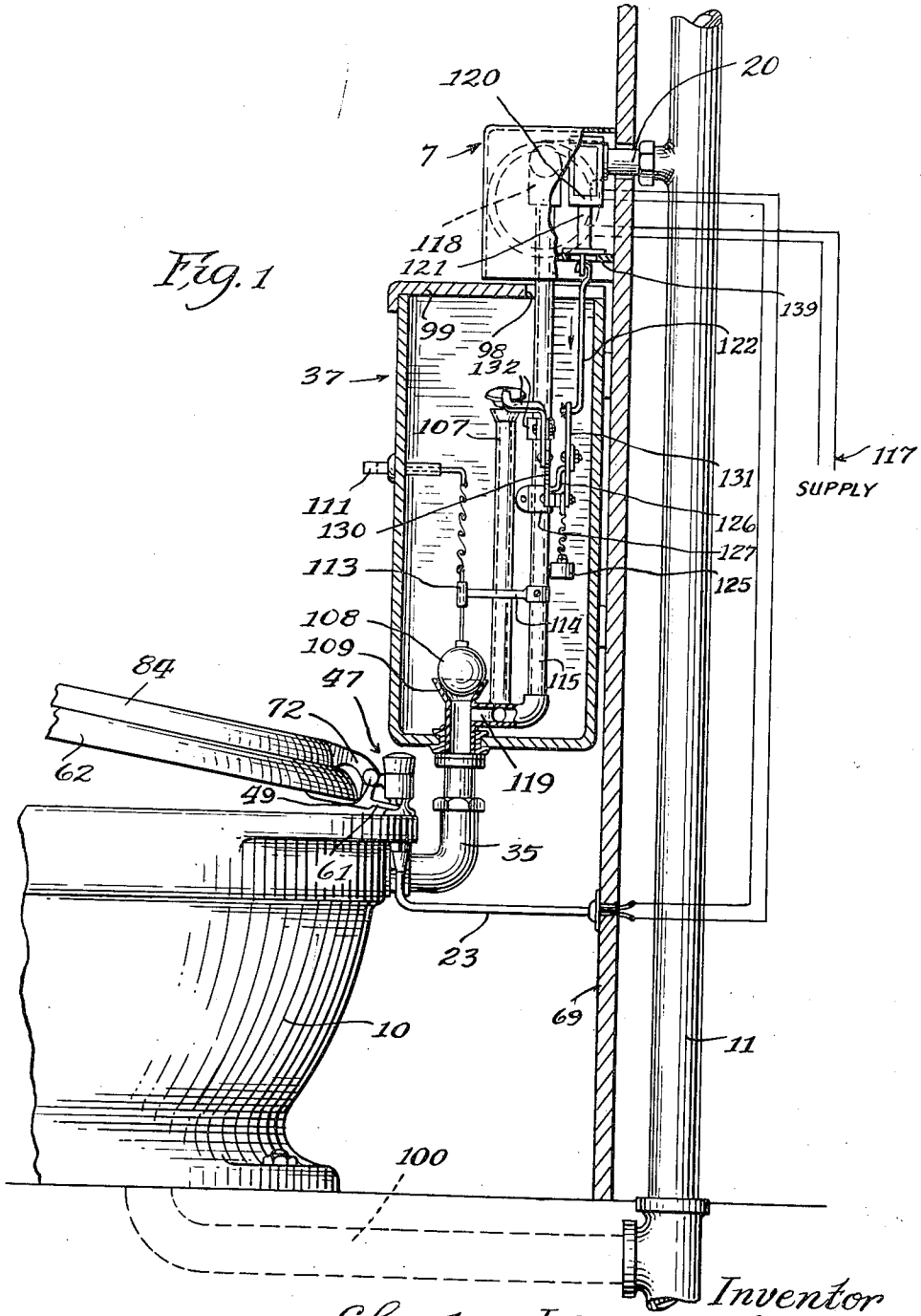
Jan. 22, 1957 C. J. MAJAUSKAS 2,778,033

VENTILATOR FOR WATER CLOSETS

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Fig. 1



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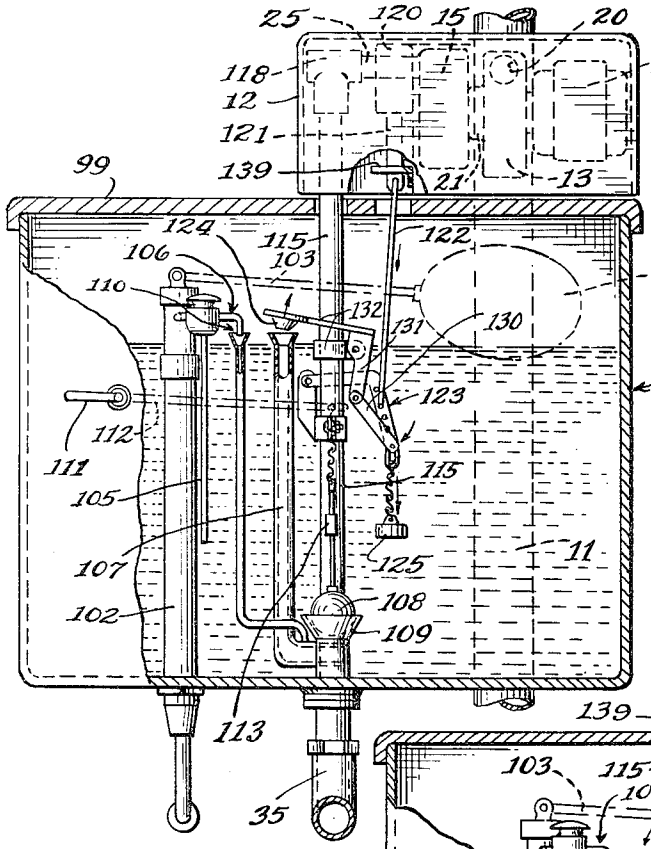


Fig. 2.

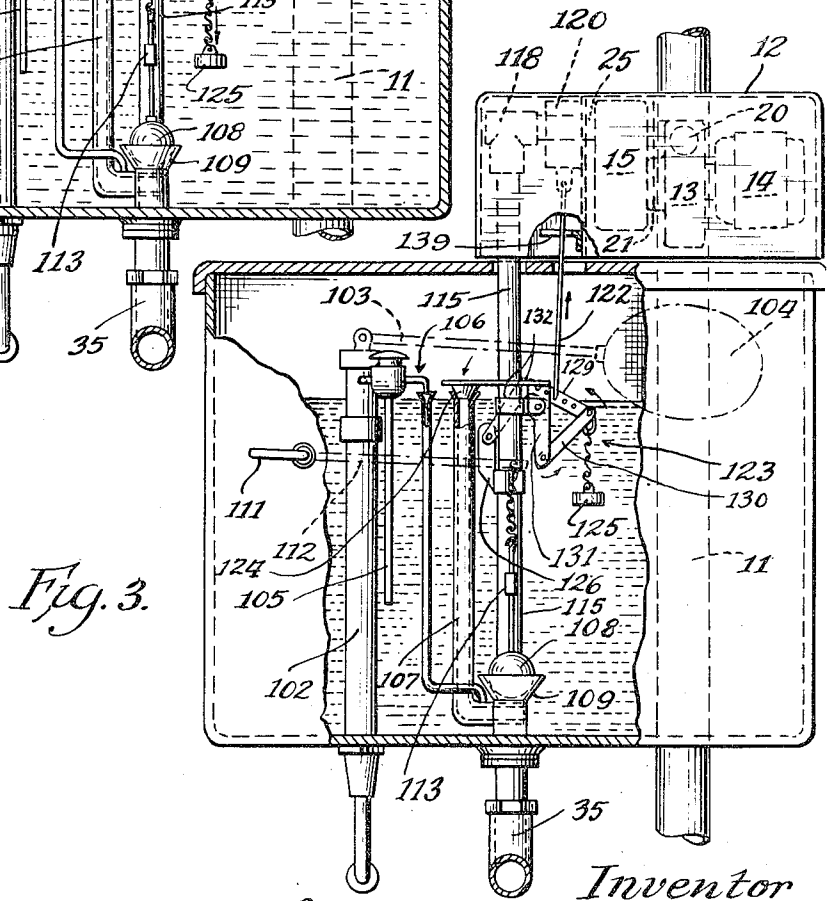


Fig. 3.

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Fig. 5.

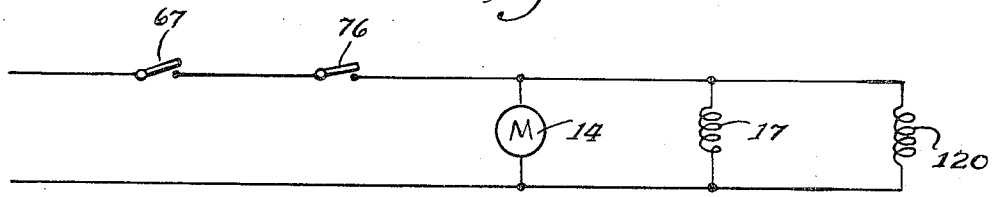
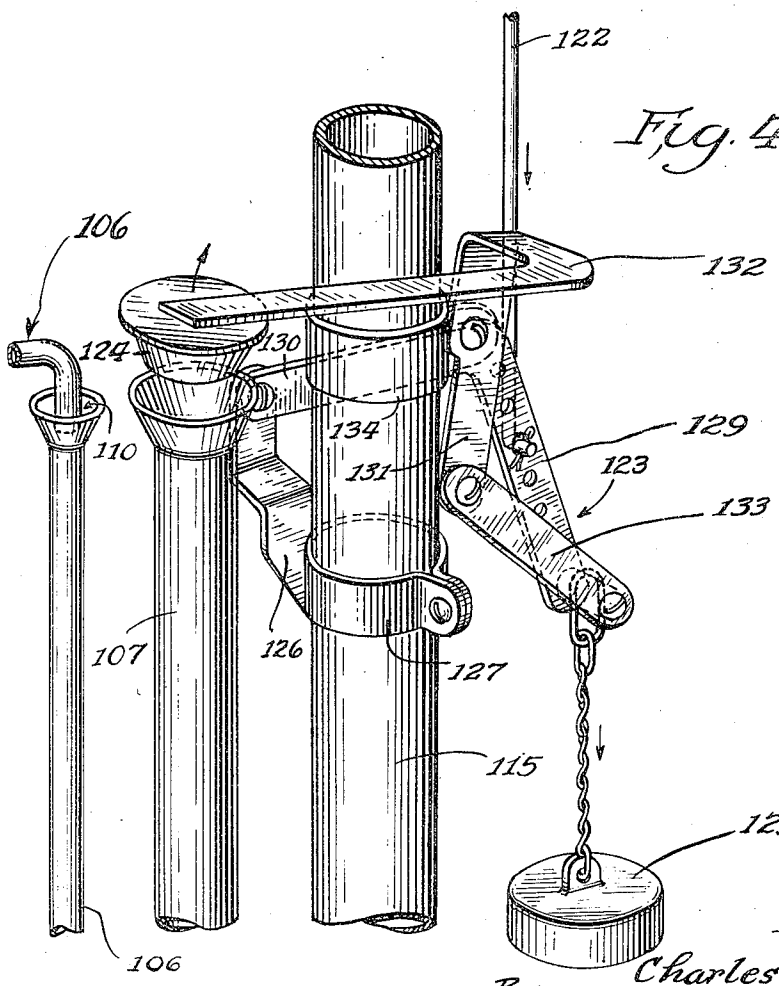


Fig. 4.



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VENTILATOR FOR WATER CLOSETS

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Application July 11, 1955, Serial No. 521,202

1 Claim. (Cl. 4—213)

The present invention relates to ventilators for water closets and finds particular application in combination with a water closet system that includes a conventional water closet tank.

The principal object of the present invention is to provide a system for efficiently eliminating the obnoxious odors and accompanying germs that appear in a closet bowl during use and it is proposed to provide such a system that is compatible with and complements conventional water closet equipment.

Briefly, the system provides facilities for exhausting the odors from the water closet bowl by means of an electrically driven blower that preferably is automatically initiated at the time that the seat ring is lowered and the closet is put in use. In addition, the system is prevented from functioning whenever the seat cover is also lowered and the closet is used as a seat.

For simplicity, the exhaust facilities utilize a portion of the water supply system which, of course, normally communicates with the atmosphere through the overflow pipe. Effective suction is maintained when dissipating the odors by terminating such communication and for this purpose suitable sealing means are provided for closing the top of the overflow pipe. The sealing means operate in synchronism with the exhaust facilities.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a side elevational view of the entire system with parts of the water tank apparatus shown in section;

Fig. 2 is a front sectional view through the water tank showing the position of the parts when the ventilator is not operating;

Fig. 3 is a view similar to Fig. 2 and illustrating the position of the parts when the ventilator is in operation;

Fig. 4 is an enlarged perspective view of the valve and leverage system for closing the top of the overflow pipe; and

Fig. 5 is an elementary diagram of the electric control circuit for the present invention.

Conventional system

The general arrangement of the entire water closet system is shown in Figs. 1, 2, and 3 and it utilizes standard equipment to the maximum possible extent. To facilitate a ready understanding of the operation and adaptability of the ventilator of the present invention to existing water closet designs and constructions, it is convenient to first point out the components of the system which may be conventional.

The water closet tank is designated **37** and communicates with a closet bowl **10** through a flush water pipe **35**. The bowl **10** in turn is connected to a vent stack **11** disposed behind the building wall **69** by means of a suitable connecting pipe **100**.

The conventional components of the water tank include

a fresh water supply pipe **102** which supplies water to a float valve **103** that is usually of the vacuum breaker type and is operated by a float **104** for regulating the water supply for both the water closet tank **37** and the water closet bowl **10**. The float valve **103** has a pair of outlet pipes, the larger of which **105** supplies water directly to the water tank and the smaller of which **106** bypasses the flush valve **108** and feeds directly into the flush water pipe **35**. As shown in Figs. 2 and 3, the upper end of the overflow pipe **107** is approximately one inch below the vacuum breaker type float valve.

Flushing is accomplished in the usual manner, there being provided a suitable handle **111** for actuating a trip lever **112** which in turn is connected to the flush valve **108** that normally rides in a valve seat **109** to shut off communication between the water tank **37** and closet bowl **10**. As shown in Fig. 1 the flush valve **108** is guided in its up and down valve opening and closing movements by a cylindrical sleeve **113** which is integrally carried by a bracket **114** that may preferably be connected to an upstanding exhaust pipe **115**.

After a flushing operation is completed and the water supply in the tank **37** has been substantially depleted, the float **104** will be riding adjacent the bottom of the tank with the float valve **103** open; thus permitting the supply of water in both the bowl and the tank to be replenished. The sizes of the outlet supply pipes **105** and **106** are proportioned in accordance with the storage capacities of the tank and the bowl respectively so that when the water in the tank reaches its proper level and causes the float to shut off the float valve **103**, the water in the bowl will simultaneously reach its proper level. The foregoing conventional arrangement is well known and needs no elaboration. It is important to note, however, that these standard components may readily be employed in connection with the ventilator of the present invention with but a minimum of rearrangement.

Specific description of ventilator

The invention provides an electrically actuated exhaust system for removing odors from the closet bowl and directing them to the vent stack **11**. A ventilator unit **7** is shown mounted directly above the water closet tank and is supplied with power from a suitable electrical source **117**. The ventilator unit comprises a housing **12** for mounting a blower **13**, a motor **14** for driving the blower, and a vent valve fitting **15** for connecting the exhaust pipe **115** to the vent stack **11**.

The blower **13** preferably of the impeller type is directly mounted on the motor **14** which is supported on a base spaced above the bottom of the housing **12**. The blower **13** has its exhaust **20** extending rearwardly from the housing **12** through the building wall **69** for connection with the vent stack **11**.

The motor **14** is a conventional fractional horsepower motor adapted for small units of this kind and has the usual condenser associated therewith. The vent valve fitting **15** is directly connected to the intake **21** of the blower **13** and has a nipple **25** extending laterally for connection to a right angle fitting **118** which in turn is connected to the exhaust pipe **115**. To accommodate the exhaust pipe **115** a slot **98** is formed in the lid **99** for the water tank **37**.

It will be seen that an exhaust path for the gases in the closet bowl is established from the bowl **10** through the flush water pipe **35**, an auxiliary pipe **119** in the bottom of the tank **37** and connecting the flush water pipe **35** to both the overflow pipe **107** and the exhaust pipe **115**, the exhaust pipe **115**, fitting **118**, the vent valve fitting **15**, the blower **13**, and the exhaust **20** which is connected to the vent stack **11**.

The circuit diagram for the motor supply circuit is shown in Fig. 5 and includes a normally open seat ring operated switch 67 and a normally closed seat cover operated switch 76. The switch 67 is closed only when the seat ring is in its down position and the cover switch 76 is closed whenever the cover is not in its fully down position. Since the switches are connected in series, both must be closed in order to complete a circuit for the motor and according to the present arrangement this condition obtains only during normal usage of the water closet. The means for accomplishing this switch actuation is indicated generally in Fig. 1 wherein the seat ring 62 and seat cover 84 are pivotally supported on a shaft 49 which is carried in sleeve bearings that are offset from a pair of chambered posts, one of which 47 is shown secured to the upper rim of the bowl. A pair of brackets pivotally connect the seat ring 62 to the shaft 49 and in addition include rearwardly extending arms 61 that are forced downwardly by springs (not shown) which are contained within the chambered posts. The normal action of these springs maintains the seat ring in the partially open position illustrated in Fig. 1. A slight additional pressure causes the spring to yield so that the seat ring may be lowered to its position of use wherein the arm 61 actuates the switch 67 which is housed in one of the chambered posts.

Similarly the seat cover 84 is pivotally connected to the shaft 49 by a pair of brackets 72 one of which has a rearwardly extending portion adapted to actuate switch 76 which is housed in the other chambered post.

The specific construction for accommodating and operating the switches 67 and 76 in the chambered posts is illustrated and described in my copending U. S. patent application Serial No. 399,309, filed December 21, 1953, since matured into Patent No. 2,759,197, dated August 21, 1956, and the disclosure thereof so far as it is not inconsistent is specifically incorporated herein by reference. While other arrangements for operating the switches are possible, these specific constructions are preferred. Reference may also be had to my said patent for a more detailed illustration of the construction of the ventilator unit 7; however, the unit shown therein finds particular application in connection with a modified water closet ventilator system and does not include all the features of the present unit.

It may be seen from my said patent that a solenoid 17 was employed for controlling a valve located in the vent valve fitting 15 and as shown in Fig. 5 this solenoid is connected in parallel with the motor 14 so that it operates simultaneously therewith. The ventilating system of the present form utilizes a slightly larger ventilator unit than is shown in Figs. 4 and 5 of my said patent, and this larger unit accommodates an additional solenoid 120 also connected in parallel with the motor 14 and operable simultaneously therewith. Solenoid 120 effects the closing of the top of the overflow pipe 107 during the exhaust operation and this arrangement maintains a proper amount of suction for exhausting the odors from the bowl. The armature 121 of this solenoid slides between and is supported on the parallel arms of a bracket 139 and is connected to a lift rod 122 which in turn is connected to a leverage system generally designated as 123 that operates a suitable valve 124 for closing the top of the overflow pipe and maintaining the negative pressure developed by the blower 13.

The functioning of the ventilator is best understood from a comparison of Figs. 2 and 3. In Fig. 2 the parts are shown in their normal arrangement when the ventilator is not in use and a weight 125 is suspended from the leverage system for raising the valve 124 and maintaining the overflow pipe in communication with the atmosphere. Fig. 3 illustrates the parts in their valve seating position during the time that the ventilator is in operation and the solenoid 120 is energized. In this case the valve 124 is held firmly seated by the action of the lift rod 122 on the leverage system.

In detail (see Fig. 4) the leverage system consists of a support bracket 126 suitably clamped as at 127 to the exhaust pipe 115 and adapted to pivotally support one end 130 of an L-shaped link 129 which is connected to one end of an intermediate link 133, the opposite end of which is pivotally connected to a downwardly extending arm 131 of the valve lever itself 132. At an intermediate point the arm 131 is pivoted on a bracket 134 that is also suitably clamped on the exhaust pipe 115. As shown, the lift rod 122 may be connected to the L-shaped lever 129 at any one of a number of spaced points for adjusting the leverage system to the travel of the armature 121 of solenoid 120.

It should be appreciated that the leverage system is smooth and reliable in operation both in assuring tight seating of the valve 124 under the urging of solenoid 120 and in assuring ready release of the valve under the urging of the weight 125.

The use of a vacuum breaker type float valve 103 involves the problem that the negative pressure created by the blower 13 in portions of the water supply system might produce undesired actuation of the vacuum breaker. To avoid this possibility the supply pipe 106 is arranged with an air intake port 110 located adjacent to the vacuum breaker and at approximately the height of the top of the overflow pipe 107. By this means the outlet side of the vacuum breaker is always maintained at approximately atmospheric pressure, and while there is a tendency for the atmospheric air entering port 110 to impair the suction action of the blower, the port 110 and supply pipe 106 are of such small size relative to the exhaust system that little actual reduction occurs. This effect is further minimized by connecting the pipe 106 adjacent the bottom of the overflow pipe 107 to provide a circuitous path for the incoming air.

Tests have proven the effectiveness of this arrangement and the ventilator of the present invention has efficiently removed all disagreeable odors without causing undesired actuations of the vacuum breaker.

Operation

The present system is automatically operative to exhaust gases from a water closet bowl while the bowl is in use and is automatically rendered inoperative during such times as the bowl is not in use. In addition, the bowl may be used as an additional seat without actuating the ventilator. The above operation is accomplished by a pair of series connected switches 67 and 76, one of which is closed only when the seat ring is in its position of use and the other of which is closed except when the cover is also in its lowermost position and is acting as a seat. The exhaust gases are conducted from the bowl 10 through the flush water pipe 35, the exhaust pipe 115, the ventilator valve fitting 15, the blower 13, and the pipe 20 to the vent stack 11.

The suction effect required for efficiently exhausting gases from the water closet bowl is maintained by terminating communications between the top of the overflow pipe 107 and the atmosphere by means of a solenoid actuated valve 124 which acts in synchronism with the suction creating blower 13.

Thus it may be seen that the objects of the present invention have been accomplished in that the ventilator is readily adapted to conventional systems and in fact draws the foul air through portions of the water supply system which also conduct the flush water for washing the pollution from the bowl. In addition the present system offers important improvements in sanitation by eliminating the obnoxious odors and accompanying germs from the room.

It should be understood that the description of the preferred form of the invention is for the purpose of complying with section 112, Title 35, of the U. S. Code and

that the invention is limited only by the scope of the appended claim.

I claim:

In a device comprising a closet bowl, a water tank having an inlet and a discharge outlet communicating with said bowl, a valve for controlling discharge of water from said tank to said outlet, and an overflow pipe having its upper end open to atmosphere and having its lower end in direct communication with said discharge outlet; suction means for exhausting odors from said bowl, said suction means including a control unit mounted above the water tank and having an electrically operated solenoid and an electrically operated exhaust blower in communication with an exhaust pipe extending into said tank for direct communication with said discharge outlet, a leverage system mounted within said tank for actuating a valve

for closing the upper end of said overflow pipe, yieldable means engaging said leverage system for continuously urging said valve open, said solenoid being connected to said leverage system and adapted when energized for actuating said valve closed, and means for actuating said solenoid and said blower in synchronism.

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