shaft 70 of an electric motor 71. Preferably the motor 71 is positioned outside of the suction chamber 65 and the housing wall 66 is shaped to provide a recess for said motor. The supply of electric current to both the coil 63 and the motor 71 is controlled by an electric switch 72, shown diagrammatically in Fig. 6, and which is positioned for operation by a vertically movable seat supporting pin 73. The pin 73 is substantially the same as the pin 46 of Fig. 4 except that the bottom end thereof is provided with a nut 74 instead of the cross pin as shown in Fig. 4. The upper end portion of the pin 73 is connected with a toilet bowl seat in the same manner as the pin 46.

Preferably the switch 72 is a delayed action switch, as respects the breaking or opening of the circuit so that when weight is removed from the toilet seat the circuit will remain closed for a short period of time thereafter and the valve 58 will be held open and the motor 71 will continue to run for a short time after the toilet seat is relieved of weight.

The electrically operated devices shown in Fig. 6 operate in substantially the same manner as the devices shown in Figs. 1 to 5 in that they provide a suction drawing air out of a toilet bowl and discharging said air down a sewer pipe whenever weight is present on the toilet seat.

This toilet bowl ventilating apparatus is herein illustrated as attached to the rear side of a toilet bowl of well known type. However it will be understood that, in other types of bowls the ventilating mechanism may be positioned at the front side of the bowl.

The foregoing description and accompanying drawings clearly disclose certain preferred embodiments of this invention but it will be understood that these disclosures are merely illustrative and that such changes in the invention may be made as are fairly within the scope and spirit of the following claim.

I claim:

In toilet bowl ventilating means, a toilet bowl having a hinged seat and having in its bottom portion a discharge opening connected with a sewer pipe; means forming a ventilator compartment alongside of said bowl, said ventilator compartment having a top wall provided with a depressed portion over which water flows to the bowl, the space above said top wall communicating with the toilet bowl and the depressed portion providing a water seal receptacle and having a valve opening in its bottom portion; an outlet conduit connecting said ventilator compartment with the discharge opening of said toilet bowl; an air impeller fan positioned to discharge air through said outlet conduit; a turbine wheel attached to said air impeller fan; an annular valve seat extending around the opening in said depressed portion; a valve positioned above said valve seat for closing movement onto said valve seat; a downwardly extending stem on said valve; a piston on the lower end of said stem; a hydraulic cylinder receiving said piston; a spring engaging said piston yieldingly urging said valve closed; a water manifold housing; a water pressure supply conduit connected with said manifold housing; a water control valve in said water pressure supply conduit adjacent said manifold housing; a discharge conduit connected with the lower portion of said manifold housing and having an outlet end positioned to direct a stream of water onto said turbine wheel, whereby said fan is driven; a sealing water conduit connected with said manifold housing and having a discharge end positioned to deliver sealing water onto said depressed portion of said top wall above said valve; another conduit communicatively connecting said water manifold housing with the lower end portion of said hydraulic cylinder; and weight operated valve opening and closing means connecting said water control valve with said toilet seat, whereby said water control valve will be opened when weight is placed on said seat and will be closed when the weight is removed from said seat, the reserve water discharging from said hydraulic cylinder and said manifold housing after said water supply valve is closed providing continued operation of said air impeller fan for a predetermined period of time after said toilet seat is relieved of weight.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
908,393	Cline	Dec. 29, 1908
1,165,836	Blanchard	Dec. 28, 1915
1,447,028	McLanahan	Feb. 27, 1923
1,564,071	Jackson	Dec. 1, 1925
1,734,498	Majauskas	Nov. 5, 1929
1,885,715	Hanson	Nov. 1, 1932
2,058,436	Friel	Oct. 27, 1936
2,134,629	Walsh et al.	Oct. 25, 1938
2,203,111	Stebbing et al.	June 4, 1940
2,329,221	Sanford	Sept. 14, 1943
2,526,278	Rosselle	Oct. 17, 1950

FOREIGN PATENTS

Number	Country	Date
250,031	Switzerland	Aug. 15, 1947
338,093	Italy	Mar. 26, 1936