Sept. 15, 1964 J. A. MORALES 3,148,381

WATER CLOSET TANK AND OUTLET VALVE

Filed Nov. 30, 1960 3 Sheets-Sheet 1

Fig.1

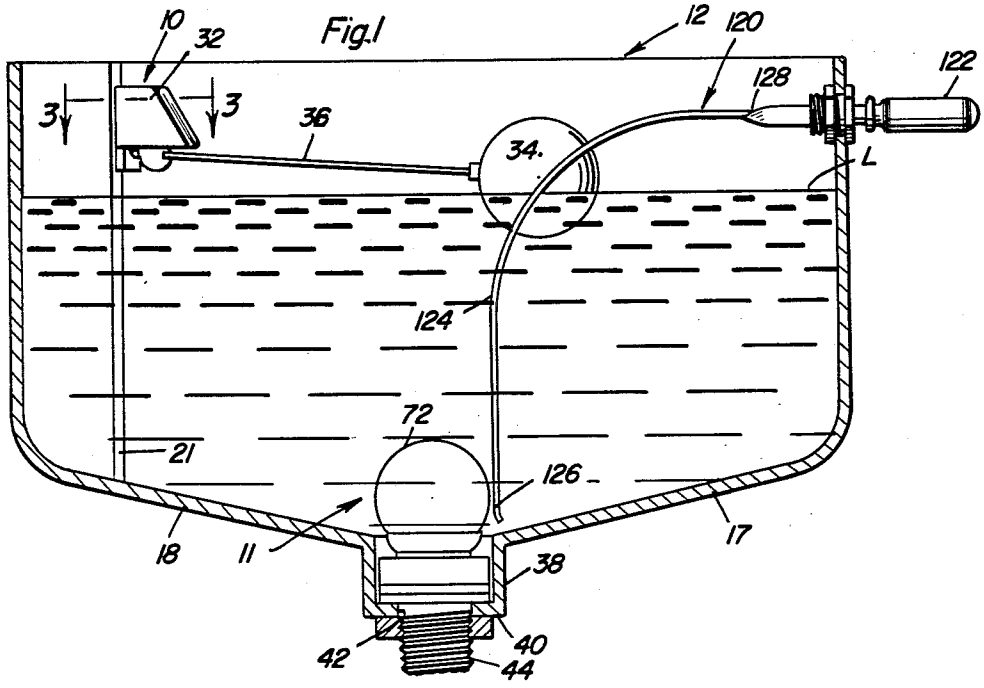


Fig.3

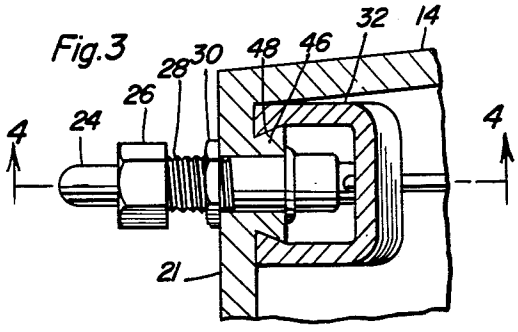


Fig.5

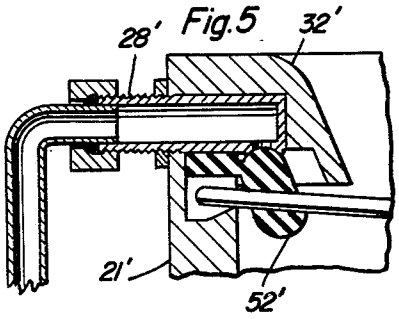
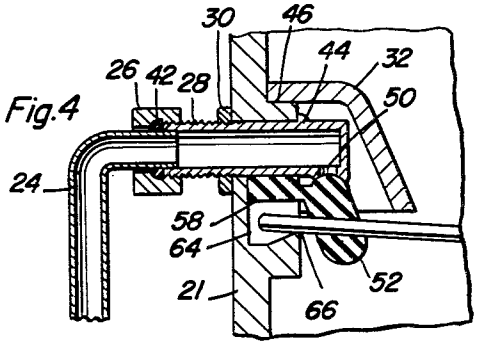


Fig.4



Juan Alberto Morales
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Sept. 15, 1964 J. A. MORALES 3,148,381

WATER CLOSET TANK AND OUTLET VALVE

Filed Nov. 30, 1960 3 Sheets-Sheet 2

Fig.2

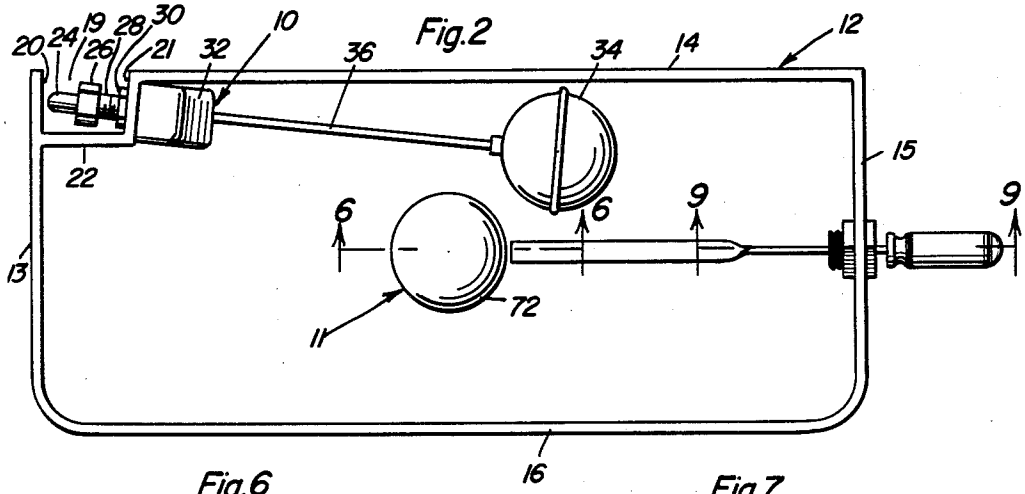


Fig.6

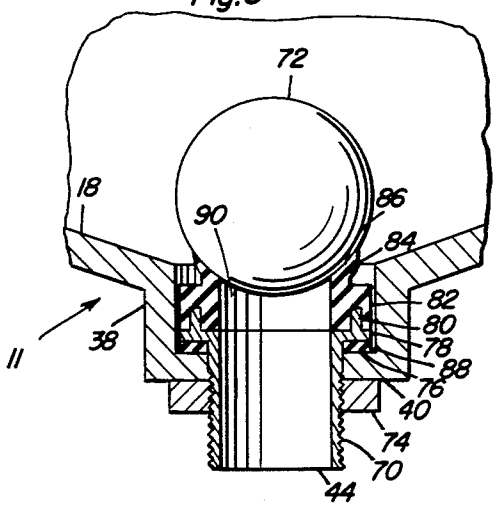


Fig.7

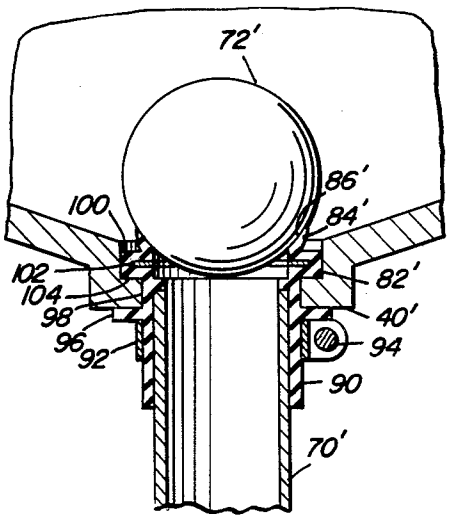
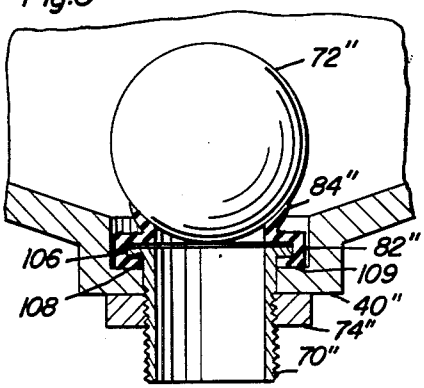


Fig.8



Juan Alberto Morales

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Sept. 15, 1964 J. A. MORALES 3,148,381

WATER CLOSET TANK AND OUTLET VALVE

Filed Nov. 30, 1960 3 Sheets-Sheet 3

Fig.9

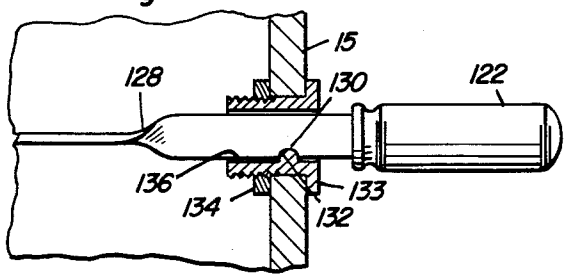


Fig.10

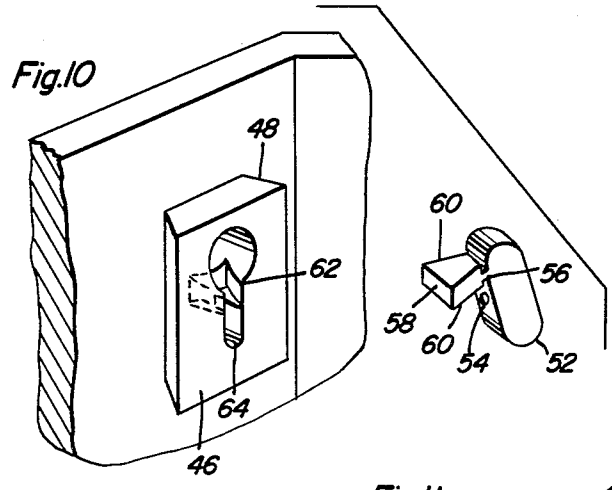
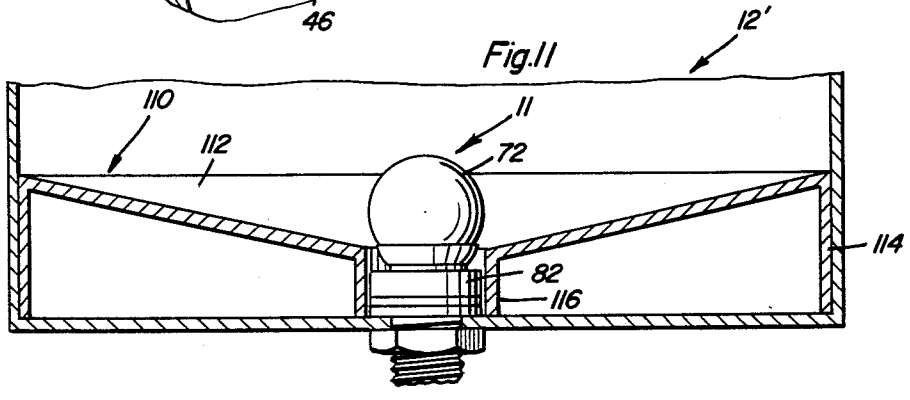


Fig.11



Juan Alberto Morales
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office 3,148,381 Patented Sept. 15, 1964

3,148,381

WATER CLOSET TANK AND OUTLET VALVE

Juan Alberto Morales, Carlos M. Icaza 17A, Panama, Panama

Filed Nov. 30, 1960, Ser. No. 72,689
2 Claims. (Cl. 4—56)

This invention relates to water closets. More specifically, this invention relates to improved means for filling and emptying the reservoir of flush type toilets.

An object of this invention is to provide valve means for a toilet tank which is simple in construction, dependable in operation and economical to produce and maintain.

Still another object of this invention is to provide a water closet tank with a conical bottom having a valve seat therein closed by a floating ball which provides a hermetic seal and always insures complete draining of the tank before the valve is closed.

Yet another object of this invention is to provide a water closet tank having a valve seat in the bottom thereof which cooperates with a ball to form a hermetic seal without any outside pressure being applied to the liquid within the tank.

Another object of this invention is to provide a water closet tank with the inlet thereof at the top portion of the tank above the normal water level and thereby reducing the possibility of leakage.

Another object of this invention is to provide a commode reservoir with inlet and outlet valves having flexible portions which are automatically self-sealing and wear compensating.

Still another object of this invention is to provide an outlet valve in the bottom of a water tank wherein the member forming the valve seat also acts as a seal between the outlet pipe and water tank.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a cross sectional view showing in elevation the general arrangement of my mechanism or device;

FIGURE 2 is a plan view of FIGURE 1;

FIGURE 3 is an enlarged view taken substantially on the plane of line 3—3 in FIGURE 1;

FIGURE 4 is a cross sectional view taken substantially on the plane of line 4—4 in FIGURE 3;

FIGURE 5 is a cross sectional view in elevation similar to FIGURE 4 but showing a modification of my invention;

FIGURE 6 is an enlarged cross sectional view taken substantially on the plane of line 6—6 in FIGURE 2 and showing an enlarged view of my ball valve;

FIGURE 7 is a cross sectional view in elevation similar to FIGURE 6 but showing a modification of my ball valve;

FIGURE 8 is a view similar to FIGURE 7 but showing a further modification of my ball valve;

FIGURE 9 is an enlarged cross sectional view taken substantially on the plane of line 9—9 in FIGURE 2;

FIGURE 10 is an enlarged view in perspective showing details of my novel inlet valve; and

FIGURE 11 shows a conventional toilet reservoir modified so as to use my novel ball valve.

As shown in FIGURES 1 and 2, the water closet assembly comprises three primary subassemblies, namely, the inlet float operated subassembly **10**, the outlet valve subassembly **11** and the reservoir tank **12**.

Referring to FIGURES 1–3, the tank **12** is substantially rectangular shaped in plan and is formed by the four vertical walls **13**, **14**, **15** and **16** while the bottom of the tank as shown in FIGURE 1 is formed of the symmetrical sloping walls **17** and **18** joined to the side walls so as to form an enclosed tank. The back left portion of the tank has a vertically extending chamber **19** which is also substantially of rectangular shape in plan view as shown in FIGURE 2 and is enclosed by the three side walls **20**, **21**, **22** with the back side of chamber **19** being open to the atmosphere for its entire vertical height. The conical bottom of the tank has located substantially in the center thereof a circular wall **38** extending downwardly therefrom and having a flange **40** extending inwardly from the bottom of the wall **38**. The flange **40** has a central aperture **42** therein for receiving a discharge pipe **44** therein.

The inlet valve **10** is connected to a city water main or other source of water pressure by means of a vertically extending pipe **24** which extends downwardly through chamber **19** and is connected at its lower end to the water source. The upper end of the pipe **24** as shown in FIGURE 4 is bent horizontally and connected to a threaded sleeve **28** by means of a nut **26** threaded onto the left end of the sleeve **28**. The flexible annular sealing member **43** is compressed between a shoulder within the nut and the left end of sleeve **28** so as to tightly grip and seal the upper end of the pipe **24** to the sleeve **28**. The sleeve **28** is locked to a thickened wall portion **46** of the tank by means of a nut **30** threaded onto the left end of the sleeve and a flange **45** on the right end of the sleeve. As shown in FIGURE 3, the vertical sides of the thickened wall portion **46** are sloped or chamfered as shown at **48** so that the water shield **32** may slide down over the wall portion **46** and become locked thereto by the dovetail formed by the wall portion **46** and the sloping walls of the shield **32** which frictionally grip these sloping walls. As shown in FIGURE 3, the shield **32** is substantially U-shaped in cross section and as shown in FIGURE 4, the shield **32** is substantially awning shaped.

The right end of the sleeve **28** has an outlet **50** which is sealed or opened by a flexible valve member. As shown in FIGURES 4 and 10, the flexible valve member comprises an oval shaped body **52** connected by a thin flexible wall **56** to a dovetailed securing member **58**. The dovetailed securing member **58** has sloping side walls which lock into a recess **62** in the thickened wall portion **46**. The recess **62** is of the same shape and of slightly smaller size than the dovetailed portion **58** whereby the dovetailed portion **58** becomes securely locked in the recess once it is inserted therein. The flexible valve member may be composed of any conventional flexible material such as synthetic rubber, natural rubber, or any of the flexible plastics. The body portion **52** of the flexible valve member has an aperture **54** formed therein for snugly receiving the float rod **36**. The rod **36** has the conventional float **34** secured to one end thereof and the other end extends through the aperture **54** of the flexible valve member and into the recess **64** in the tank wall. The aperture **54** in the flexible valve member may be slightly smaller in size than the rod **36** whereby the rod **36** will be tightly and frictionally gripped by the flexible valve member. Also, the extreme left end of the rod which extends beyond the flexible valve member may be flattened if so desired. The inner lower end of the aperture **64** in the tank wall has a knife edge **66** for pivotally supporting the end of the float rod **36**.

FIGURE 5 shows an inlet valve for a water closet tank slightly modified from that form shown in FIGURES 1–4 so as to be adapted to fit a tank having a thickened wall and a valve shield formed integrally therewith at the top of the wall. Comparing FIGURE 5 with FIGURE 4 it can be seen that the general arrange-

ment of the valve parts and the shape of the valve parts in both species are substantially identical. However, the valve shield 32' in FIGURE 5 is integral with the thickened wall portion 21'. The flange 45 shown in FIGURE 4 has been omitted in FIGURE 5 and the sleeve 23' has a press or a snug fit within the wall portion 21.

By having the inlet valve 10 at the top of the tank and above the normal water level within the tank, the possibility of water leakage from the tank is substantially reduced over that form of tank wherein the inlet valve is located in the bottom portion of the tank.

Referring to FIGURES 1 and 6, a preferred form of the tank outlet valve is shown comprising the outlet pipe 44 having an annular radially extending flange 78 integral therewith at its upper end. The annular flange 78 rests on an annular flexible washer 88 which in turn rests on the upper surface of the tank flange 40. An internally threaded nut 74 is threaded upon the threads 70 of the pipe 44 and tightened against the lower surface of the flange 40 whereby the flexible washer 88 is compressed between the flanges 78 and 40 to form a leakproof seal in the bottom of the tank. A valve seat 82 composed of some flexible material such as rubber or plastic seats upon the flange 78. The center of the valve seat has a large circular opening 90 therein which is of the same size and coincides with the opening through pipe 44. The lower surface of the valve seat 82 has an annular groove therein which tightly receives the upstanding annular flange 80 extending upwardly from the flange 78. The flange 80 fits with sufficient tightness in the groove in seat 82 so as to form a leakproof seal therewith. The upper portion of the valve seat 82 has a part spherical surface for receiving and snugly contacting the lower surface of the ball 72. The surface 84 of the valve seat has a very smooth finish whereby it may form a hermetic seal with the ball 72. The upwardly extending lips 84 of the valve seat are annular in shape and tapered in cross section whereby the outer upper edges of the lips are extremely flexible so that they may readily flex into tight contact with the ball 72.

FIGURE 7 shows a modification of the outlet valve wherein the flexible valve seat 82' is elongated to extend through the bottom wall of the tank and thereby receive the outlet pipe 70'. In this form, the seal or seat 82' serves a dual function, namely, it forms a valve seat at 86' and forms a seal with the water pipe at 90. Also, the valve seat is recessed at 98 so as to receive the annular flange 40' of the water tank whereby it also forms a seal between the outlet pipe and the water tank. The flexible extension 90 is tightened around the upper end of the pipe 70' by means of a conventional C clamp 92 which is tightened by means of a threaded stud 94. The upper inner wall of the seal 82' has an annular recess which receives a rigid washer 102. However, the washer 102 may be of the expansible split ring type. Since the upper flange 104 of the valve seat is normally larger in outside diameter than the inside diameter of the recess 100 in the tank, the seat fits the recess with a tight fit. The washer 102 maintains the flange 104 into tight fitting engagement with the recess 100.

FIGURE 8 shows a third modification where the valve seat 82'' is of reduced size but still performs the double function of acting as a valve seat for ball 72'' and as a seal between the flange 40'' and the outlet pipe 70''. The lower end of the seal 82'' has a recess 108 therein for receiving a flange 106 which is integral with the upper end of the outlet pipe 70''. When nut 74'' is screwed upon the threaded pipe 70'' it pulls the flange 106 of the pipe downwardly into tight engagement with the lower flange 109 of the valve seat 84'' thereby forming a leakproof seal between the pipe and the flange 40'' above the tank. The ball 72'' seats with the flexible lips 84'' in the same manner as in the species shown in FIGURES 6 and 7.

FIGURE 11 shows a conventional flat bottomed tank

12' modified to employ the outlet valve 11 shown in FIGURE 1. The false bottom 110 is of rectangular shape in plan view whereby it fits snugly within the water tank 12' and rests on the bottom thereof. The false bottom 110 comprises a floor section 112 which is of conical configuration and is supported on the vertical walls 114. The conical floor 112 provides a means for guiding the valve ball 72 onto its seat 82.

An outlet valve operating device 120 comprises a handle 122 connected to a curved lever 124 which has a lower end 126 for contacting the valve ball 72. As shown in FIGURES 1 and 9, the rod 124 is formed of flat bar stock twisted 90 degrees at 128. The tank wall 15 is apertured for receiving a threaded sleeve 133 which has a shoulder at its right end for abutting the wall 15. A nut 134 is threaded onto the exterior of the sleeve 133 for tightly connecting it to the wall 15. The lever 124 has a small recess at 132 which receives a rounded projection 130 formed integral with the interior of the sleeve 133. As shown in FIGURE 9, the lever 124 has substantial clearance from the inside of the wall of the sleeve 133 and fulcrums about the projection 130.

In operation, the tank 12 is usually substantially filled with water to the level L as shown in FIGURE 1. If it is desired to flush the commode to which the water tank is connected, it is only necessary to push downwardly on the handle 122 whereby lever 120 fulcrums about the pivot point 130 so as to move the lower end 126 of the lever into engagement with the ball 72 whereby the seal between the ball and the valve seat 82 is broken, and the ball 72 being lighter than water, floats to the surface of the water in the tank. The valve seat 82, then being no longer closed by ball 72, permits the water to rush out of the tank and through the outlet pipe 44 to flush the toilet. When all of the water is finally drained from the tank 12, the ball 72 settles by gravity onto one of the walls 17 or 18. The walls 17 and 18 being inclined towards the valve seat 82, the ball 72 is forced by gravity to roll down these bottom walls onto the seat 84, since both the ball 72 and the surface 86 of the valve seat are very smooth, and since the seat 86 is still moist from the water that was in the tank, a hermetic seal is formed between the ball 72 and the seat 86. Due to the flexibility of the lips 84 of the valve seat, and due to the smoothness of the ball 72 and seat 84, the valve seat acts as a suction cup on the ball 72 and the seal therebetween cannot be broken since atmospheric pressure firmly holds or forces the lips 84 into contact with the lower outer surface of the ball 72. Since the lips 84 are extremely thin and flexible, they may flex to fill or seal any slight irregularities in the surface of the ball 72.

When the valve 11 is opened, the level of the water in the tank immediately begins to drop which in turn causes the float 34 to drop. As the float 34 moves downwardly, the rod 36 and valve body 52 rotate counterclockwise about the fulcrum point 66. This causes the flexible neck 56 which supports the valve body 52 to bend downwardly thereby separating the upper surface of the valve body 52 from the aperture 50 in the valve assembly 10. This opens the valve assembly 10 and thereby immediately allows water to rush through the pipe 54 and into the tank 12. However, since the outlet pipe 44 is many times larger in diameter than the aperture 50, the water entering the tank through the inlet valve 10 cannot have any effect in filling the tank until the ball 72 is seated on the outlet valve. Once the tank is empty and the ball 72 has formed a seal on the seat 82, then the water entering the tank through the inlet valve begins to fill the tank 12. As the tank begins to fill the float 34 begins to rise upwardly therein on the surface of the water thereby gradually closing the valve 10. The valve 10 does not become completely closed until the water in the tank has reached the level or approximate level indicated at L. The valve 10 may be adjusted to cut-off the inlet water supply at any desired level by bending the rod 36 if desired. Due to

the flexibility of the valve body **52**, it will always form an hermetic seal with the seat at **50** even when this seat becomes worn or deformed by corrosions or deposits.

The floating members **34** and **72** may be formed of any conventional materials. However, it is preferable to form these members out of non-corrosive materials as plastics or rubber.

When the tank is being filled with water, the ball **72** cannot float off of the seat **86** because as explained above the lips **84** acts as suction cups on the bottom of the ball surface and furthermore the weight of the water on top of the ball forces it more tightly into engagement with the seat. Also, once the tank becomes filled with water, the pressure of the water acting on the outer surface of the lips **84** force them more tightly into engagement with the ball **72** thereby even more tightly sealing the outlet valve.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In combination with a water closet tank adapted to be partially filled with water to a predetermined level and having a flat bottom and side walls with the upper inlet end of the centrally disposed discharge pipe sealingly secured through said bottom, an improved outlet valve assembly and actuator therefor comprising a removable false bottom snugly received in said tank and supported from said bottom, said false bottom defining a centrally disposed aperture of a larger diameter than, vertically spaced above and alined with the inlet end of said discharge pipe, the upper surfaces of said false bottom being inclined downwardly toward said aperture, an upstanding generally cylindrical valve seat sealingly secured at its lower end to the upper end of said discharge pipe and extending upwardly from said pipe to a point at least closely adjacent a generally horizontal plane containing the surfaces of said false bottom defining the uppermost extremity of said aperture, a freely floatable ball float

valve in said tank above said false bottom sealingly seatable in the upper end of said valve seat with appreciably less than the lower half of said ball float valve disposed in the upper end of said valve, an aperture formed through one of said side walls above said level, pivotable lever means extending through said aperture and including a first end disposed in said tank and engageable only with the portion of said float valve disposed above said seat for unseating said float valve from said seat upon pivotal movement of said lever to cause said ball float valve to float in said water and open said valve seat, said ball float valve being reseatable in said valve seat by the rolling of said ball valve by gravity down said false bottom to said valve seat in said aperture when said water is drained from said tank.

2. The combination of claim 1 wherein at least the upper end of said valve seat with which said ball float valve is engageable is thin walled and constructed of resilient material.

References Cited in the file of this patent

UNITED STATES PATENTS

401,640	Connolly	Apr. 16, 1889
1,004,707	Stewart	Oct. 3, 1911
1,154,695	Friesleben	Sept. 28, 1915
1,193,760	Campbell	Aug. 8, 1916
1,338,179	Hohmeister	Apr. 27, 1920
1,439,268	Shoppe et al.	Dec. 19, 1922
1,660,922	Haas	Feb. 28, 1928
1,871,579	Bashara	Aug. 16, 1932
2,001,830	Weir	May 21, 1935
2,228,811	Beutin	Jan. 14, 1941
2,241,636	Eliason	May 13, 1941
2,614,263	Kass	Oct. 21, 1952
2,659,088	Smith	Nov. 17, 1953
2,879,520	Hollingsworth	Mar. 31, 1959
2,886,829	Kadish	May 19, 1959
2,907,050	Harris	Oct. 6, 1959
2,959,790	Nelson	Nov. 15, 1960
3,022,516	Trafton	Feb. 27, 1962

FOREIGN PATENTS

7,903	Great Britain	June 16, 1910
1,319	Great Britain	June 1, 1911