July 22, 1952 H. BAITHER 2,603,797

WATER MOTOR-DRIVEN VENTILATOR

Filed July 26, 1947 2 SHEETS—SHEET 1

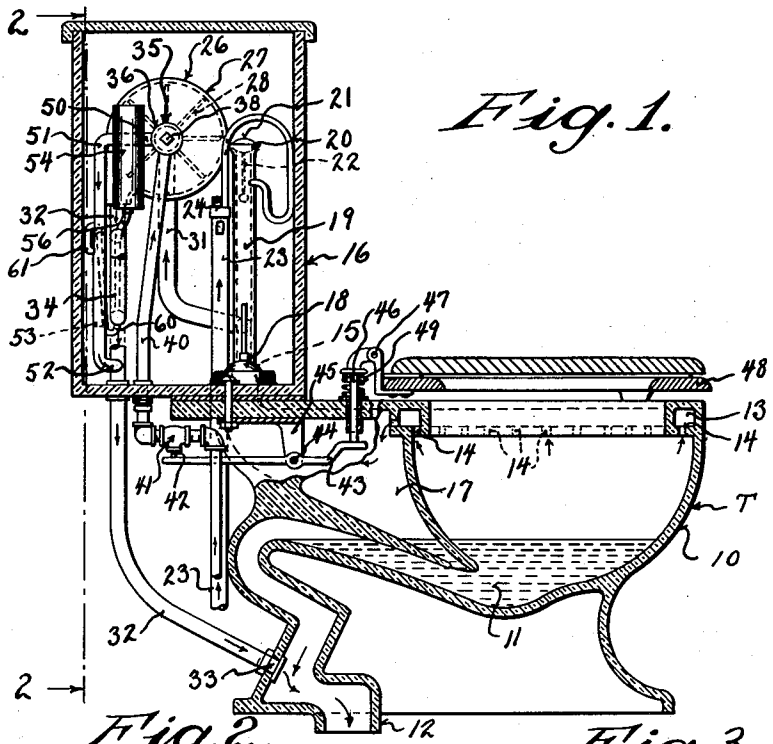


Fig. 1.

Fig. 2.

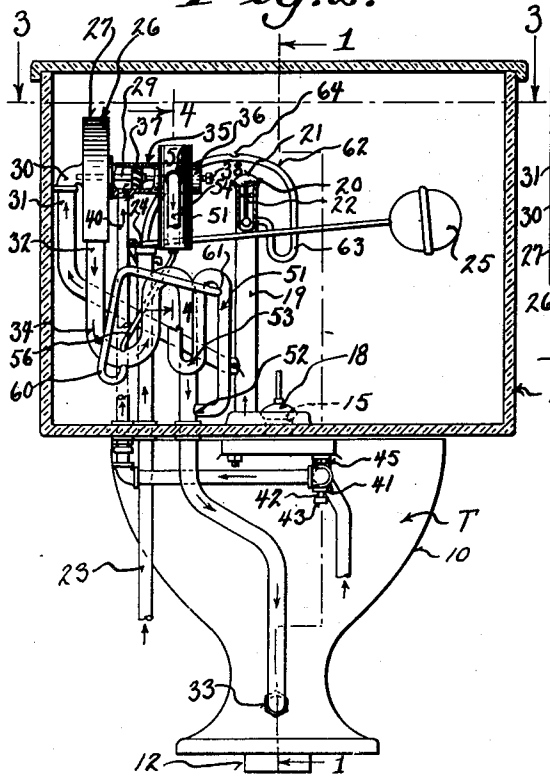


Fig. 3.

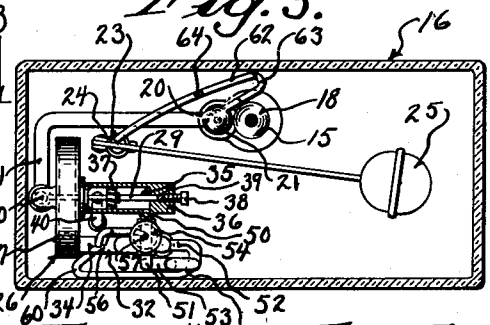


Fig. 4.

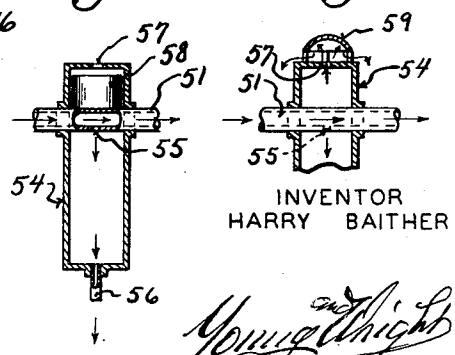


Fig. 5.

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Fig. 6.

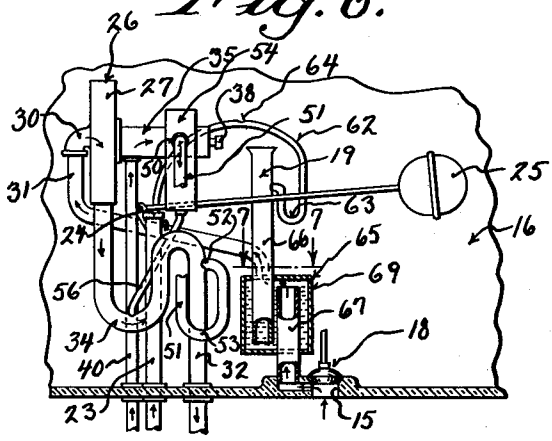


Fig. 7.

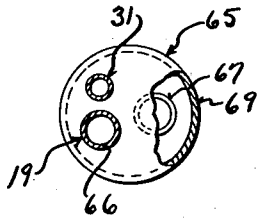


Fig. 8.

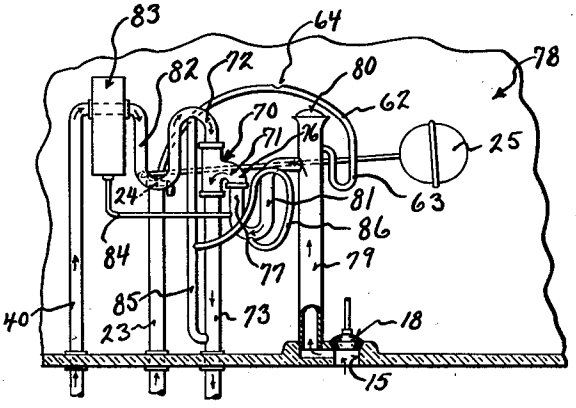
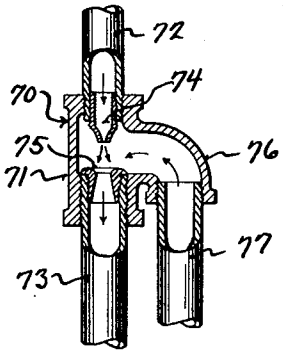


Fig. 9.



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WATER MOTOR-DRIVEN VENTILATOR

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2 Claims. (Cl. 4—214)

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This invention relates to ventilated toilets and is an improvement over my prior patents, Nos. 1,931,052, 2,227,920 and 2,297,935 issued respectively to me October 17, 1933, January 7, 1941 and October 6, 1942.

In these patents, I illustrated means for creating an air suction in the bowl of the toilets during the use thereof for eliminating objectionable odors.

My present invention appertains to means for creating such suction by the use of a water motor or injector so as to eliminate the use of electric motors and the like.

One of the primary objects of my invention is to provide novel water-seals or traps for the various conduits and pipes used in my ventilated toilet, so as to effectively prevent the passage of objectionable vapors from the bowl and sewer pipe to the flush tank.

Another salient object of my invention is to provide means for emptying the water-seals while the water motor and suction fan is in operation and for automatically replenishing the seals with water when the toilet is not in use.

A further important object of my invention is the provision of means for automatically supplying water to the water motor as soon as weight is applied to the toilet seat, whereby the suction fan will be immediately set in operation.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings,

Figure 1 is a longitudinal sectional view through a toilet equipped with my improved ventilating means, the section being taken substantially on the line 1—1 of Figure 2 looking in the direction of the arrows.

Figure 2 is a vertical sectional view taken on the line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a horizontal sectional view through the flush tank taken on the line 3—3 of Figure 2 looking in the direction of the arrows, the view showing the ventilating apparatus in top plan with parts broken away and in section.

Figure 4 is a detail vertical sectional view taken on the line 4—4 of Figure 2 looking in the direction of the arrows, illustrating one means employed for replenishing water to one of the water-seals, the view also showing the means utilized to prevent the formation of a vacuum in said water replenishing means.

Figure 5 is a view similar to Figure 4, but showing a modified form of the water replenishing means in which the vacuum float breaker is eliminated.

Figure 6 is a fragmentary detail vertical sectional view through a flush tank showing a slightly modified form of my ventilating apparatus.

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Figure 7 is a detail horizontal sectional view taken on the line 7—7 of Figure 6 looking in the direction of the arrows.

Figure 8 is a sectional view similar to Figure 6, but showing another form of my invention using the injector principle instead of a water motor.

Figure 9 is an enlarged fragmentary detail sectional view through the injector.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter T generally indicates my improved ventilated toilet and the same comprises a toilet bowl 10 having communicating therewith, through a water basin or trap 11, a drain pipe 12.

The upper end of the bowl 10 has formed therein a flush ring 13. Formed in the flush ring 13 is a plurality of outlet apertures 14 and the flush ring communicates with the main water outlet 15 of the flush tank 16. This outlet 15 communicates with an enlarged passageway 17 of the bowl 10. The flush tank 16 can be formed integral with or separate from the bowl 10.

The outlet 15 of the tank can be controlled by any preferred type of valve 18. Communicating with the outlet passage 15 below the valve 18 is an upright over flow pipe 19. The upper end of this pipe, in accordance with my invention is flared to form a valve seat 20 which is normally closed by a float valve 21. Depending from the float valve 21 is a weighted valve guide stem 22. If the water in the tank 16 rises above the over flow pipe the valve 21 will float off of its seat and allow the water to drain into the pipe 19 and thence into the toilet bowl. Under normal conditions the valve 21 closes the overflow pipe against the admittance of water and air.

The valve 18, utilized for controlling the flow of water from the tank 16 to the bowl can be operated in any desired way.

Extending into the tank 16 is a main water supply pipe 23 and this pipe is provided with a valve 24 which is automatically operated by a pivoted float 25. When the float 25 lowers, the valve 24 is opened so as to admit water to the tank and when the float valve raises with the water in the tank a certain distance the valve is closed. This is in accordance with the usual practice and forms no part of my present invention.

In order to create the suction in the bowl through the ring 13 I employ a rotary suction fan 26. This fan includes a casing 27 and a rotary fan blade 28 mounted upon a shaft 29. The inlet 30 of the fan casing or housing 27 has communicating therewith an air intake conduit pipe 31 and the lower end of this pipe communicates with the overflow pipe 19 adjacent to

its lower end. Consequently when the fan 26 is in operation, air will be sucked in from the overflow pipe 19 into the fan casing and air will be drawn by the fan from the bowl through the ring 13. Obviously, the valve 21 prevents the sucking of air from the tank 16. The outlet of the fan casing 27 has communicating therewith an exhaust pipe 32 and this pipe can be tapped into the outlet 12 below the water basin 11, as at 33. To prevent the entrance of sewer gases up through the pipe 32 when the fan 26 is not in operation, I provide a water trap or seal 34 in the pipe 32. The means for drawing the water from the seal when the fan is in operation and means for replenishing the seal with water when the fan is not in operation will be fully set forth.

In order to operate the suction fan 26, I utilize a water driven motor 35. This motor can be of the turbine type and includes a cylindrical casing 36.

The casing forms bearings for the shaft 29 and the shaft has secured thereto a turbine wheel 37. As illustrated, one end of the cylindrical casing can be provided with a wear take-up screw 38 and an antifriction ball 39 can be disposed between the adjacent ends of the shaft 29 and the screw 38. Communicating with the water motor casing 36 is a water inlet pipe 40 and this pipe can lead to any suitable source of water supply. The pipe 40 extends through the bottom of the flush tank 16 and has connected therewith a valve 41 for controlling the flow of water through the pipe to the water motor. The valve 41 is of the poppet type and is provided with a depending operating stem 42. When the stem is pressed upwardly, see Figure 1, the valve will be open to permit the flow of water through the pipe. To push up on the stem, I provide a lever 43 which is rockably mounted intermediate its ends on a pivot pin 44 carried by a bracket 45. The bracket is secured in place in any desired way. The rear end of the lever extends under the stem 42 and the front end of the lever extends under one of the sliding brackets 46 which hingedly support, as at 47, the toilet seat 48. The brackets 46 are normally held in a raised position by expansion springs 49. When weight is placed on the seat 48 the brackets 46 will be lowered against the tension of the springs 49 and the lever 43 will be actuated to open the valve 41. When pressure is relieved from the seat the lever will resume its normal position and the valve 41 will return to its normal closed positon by the weight of the valve body or by spring means. Obviously this valve 41 can be of an ordinary well-known type.

The outlet 50 for the water motor 35 is arranged on the opposite side of the turbine wheel 37 from the inlet water pipe 40. This outlet 50 communicates with a water discharge conduit pipe 51. The lower end of the pipe is connected as at 52 to the air discharge conduit pipe 32. A water trap 53 is formed in the water discharge conduit pipe 51 so as to prevent the back flow of gases through this pipe.

The pipe 51 extends through the upper end of an upright casing 54 utilized for replenishing certain seals and traps with water and the pipe 51 is provided with a small opening 55 to allow the flow of water therefrom into said upright casing. The lower end of the upright casing 54 has connected therewith a tube 56 which leads to the water-seal and trap 34 of the air exhaust conduit pipe 32. When water is flowing through the pipe 51, water dripping through the opening 55 will flow into the upright casing 54 and the upper end of the casing can be provided with an air opening 57. If preferred, a float 58 can be arranged in the casing 54 between the pipe 51 and the top wall of the casing. When the casing is filled with water, the float 58 will rise and close the air opening 57 and prevent the escape of air from the casing. When the water falls, the float 58 will move away from the opening 57 to allow the entrance of air and break any vacuum which might occur in said casing.

As illustrated in Figure 5 the upright casing 54 can merely be provided with a guard 59 to prevent splashing of water in lieu of the float and the splash guard 59 is so arranged to direct any water flowing through the opening 57 downward into the tank.

The trap 34 of the air exhaust conduit pipe 32 is preferably provided with a water drain pipe 60 at its lower-most point.

This drain pipe is of the siphon type and is of an inverted U shape and has the long leg communicating as at 61 with the water discharge pipe 51.

Considering that the trap 34 and the trap 53 are filled with water and the seat 48 is lowered by a user, then the valve 41 will be opened and water under pressure from a water main will enter the motor casing 36 and drive the turbine wheel and this water will flow out of the pipe 51. The flow of water through the pipe 51 will create a suction in the siphon tube 60 and will drain out the water from the trap 34. The rapid rotation of the turbine wheel will operate the fan 26 and cause the intaking of air from the bowl 10, through the ring 13, chamber 17, overflow pipe 19, and pipe 31. The exhaust air will now flow through pipe 32 and the air under some pressure will tend to carry any trapped water from the trap 34 to the sewer pipe. It being understood, that most of the water or all of the water in the trap will be siphoned off by the siphon tube 60. The water from the water motor will be carried to the lower end of the pipe 32 by the discharge pipe 51 and the upright casing will receive water therefrom. As soon as weight is removed from the seat and the fan 26 stops its operation the water flowing from the upright casing through tube 56 will refill the trap 34.

It therefore can be seen that I have provided novel means including a water motor for effectively removing objectionable odors from a toilet bowl. The entire ventilating means is so arranged and constructed as to meet with the approval of the underwriters.

As in the usual construction of toilets for flush tanks, I can provide a refill tube 62 for the bowl 10 after the flushing of the toilet. This refill tube communicates with the upper end of the water supply pipe 23 and enters into the overflow pipe 19. The refill tube is provided with a water trap 63 and an air opening 64 adjacent to its upper end.

In Figure 6 I have illustrated a slightly modified form of my invention and I have found in communities where water pressure is sufficiently great, it is unnecessary to provide the drain siphon pipe or tube 60 shown in Figures 1 to 3 inclusive. Consequently in Figure 6 I have eliminated the showing of this siphon tube. Where the water pressure is sufficient, the flow of water through the outlet pipe 51 will be of such force as to create a suction in the pipe

32 to drain the water from the trap 34. Likewise the fan 26 will be operating at such a speed that the air exhausting therefrom will be enough to drive the water out of the trap 34.

In lieu of providing the float valve 21, I can provide a water trap 65 for the over flow pipe 19. As illustrated in Figure 6, the overflow pipe 19 is divided and includes an upright section 66 and a short section 67 which communicates with the outlet 15, below the flush valve 18. The upper end of the pipe 67 extends into the water trap casing 69 above the normal water level therein and the upright section 66 extends into the trap casing 69 below the water level. The air intake pipe 31 instead of communicating directly with the overflow pipe, connects with the upper end of the trap casing 69. Consequently air will be only drawn from the bowl and in through the short section 67 of the overflow pipe.

In Figures 8 to 9 inclusive I have shown another form of my invention in which an ejector or siphon jet 70 can be utilized for creating the desired suction in the toilet bowl.

The injector can be in the nature of a T coupling 71, the longitudinally aligned legs of which can have coupled thereto the water supply pipe 72 and the water outlet pipe 73. The inner end of the water inlet pipe 72 is provided with a nozzle 74, which points toward an intake head 75 carried by the inner end of the water outlet pipe 73. Communicating with the other leg 76 of the T coupling is the air intake suction pipe 77. Obviously, when water under pressure is flowing through the pipe 72 and forced through the fine nozzle 74 into the pipe 73 a draft or suction will be created in the ejector so that air from the pipe 77 will be forcibly sucked from the pipe 77.

In Figure 8 the flush tank is indicated by the reference character 78 and the ejector 70 is located in said tank and the pipe 77 communicates with the overflow pipe 79 of the tank. The overflow pipe can be normally closed by a float valve 80 of the same type as shown in Figure 2. The pipe 77 is provided with a water trap or seal 81 so as to prevent the flow of objectionable vapors therethrough. The pipe 73 carrying the exhaust water and the objectionable vapors is tapped into the sewer pipe in the same manner as conduit 32 shown in Figures 1 and 2. The water supply pipe 72 receives its source of supply from a water main or the like through water inlet pipe 40 and is provided with a water seal or trap 82. This pipe passes through an upright casing 83 which corresponds to the upright casing 54 and the pipe at the point where it passes through the casing 83 has a water drip opening formed therein so that water will be supplied to the casing. The lower end of the casing has a water supply tube 84 leading therefrom to the water trap 81 so that this trap will be supplied with water. The trap 82 has communicating therewith, above its U bend, a pipe 85 and this pipe in turn communicates with the water drain 73. Communicating with the pipe 85 is a siphon tube 86 and this tube communicates with the lower end of the trap 81. Consequently when water is flowing through the pipe 85 a suction will be caused in the siphon tube to permit the withdrawal of the water in said trap 81. When my apparatus is in operation, water will be withdrawn from the seal 81 to allow the withdrawing of the vapors from the bowl through the overflow pipe 79, pipe 77, into pipe 73. Where water pressure is great enough to cause sufficient suction in pipe 77 to withdraw the water from the trap 81, the siphon tube 86 can be eliminated.

The flow of water through the pipe 72 is controlled by a valve in the same manner as the pipe 40 is controlled by the valve 41 in Figures 1 and 2 of the drawings.

Other changes in details can be made without departing from the spirit or the scope of my invention, but what I claim as new is,

1. A ventilated toilet comprising a bowl having a water basin therein and a drain pipe below the basin communicating therewith and with the sewer, a flush tank above the water basin, means within said flush tank for creating a suction in said bowl above the water basin including a suction fan, an air conduit connecting the outlet of the suction fan with the drain pipe below the water basin, whereby when the fan is in operation air and foul odors are removed from above the water basin and forced out the drain pipe below the water basin, a U-shaped portion in said air conduit forming a trap therein, a water motor for operating the fan, said water motor having an inlet water conducting pipe communicating therewith and a water outlet conducting pipe communicating therewith and with the air conduit below said U-shaped portion, a U-shaped portion in said water outlet pipe forming a water seal therein, a water receiving casing located adjacent to the water motor, said water outlet conducting pipe passing through apertures formed in said water receiving casing adjacent the top thereof and having an aperture formed in the bottom portion of the pipe within the casing, a tube connecting the trap in said air conduit with said casing, whereby water from said casing enters the trap and a water seal is formed to prevent the backflow of sewer gases when the fan is not in operation, and a siphon tube connecting the air conduit trap with the water outlet conducting pipe whereby when water is flowing through said pipe water will be withdrawn from the trap.

2. A ventilated toilet comprising a bowl having a water basin therein and a drain pipe below the basin communicating therewith and with the sewer, a flush tank above the water basin, a toilet seat for said bowl, means for creating a suction in said bowl above the water basin including a suction fan, an air conduit connecting the outlet of the suction fan with the drain pipe below the water basin, whereby when the fan is in operation air and foul odors are removed from above the water basin and forced out the drain pipe below the water basin, a U-shaped portion in said air conduit forming a trap therein, a water motor for operating the fan, said water motor having an inlet water conducting pipe communicating therewith and a water outlet conducting pipe communicating therewith and with the air conduit below said U-shaped portion, a U-shaped portion in said water outlet pipe forming a water seal therein, a water receiving casing located adjacent to the water motor, said water outlet conducting pipe passing through apertures formed in said water receiving casing adjacent the top thereof and having an aperture formed in the bottom portion of the pipe within the casing, a tube connecting the trap in said air conduit with said casing, whereby water from said casing enters the trap and a water seal is formed to prevent the back-

flow of sewer gases when the fan is not in operation, a siphon tube connecting the air conduit trap with the water outlet conducting pipe whereby when water is flowing through said pipe water will be withdrawn from the trap, said suction fan, water seals, water motor, and siphon tube all housed within the flush tank, and means operated by weight upon the toilet seat for supplying water to the inlet water conducting pipe.

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