Jan. 30, 1968 P. P. CHIAPPETTA 3,365,730

WATER SAVER FLUSH VALVE

Filed Dec. 30, 1964 2 Sheets-Sheet 1

Fig-1

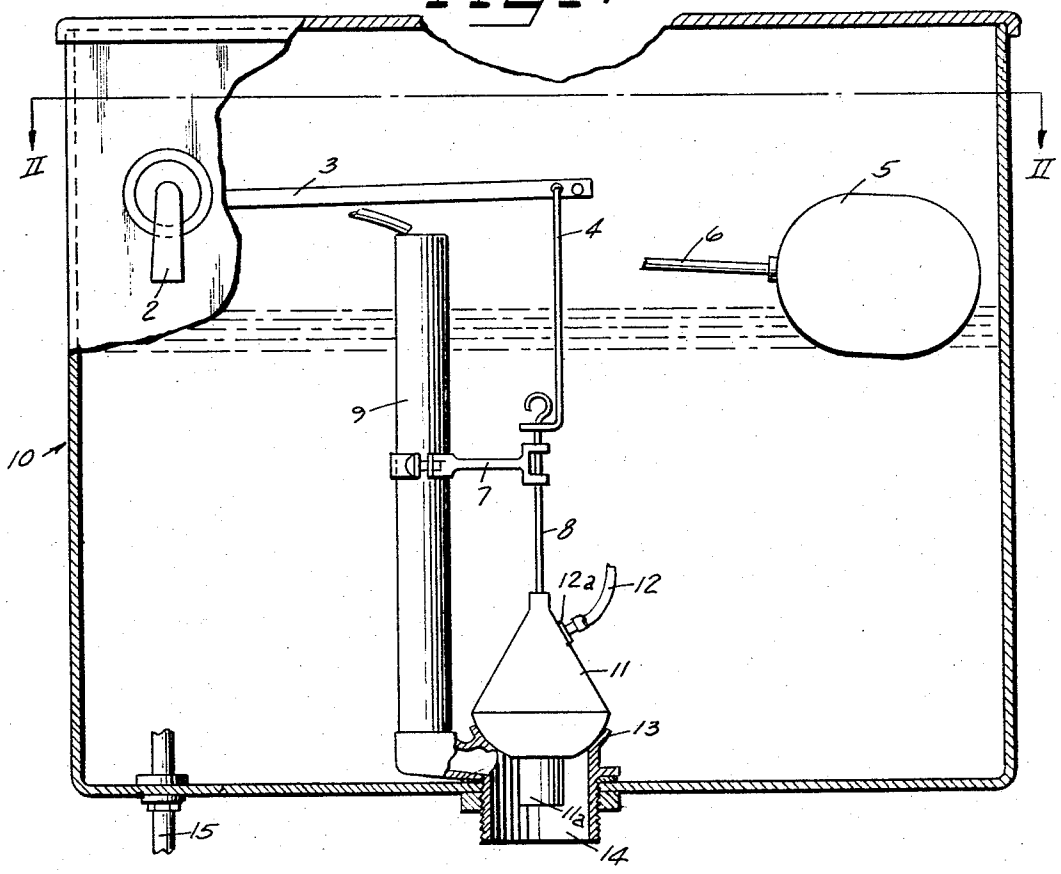
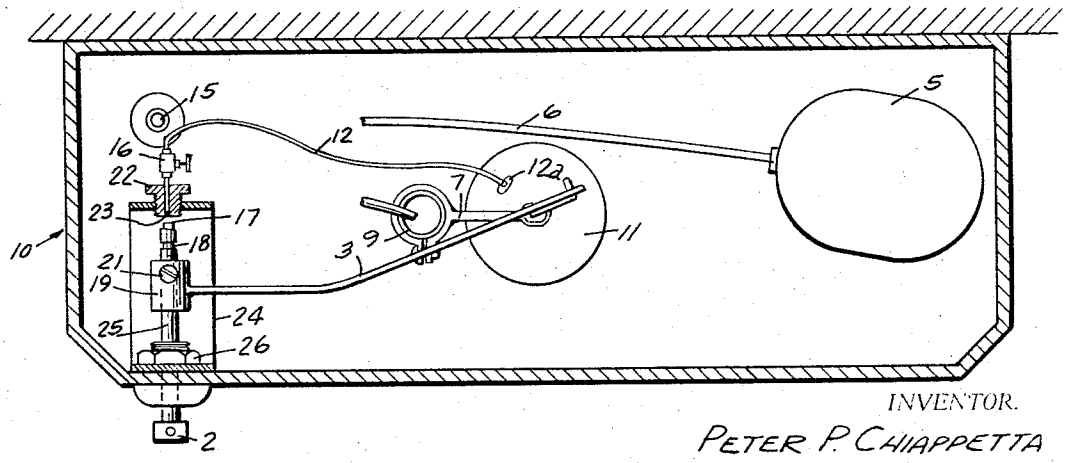


Fig-2



INVENTOR.
PETER P. CHIAPPETTA

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

Jan. 30, 1968 P. P. CHIAPPETTA 3,365,730

WATER SAVER FLUSH VALVE

Filed Dec. 30, 1964 2 Sheets-Sheet 2

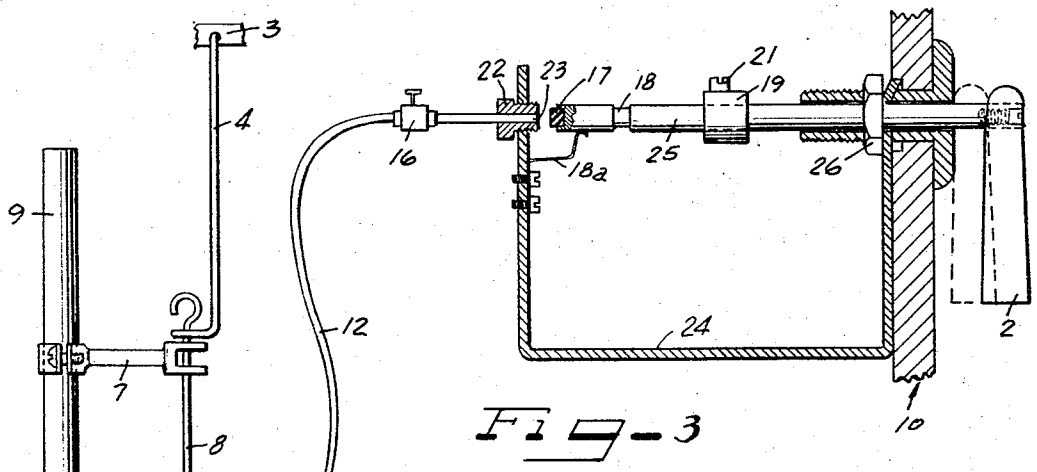


Fig-3

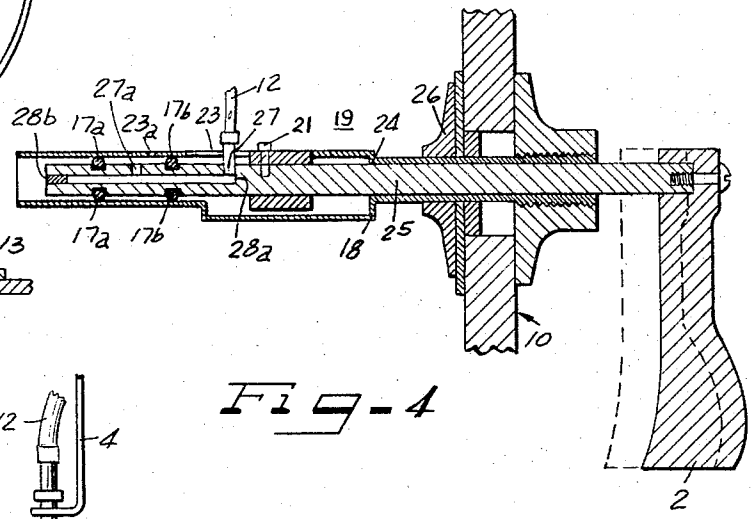


Fig-4

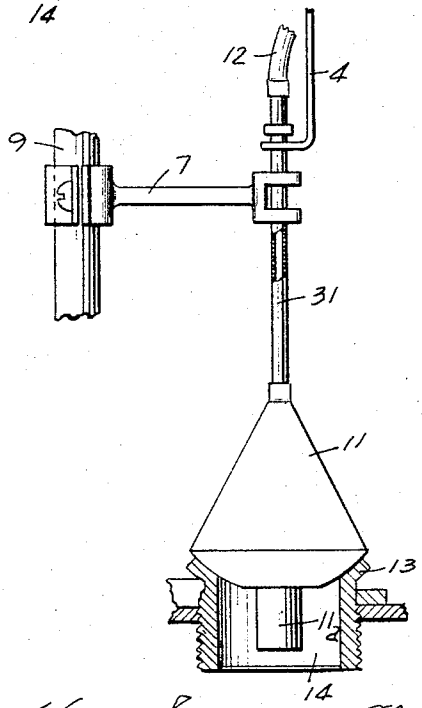


Fig-5

INVENTOR.
PETER P. CHIAPPETTA

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

United States Patent Office 3,365,730 Patented Jan. 30, 1968

3,365,730

WATER SAVER FLUSH VALVE

Peter P. Chiappetta, 4606 Main St., Lisle, Ill. 60532

Filed Dec. 30, 1964, Ser. No. 422,256
8 Claims. (Cl. 4—67)

This invention relates to flush toilets of the type having a gravity tank from which water flows for flushing the toilet.

The typical toilet tank is made with sufficient capacity to meet maximum flushing requirements and in standard practice, generally may contain six to eight gallons of water. In many instances, it is possible to conduct the flushing operation with the use of less water. Various attempts have been made to utilize fractional quantities of water in the tank, however, these methods involve expensive and complicated mechanisms which do not provide satisfactory results.

With the general increase of population in certain metropolitan areas, and the resultant lowering of the water table in those areas, it has become increasingly more important to conserve water. It is, of course, desirable to accomplish this, if possible, without inconvenience to the inhabitants of these areas. The present invention is embodied in an apparatus which may be installed quickly and easily in the tank of a standard water closet or may be included as part of the equipment upon the initial installation.

Accordingly, it is an important object of my invention to provide a water saver flush valve which will effect the saving of substantial amounts of water used in the flushing of toilets without reducing the efficiency of the toilet unit.

Another object of the present invention is to provide an improved water saver device which is comprised of relatively few parts which are so constructed and arranged that they will give maximum efficiency and length of service.

A further object of the present invention is to provide an improved device which may be attached to the conventional buoyant outlet valve controlling the flow of water from the flush tank to the toilet bowl without altering the structure of the conventional flush tank unit.

A still further object of the present invention is to provide an improved water saver device wherein the normal positioning of the flushing handle will permit the discharge of substantially all of the water from the flush tank into the toilet bowl for flushing and when the flushing handle is drawn to a position away from the normal position, will permit the discharge of only a portion of the water from the flush tank into the toilet bowl.

Another object of the present invention is to provide a flush ball valve which permits water to enter and air to exit thereby allowing the flush ball valve to reseat from its up position independently of the water level in the flush 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 front elevation of a conventional toilet tank with the front wall broken away and showing the tank full with the outlet valve closed;

FIGURE 2 is a plan view taken substantially along the line II—II of FIGURE 1;

FIGURE 3 is a vertical sectional view of the water saver flush valve employing the teachings of the instant invention;

FIGURE 4 is a fragmentary vertical sectional view showing another embodiment of the invention; and

FIGURE 5 is another fragmentary vertical sectional view showing a still further embodiment of the invention.

As shown on the drawings:

Referring to FIGURE 1, there is shown a conventional toilet tank **10** having a supply pipe indicated at **15** but not shown in further detail as it and its related valve are conventional. The supply pipe valve is controlled in the usual manner by a float **5** carried by the lever operating arm **6**.

The outlet port **14** leading to the toilet is likewise conventional and includes the valve seat **13** and the connected overflow pipe **9**. A hollow rubber ball valve **11** normally closes pipe **14** during periods of non-use. The hollow rubber ball valve **11** is provided with a tube **11***a* at the bottom thereof providing direct connection with outlet pipe **14**. The ball valve is actuated in a conventional manner by means of the vertical stem **8**, stem guide **7**, upper link **4** and valve lever **3**.

The mechanism that enables this invention to cause additional discharge of a fractional part of the tank of water will now be described in more detail by reference to the various figures in which like parts have been given the same number.

Commencing with the operating handle **2**, it will be seen that there is a shaft **25** fixed thereto, supported at the inner face of the tank in conventional manner by a nut **26**. Affixed to the inner face of the tank is a housing **24** which has at its inner end, means providing threading engagement with a threaded member **22**. The threaded member **22** is provided with a centrally disposed passage **23** which is connected to needle valve **16**. The needle valve is connected by flexible hose **12** through coupling **12***a* to the hollow rubber ball valve **11**.

On shaft **25** there is provided a sleeve **19** with a clamping screw **21**. A sleeve **19** is directly connected with valve lever **3**, or it may be constructed as a single unit. Shaft **25**, at a position further in from sleeve **19** is provided with an annular recessed groove **18** and at its innermost end with plug **17**. Along the inner face of the inner wall of housing **24**, facing the flushing handle, there is provided lock means **18***a* which is so positioned as to cooperate with the annular groove **18** and thus hold shaft **25** at an in position, as shown by the phantom lines in FIGURE 3.

Centrally disposed passage **23** is connected by means of a rigid tube to needle valve **16** which is conventional and capable of adjusting the orifice of said tube. Needle valve **16** is also connected to flexible hose **12** which may be made of any material that is impervious to water and will not unduly stiffen in water at normal room temperatures. Flexible hose **12** is connected to the hollow rubber ball valve **11** by means of coupling **12***a*, which is impervious to water and prevents water from entering valve **11**. Hollow rubber ball valve **11** is provided with tube **11***a* having an opening at the bottom thereof which is of ample size to permit quick entrance of water into the hollow rubber ball valve. It will be understood, of course, that tube **11***a* may be replaced by any suitable means permitting quick entrance of water in valve **11**.

The operation of the structure of the invention is as follows:

When it is desired to flush the tank completely, the user turns handle **2**, in its normal position, as shown in the phantom lines at FIGURE 3 in a counterclockwise direction. On so doing, lever **3** will be raised. This results in lifting valve **11** a sufficient distance above valve seat **13** so that the outward flow of water through pipe **14** will not be able to overcome the tendency of the air filled valve **11** to raise to a limited position against guide **7**. Thus, the valve is completely open and the water in the tank runs out in the normal manner until the level drops to a point close enough to valve seat **13** to permit reseating of valve **11** which has descended with the water

level during the last part of the tank discharge. It will be noticed that with the handle 2 in at the in position, i.e., not pulled out, plug 17 will efficiently plug orifice 23 thereby making it airtight, causing hollow ball valve 11 to retain its air and thereby not permitting any water to enter through tube 11*a*. As soon as valve 11 has reseated, further discharge is prevented. Float 5 is in down position and has opened the water valve attached thereto, so refilling of the tank at once commences, to prepare for the next flushing.

In the operation just described, it will be noted that it is substantially similar to the normal operation as has heretofore been known. Thus, as soon as the valve has been completely opened with valve 11 rising to the position limited by guide 7, the operator may release handle 2 which permits lever 3 to return immediately to its normal downmost position, as indicated in FIGURE 1, with the upper link 4 sliding downwardly in relation to stem 8 which remains at the latest position until the water level has descended far enough to take valve 11 downwardly with it to close pipe 14.

When it is desired to use only a fraction of a tankful of water for the flushing operation, the user pulls the handle 2 away from tank 10, as shown in the solid lines of FIGURE 3 and moves the handle counterclockwise. This handle movement, with reference now to FIGURE 3, results in the plug 17 disengaging from orifice 23 and subsequently causing valve lever 3 to be raised. Upward movement of lever 3 causes corresponding upward movement of upper link 4 and vertical stem 8 and valve 11. This results in lifting valve 11 a sufficient distance above valve seat 13 so that the outward flow of water through pipe 14 will not be able to overcome a tendency of the air-filled valve 11 to rise to a limited position against guide 7. Thus, as valve 11 attains its raised position, water will enter it through tube 11*a* thereby displacing the air in valve 11 which will exit through hollow tube 12 and needle valve 16 at orifice 23. Thus valve 11 will quickly become filled with water, thereby losing its buoyancy and quickly descending to valve seat 13, thus preventing further discharge. Water will only enter valve 11 when air is escaping from the interior thereof and once a substantial portion of the air has been displaced, the water present in valve 11 will immediately egress through tube 11*a* into outlet pipe 14.

Water is considered to have a specific gravity of unity at any given temperature, that is it is normally considered as a standard in the measurement and specific gravity of other liquids or solids. The operation of the present invention provides for increasing the specific gravity of valve 11 to more than unity, causing the valve 11 to reseat independently of the water level in the toilet tank.

As soon as valve 11 has reseated, further discharge is prevented. Float 5 is in its down position and opens the water valve attached thereto so refilling of the tank commences at once to prepare for the next flushing. By enlarging or diminishing the orifice 23, or adjusting needle valve 16 so as to effect greater or smaller orifice therefrom, it is possible to control the rate of discharge of the air in valve 11 and thereby control the rate of reseating of valve 11 after the flushing operation commences. Thus, by having orifice 23 of suitable size, the time that will elapse before valve 11 is reseated can be controlled. This time of reseating can in turn be related to the quantity of water and the rate of discharge into pipe 14. In the preferred adjustment of the mechanism the rate of air discharge will permit reseating valve 11 when approximately one-half of the tankful of water has been discharged.

FIGURE 4 illustrates another embodiment of the invention. Shaft 25 is provided with a centrally disposed bore 28*a* at its innermost end. This may be provided by drilling or other suitable means. Bore 28*a* is provided with an end plug 28*b* which substantially provides an airtight plug for bore 28*a*. Shaft 25 if further provided with two vertical bores 27, and 27*a* connecting the exterior

surface of the shaft 25 to the central bore 28*a*. Vertical bore 27 is also provided with a rigid tube having a diameter matching that of vertical bore 27, which is connected to flexible tube 12.

Shaft 25, at a point beyond vertical bore 27 but prior to vertical bore 27*a* is provided with annular groove housing O-ring 17*b* and at a point beyond vertical bore 27*a* there is provided another annular groove housing O-ring 17*a*. Housing 24 is constructed so as to allow sleeve 19, with clamping screw 21 to directly contact shaft 25. Housing 24 is provided with rectangular bottomed recess 18 which allows sleeve 19 to move with shaft 25 as it is moved between its in and out positions. Housing 24 is generally constructed so as to conform to the shape of shaft 25 and be in close working relation with O-rings 17*a* and 17*b*. Housing 24 is further provided with an orifice 23. Orifice 23 is of such size and positioned in such a manner as to allow sleeve 19 to fit therein and move to the extent permitted by rectangular recess 18 which extent coincides with the in position of shaft 25. The out position of shaft 25 is determined by the outer end of orifice 23, the one nearest to nut 26. Housing 24 is also provided with an additional orifice 23*a* which is positioned between O-ring 17*b* and vertical bore 27*a*, which are on the shaft 25.

Thus when shaft 25 is at its in position sleeve 19 abuts rectangular recess 18 at its inner wall and O-ring 17*b* is beyond orifice 23*a*.

The operation of this embodiment of the invention is as follows: When it is desired to flush the tank completely, the user allows the handle to remain in its normal position, i.e., the in position, shown by the phantom lines in FIGURE 4, and turns handle 2 in a counterclockwise direction. Upon so doing, lever 3 will be raised, thereby raising valve 11 and allowing full discharge of the tank as previously described in connection with FIGURE 3. It will be noted that when the flush handle 2 is in the normal position, the air from valve 11 cannot pass through orifice 23*a* through flexible member 12 because O-ring 17*b* is now beyond orifice 23*a* and the air is now trapped in horizontal bore 28*a* and the space between O-rings 17*a* and 17*b* and the flushing operation will be conventional.

When it is desired to use only a fraction of a tankful of water in the flushing operation, using the embodiment illustrated in FIGURE 4, the user withdraws handle 2 to the position indicated in solid lines in FIGURE 4 and moves the handle 2 counterclockwise. On so doing, lever 3, and valve ball 11 will be raised permitting the discharge of water from the tank. However, at this position the air trapped in valve 11 is capable of escaping through flexible tube 12 into passage means 28*a* and out of orifice 23*a*. Thus, it will be noted that when flush handle 2 is pulled out, orifice 23*a* is positioned between O-rings 17*a* and 17*b* and thus permits the air to escape. In other respects, this flushing operation is identical to that described in conjunction with the fractional flushing operation of FIGURE 3.

FIGURE 5 illustrates a still further embodiment of my invention. It will be noted that valve 11 is provided with a hollow vertical stem 31, which in addition to performing a function similar to vertical stem 8 described in FIGURES 1 and 3, provides the additional function of serving as a hollow member for the discharge of air from valve 11. It will be noticed that with this arrangement, since the air passage is at the vertex of valve 11 all of the air is permitted to escape, thereby allowing faster reseating of valve 11.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to the worker skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents which do not constitute departure from the

spirit and scope of the invention are intended as part of the invention.

I claim as my invention:

1. A valve construction for use in a toilet flush tank including an outlet port having a valve seat and a conventional valve flush actuating means, said conventional valve flush actuating means being arcuately and axially movable, a flush valve assembly movably attached to said valve actuating means, said valve assembly comprising a hollow valve body engageable with said valve seat to seal said outlet port, passage means connecting said hollow valve body with said valve actuating means selectively permitting release of air from said valve body in accordance with the axial movement of said valve flush actuating means, whereby the arcuate movement of the valve actuating means raises the valve assembly to unseat the valve body from the valve seat allowing water to substantially simultaneously discharge from the outlet port and the axial movement of the valve actuating means allows air to enter the valve body allowing the valve body to reseat independently of the water level in the toilet flush tank.

2. A valve construction according to claim 1 wherein the passage means is composed of a hollow guide stem attached to said hollow valve body and a flexible passage means attached to said hollow guide stem and the valve actuating means.

3. In a tank type toilet flushing mechanism, the combination comprising a trigger means arcuately movable for flushing and axially movable for venting, a water outlet port in the tank, a floating ball valve for seating over said port and permitting water discharge when raised by said trigger means, vent means connecting said ball valve with said trigger means for allowing substantially simultaneous water discharge from said port and egress into said ball valve in response to the axial movement of said trigger means.

4. A valve construction for use in a toilet flush tank comprising a handle movable between in and out positions and arcuately exterior to said tank, a shaft connected to said handle, said shaft extending through the tank wall and adapted to be rocked via said handle, a flushing lever attached to said shaft, a hollow valve body movable between up and down positions, said hollow valve body, in its down position, being engageable with the valve seat of the outlet port of said tank to seat therein, means connecting said lever to said hollow valve body, a metering orifice above the water level of the flush tank in relatively close proximity to said shaft, a flexible hollow passage means connecting said hollow valve body with said metering orifice, a support housing for said metering orifice attached to the interior tank wall and having said shaft passing thereinto, a plug member at the end of said shaft corresponding in diameter to said metering orifice, whereby said lever raises in response to said arcuate movement of the handle raising said connecting means and said hollow valve body, unseating said valve body upwardly from said valve seat of the outlet port and while said handle is at the out position, permitting water to simultaneously discharge from the outlet port and enter said hollow valve body causing said hollow valve body to reseat independently of the water level in said tank.

5. A valve construction for use in a toilet flush tank including an outlet port having a valve seat and conventional valve flush actuating means, said conventional valve flush actuating means being adapted to move axially and arcuately, a flush valve assembly comprising a hollow valve body movable between up and down positions, said hollow valve body, in its down position, being engageable with said valve seat to seat therein, said hollow valve body provided with a passage means cooperatively associated with said outlet port whereby said hollow valve body, in its down position, is in constant communication with said outlet port, an adjustable orifice above the water level of the toilet flush tank in working relationship with said valve flush actuating means, a flexible tube member connecting said hollow valve body with said adjustable orifice above the water level of said toilet flush tank, a stem operatively connected to said actuating means and to said hollow valve body whereby said hollow valve body is unseated upwardly from said valve seat, thereby allowing water to simultaneously discharge from the outlet port and enter said passage means of said hollow valve body displacing the air therein, said air exiting at a controlled rate through said flexible tube member at said adjustable orifice thereby allowing said hollow valve body to reseat independently of the water level in said tank.

6. A valve construction for use in a toilet flush tank comprising a handle movable between in and out positions and arcuately exterior to said tank, a shaft connected to said handle and rocked thereby, extending through the tank wall, a flushing lever attached to said shaft, a hollow valve body movable between up and down positions, said hollow valve body, in its down position, being engageable with the valve seat of the outlet port of said tank to seat therein, means connecting said lever to said hollow valve body, a metering orifice above the water level of said tank in relatively close proximity to said shaft, a flexible hollow passage means connecting said hollow valve body with said metering orifice, a support housing for said metering orifice attached to the interior tank wall and having said shaft passing thereinto, a plug member at the end of said shaft corresponding in diameter to said metering orifice, said shaft having a locking mechanism engageable with said handle at its in position, thus preventing said plug member from disengaging from said orifice, whereby said lever raises in response to said arcuate movement of the handle, raising said connecting means and hollow valve body, unseating said valve body upwardly from said valve seat of the outlet port, permitting water to discharge from the outlet port and retaining the air within the hollow valve body causing said hollow valve body to reseat in accordance with the water level in said tank.

7. A valve construction for use in a toilet flush tank comprising a handle movable between in and out positions, exterior to said tank, a shaft connected to said handle and rocked thereby, extending through the tank wall, a flushing lever attached to said shaft, a hollow valve body movable between up and down positions, said hollow valve body, in its down position, being engageable with the valve seat of the outlet port of said tank to seat therein, means connecting said lever to said hollow valve body, a metering orifice above the water level of said tank, a flexible hollow passage means connecting said hollow valve body with said metering orifice, a support housing for said metering orifice attached to the interior tank wall and having said shaft passing thereinto, a plug member at the end of said shaft corresponding in diameter to said metering orifice, said shaft having a locking mechanism engageable with said handle at its in position, thus preventing said plug member from disengaging from said orifice, whereby said lever raises in response to said handle, raising said connecting means and hollow valve body, unseating said valve body upwardly from said valve seat of the outlet port, permitting water to discharge from the outlet port and depending upon the axial position of the handle allowing the hollow valve body to reseat independently of and dependently on the water level of said tank.

8. A valve construction for use in a toilet flush tank comprising, an outlet port having a valve seat thereon, a handle movable between in and out positions and in arcuate movements, exterior to said tank, a shaft connected to said handle and extending through the tank wall, a hollow valve body movable between up and down positions, said hollow valve body in its down position being engageable with said valve seat to seat therein, a flushing lever attached to said shaft, means connecting said lever to said hollow valve body, a metering orifice

above the water level of said tank, a passage means provided in said shaft, two sealing rings mounted on said shaft having one end of said passage means therebetween, a flexible passage means connecting the other end of said passage means with said hollow valve body, a support housing for said shaft attached to the interior tank wall and in working relationship with said sealing rings providing an airtight seal thereby, an orifice in working relationship with said passage means positioned on said support housing, said orifice being so positioned as to be blocked by one of said sealing rings when said handle it at its in position, a slot in said support housing being associated with said flexible passage means and said passage means, whereby said flushing lever raises in response to the arcuate movement of the flushing handle, raising said connecting means and hollow valve body thereby unseating said hollow valve body upwardly from said valve seat of the outlet port and, in accordance with the axial

position of the flushing handle permitting varying amounts of air within said hollow valve body to escape through the flexible passage means at said passage means through said orifice while simultaneously allowing water to discharge from the outlet port thus permitting the use of full and fractional portions of water in the flush tank.

References Cited

UNITED STATES PATENTS

2,214,439	9/1940	Robertson	4—56
2,741,776	4/1956	Christe et al.	4—57
2,869,141	1/1959	Koch et al.	4—56
2,883,675	4/1959	Hartman	4—57

LAVERNE D. GEIGER, *Primary Examiner.*

HENRY K. ARTIS, *Assistant Examiner.*