Feb. 11, 1936. C. H. ZWERMANN 2,030,559

WATER CLOSET

Original Filed July 30, 1932 2 Sheets-Sheet 1

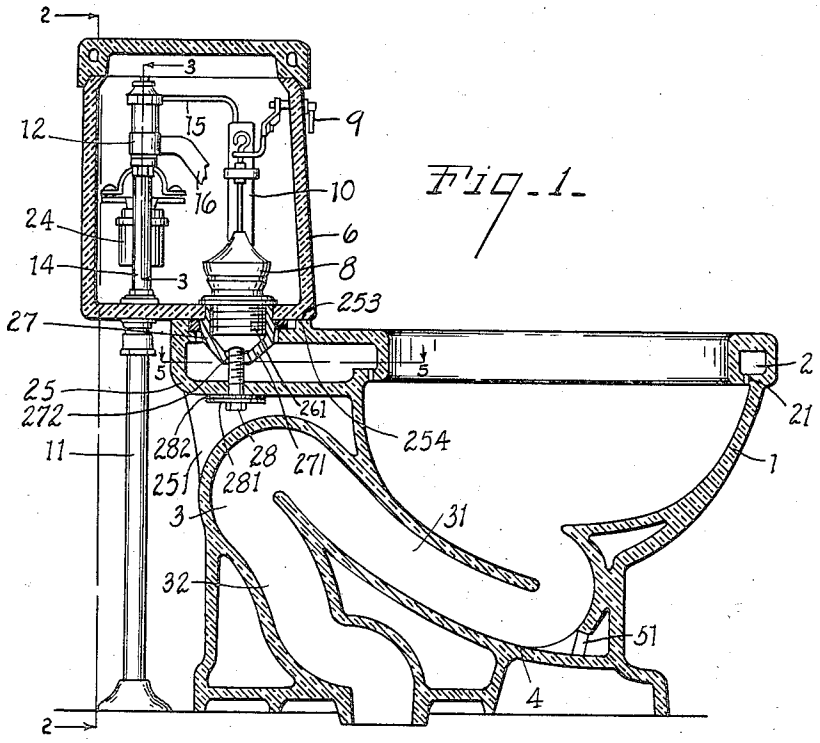


Fig. 1.

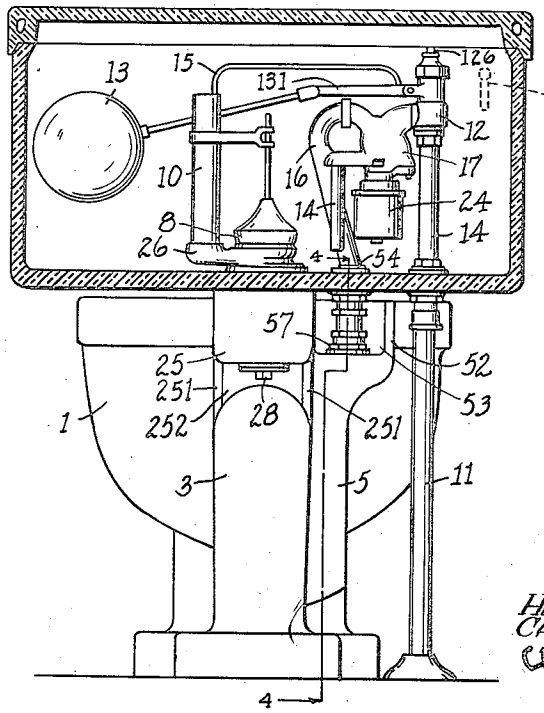


Fig. 2.

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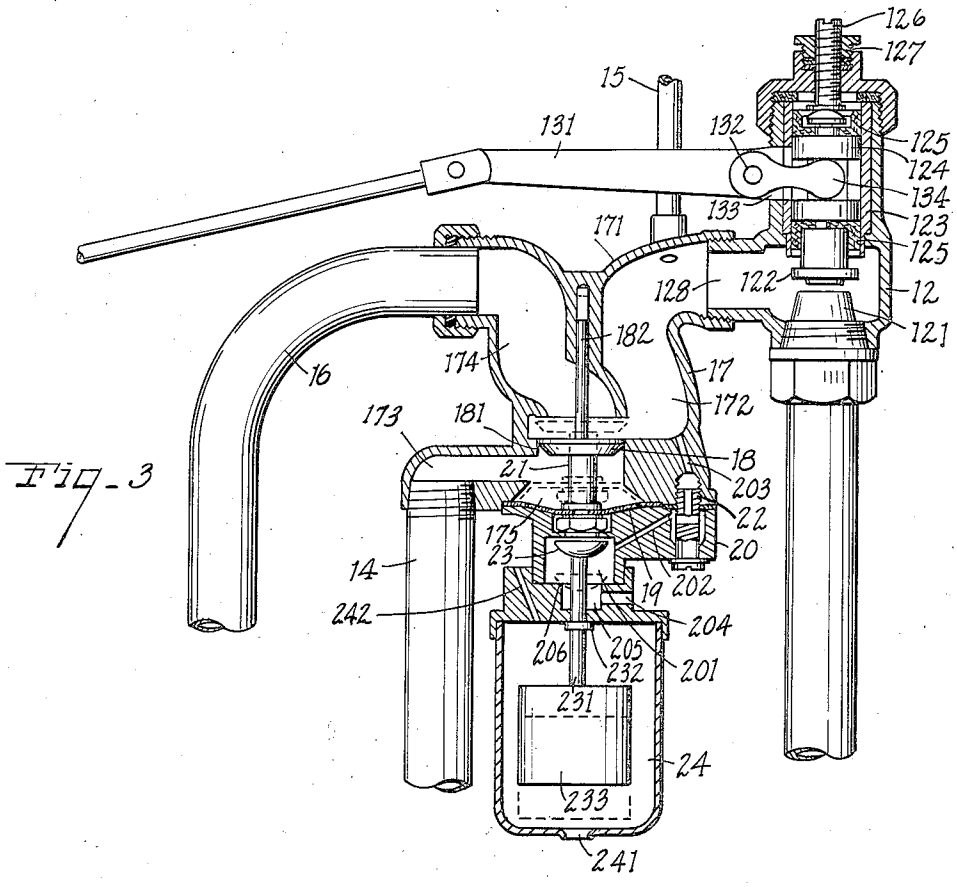


Fig. 3

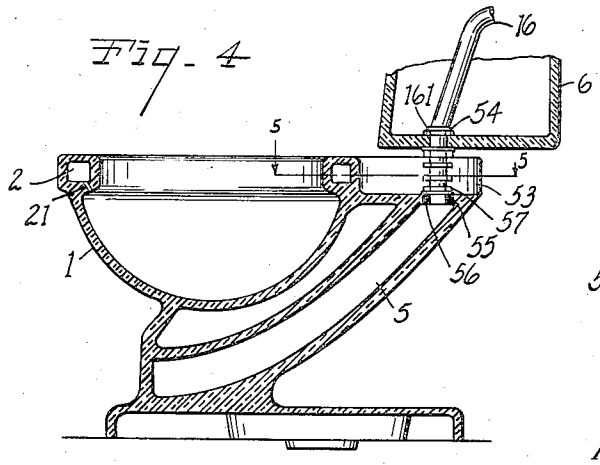


Fig. 4

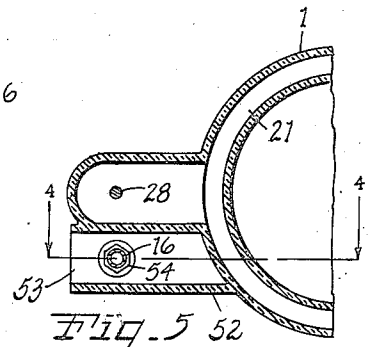


Fig. 5

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UNITED STATES PATENT OFFICE

2,030,559

WATER CLOSET

Carl H. Zwermann, deceased, late of Robinson, Ill., by Helene Zwermann, executrix, and Carl H. Zwermann, Jr., executor, Robinson, Ill., assignors to W. A. Case & Son Mfg. Co., Robinson, Ill.

Original application July 30, 1932, Serial No. 626,540. Divided and this application January 26, 1935, Serial No. 3,538

5 Claims. (Cl. 4—14)

This is a division of his application for patent for Water closets, Serial No. 626,540, filed July 30, 1932, and relates to the inventions of his Patents No. 1,869,401, issued August 2, 1932, and No. 1,933,518, issued October 31, 1933.

The object of this invention is to provide a water closet having a flush tank to store water to institute siphonic action in the bowl and a jet under strong pressure to completely flush the bowl, and in which a simple and efficient means of securing the tank to the bowl to provide a unitary structure of neat and attractive appearance is provided.

Objects and advantages of construction and operation will appear from the description to follow. A preferred embodiment of his invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a sectional elevation of a water closet embodying his invention.

Fig. 2 is a sectional view of such a water closet taken on line 2—2 of Fig. 1.

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

Fig. 4 is a detail sectional view of the bowl of such a closet showing the passage for the introduction of water from the supply main taken on line 4—4 of Figs. 2 and 5.

Fig. 5 is a detail sectional plan view of a portion of the bowl taken on line 5—5 of Figs. 1, 2 and 4.

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

1 is a water closet bowl 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 having the up-leg 31 and the down-leg 32. 5 is an auxiliary passage for supplying water to jet 51 in the bottom of the bowl 4 under strong pressure from the water main. The jet 51 discharges across the bottom of the bowl and into the up-leg 31 of the siphon 3.

6 is a water tank of small capacity. The capacity is preferably less than is required to completely flush the bowl but is sufficient to institute siphonic action therein. 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 re-fill pipe leading from the valve chamber upwardly and around over into the overflow pipe 10. 16 is the auxiliary supply pipe extending to the port 161 to the auxiliary jet passage 5. 17 is the auxiliary valve casing.

Ball cock 12 is provided with a conical seat 121 against which closes the poppet valve 122. A cylindrical bushing 123 is provided within the valve casing and a counter-balanced, cylindrical, spool-shaped plunger 124 reciprocates within this casing, being provided with a hydraulic cup packing 125, 125 at each end and being provided with a central bore whereby the plunger will be counter-balanced by 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 a 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. 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 a valve seat 183 controlling the supply to the chamber 174. Valve seat 183 is directly above valve seat 181 so that when the valve 18 is raised against the valve seat 183, the supply of water to passage 173 and auxiliary pipe 16 is cut off and water delivered directly from supply chamber 173 to pipe 14 for filling the tank.

The action of 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 seat 183. This is accomplished when the diaphragm is acted upon automatically by hydraulic pressure. A cylindrical chamber 201 is formed cen-

trally 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 dished 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 is vented at the top at 242 and embraces said float 233 and is disposed below the valve chamber 17 and attached thereby to suitable head, as shown.

25 is a hollow shelf with supporting side walls 251, 251 forming a recess 252 entirely concealing from view the attaching screw to be hereafter described. The tank 6 is of vitreous china material and is supported on said shelf, there being a ground joint 253 on the bottom of the tank fitting a corresponding ground joint 254 on the top of the shelf of the bowl. 26 is a usual flush valve construction having a screw threaded shank 161 projecting well below the bottom in the usual manner and projecting into the opening in the top wall of the shelf. 27 is a special nut for attaching the flush valve structure, threaded to engage the projecting shank 261 and thus support the flush valve structure. The nut is provided with a downwardly projecting cross bar 271 having a threaded boss 272 at the center. Attaching screw 28 projects upwardly through the lower wall of the shelf and engages the threaded boss 272. The screw 28 is centrally located and is embraced and concealed in the recess 252 at the back of the bowl. A metal washer 281 is provided which engages a rubber packing washer 282 to securely close the opening.

The passage 5 is arranged at the outside of the bowl and a wall or web 52 forming a recess 53 entirely conceals from view the connection between the pipe 16 and the passage 5. The pipe 16 extends downwardly through the opening 161 and is anchored by nuts 54. The end projects into opening 55 wherein is a packing 56 that shoulders against nut 57 to make a tight butt-joint. The nut 57 makes the shoulder adjustable to assure a tight fit as the tank is tightened into place. The screw 28 when tightened holds this joint as it does the joint formed at the flush valve.

The parts of the closet having been described, the operation will be discussed in detail.

When the lever 9 is tripped, valve 8 is raised and the water in the tank drops by gravity through the shank 261 into the hollow shelf 25. The water flowing into the hollow shelf 25 flows into annular passage 2 and is discharged through opening 21 into the bowl to start the siphonic action by filling the bowl. The discharge through jet 51 into the up-leg 31 of the siphon then boosts the siphonic action and carries on the flushing of the bowl, as will be more fully set forth hereafter. The tank 6 is of such capacity that there is sufficient water to start the siphonic action which is taken up by the jet 51 to cause the flushing operation.

As the water flows from the tank, the float 13 drops and valve 122 is raised from its seat 121. Water under pressure at once rushes into the discharge opening 128 to chamber 172 above valve 18, up past valve seat 183 to discharge chamber 174 into pipe 16, thence down through the passage 5, delivering a strong jet of water under direct pressure from the main across the bottom of the bowl and into the up-leg 31 of the siphon.

This action continues with increasing strength as valve 122 is raised, thus securing a very strong jet discharging action into the up-leg 31 of 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 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 the float valve 23 off its seat. When this is done water from 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 against ready for operation.

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

By using his improvement it is possible to make use of a much smaller flush tank than formerly, while obtaining the silent action of the siphon with the positive flushing action of the pressure from the water main, which action is obtained in a substantially noiseless manner.

By the construction of the shelf on the bowl and the flush tank fastened by the single screw, he has produced a structure that is very simple and in which the parts are effectively sealed and made water tight. The pipe 16 is held in water tight relation to the passage 5 by the action of the single screw and a much simpler structure is possible, the present structure being easily detached and at the same time embodying the advantages heretofore set forth.

He has described his structure in the precise detail in which he wishes to claim it specifically. He also wishes to claim the invention broadly as pointed out in the appended claims.

Having thus described the invention, what he claims as new and desires to secure by Letters Patent is:

1. In a water closet having a bowl with a rearwardly projecting hollow shelf adapted to supply said bowl, a jet within the bowl, a passage to said jet within the bowl, a gravity tank adapted to supply said hollow shelf and be supported thereon and having therein a ball cock and an auxiliary valve controlled by pressure from the ball cock and having therein a direct connection through the tank and from the main water supply adapted to be connected to said passage in said bowl and controlled by said auxiliary valve, the same constituting automatic means for controlling said water supply, the combination of side walls supporting said hollow shelf and forming a concealed recess at the back of the bowl, a side wall forming a second concealed recess into which said passage opens and adapted to receive the end of said direct connection through said tank, means for forming a water tight joint between said tank and said hollow shelf, a butt-

joint in said second recess between said connection through the tank and said passage, and means to pull said tank toward said shelf to seal said means for forming a water-tight joint between the tank and shelf to secure the tank on the shelf and to seal said butt-joint comprising a screw concealed in said first-mentioned recess.

2. In a water closet having a bowl with a rearwardly projecting hollow shelf adapted to supply the bowl, a jet within the bowl, a passage within the bowl leading to said jet, a gravity tank adapted to supply said hollow shelf and be supported thereon, a direct connection through said tank and from the main water supply adapted to be connected to said passage, the combination of side walls supporting said hollow shelf and forming a concealed recess at the back of the bowl, a side wall forming a second concealed recess to which said passage communicates and adapted to receive said direct connection through the tank, means for forming a tight joint between said hollow shelf and tank, and a butt-joint in said second recess and between said connection and said passage, and means for securing said tank on said shelf and for sealing said means for making a tight joint and for sealing said butt-joint comprising a screw concealed in said first-mentioned recess to pull said tank toward said shelf.

3. In a water closet having a bowl with a rearwardly projecting hollow shelf adapted to supply the bowl, a jet within the bowl and a passage leading to said jet and a gravity tank adapted to supply said hollow shelf and be supported thereon with a direct connection from the main water supply through said tank and adapted to be connected to said passage, the combination of side walls supporting said shelf and forming a concealed recess at the back of the bowl, means forming a seal between said gravity tank and said hollow shelf and a butt-joint between said connection and said passage, and means for securing said tank on said shelf and for sealing said butt-joint comprising a screw concealed in said recess to pull said tank toward said shelf.

4. In a water closet having a bowl with a rearwardly projecting hollow shelf adapted to supply the bowl, a jet within the bowl, a passage from the jet to a portion of the bowl adjacent the shelf, a gravity tank adapted to supply said hollow shelf and be supported thereon having therein a ball cock, an auxiliary valve controlled by pressure from the ball cock both in said tank, and a direct connection through said tank from the main water supply and adapted to be connected to said passage and be controlled by said auxiliary valve, the combination of means forming a water-tight joint between said tank and said shelf, and a butt-joint between said direct connection and said passage and means to pull said tank toward said shelf to seal said means for forming a water-tight joint between said tank and said shelf and to seal said butt-joint comprising a screw, and a pair of walls extending rearwardly from said bowl forming a recess concealing said screw and said butt-joint.

5. In a water closet having a bowl having a rearwardly projecting hollow shelf adapted to supply said bowl, a jet within the bowl, a passage from said jet to a portion of the bowl adjacent said shelf, a gravity tank adapted to supply said hollow shelf and be supported thereon and a direct connection through said tank and from the main water supply and adapted to be connected to said passage, the combination of means forming a water-tight joint between said shelf and said gravity tank, a butt-joint between said direct connection and said passage, and means to pull said tank toward said shelf to seal said means forming a water-tight joint between said shelf and said tank and to seal said butt-joint comprising a screw and a pair of walls extending rearwardly from said bowl forming a recess concealing said screw and said butt joint.

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Executrix and Executor of Carl H. Zwermann. Deceased.