Oct. 31, 1933. C. H. ZWERMANN 1,933,518

WATER CLOSET STRUCTURE

Filed Sept. 8, 1930 2 Sheets-Sheet 1

Fig. 2

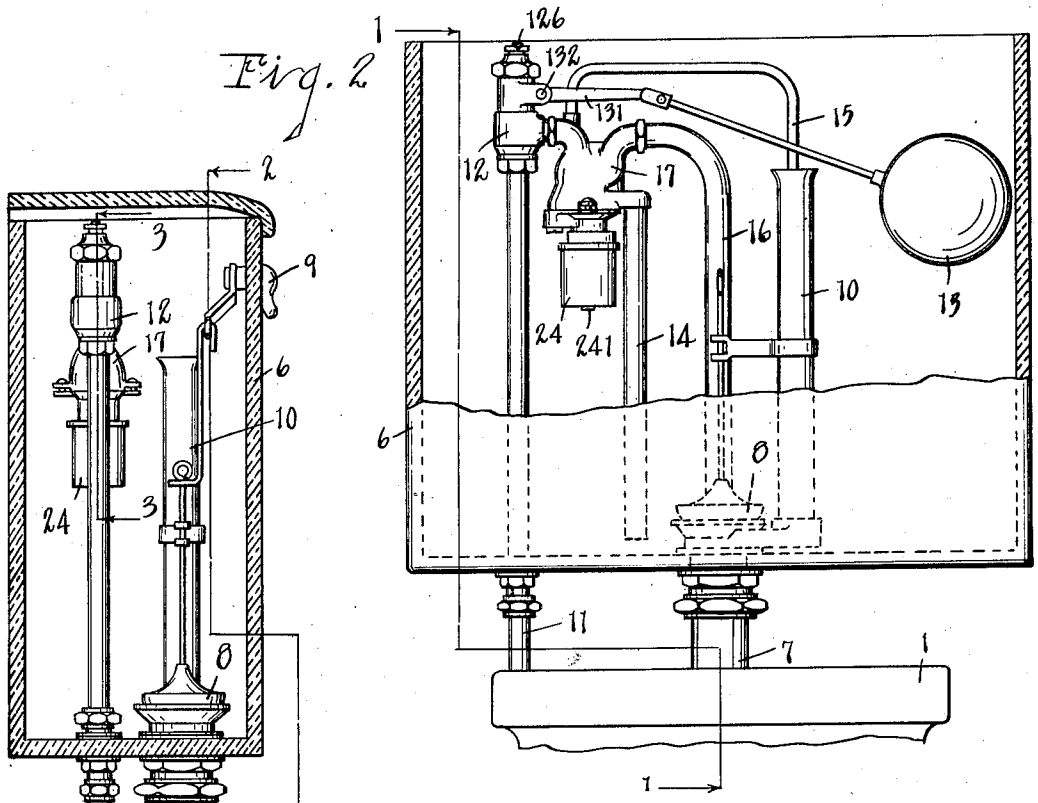


Fig. 1

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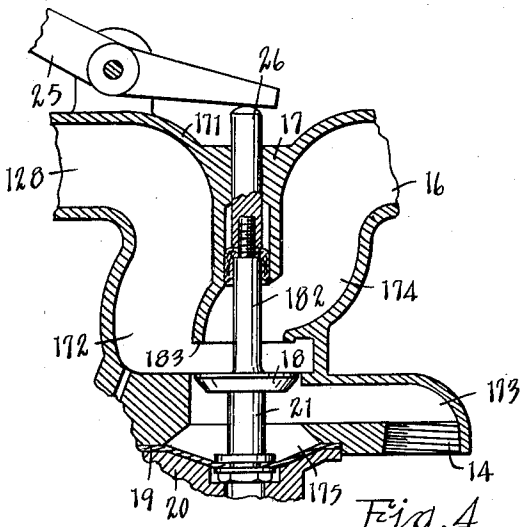


Fig. 4.

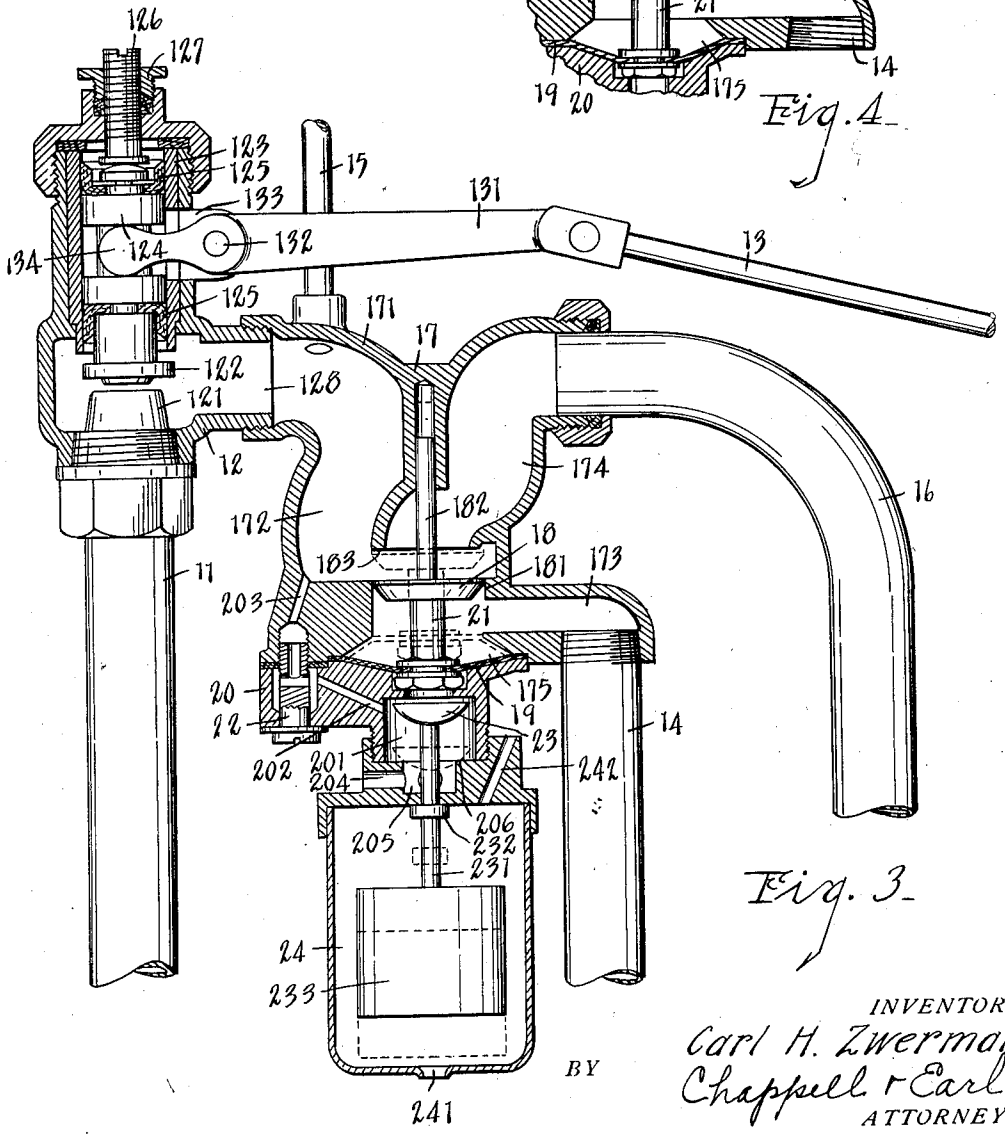


Fig. 3.

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1,933,518

WATER-CLOSET STRUCTURE

Carl H. Zwermann, Robinson, Ill.

Application September 8, 1930. Serial No. 480,317

12 Claims. (Cl. 4—73)

This invention relates to improvements in water closets, particularly to the water closet bowl and water supply and valve control means therefor.

The objects of the invention are:

First, to provide such a water closet having an annular water supply conduit to the bowl and having an auxiliary jet under strong pressure at the bottom of the bowl.

Second, to provide an improved valved water supply, organized in connection with the ball cock, for delivering water by gravity to the upper annular conduit supply and also delivering water under strong pressure, as a jet, in the bottom of the bowl.

Third, to provide a special valve structure with automatic float and control means for the purpose of delivering water by gravity from a tank and by direct water main pressure.

Objects pertaining to details and economies of construction and operation will appear from the detailed description to follow.

Preferred embodiments of my invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a detail vertical sectional elevation through a water closet tank and valve mechanism taken on a line corresponding to the irregular line 1—1 of Fig. 2, the gravity water supply connection and the auxiliary pressure connection and the valve structure being shown in full lines.

Fig. 2 is a detail sectional elevation taken on line 2—2 of Fig. 1, the lower portion of the bowl being broken away, the lower part of the tank being shown in full lines and the relation of the parts inside indicated by dotted lines.

Fig. 3 is an enlarged detail sectional elevation through the ball cock valve and the auxiliary valve mechanism taken on section line 3—3 of Fig. 1.

Fig. 4 is a detail modification where a manually operated, mechanical control of the auxiliary valve is provided.

The parts will be identified by their numerals of reference which are the same in all the views.

1 is a water closet bowl. It is provided with an annular supply passage 2 at the top with downwardly directed delivery perforation 21 leading into the upper part of the bowl. 3 is the discharge siphon from the bowl. 4 is the bottom of the bowl and 5 is an auxiliary passage for supplying water to jet 51 under strong pressure from the water main across the bottom 4.

6 is the water tank. 7 is the gravity elbow connection from the bottom of the water tank to the annular passage 2. 8 is the usual rubber water closet valve controlled by the usual lever connection 9. 10 is the overflow pipe of usual construction. 11 is the supply pipe, 12 is the ball cock valve, and 13 is the float which controls the same. 14 is the supply pipe leading to the ball cock valve, and 15 is the refill pipe leading from the valve chamber upwardly and around over into the overflow pipe 10. 16 is the auxiliary supply pipe extended below the tank 6 at 161 to the auxiliary jet passage 5. 17 is the auxiliary valve casing.

Ball cock 12 is provided with a conical valve seat 121 against which closes the poppet valve 122. A cylindrical bushing 123 is provided within the valve casing and a counterbalanced cylindrical spool-shaped plunger 124 reciprocates within this casing, being provided with hydraulic cup packings 125 125 at each end and being provided with a central bore, whereby the plunger will be counterbalanced by an equal pressure of water at both ends. The throw of the plunger is adjustable by set screw 126 extending through stuffing box 127. Float lever 131 is fulcrumed at 132 to ears 133 on the side of the casing of valve 12 and has a rounded inwardly projecting short arm 134 engaging between the end flanges of the plunger 124. This provides a valve the operation of which is readily adjustable and is very free in its movements, which is required for a structure of this kind.

The outlet 128 of the ball cock valve 12 leads into the casing 171 of the auxiliary valve mechanism 17. This valve casing is provided with an intake chamber 172 and an outlet chamber 173 delivering downwardly through pipe 14, whereby the tank 6 is filled. This is the main supply. Valve casing 17 is also provided with discharge chamber 174 to supply the pipe 16 to the auxiliary jet under direct pressure from the main. Valve 18 is provided for controlling the flow of water through the auxiliary valve. In its lower position it closes valve seat 181 and prevents the direct flow of water from chamber 172 to the main passage 173. Valve 18 is provided with a vertical stem 182 and within the casing 171 is the valve seat 183 controlling the supply to the chamber 174. Valve seat 183 is directly above the valve seat 181 so that when the valve 18 is raised against the valve seat 183, the supply of water to the passage 173 and auxiliary passage 16 is cut off and water is delivered directly through the supply chamber 173 to the pipe 14 for filling the tank.

The action of the valve 18 is controlled automatically by the diaphragm, plunger and float means. In a recess 175 below valve 18 is disposed a diaphragm 19 which is clamped at its periphery by bottom cover plate 20. To the center of this diaphragm is secured the vertical plunger 21. The plunger 21 is disposed axially under valve 18, and, when it is raised, elevates the valve to the dotted position indicated in Fig. 3, closing part 183. This is accomplished when the diaphragm is acted upon automatically by

hydraulic pressure. A cylindrical chamber 201 is formed centrally beneath the diaphragm 19 in the cover 20. A restricted passage 202 203 through hollow screw 22 delivers into the upper part of chamber 201 directing a jet radially and centrally into the same. The lower part of the chamber is provided with outlet 204 connecting to a central bore 205 terminating in a valve seat 206 above. A dish-shaped valve 23 cooperates with the valve seat 206. This valve is a float valve provided with a central stem 231 attached to a screw and suspending a float 233 at its lower end. Limiting stop collar 232 is provided on the valve stem 231. The float chamber 24, having a bottom aperture 241 vented at the top at 242, embraces the said float 223 and is disposed below the said valve chamber 17 and attached thereto by suitable head as shown.

The parts of my improved water closet structure have thus been completely described in the preferred form. The operation will be described in detail.

When the lever 9 is tripped, the valve 8 is raised and the water in the tank drops by gravity through pipe 7 to the annular supply passage. This permits the float 13 to drop and the valve 122 is raised from its seat 121. Water under pressure at once rushes into the discharge opening 128 into chamber 172, above valve 18, up past valve seat 183, into discharge chamber 174 into pipe 16, and thence down through the auxiliary passage 5, delivering a strong jet of water under direct pressure from the main across the bottom 4 of the bowl.

This action continues with increasing strength as the valve 122 is raised, thus securing a very strong jet discharging action across the bottom of the bowl into the siphon 3. As the water in the tank descends, it eventually drops below the valve casing 24 and permits water to flow out through the aperture 241, permitting float 233 to drop. This carries down valve 23 by its connection to the valve stem 231. As soon as valve 23 seats at 206, chamber 201 is substantially closed and water under pressure enters and acts upon the diaphragm 19 carrying plunger 21 upwardly against valve 18, lifting it against the seat 183 and cutting off the auxiliary water supply to the jet.

Valve 18 closes against seat 183 and is maintained there until the float 233 raises float valve 23 off its seat. When this is done, water from the chamber 201 is at once discharged and the pressure on diaphragm 19 is released, the plunger 21 drops, and by this time valve 122 has been closed onto its seat 121, pressure is released, and valve 18 drops into its seat 181 and the water closet is again ready for operation.

In the meantime, during these operations, sufficient pressure is in the chamber 171 to deliver sufficient water through the refill pipe 15 to refill the bowl.

It will be seen that the structure is completely automatic. However, the valve 18 may be provided with mechanical trip means; as illustrated in Fig. 4, for returning it to initial position. This, however, would require special manipulation and is not so desirable. A manual lever 25, acting upon a packed plunger 26, would be used for the purpose. The diaphragm would thus be forcibly depressed and turn pressure into the auxiliary passage which would be closed by the action of the parts at the proper time.

Any suitable means may be provided to control the pressure jet in the bottom of the bowl.

In certain instances it is desirable to connect the auxiliary pressure to the annular passage 2, when the bowl would be filled by a usual main connection.

I have described my structure in the precise detail in which I wish to claim it specifically. I also wish to claim the invention broadly, as pointed out in the appended claims.

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

1. The combination of a water closet bowl having an annular ring passage with supply to the upper part of the bowl, a jet passage connecting from the main supply to the lower part of the bowl, a supply tank having a gravity connection to the upper part of the bowl, and ball cock means having an auxiliary valve mechanism for controlling the connection and supply to the pressure connection to deliver the jet after flushing and siphonic action has begun.

2. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock and gravity supply, and having an independent pressure passage connecting from the main supply to supply a jet in the bottom of said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passages alternately, a plunger for controlling the said double acting valve, a diaphragm connected to said plunger, a cylindrical hydraulic chamber beneath the said diaphragm, a valve for controlling the said hydraulic chamber, a float connected to said valve, a float chamber apertured at the bottom and vented at the top to permit the said float to fall as the water in the tank falls and close said valve, and an auxiliary restricted passage to said hydraulic chamber directed centrally and downwardly onto the valve therein to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

3. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock and gravity supply, and having an independent pressure passage connecting from the main supply to supply water to said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passages alternately, a plunger for controlling the said double acting valve, a diaphragm connected to said plunger, a cylindrical hydraulic chamber beneath the said diaphragm, a valve for controlling the said hydraulic chamber, a float connected to said valve, a float chamber apertured at the bottom and vented at the top to permit the said float to fall as the water in the tank falls and close said valve, and an auxiliary restricted passage to said hydraulic chamber directed centrally and downwardly onto the valve therein to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

4. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock and gravity supply, and having an independent pressure passage connecting from the main supply to supply water to said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passage alternately, a plunger for controlling the said double acting valve, a diaphragm connected to said plunger, a cylindrical hydraulic chamber beneath the said diaphragm, a valve for controlling the said hydraulic chamber, a float connected to said valve, a float chamber apertured at the bottom and vented at the top, a manually operated lever to force said valve down to close said valve, and an auxiliary restricted passage to said hydraulic chamber directed centrally and downwardly onto the valve therein to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

5. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock and gravity supply, and having an independent pressure passage connecting from the main supply to supply a jet in the bottom of said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a diaphragm valve with a double acting valve lid disposed within the valve casing to control the said passages alternately, hydraulic means to actuate said valve to close the auxiliary passage and open the supply to fill the tank when the same shall have been emptied and open the auxiliary passage when the pressure is cut off, and an auxiliary restricted passage to said hydraulic chamber to create pressure therein to actuate the diaphragm valve and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

6. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock and gravity supply, and having an independent pressure passage connecting from the main supply to supply water to said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passage alternately, hydraulic means to actuate said valve to close the auxiliary passage and open the supply to fill the tank when the same shall have been emptied and open the auxiliary passage when the pressure is cut off, and an auxiliary restricted passage to said hydraulic chamber to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

7. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock, and gravity supply and having an independent pressure passage connecting from the main supply to supply a jet in the bottom of said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passages alternately, automatic means to actuate said valve to close the auxiliary passage and open the supply to fill the tank when the same shall have been emptied and open the auxiliary passage when the pressure is cut off, and an auxiliary restricted passage to said hydraulic chamber to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

8. In a water closet structure, the combination of a closet bowl having a supply tank, ball cock, and gravity supply and having an independent pressure passage connecting from the main supply to supply water to said bowl, an auxiliary valve having a casing connected to be supplied from the said ball cock, a supply passage leading from said auxiliary valve to fill the tank, an auxiliary passage from said auxiliary valve connected to the pressure supply passage, a double acting valve lid disposed within the valve casing to control the said passages alternately, automatic means to actuate said valve to close the auxiliary passage and open the supply to fill the tank when the same shall have been emptied and open the auxiliary passage when the pressure is cut off, and an auxiliary restricted passage to said hydraulic chamber to create pressure therein to actuate the diaphragm and raise the valve to cut off the auxiliary supply passage and connect the main supply passage and permit the tank to fill.

9. The combination of a water closet bowl having a flushing rim, a gravity tank therefor connected to supply the bowl and rim, a ball cock, an auxiliary valve controlled by pressure from the ball cock, a jet within the bowl, a direct connection from the jet to the main water supply controlled by said auxiliary band, the same constituting automatic means for controlling the said water supplies.

10. The combination of a water closet bowl, a gravity tank therefor connected to supply the bowl, a jet within the bowl, a direct connection from the jet to the main water supply, and automatic means for controlling the said water supplies timed to deliver the jet after flushing from the tank has started the siphon.

11. The method of flushing siphonic bowl closets consisting in supplying the bowl and the rim of the bowl with water from a gravity tank at low pressure to initiate the siphonic action, and thereafter supplying a jet in the bowl from a direct connection to the main water supply to boost the siphonic action.

12. The method of flushing siphonic bowl closets consisting in supplying the bowl with water from a gravity tank at low pressure to initiate the siphonic action, and thereafter supplying a jet in the bowl from a direct connection to the main water supply to boost the siphonic action.

CARL H. ZWERMANN.