Nov. 9, 1926. 1,605,938

P. HAAS

FLUSHING VALVE MECHANISM

Filed March 24, 1925 4 Sheets-Sheet 1

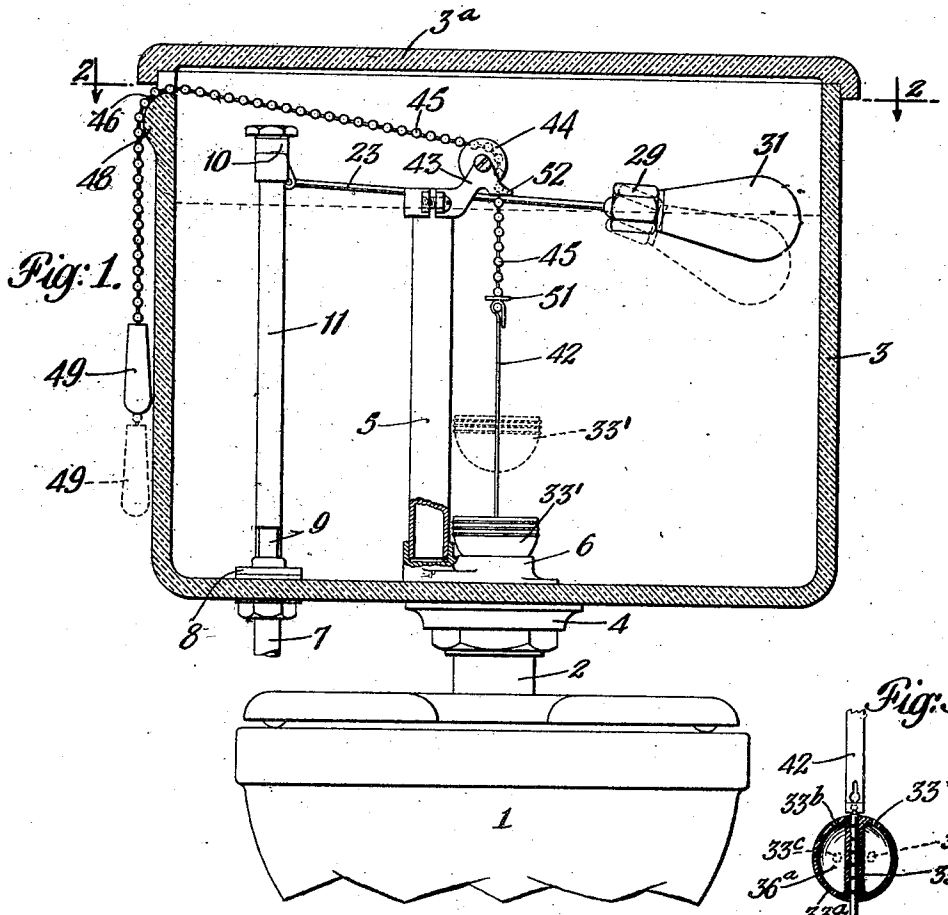


Fig: 1.

Fig: 3.

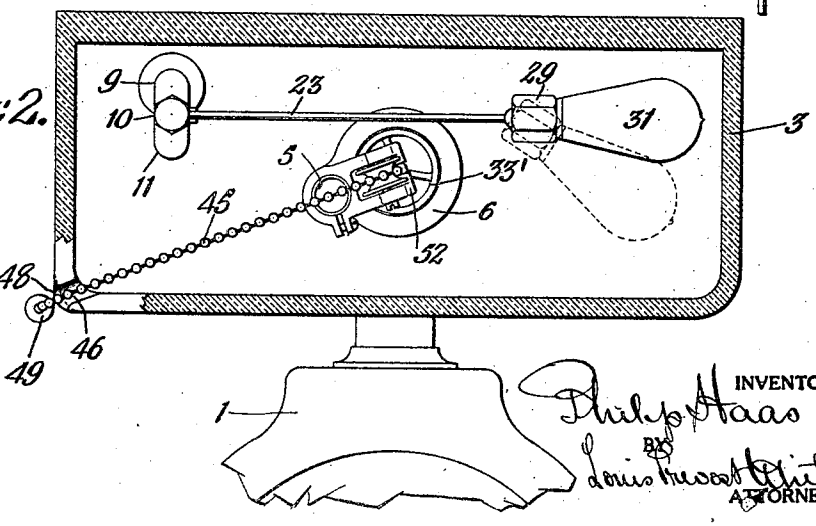


Fig: 2.

INVENTOR
Philip Haas
BY
Louis Prescott Whitaker
ATTORNEY

Nov. 9, 1926. 1,605,938

P. HAAS

FLUSHING VALVE MECHANISM

Filed March 24, 1925 4 Sheets-Sheet 2

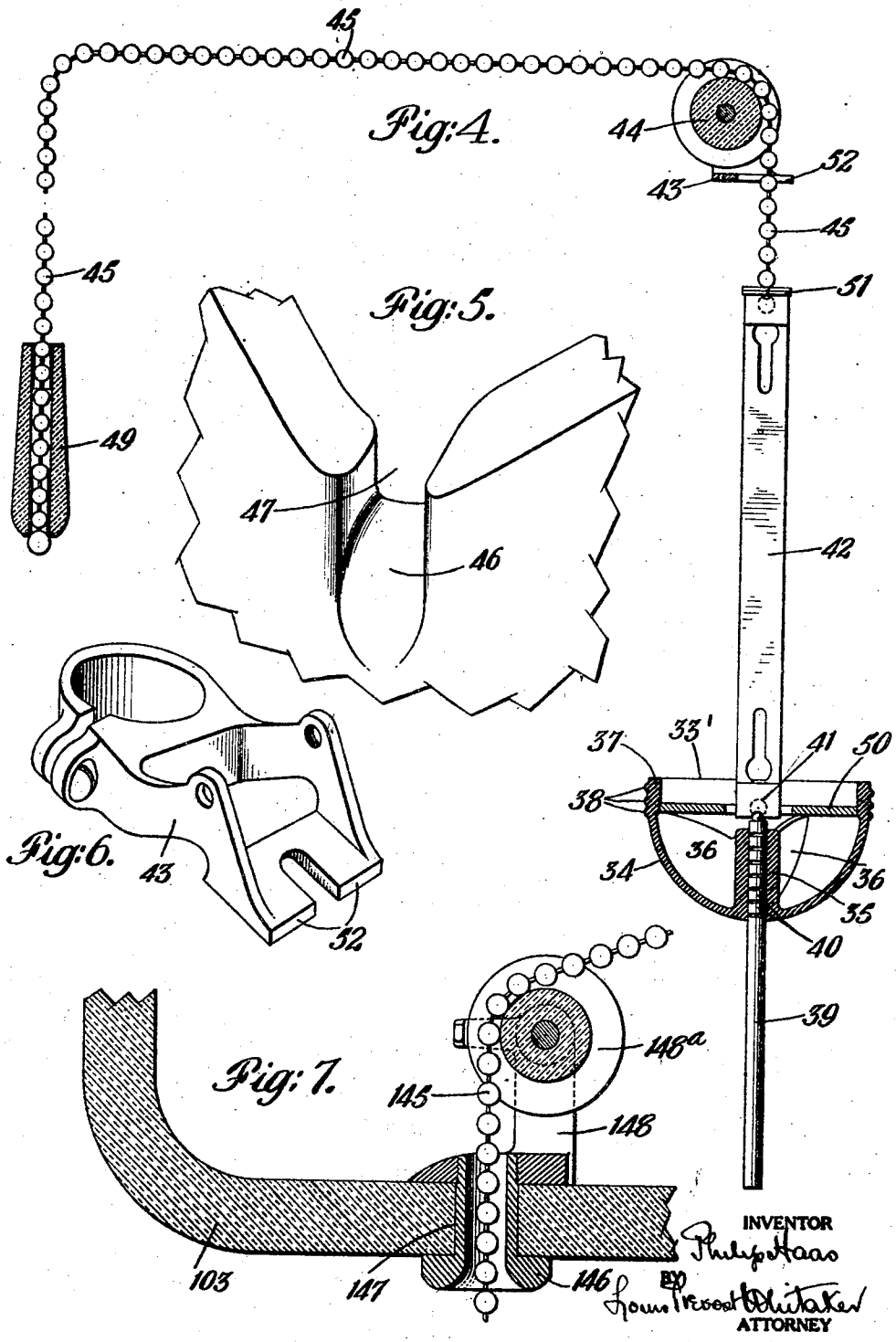


Fig:4.

Fig:5.

Fig:6.

Fig:7.

INVENTOR
Philip Haas
BY
Louis Prescott Whitaker
ATTORNEY

Nov. 9, 1926. 1,605,938

P. HAAS

FLUSHING VALVE MECHANISM

Filed March 24, 1925 4 Sheets-Sheet 3

Fig. 8.

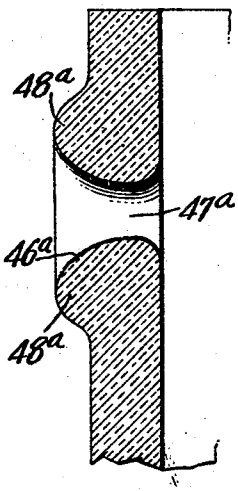
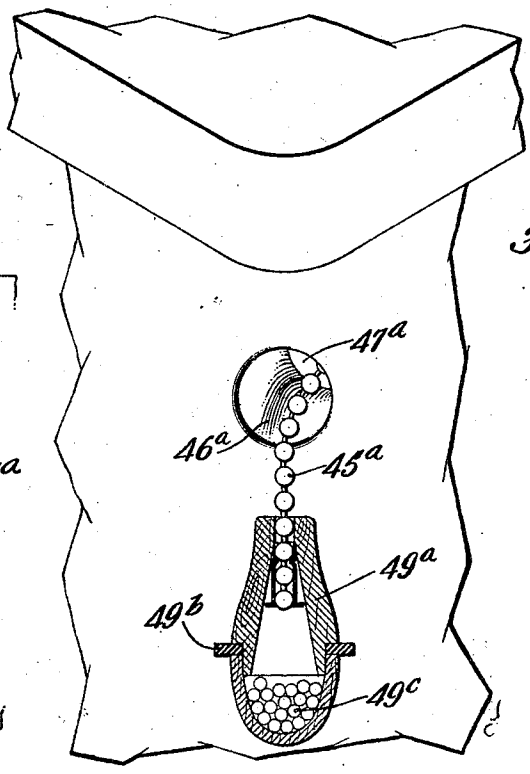


Fig. 9.



INVENTOR
Philip Haas
BY
Louis Prevost Whitaker
ATTORNEY

Nov. 9, 1926. 1,605,938

P. HAAS

FLUSHING VALVE MECHANISM

Filed March 24, 1925 4 Sheets-Sheet 4

Fig: 10.

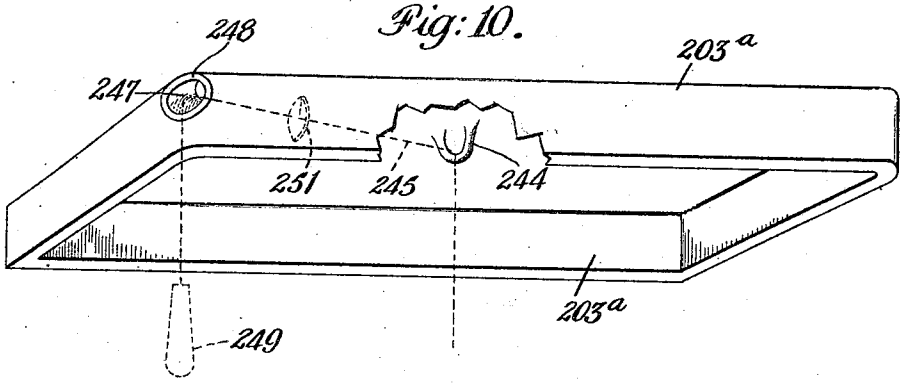
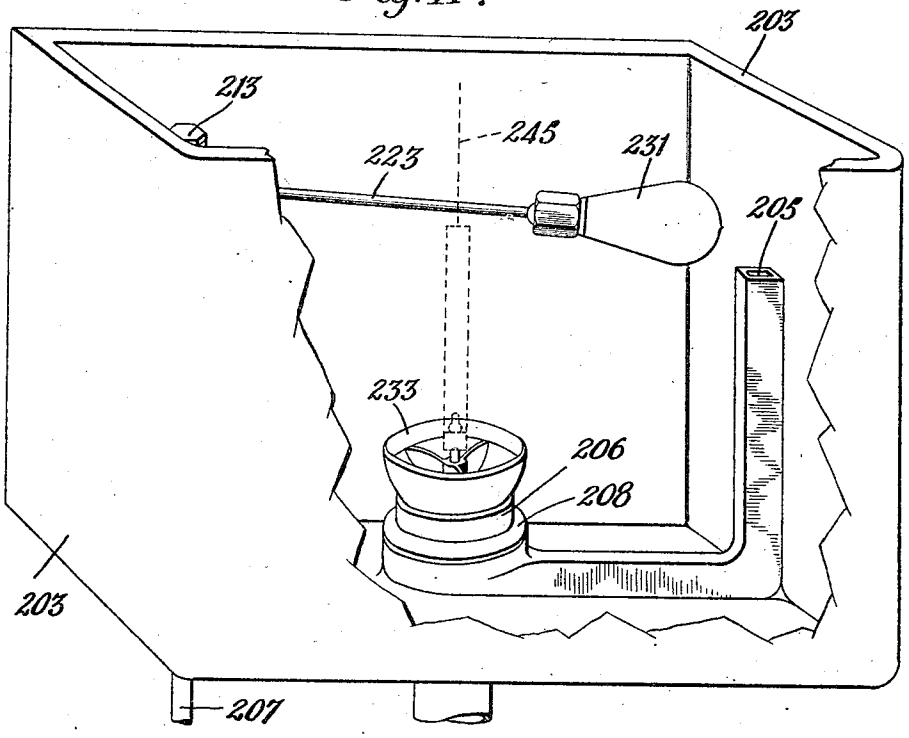


Fig: 11.



INVENTOR
Philip Haas
Louis Prevost Whitaker
ATTORNEY

Patented Nov. 9, 1926. 1,605,938

UNITED STATES PATENT OFFICE.

PHILIP HAAS, OF DAYTON, OHIO.

FLUSHING-VALVE MECHANISM.

Application filed March 24, 1925. Serial No. 17,856.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one embodiment of my invention, and several modifications thereof, selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

The object of my invention is to provide a flushing valve mechanism for water closets of the utmost simplicity, which can be manufactured cheaply and readily installed, and which can be readily removed for examination, adjustment, repair or replacement of parts, by any one, as an ordinary householder, and which is absolutely efficient and reliable in operation. In carrying out my invention I employ a flushing valve of unique character, preferably in the form of a hollow body, to which the water in the flush tank has access, so that the contained water serves as a weight for the valve, which may be varied or adjusted to secure the proper or desired operation of the valve. The said valve is preferably suspended in the tank freely without the use of guides, making a practically guideless valve, and is provided with a seat engaging portion in the form of a segment of a sphere, which I term the "spherical" seat engaging portion, and which engages a narrow seat surrounding the flushing outlet, so that a perfect seating of the valve will always result regardless of the fact that its vertical axis may assume angular positions with respect to the plane of the valve seat. I also employ in connection with my improved valve, operating connections which preferably include flexible portions, as cord, chain or the like, and which are supported so as to provide a depending portion within the tank, connected to the flushing valve, a depending portion exterior to the tank to be grasped by the operator, the construction being such that when the valve is submerged, its excess weight beyond that of the water it displaces, will hold the actuating means substantially counterbalanced, so that the valve will remain in any position to which it is moved so long as it is submerged, but when the water recedes and withdraws its support from the valve, its weight is such that it will overcome the resistance of the exterior depending portion of the actuating means, and any frictional resistance, so as to seat itself slowly, the time occupied in seating the valve being capable of regulation or adjustment by varying the actual weight of the valve, or the internal portion of the operative connections therefor. The supporting means of the valve operating connections are preferably so constructed that the valve and its operative connections can be bodily lifted out of engagement with the tank and replaced therein without using a tool. My invention also contemplates means for adapting my improved valve and its operative connections to tanks now in use, in which an aperture in the front wall is usually provided.

My invention also includes the novel features of construction and combination of parts hereinafter more particularly described and particularly pointed out in the claims.

Referring to the accompanying drawings,

Fig. 1 represents a view, partly in section, of a portion of a closet bowl with flushing mechanism therefor, embodying my invention.

Fig. 2 represents a horizontal section on the line 2—2 of Fig. 1.

Fig. 3 is a detail view, partly in section, showing a slightly modified form of flushing valve.

Fig. 4 is an enlarged detail view showing my preferred form of flushing valve and its operative connections.

Fig. 5 represents a detail perspective view of a portion of a porcelain flushing tank provided with a notched portion to receive and support the operative connections for the flushing valve.

Fig. 6 is a detail perspective view of a bracket which I conveniently use for attaching one of the supporting means for the flushing valve and illustrating shoulders for limiting the vertical movement of the valve.

Fig. 7 is a horizontal sectional view of a bracket and support for engaging the operative connections for the flushing valve adapted for use with present installations in which the tank is provided with a lateral aperture.

Fig. 8 is an enlarged detail perspective view showing a portion of the tank provided with an aperture for the passage of the operative connections for the flushing valve therethrough, and illustrating in section, a slightly modified form of pull handle, for said operative connections.

Fig. 9 is a detail sectional view illustrating a portion of a porcelain tank having an aperture therein for the operative connections from the flushing valve and designed to serve as a support for the same.

Fig. 10 is a detail view of the lid of a porcelain tank showing it provided with means for supporting the flexible portions of the flushing valve operating connections.

Fig. 11 is a view, partly in section, illustrating a modified form of porcelain tank adapted for use in connection with my improved flushing mechanism, and capable of use with the cover illustrated in Fig. 13.

Referring to Fig. 1, 1, represents a closet bowl of any usual or preferred construction, provided with a flushing pipe, 2, connected with a tank, indicated at 3, which may be made of any suitable material, but is preferably made, according to modern methods, of porcelain, and provided with the usual fitting, indicated at 4, for securing it to the flushing pipe, 2, said fitting providing the usual overflow pipe, indicated at 5, and being also provided with a flushing aperture surrounded by a narrow, annular valve seat, which is indicated at 6, to engage the flushing valve. 7 represents the water inlet pipe for supplying the tank with water, and said pipe is connected by a suitable fitting, indicated at 8, with a vertical pipe, 9, provided at its upper end with a float operated inlet valve, the casing of which is indicated at 10, and which controls the discharge of water through the inlet pipes, 7 and 9, to a downwardly extending pipe, 11, which discharges adjacent to the bottom of the tank, in order to minimize the noise of the incoming water in filling the tank.

It will be understood, by reference to Fig. 1, that the water level will be substantially as indicated by the dotted lines in Fig. 1, and approximately at the height of the top of the overflow pipe, 5, although the actual water level to be maintained within the tank may be varied. In connection with the flushing aperture and its seat, I prefer to employ the novel form of valve, the preferred form of which I have illustrated in Figs. 1, 2, 3 and 4. This valve is preferably formed of pure rubber and its seat engaging portion is a segment of a sphere, and may be generally referred to as spherical, although I prefer to make the valve in substantially the form of a hemisphere with an opening on the upper end to permit water to enter when the valve is submerged and fill the hollow interior, as best seen in Fig. 4. The flushing valve indicated as a whole, at 33′, comprises the hemispherical wall, 34, provided centrally with an internal tubular portion, 35, which is preferably connected with the wall by a plurality of webs, indicated at 36. I prefer to employ three webs for the reason that I have found that the best results in seating the valve are obtained thereby. The lateral portions of the wall, 34, are preferably continued above the webs, forming a substantially cylindrical portion, indicated at 37, which is preferably provided with a plurality of annular grooves, or ribs, 38, which I term balancing ribs, and which are intended as indications by which more or less of the upper portion of the valve may be cut away by the scissors or knife, to decrease the contents of the ball when desired, and to the extent desired in adjusting the ball for operation in a particular installation.

My improved valve is operated without any guides, and may be designated properly as a guideless valve. In order to prevent the valve from getting entirely out of alignment with the valve seat, I conveniently provide it with a stem, indicated at 39, projecting below the valve which extends down through the valve seat and merely serves the purpose of preventing the valve from becoming entirely disassociated from its seat, but on account of the peculiar shape of the valve, it is obvious that it will seat and make a tight joint regardless of whether it is maintained with its axis vertical or not. I conveniently provide the stem, 39, with a roughened portion, indicated at 40, to engage the inner surface of the tubular portion 35, of the valve, and the upper end of the stem, 39, is conveniently provided with a ball, indicated at 41, which is connected by a suitable connecting device, indicated at 42, with the operative connections for operating the valve. I prefer to use a ball chain, or other flexible connection as the means for operating my improved valve, and I prefer to so support the said flexible connections that the entire valve and flexible connections can be lifted out of the tank, and away from the same for repair or adjustment, without the use of a tool, and without disturbing any of the rest of the apparatus. In the preferred embodiment of my invention shown in Figs. 1 and 2, I have illustrated a bracket member, 43, shown in detail in Fig. 6, supported on the upper end of the overflow pipe, to which it is conveniently clamped and carrying a grooved supporting device of porcelain, and conveniently in the form of a roller, 44, although it is not important that the support, 44, should be capable of rotating, as a stationary porcelain device provided with a groove will answer the purpose admirably. 45 represents a ball chain or other flexible connection secured to the connecting device, 42, at one end, or otherwise connected to the flushing valve, 33, and passing over the support, 44, and preferably over a similar supporting device, indicated at 46, formed on the wall of the tank in the manner illustrated in Figs. 1 and 5. In order to facilitate the removal of the flexible connection

and valve from the tank, by simply lifting them out without disassociating them, I prefer to provide the tank wall for instance at a corner, as indicated in Fig. 5, with a notch, 47, the bottom portion of which is curved to form the supporting surface for the ball chain, or other flexible connection, so as to make a nearly frictionless support therefor.

In practice, it is desirable to provide the wall of the tank below the surface, 46, with a projection, 48, as indicated in Fig. 1, in order that the handle, 49, or pull, which is usually attached to such a chain, or flexible connection, may hang clear of the wall of the tank, but this projection, 48, is not essential. It will be noted with reference to Fig. 1, that the notch, 47, is of such depth that the lid, 3ª, of the tank, which usually has a downwardly extending flange, may be placed in position without interfering with the passage of the flexible connection, 45, therethrough.

It will be seen that the construction thus far indicated, comprises a flushing valve, operative connections therefor extending from the valve to the outside of the tank, and comprising at least in part a flexible chain or its equivalent and supported intermediate its ends, so as to provide a depending portion inside of the tank adjacent to the valve, and a depending portion outside of the tank adjacent to the handle or pull, it being understood that the hollow valve is filled with water. The parts will be so adjusted that when the valve is submerged and a portion of its weight is borne by the water to the extent of the amount of water which it displaces, there will be a practical equilibrium established between the valve and the internally depending portion of the connecting devices, and the external portion and the handle on the outside of the tank, so that the valve tends to stay in any position to which it may be moved so long as it is submerged. When, however, the valve is raised so as to open the flushing aperture and permit the water in the tank to be discharged, the water will descend below the position occupied by the valve when in raised or open position, indicated in dotted lines in Fig. 1, and as soon as the water descends below the valve and releases it from the lifting force previously exerted, the increased weight of the valve in the air will cause it to overcome the weight of the exterior depending portion of the flexible connection so that the valve will descend more or less rapidly upon its seat, according to the difference between its weight when suspended in the air, and its weight when partially supported by being submerged in the water. I provide means for adjusting the weight of the valve for the purpose of adjusting the speed with which it will close, as for example, the balancing ribs, 38, can be employed for this purpose. If the valve closes too quickly, and does not give a sufficient length of flush, it can be made to close more slowly by cutting down the lateral portions of the valve to a greater or less extent so that it will contain less water and will therefore be less heavy when the water leaves it exposed. If it is desirable to increase the weight of the valve so as to make it close more quickly, or for the purpose of counterbalancing a longer exterior chain section, I may provide one or a plurality of washers, one of which is indicated at 50 in Fig. 4, any number of which may be employed to increase the weight of the valve. I could also load the hollow valve with shot or similar weights, but I prefer not to do so, as any weight supported only upon the hollow spherical portion, 34, of the valve, might interfere with its seating properly, but by supporting the washer, or washers, 50, upon the top edges of the webs, 36, the weight will be distributed and the seating of the valve will not be affected. If it is necessary to counterweight the valve by increasing the weight of the exterior portion of the chain or other flexible connection I may provide a hollow handle, such as is indicated in Fig. 11, at 49ª, said handle being in this instance made in two parts fitted together and provided with a rubber cushioning device, 49ᵇ, the lower portion of the handle being provided with weighting balls or shot or similar material, as indicated at 49ᶜ. In Fig. 11, I have shown the flexible connection, here indicated at 45ª, extending through a circular aperture, 47ª, formed in the wall of the tank, and this may be employed instead of the slot, 47, the surface of the aperture being glazed and providing a practically frictionless supporting surface, indicated at 46ª, as in the case of the slot, 47. In such case it is desirable to provide a thickened or projecting portion, 48ª, surrounding the aperture, 47ª, in this instance in the form of a rosette, to hold the chain far enough away from the side of the tank to prevent the handle from striking it, but this is not essential.

The flexible connection, 45, is provided with means for arresting the valve when it is drawn upwardly into open position so as to prevent it from being drawn up too far and to prevent the entire disengagement of the depending rod, 39, from the valve seat, 6. In this instance I have shown the flexible connection, 45, provided with a stop 51, or washer, see Figs. 1 and 4, adapted to strike against stationary shoulders, 52, on the bracket, 43, or any other suitable means may be employed for limiting the upward movement of the valve.

Assuming that the parts are installed as indicated in Figs. 1, 2 and 4, and that the pipe, 7, communicates with the water main, the flushing valve, (33′), being seated and

the float in its lowest position, holding the inlet valve open, the water will enter through the pipes, 7 and 9, passing the inlet valve, and flowing into the tank at the lower end of the pipe, 11, gradually raising the water level in the tank, and gradually raising the float, 31, until the float lever relieves the inlet valve and permits it to seat under the pressure of the incoming water at whatever level the float has been adjusted. It will be understood that the valve is filled with water, and that obviously there will be no tendency for the valve to become unseated, as the pressure of the water will hold it closed upon its seat. If it is desired to flush the bowl, the handle, 49, is pulled downwardly in the usual manner, thereby raising the valve in the water, until the valve is arrested by the stop, 51, engaging the shoulders, 52. The water immediately flows from the tank into the bowl in any usual or preferred manner, according to the design of the flushing passages in the bowl. The valve, 33, will remain in raised position so long as it is submerged by reason of the fact that the weight of the valve and the inner depending portion of the flexible connections substantially balances the external depending portions of the same. As soon as the water descends below the valve, 33, so as to expose it, and remove from it the uplifting force, which its displacement has caused the water to exert upon the valve, the weight of the valve and its contents in the air and its adjacent depending portion of the flexible connection, will be greater than the external depending portions of the flexible connections, and the valve will immediately begin to descend upon its seat. The rapidity with which the valve descends to its seat will naturally depend upon the weight of the valve which can be varied as heretofore explained. As soon as the valve has seated the flushing action will cease, and as the lowering of the water level has also lowered the float and opened the inlet valve, which remains open until the float is again raised, water will flow in and fill the tank to the level for which the float is set, leaving the parts in position for a repetition of this operation.

It will be observed that in the construction illustrated in Fig. 1, if it is desired to remove the flushing valve for inspection or adjustment or repair, it is only necessary to remove the cover of the tank when the entire valve and flexible operative connections can be entirely removed from the tank, by simply lifting them out without disturbing any other part of the apparatus. If the tank is provided with an aperture, 47ª, indicated in Figs. 8 and 9, instead of the slot, 47, it would be necessary to disconnect the handle from the chain and pull the chain back through the aperture in order to lift out the flushing valve, and its flexible connection, and for this reason I prefer the slot indicated in Figs. 1 and 5. The duration of the flushing can be determined by the adjustment of the float in the manner hereinbefore described, and also by the adjustment of the weight of the valve by which the rapidity of its descent to closed position may be regulated.

It will be noted that the whole construction of my improved flushing mechanism is remarkably simple and inexpensive in its original cost of production, and that it can be readily and conveniently and inexpensively kept in perfect working order by occasionally replacing parts, as may become necessary.

In Fig. 3 I have shown a slightly modified form of valve, indicated at 33ª, which is in the form of a sphere or hollow ball, provided with the central vertical, cylindrical portion, 35ª, and with interior webs or reinforcements, as at 36ª, if desired. The ball is shown as provided with apertures, indicated at 33ᵇ, so that water can have access to the inside of the valve to fill it and provide necessary weight, and this weight may be diminished by providing apertures, indicated in dotted lines, at 33ᶜ, at lower positions on the bowl, to permit a greater or less amount of the water to run out when the ball is not submerged, so as to prevent it from closing too quickly. This ball type valve can also be weighted in any desired manner, or counter-balanced, by providing an additional length of chain on the exterior of the tank, or by weighting the handle, as indicated in Fig. 8, so as to secure substantially the same operation as has been previously described, with reference to my preferred construction of valve.

In the use of flushing tanks as at present constructed. they are usually provided on the front side with an aperture to receive a short rock shaft, by means of which the flushing valve is operated. In Fig. 7 I have shown a device designed for the purpose of enabling my improved flushing valve to be installed in the ordinary flushing tank without the necessity of providing special means for the passage of the flexible connection to the exterior of the tank. In this instance I have shown, at 103, an ordinary porcelain flushing tank, for example, provided with an aperture in its front wall, indicated at 147. In connection with this aperture I conveniently provide a sleeve, 146, the outer portion of which is provided with a collar having a flared opening communicating with the interior of the sleeve, the inner end being threaded and screwed into a threaded opening in a bracket, 148, which carries a grooved guiding and supporting device for the flexible connection, here indicated at 145, and which may be a grooved roller, 148ª,

preferably of porcelain, or a stationary part of porcelain having a grooved chain engaging part will answer as well as the roller. By adapting this sleeve and bracket in the opening on the front wall of the tank, and by attaching the bracket, 43, shown in detail in Fig. 6, on the top end of the ordinary overflow pipe, my improved valve may be substituted for the ordinary flushing valve, and will operate substantially as hereinbefore described, except that in order to take it out for examination or repair, or replacement, it would be necessary to separate the handle in order to get the flexible connection through the sleeve, 146. Of course in either form of the invention herein shown, if the householder was provided with an extra valve, it would not be really necessary to remove the flexible connection from engagement with the tank, as in any case, by simply removing the top of the tank, the valve could be lifted out over the side of the tank for examination, repair or replacement, but I prefer to remove it entirely so that it can be taken to a work-bench, or to a hardware store, or plumbing establishment, for the purpose of supplying the parts to be replaced in case repair is necessary, and for that purpose the form shown in Figs. 1, 2 and 5, is particularly advantageous.

In Fig. 10 I have illustrated a slight modification in which the supporting means for the valve operating chain, or flexible connection, are provided on the cover of the tank, and preferably are formed integrally therewith, where, as illustrated in Fig. 10, the cover is made of porcelain. In this figure, 203[a], represents the tank cover, preferably formed of molded porcelain, to fit a porcelain tank. In this instance the underside of the lid or cover is provided with a recessed or perforated supporting member, indicated at 244, molded as an integral part of the lid, and in the form of a loop (or hook), provided with rounded, glazed supporting surface for the chain, 245, the position of which is indicated in dotted lines in Fig. 10, and having its central portion located directly above the seat for the flushing valve. The support, 244, whether in loop or eye form, or in hook form, preferably has its central aperture so constructed as to provide for the ready disengagement of the chain therefrom, and in the case of an eye or loop form, shown in Fig. 10. this aperture will preferably be made large enough to permit the handle, indicated in dotted lines at 249, to pass through it so that the valve mechanism and its flexible operating means can be readily disengaged from the lid, when desired. In Fig. 10 I have shown the lid or cover provided preferably at one of the forward corners with a guiding and supporting aperture, 247, which is preferably of sufficient size to permit the passage of the handle, 249, therethrough, the said aperture being preferably provided on the exterior of the cover or lid with a circular boss, indicated at 248, and the chain engaging surfaces surrounding the aperture, and on the boss, are preferably flared outwardly and glazed to minimize friction, and to enable the chain to be pulled readily from any direction. It will also be understood that the support, 244, on the lid, or other equivalent supporting means, secured to the lid itself and located above the center of the flushing aperture, can also be used with tanks having a notch (as 47 in Figs. 1 to 4) or an aperture (as 47[a] in Fig. 8) formed in the tank wall, if this is found to be convenient or desirable.

In Fig. 11, I have illustrated one form of tank which can be conveniently employed in connection with the lid or cover illustrated in Fig. 10, in connection with my improved flushing mechanism. In this instance the tank, 203, is provided with an overflow passage, 205, which is molded as an integral portion of the tank, and communicating with the fitting, 208, provided with the flushing valve seat, 206, in the bottom of the tank, thus dispensing entirely with the vertical metallic overflow pipe in the center of the tank. The inlet pipe, 207, inlet valve, 213, float lever, 223, and float, 231, may be constructed as hereinbefore described, or may be of any other preferred construction. It will be understood that with the form of tank illustrated in Fig. 11, the valve 233, is connected to the flexible connection 245, which passes through a support, as 244 (Fig. 10) secured to the lid or cover directly above the axis of the flushing valve seat, and thence to the exterior of the tank where the depending portion is provided with the handle, 249, as shown in Fig. 10. The flexible connection is illustrated in dotted lines in Fig. 11. It will be understood that the valve and its flexible connection will be so constructed as to be in a substantially balanced condition when the valve is submerged, and that the operation of the flushing mechanism will be as hereinbefore described.

What I claim and desire to secure by Letters Patent is:

1. The combination with a flushing tank provided with a flushing outlet having a valve seat, of a flushing valve for engaging said seat and operative connections extending from the valve to the outside of the tank, for lifting the valve from its seat, said valve and its operative connections being so constructed as to be in a substantially balanced condition when the valve is submerged, whereby the valve may be raised from its seat and will remain in open position while submerged and whereby the valve when deprived of the support of the sur-

rounding water will return to its seat and restore the operative connections to normal position.

2. The combination with a flushing tank provided with a flushing outlet and valve seat, of a flushing valve for engaging said seat, and operative connections for said valve comprising a depending portion within the tank for freely suspending the valve above its seat, a depending portion outside of the tank and intermediate connecting portions including flexible portions, said tank being provided with supporting means for said operative connections engaging flexible portions thereof, said valve and its operative connections being so constructed as to be in a substantially balanced condition when the valve is submerged, whereby the valve may be raised from its seat and will remain in open position while submerged, and whereby the weight of the valve when deprived of the support afforded by the water will cause it to seat itself and return its operative connections to normal position.

3. In a flushing valve operating mechanism for flushing tanks comprising among its members a flushing valve, a flexible connection provided with an interior depending portion connected to the valve, an exterior depending portion extending outside of the flushing tank and guiding and supporting means engaging intermediate portions of said flexible connections, the interior depending portion and valve being substantially counter-balanced by the exterior depending portion of said operative connections when the valve is submerged.

4. The combination with a flushing tank provided with a flushing outlet and a valve seat surrounding the same, a valve provided with a spherical portion for engaging said seat, operative connections for said valve comprising a freely depending portion within the tank connected to the valve and suspending it above said seat, a freely depending portion located outside of the tank and intermediate portions including flexible portions, said tank being provided with supporting means for said operative connections engaging said flexible portions thereof, said operative connections and valve being in substantially counter-balanced condition when the valve is submerged.

5. The combination with a flushing tank provided with a flushing outlet and valve seat therefor, of a valve for engaging said seat, operative connections for raising the valve from said seat, said operative connections and valve being so constructed as to be in a substantially balanced condition when the valve is submerged and means for varying the weight of the valve with respect to the amount of water displaced thereby, to vary the speed with which the valve will return to its seat.

6. The combination with a flushing tank provided with a flushing outlet and a valve seat surrounding the same, a valve provided with a spherical portion for engaging said seat, operative connections for raising the valve from its seat, comprising a depending portion within the tank connected to said valve, a depending portion outside of the tank and intermediate portions including flexible portions, said tank being provided with supporting means engaging said flexible portions, the interior depending portion and valve being substantially counter-balanced by the exterior depending portion, and means for varying the weight of the valve with respect to the amount of water displaced thereby to regulate the speed of closing of the valve.

7. The combination with a flushing tank provided with a flushing outlet and valve seat, of a hollow valve forming a receptacle in communication with the water in the tank and adapted to be filled with water to a predetermined extent, operative connections for raising said valve, said valve and its operative connections being so constructed as to be in a substantially balanced condition when the valve is submerged, whereby the valve may be raised from its seat and will remain in open position while submerged, and whereby the weight of the valve and the water contained therein will cause it to seat when deprived of the support of the surrounding water.

8. The combination with a flushing tank provided with a flushing outlet and valve seat, of a cup shaped valve provided with a spherical portion for engaging said seat, said valve being open at its upper end to receive water from the body of water in which it is submerged, and being provided with radially disposed reinforcing webs, and operative connections for raising the valve off of its seat, said valve and its connections being so constructed as to be in a substantially balanced condition when the valve is submerged.

9. The combination with a flushing tank provided with a flushing outlet and valve seat, of a cup shaped valve provided with a spherical portion for engaging said seat and having the upper portion of its lateral edges provided with annular indicating devices for indicating portions thereof which may be removed to regulate the quantity of water contained in the valve, and operative connections for raising the valve from its seat, said valve and its operative connections being in substantially balanced condition when the valve is submerged.

10. The combination with a flushing tank provided with a flushing outlet and valve seat, the space within the valve seat being unobstructed, of a guideless valve for engaging said seat, operative connections for said

valve including a freely depending portion within the tank for suspending said valve substantially axially above said seat, and operative portions extending outside of the tank, said valve and its operative connections being in a substantially balanced condition when the valve is submerged, said valve being provided with a depending device of materially less diameter than the valve seat extending through the valve seat for preventing the valve from swinging laterally out of alignment with the seat.

11. The combination with a flushing tank provided with a flushing outlet and valve seat, the space within the valve seat being unobstructed, of a valve for engaging said seat, operative connections for said valve including a freely depending portion within the tank for suspending said valve substantially axially above said seat, and operative portions extending outside of the tank, said valve and its operative connections being in a substantially balanced condition when the valve is submerged, said valve being provided with a depending device of materially less diameter than the valve seat extending through the valve seat for preventing the valve from swinging laterally out of alignment with the seat, and stop mechanism for limiting the vertical movement of the valve to prevent said depending device from being lifted above the level of the seat.

12. The combination with a flushing tank provided with a flushing outlet and valve seat, of a guideless valve for engaging said seat, a chain extending from said valve to a point outside of the tank and provided at its outer end with an operating handle, said tank being provided with means for supporting intermediate portions of the chain so as to provide a depending portion of the chain within the tank above the valve and connected therewith, and an external depending portion adjacent to the handle, said valve and chain being in a substantially balanced condition when the valve is submerged.

13. The combination with a flushing tank provided with a flushing outlet and valve seat, of a cup shaped valve provided with a spherical portion for engaging said seat and being open at its upper end to receive water from the body of water in which it is submerged when seated, a flexible chain connected to said valve and extending vertically therefrom and to a point outside of the tank and having an exterior depending portion, said tank being provided with supporting means for intermediate portions of the chain, said chain and valve being in a substantially balanced condition when the valve is submerged, whereby the valve may be raised from its seat and will remain in open position while submerged and whereby the weight of the valve and the water contained therein will cause it to seat and return the chain to normal position when the valve is deprived of the support of the surrounding water.

14. The combination with a flushing tank provided with a flushing outlet and flushing valve seat and having an aperture in the wall of the tank above the water level when the tank is filled, of a guideless valve for engaging said seat, a sleeve extending through the lateral aperture in the tank wall and provided on the inner face of said wall with a supporting device secured to said sleeve, a support within the tank located above the axis of the valve seat and a flexible connection secured to said valve, and extending over said supports and through said sleeve and having a depending portion outside of the tank, said valve and said flexible connection being in balanced condition when the valve is submerged.

In testimony whereof I affix my signature.

PHILIP HAAS.