Oct. 8, 1946. F. J. LA MERE 2,409,048

WATER CLOSET

Filed April 10, 1944 2 Sheets-Sheet 1

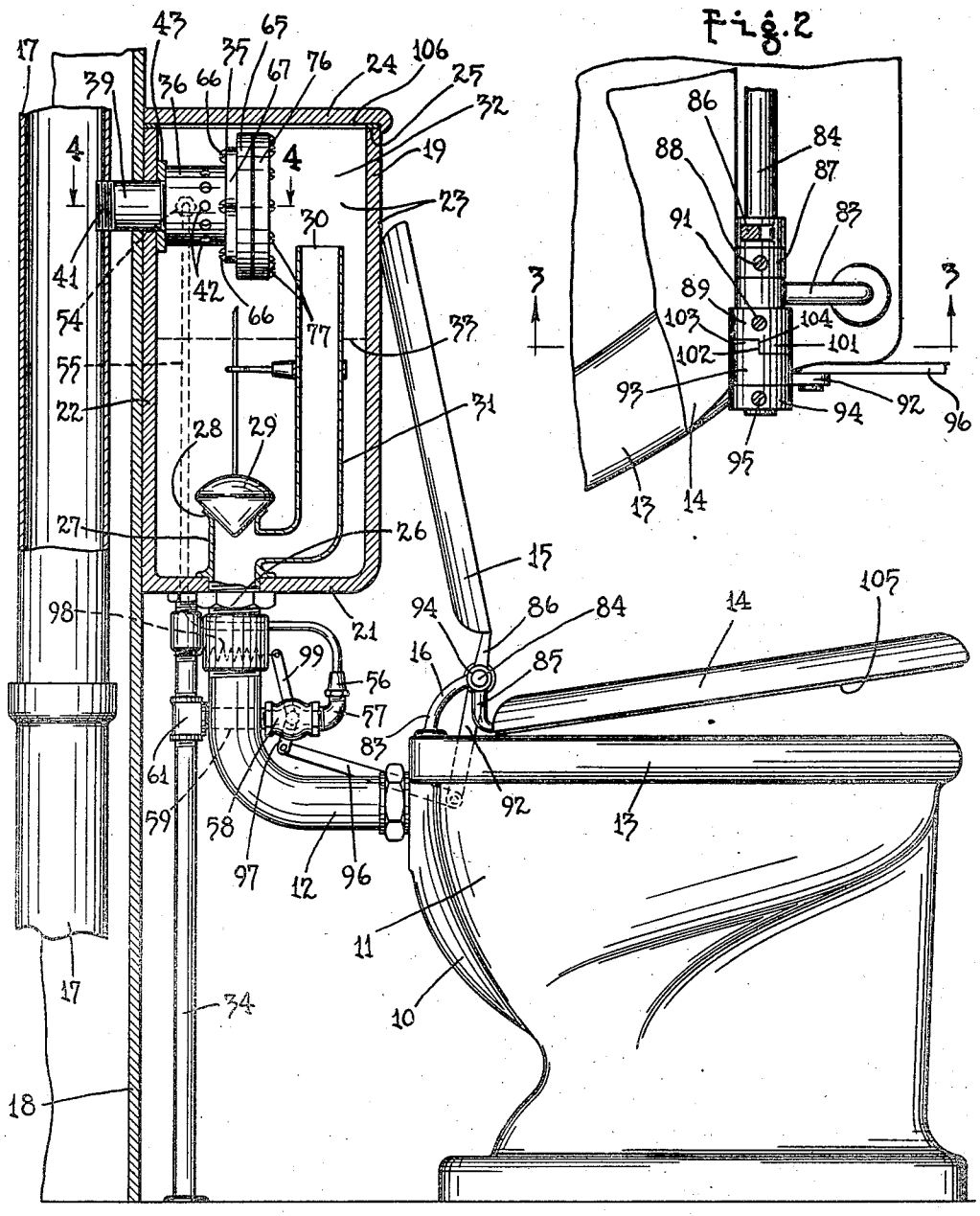


Fig. 1

Fig. 2

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Fig. 4

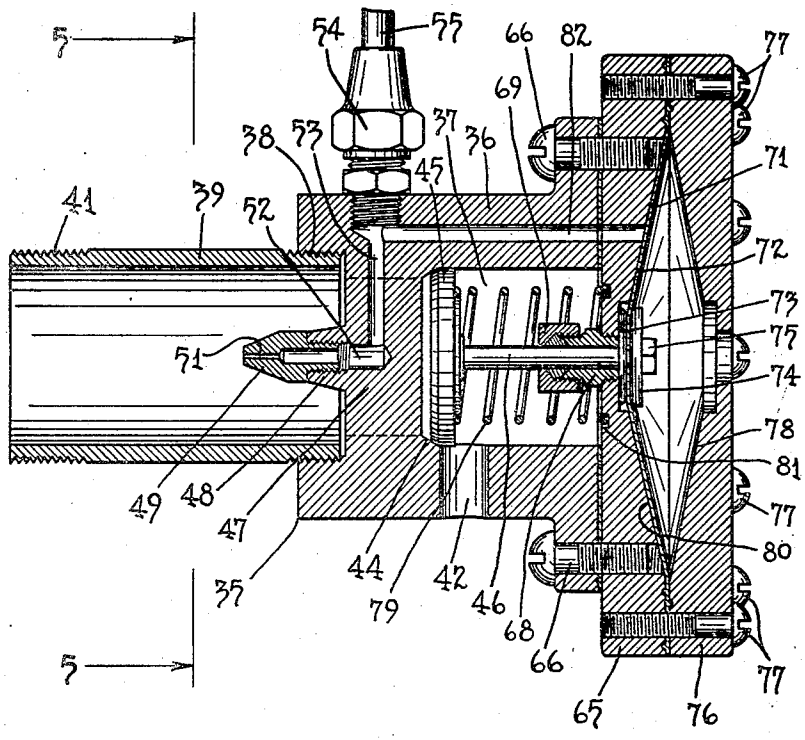
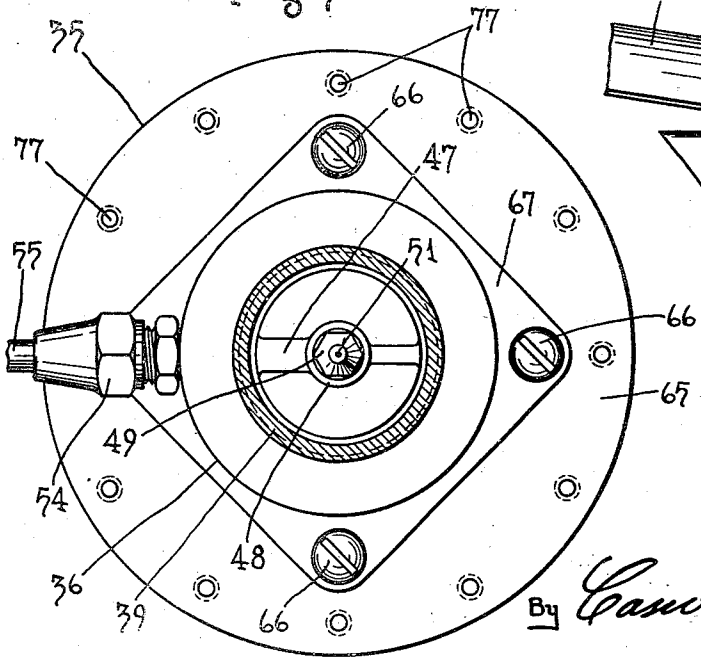


Fig. 5



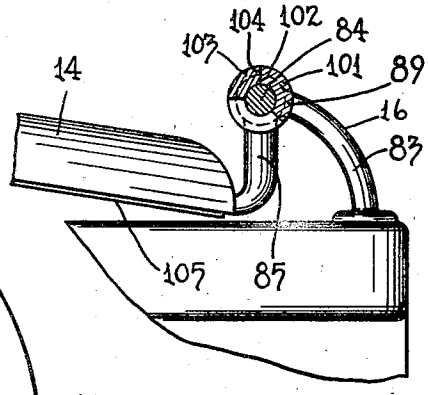


Fig. 3

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WATER CLOSET

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7 Claims. (Cl. 4—215)

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My invention relates to water closets and has for an object to provide a ventilated water closet adapted to be operated upon depression of the seat thereof.

An object of the invention resides in providing a device which can readily be installed in the flush tank of an ordinary water closet.

A still further object of the invention resides in providing a device which can be readily attached to the stack to which the water closet is connected.

Another object of the invention resides in providing an injector for causing circulation of air through the water closet, and in further providing a valve mechanism for controlling the flow of air and other gases.

Another object of the invention resides in providing a control valve operated through depression of the seat, for actuating said injector.

A still further object of the invention resides in providing an air valve for controlling the passage of air and in further providing means operated by the water pressure and controlled through the action of said control valve for operating the air valve.

Another object of the invention resides in utilizing a diaphragm for operating the air valve.

A feature of the invention resides in providing resilient means for closing the air valve and in utilizing the water pressure for moving the air valve into open position.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is an elevational view, partly in section, illustrating a water closet embodying my invention.

Fig. 2 is a fragmentary plan sectional view of the seat and seat hinge and associated structures shown in Fig. 1 and drawn to a greater scale.

Fig. 3 is a fragmentary elevational sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a plan sectional view taken on line 4—4 of Fig. 1 and drawn to a greater scale.

Fig. 5 is an elevational sectional view taken on line 5—5 of Fig. 4.

In the construction of ventilated water closets, one of the serious objections has been the flow of air through the closet when the same is not in use, causing a continual draft through the closet and consequent loss of heat. The present invention overcomes this difficulty by providing a water closet in which the air outlet to the stack is closed when the water closet is not in use.

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For the purpose of illustrating my invention, I have shown in Fig. 1 an ordinary water closet indicated in its entirety by the reference numeral 10. This water closet comprises the usual bowl 11 having a flush pipe 12 connected to the same at the rearward portion thereof. The upper portion of the bowl 11 is provided with a rim 13 on which is adapted to rest a seat 14. In conjunction with the seat 14 is provided a cover 15. Both the seat 14 and cover 15 are hingedly mounted on a hinge structure 16, to be presently more fully described. The waste pipe from the bowl 11 has not been shown, but leads to a stack 17 situated within the wall 18 of the building in which the water closet is arranged. This stack is usually situated rearwardly of the bowl 10 and the same has been so illustrated in this application.

In connection with the bowl 11, a flush tank 19 is provided which is supported on the wall 18. This flush tank has a bottom 21, a back 22 and other lateral walls 23, being open at the top. The said tank is closed by means of a closure 24 of any suitable construction which merely rests upon the upper edge 25 of the said flush tank. The flush pipe 12 is preferably in the form of an elbow and is connected to a pipe fitting 26 which is attached to the bottom 21 of the tank and which is in turn connected to a vertically extending pipe 27 disposed within the interior of the tank. This pipe terminates at its upper end in a valve seat 28 on which is adapted to be seated the usual flush valve 29. Connected to the pipe 27 is an overflow pipe 31, the upper end 30 of which is open and communicates with the space 32 within the interior of the flush tank and which is disposed above the level of the water designated by the reference numeral 33. When the valve 29 is closed, the space 32 is in direct communication with the interior of the bowl 11 through the overflow pipe 31, the pipe 27 and the flush pipe 12, whereby ventilation may be procured from the interior of the bowl to the space 32.

For the purpose of providing water for operating the flush tank 19, a water pipe 34 is employed which is connected to the usual valve mechanism in the flush tank which is operated by the usual float and controls the flow of water into the flush tank. Such construction being well known in the art and forming no particular feature of the invention, has not been shown in the drawings.

Within the space 32 in the flush tank 19 is mounted a ventilating device 35 which is shown in detail in Fig. 4. This device includes a case 36 which is provided with a passageway 37 extending through the same from end to end. One end of the passageway 37 is threaded as designated at 38, to receive an end of a large nipple 39, the

other end 41 of which is screwed into the stack 17. The case 36 has a number of circumferentially arranged holes 42 in the same, best shown in Fig. 1, which bring the interior of the passageway 37 into communication with the space 32 in the flush tank 19. The device 35 is supported through the nipple 39 and a tight connection is made between the flush tank 19 and said device by means of a gasket 43 located between the back 22 and the end of the case 36.

Formed in the passageway 37 adjacent the holes 42 is a valve seat 44. A valve head 45, mounted on a valve stem 46, is slidable within the passageway 37 to engage said seat 44 and obstruct the flow of gases through the passageway 37 or to move away from said seat sufficiently to uncover the holes 42 and allow the flow of gases through said passageway. The method of supporting and operating the valve 45 will be presently described in detail.

Extending across the passageway 37 and adjacent the end of the case 36 in which the threads 38 are formed is a bridge or divider 47 which is best shown in detail in Fig. 5. This bridge has issuing outwardly from it a boss 48 which is threaded to receive a nozzle 49. Nozzle 49 is provided with a discharge opening 51 which is directed axially along the interior of the nipple 39. The opening 51 communicates with a longitudinal passageway 52 formed in the bridge 47 and which, in turn, communicates with a transverse passageway 53 formed in said bridge. A tube connection 54 is screwed into the case 36 and has attached to it a tube 55 which communicates with the passageway 53. The tube 55, as shown in Fig. 1, is connected to another tube connection 56, which, in turn, is connected to an elbow 57. Elbow 57 is connected to a valve 58, which, in turn, is connected through a nipple 59 with a T 61 connected in water pipe 34. It will thus be seen that when the valve 58 is opened, water flows through the tube 55 and through the nozzle 51, causing a spray to flow in the nipple 39. This induces a flow of air through the passageway 37 when the valve 45 is in open position and draws air from the interior of the bowl 11 through the flush pipe 12, the overflow pipe 31 and the ventilating device 35 and discharges the same into the stack 17.

The case 36 of the ventilating device 35 is provided at one end with a cylindrical block 65. This block is attached to the case by means of screws 66 which pass through a flange 67 formed on said case and which are screwed in said block. The valve stem 46 of valve 45 is guided for axial movement in a guide 68 which is screwed into the center of the block 65. A stuffing box 69, associated with the guide 68, prevents leakage past said guide. The end of the valve stem 46 extends beyond the guide 68 and passes through a diaphragm 71 which is received within a conical depression 72 formed in the block 65. The diaphragm 71 is disposed between two disks 73 and 74 mounted on the stem 46 which are clamped together by means of a nut 75 screwed upon the end of the stem 46. In this manner, the diaphragm 71 is rigidly attached to the stem 46. The outer edge of the diaphragm 71 is clamped in position between the outer marginal portion of the block 65 and a cap 76 which overlies said block and which is secured thereto by means of screws 77. Screws 77 extend through the cap 76 and are threaded into the block 65. The cap 76 has a conical depression 78 in it in which the diaphragm 71 is received when the valve 45 is moved to open position. The valve is normally urged into closing position by means of a compression coil spring 79 which is seated at one end against said valve and at its other end against the outer face of the block 65 being received in a groove 81 formed in said block. The space formed within the conical depression 72 and lying between the diaphragm 71 and the block 65, which is designated by the reference numeral 80, communicates with a passageway 82 extending through both the block 65 and case 36, which, in turn, communicate with the passageway 53 in said case. It will readily become comprehended that when the valve 58 is opened to cause the flow of water into the ventilating device 35, that part of the water flows through the passageway 82 and into the space 80 and forces the diaphragm 71 into the depression 78. This moves the valve 45 past the holes 42 and brings the interior of the passageway 37 into communication with the space 32 in flush tank 19. At the same time, water is forced through the nozzle 49 and flow of air is induced in the nipple 39 which draws the gases from the bowl 11 and discharges the same into stack 17. When the valve 58 is closed, the pressure of water in the space 80 is cut off and the spring 79 gradually moves the valve 45 toward the seat 44. As this occurs, the water in the space 80 is discharged through the nozzle 49 and into the nipple 39 from which it flows by gravity into the stack 17.

The hinge structure 16, previously referred to, includes two brackets 83 which are attached to the bowl 11 at the rearward portion of the rim 13 thereof. A pintle 84 extends through these brackets. Mounted on the pintle 84 are pairs of arms 85 and 86 which are attached to the seat 14 and the cover 15, respectively. By means of these arms, the seat and cover may swing from open to closed position in the customary manner. One of the arms 85 namely, the one situated on the same side of the seat as the valve 58 is constructed with a hub 87 through which the pintle 84 extends. This hub is held immovable relative to the pintle 84 by means of a set screw 88, illustrated in detail in Fig. 2. Mounted on the end of the pintle 84 exteriorly of the bracket 83 adjacent hub 87 is a collar 89 which is secured to said pintle by means of a set screw 91. The collar 89 and the hub 88 deprive the pintle 84 of axial movement and hold the seat 14 and cover 15 in place. Outwardly of the collar 89, above referred to, is provided a depending arm 92 which is constructed with a hub 93 similar to the collar 89 and through which the pintle 84 extends. This hub is rotatable on the pintle 84 and is held in position on the end of the pintle by means of a collar 94 which is secured to the end of said pintle by means of a set screw 95. The arm 92 is connected by means of a link 96 with an arm 97 which operates the valve 58. The valve 58 has not been shown in detail, though it can readily be comprehended that a valve with a rotatable valve member or with a depressible valve member can be employed and that the arm 92 can be made to operate either form of valve. The valve 58 is maintained in closing position by means of a tension coil spring 98 which is attached to an arm 99 movable with the valve member of said valve and which spring is also attached to the water pipe 34. This spring, in addition to urging the valve 58 into closing position, also serves to hold the seat 14 above its lower position, as shown in Fig. 1, by a construction now to be described.

Formed on the collar 89 of arm 85 is a lug 101

having a shoulder 102. Similarly formed on the hub 93 of arm 92 is another lug 103 having a shoulder 104. The shoulder 102 is adapted to engage the shoulder 104 when the seat is disposed in the position shown in Fig. 1. When said seat 14 is depressed, the arm 92 is caused to move with it and the valve 58 is opened. It will be noted that the lugs 101 and 103 are of such dimensions that the shoulders on the opposite sides thereof do not come in contact with one another when the seat 14 is raised. In this manner, the valve 58 remains closed when the seat is moved from fully open position to that shown in Fig. 1, and is only opened when the seat 14 is depressed below such position.

To prevent leakage of air between the seat 14 and the bowl 11, a gasket 105 is attached to the under side of the seat which engages the upper surface of the rim 13. Likewise, a gasket 106 may be placed between the cover 24 and the flush tank 19.

The use of my invention is manifest. When the water closet is out of use, valve 58 is closed and, likewise, valve 45, so that neither air nor water passes through the ventilating device. When the occupant sits on the seat 14, the same is depressed and the valve 58 is opened. This causes the operation of the ventilating device 35 and valve 45 is opened and the flow of air to the said ventilating device is produced by the nozzle 49. As soon as the occupant leaves the seat 14, spring 98 raises the seat and closes the valve 58.

The advantages of my invention are manifest. The device is extremely simple in construction and can be readily installed on existing closets without appreciable expense or alteration thereof. With my invention, both the air and the water are shut off when the toilet is not in use, so that undesirable drafts and waste of water are prevented. My invention can be manufactured at a nominal expense, so that the same may be readily applied to water closets without materially increasing the cost thereof.

Changes in the specific form of my invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway, an injector connected to said water pipe for procuring a draft through said passageway, means including an expansible fluid chamber connected to said water pipe for operating said valve and means for causing the simultaneous opening of said valve and operation of said injector.

2. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway, an injector connected to said water pipe for procuring a draft through said passageway, means including an expansible fluid chamber connected to said water pipe for operating said valve and a valve connected to said water supply pipe at a locality between the water supply pipe and both said injector and expansible fluid chamber and simultaneously controlling the flow of water to both said injector and said expansible chamber.

3. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway, motive means having an expansible chamber and including a diaphragm, means for connecting said expansible chamber to said water supply pipe and means for connecting said diaphragm to said valve.

4. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway, motive means having an expansible chamber and including a diaphragm, means for connecting said expansible chamber to said water supply pipe, means for connecting said diaphragm to said valve to procure movement of the valve into open position and resilient means for moving said valve into closing position.

5. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway normally closing said passageway, resilient means for urging said valve into closing position, motive means having an expansible chamber and including a diaphragm, means for connecting said expansible chamber to said water supply pipe, means for connecting said diaphragm to said valve to procure movement of the valve into open position and against the action of the resilient means, an injector connected to said water supply pipe and causing a draft through said passageway, a single water valve for operating said injector and moving said diaphragm, said diaphragm, through the action of said resilient means, discharging the water in said expansible chamber through said injector upon closure of the water valve.

6. In combination, a case having a longitudinally extending gas passageway therethrough, means intermediate the ends of said passageway forming a valve seat, a valve member movable along said passageway and adapted to be seated upon said valve seat, means having an expansible chamber and including a movable member operable within said chamber for moving said valve member, a branch air passageway extending through said case between said valve seat and said expansible chamber and communicating with said longitudinally extending gas passageway, a water passageway in said case communicating with said expansible chamber and a nozzle communicating with said water passageway and situated within said gas passageway on the side of said valve seat opposite said expansible chamber, said nozzle inducing the flow of gas through said gas passageway, the pressure of the water in said water passageway actuating the movable member in said expansible chamber and procuring opening of said valve to admit gas through said transverse passageway and into the longitudinal passageway.

7. In combination with the bowl, stack and water supply pipe of a water closet, means forming a gas passageway between said bowl and stack, a valve in said passageway including a movable valve member, said valve member normally obstructing the flow of gas through said passageway, a pressure responsive movable member adapted to be operated by the pressure of the water in the supply pipe, and a part connected to said valve member and pressure responsive movable member and adapted, upon movement of said pressure responsive movable member, to open said valve.

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