

Feb. 28, 1928.

P. HAAS

1,660,749

FLUSHING VALVE MECHANISM

Filed Jan. 27, 1927

2 Sheets-Sheet 1

Fig. 1.

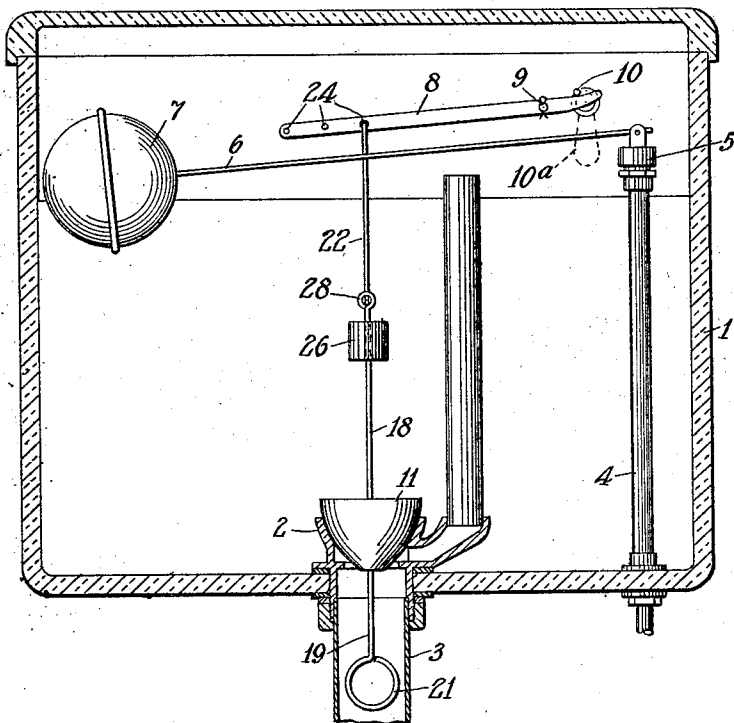


Fig. 2.

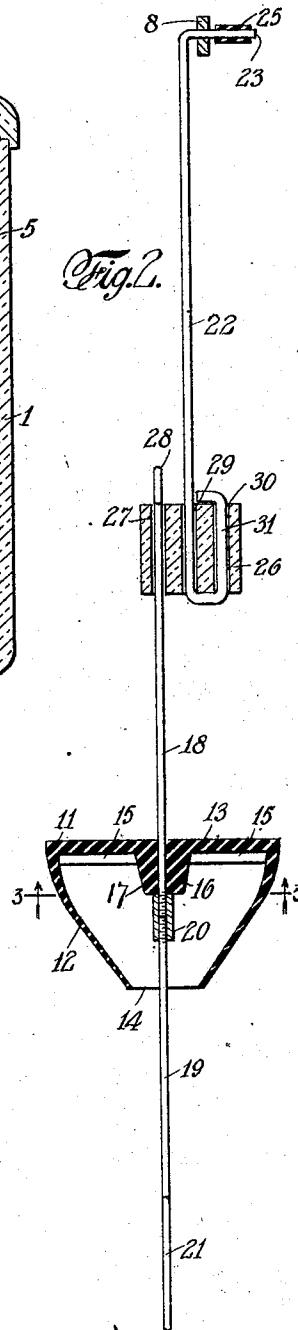


Fig. 3.

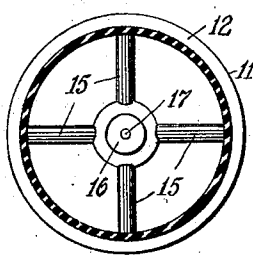
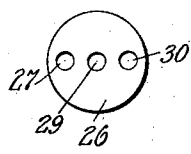


Fig. 4.



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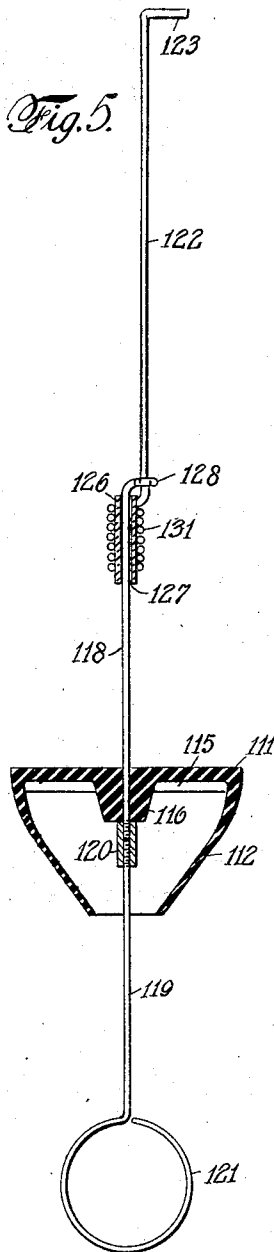
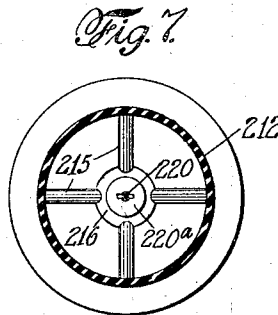
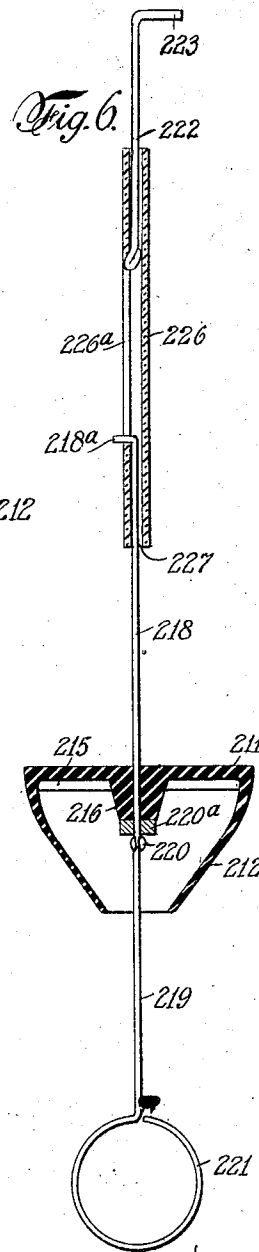
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FLUSHING VALVE MECHANISM

Filed Jan. 27, 1927

2 Sheets-Sheet 2



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FLUSHING-VALVE MECHANISM.

Application filed January 27, 1927. Serial No. 163,633.

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

My present invention is an improved flushing valve mechanism of the type in which the flushing valve is lighter than the amount of water it displaces, or in other words is what is generally referred to as a "float" valve to distinguish it from a valve, the specific gravity of which is greater than that of water. In the flushing valve mechanisms of the float valve type, in general use, the valve is provided with a stem which passes through a stationary rigid guide, usually secured to the overflow pipe in such position as to hold the valve centered over its seat and insure that after a flushing operation when the valve descends, that it shall properly engage the seat. Such valves are usually operated by means of a lifting rod connected with a lifting lever or other hand operated means, and the lifting lever is connected with the valve stem in such manner as to permit the valve stem to move upwardly independently thereof, to permit the valve to remain open by its own buoyancy, after the hand operated lifting means is released, until it descends upon its seat with the lowering of the water level in the tank. These guides frequently wear out by friction of the valve stem and corrosion, and have to be replaced as do the valves also, and as the insertion and adjustment of the valve with respect to its guide, and the adjustment of the guide with respect to its support, and the axis of the valve seat must be made in situ, and the space within an ordinary flush tank renders this most inconvenient, it is a difficult matter, requiring expert skill, to replace a valve or an ordinary rigid guide in a particular tank so as to secure the proper operation of the valve. This difficulty is increased by the fact that these parts are not standardized, and there is frequently a variation in the distance between the vertical axis of the overflow pipe or other fixed support for the guide, and the axis of the valve seat above which the guiding portion of the rigid guide must be located. The object of my invention, there-

fore, is to provide a flushing valve mechanism which may be used as an original installation in a flushing tank, but is especially useful in repairing flushing tanks already installed and in use, and in its preferred form it comprises in conjunction with the valve lifting means and the flushing valve seat, a flushing valve of the float type provided with a valve stem engaging a pendulous guide, which is preferably attached to and suspended by the lifting rod which is provided at its upper end with means for detachably engaging the lifting means. The flush valve is guided in its vertical movements by the pendulous guide, so that the valve stem is held substantially parallel with the lifting rod, and the valve is preferably provided with a downwardly extending guiding stem loosely engaging the flushing pipe or discharge pipe of the tank, and preferably provided with a vertically disposed ring or disc of diameter slightly less than that of the discharge pipe, so as to provide rounded edges for engagement with the pipe to prevent it from catching therein, and to substantially center the valve stem with respect to the valve seat, without interfering with the free discharge of water through the discharge pipe.

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

Referring to the accompanying drawings,

Fig. 1 is a vertical sectional view of a flushing tank provided with one form of flushing valve mechanism embodying my invention.

Fig. 2 is an enlarged view of the valve, valve stem, lifting rod, pendulous guide, and depending guide shown in Fig. 1.

Fig. 3 is a horizontal section through the valve on the line 3—3 of Fig. 2, looking in the direction of the arrows in that figure.

Fig. 4 is a top plan view of the pendulous guide shown in Figs. 1 and 2.

Fig. 5 is a view similar to Fig. 2, showing a slight modification of my invention.

Fig. 6 is a view similar to Fig. 2, showing another slightly modified form of my invention.

Fig. 7 is a horizontal section through a portion of the combined valve stem and bottom guide illustrated in Fig. 6.

Referring to Figs. 1 to 4 inclusive, 1, represents a flush tank of any usual or preferred construction, provided with a flushing valve seat, 2, adjacent to the bottom, and a flushing discharge pipe, 3, which communicates with the closet bowl in the usual manner. The tank is also provided with a water inlet pipe, 4, provided with a float operated valve, 5, of any usual or desired construction, controlled by a float lever, 6 and float, 7. The tank is also provided with suitable valve lifting means of any usual or preferred construction. In this instance, I have shown a lifting lever, 8, pivotally mounted at 9, on the front wall of the tank, and provided with the usual operating crank arm, 10, and handle, 10^a, indicated in dotted lines, but the particular form of the hand operated valve lifting mechanism of the tank forms no part of my present invention. 11, represents the flushing valve proper, which may be of any usual or desired form, which is lighter than the amount of water it displaces, so that when submerged it will have a tendency to rise when released from its valve seat. The valve is preferably made of soft molded rubber, and the lower portion thereof is preferably of tapering or substantially hemispherical shape, so that it will readily seat and accommodate itself to seats of varying diameters. I prefer to make the valve hollow with thin flexible walls indicated at 12, and a flat or horizontal top indicated at 13, the valve being provided with an opening, 14, at the bottom, so that it will include a body of air and render the valve very buoyant. The upper wall of the valve is preferably stiffened by radial ribs or webs, 15, preferably formed within the valve, as shown in Figs. 2 and 3, and the central portion of said upper face and preferably within the valve is provided an elongated sleeve portion, indicated at 16, provided with a central aperture, 17, through which the valve stem, 18, extends. The aperture, 17, is made a little smaller than the valve stem, so as to fit it tightly and prevent any water from leaking through the aperture, 17, around the valve stem into the interior of the valve. The valve is also preferably provided with a downwardly extending or bottom guide, indicated at 19, which is preferably threaded at its upper end and screwed into a connecting sleeve or coupling, 20, into the upper end of which the threaded lower end of the valve stem is also screwed. This connects the bottom guide, 19, rigidly with the valve stem, 18, and the collar, 20, forms a positive stop to engage the bottom of the sleeve, 16, of the valve, which is pressed down against the upper end of the connecting sleeve, 20, and prevents any water from reaching the screw threaded portion of the valve stem and bottom guide, 19, so that these parts

are not likely to become corroded, but are at all times kept out of contact with the water. The lower end of the bottom guide, 19, is provided with a vertically disposed circular device, or member, which is preferably in the form of a ring, 21, formed integrally with the guide, and having a diameter a little less than the diameter of the portion of the flushing pipe, 3, into which it projects. The engagement between this ring, 21, (or disc), and the pipe, 3, tends to assist in keeping the valve substantially coaxial with its seat without interfering with the discharge of flushing water through the pipe, 3, when the valve is open, and without any danger of binding or catching in the pipe, and the bottom guide, 19, is of such length that when the valve is lifted to its highest position, the ring, 21, (or disc), will be in engagement with the pipe, 3, or the flushing aperture communicating therewith, and will never be lifted above the valve seat. 22, represents the lifting rod, the upper end of which is provided with an angular portion, 23, adapted to engage one or other of adjusting apertures, 24, in the lifting lever, 8, for example, and secured in engagement therewith by a very simple retaining device, 25, which consists of a short section of small rubber tube adapted to frictionally engage the end of the part, 23, and hold the lifting rod and lifting lever in operative relation against accidental displacement, while permitting them to be instantly separated by removing the frictional retaining device and disengaging the part, 23, from the lever. The lower end of the lifting rod, 22, is provided with a pendulous guide, indicated at 26, consisting in this instance of a block of porcelain or other non-metallic material not affected by water, and provided with an elongated vertical guiding aperture, 27, through which the valve stem, 18, loosely extends, said stem being provided above the guide with a stop, indicated at 28, which may be conveniently formed by bending the upper end of the valve stem into a loop as shown, or by otherwise providing it with an enlargement which will not pass through the guiding aperture, 27. The pendulous guide is suspended by the lifting rod, 22, to which it may be secured in any desired manner, which will prevent it from rotating with respect to said lifting rod. I prefer to provide the porcelain block, 26, with two additional vertical apertures, 29 and 30, and to pass the lifting rod, 22, through the central aperture, 29, and provide it with an upwardly extending portion indicated at 31, which extends upwardly through the passage, 30, in the porcelain block, and is bent over at its upper end to lock the block securely to the lifting rod. This prevents the block from rotating on the lifting rod, which is itself held against rotation by the engage-

ment of the part, 23, with the lifting lever, and the said part, 23, will be placed in engagement with the particular aperture, 24, in the lifting lever, which will suspend the valve in a co-axial relation with its seat.

It will be seen that the pendulous guide, 26, is suspended by the lifting rod, 22, and provides for maintaining the valve stem, 18, in parallelism with the lifting rod at all times, while permitting said valve stem to freely move vertically within the guide, thus doing away with the former rigid guide usually employed in these mechanisms. It is necessary, however, to provide means to prevent the valve when raised from its seat, from rising to the surface of the water by swinging on the part, 23, of the lifting rod, which would prevent it from properly engaging its seat when the water has been discharged from the tank, and this function is performed in this instance by the bottom guide, 19, which co-acts with the pendulous guide, 26, in insuring to the valve a vertical movement substantially co-axial with its seat, thus insuring the proper seating of the valve upon its seat when the water is discharged from the tank and without the necessity of adjusting the pendulous guide, which by reason its being suspended can readily adapt itself to any lateral movements of the valve permitted by the bottom guide, 19.

It will be understood that the float valve, 11, will be normally held seated by the pressure of water on its upper face. When it is desired to effect a flushing action, the handle, 10^a, is operated so as to cause the lifting lever to lift the valve off of its seat. As soon as the valve is disengaged from the seat, the water begins to run from the tank and the valve is free to rise by its natural buoyancy, the stem, 18, sliding vertically through the guiding aperture, 27, in the pendulous guide. It is not necessary to hold the lifting rod in raised position, and it may be released as soon as the valve is lifted. The pendulous guide, 26, in conjunction with the bottom or depending guide, 19, keeps the valve in substantially co-axial relation with its seat, so that as the water level is lowered, the valve descends until it engages its seat and closes the flushing aperture when the tank will be refilled in the usual manner, and the valve will be held in closed position.

In case it becomes necessary to install a new valve, it is only necessary to remove the frictional retaining device, 25, detach the arm, 23, from the lifting lever, and remove from the tank the lifting rod, the guide, 26, the valve stem, valve and bottom guide, 19. A new valve can be attached to the valve stem and the parts replaced in the same manner, without the necessity of reaching into the tank or making any adjustment of

the non-rigid guide or other parts of the apparatus. If any adjustments should be necessary, they can be made outside of the tank. It will also be seen that anyone of ordinary intelligence can replace the flushing valve in my improved construction, and that skilled labor for this purpose is unnecessary. It will also be seen that my improved valve mechanism can be readily installed in the same way in any of the tanks now in use in which float valves are employed, by removing the fixed guide on the overflow pipe and the present valve, valve stem, and lifting rod, and substituting my improved valve mechanism previously described.

In Fig. 5, I have shown a slightly modified form of my invention, in which the corresponding parts are given the same numerals as in Figs. 1 to 4, with the addition of 100, and these parts will not be further described, except in so far as they differ in construction from those previously described. In this form of the invention, the lower end of the lifting rod, 122, is provided with a tubular member, 131, which in this instance is formed by bending a portion of the rod into a tubular coil. Within this coil is frictionally held a sleeve, 126, of celluloid or other non-corrodible material, provided with a longitudinal guiding aperture, 127, through which the valve stem, 118, extends. The upper end of the valve stem is provided with a stop in the form of a loop, 128, adapted to engage the upper end of the celluloid sleeve, and while it is not essential, the loop, 128, is in this instance turned horizontally, and slidably engages the lifting rod, 122, which prevents the rotation of the valve stem with respect to said rod. The operation of the device is exactly the same as that previously described.

In Fig. 6, I have shown another slight modification of my invention, in which corresponding parts are given the same numerals as in Figs. 1 to 4, with the addition of 200. In this construction, the pendulous guide consists of sleeve, 226, of celluloid or other non-corrodible material, provided at one side with a slot, 226^a. The lifting rod, 22, is secured to the upper end of the sleeve in any desired way, as by forming a loop at its lower end to engage the upper end of the slot, and the valve stem, 218, extends through the lower end of this sleeve, 226, within the guiding aperture, 227, therein, and has its upper end bent outwardly, as at 218^a, and engaging the slot, 226^a, so as to guide the valve in its vertical movements, and prevent it from rotating with respect to the sleeve and the lifting rod. In this instance, I have shown the depending or bottom guide, 219, formed in one piece with the valve stem, 218, and provided with a flattened portion, indicated at 220, which engages a metallic

washer, 220^a, against which the lower end of the rubber sleeve, 216, within the valve engages, thus holding the valve from downward movement with respect to the valve stem and bottom guide without the use of screw threaded parts, (see Fig. 7). The operation of the form shown in Figs. 6 and 7 is the same as that previously described. It will be seen that in all of the forms of my invention herein shown and described, a pendulous guide is suspended and supported by the lifting rod, so that it is free to move laterally to accommodate slight lateral movements of the valve, and therefore this guide is self-adjusting with respect to the valve, and will permit the valve to seat properly at all times without binding of the valve stem therein, while holding the valve stem in parallelism with the lifting rod. It will also be seen that the pendulous guide is preferably formed of non-metallic material, as porcelain, celluloid, etc., which is not corrodible by water, and therefore there will be no likelihood of the valve stem sticking with respect to the pendulous guide. It will be understood that if it were attempted to suspend a floating valve from a lifting rod without providing a guide for holding the valve stem in parallelism with the lifting rod, the buoyancy of the valve would cause it to swing on its connection with the lifting rod and ascend to the surface of the water, and this would occur whether or not the valve was provided with a depending guide of sorts, and upon the release of the lifting mechanism the valve would not descend upon its seat. According to my invention, the guide while being self-adjusting and pendulous nevertheless by its weight tends to hang vertically, and to retain the valve stem in parallelism with the lifting rod and prevents the jack-knifing result, which would otherwise occur, and the depending rod or guide below the valve, so located that it may not be withdrawn above the valve seat in the highest position of the valve, further prevents the valve from swinging on the pivotal connection between the lifting rod and lifting lever out of alignment with its seat, said guides co-operating with each other in maintaining the valve at all times substantially co-axial with its seat, while by my invention the entire valve, guides, and lifting rod can be instantly removed from the tank for the replacement of the valve and re-inserted in operative position without the necessity of skilled labor, and without the necessity of adjusting the guide either within or without the tank.

In some instances the bottom guide may be omitted, as where the pendulous guide is made sufficiently heavy so that it will by its gravity maintain the lifting rod at all times in a vertical position, and this is desirable in some cases as the omission of the bottom

guide relieves the valve of a certain amount of weight and makes it more buoyant. In such case the engagement of the valve stem in the guiding aperture in the guide will also maintain the valve stem vertical, and the valve substantially co-axial with the valve seat. I prefer, however, to employ the lower guide as shown, loosely engaging the discharge pipe, as it prevents the possibility of the valve moving materially out of co-axial relation with seat, and permits the use of a guide of lighter weight.

It will be noted that in all forms of my invention, the stem of the float valve is free to rotate within the pendulous guide, so that the valve is free to rotate in seating, and under the action of the water in the tank. This facilitates the seating of the valve and increases its durability, as the same portions of its surface do not continually engage the identical portions of the seat, and the valve is given greater freedom from rotation with respect to its guiding means.

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

1. In a flushing valve mechanism for a flush tank provided with a flushing valve seat and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a guide having an elongated guiding passage therethrough, a lifting rod provided at its upper end with means for suspending it from the valve lifting means, and having its lower end connected with said guide so as to support the guide pendulously, with its guiding passage vertical, said valve stem extending loosely through said guiding passage, and being provided above the same with a stop to permit of lifting the valve from its seat, the weight of said guide tending to hold the valve when unseated, in substantially coaxial relation with its seat while permitting sufficient freedom of movement of the valve to facilitate its seating.

2. In a flushing valve mechanism for a flush tank provided with a flushing valve seat and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a guide having an elongated guiding passage therethrough, a lifting rod provided at its upper end with means for suspending it from the valve lifting means, and having its lower end connected with said guide so as to support the guide pendulously, with its guiding passage vertical, said valve stem extending loosely through said guiding passage, and being freely rotatable therein, said stem being provided above the same with a guiding stop to permit of lifting the valve from its seat, the weight of said guide tending to hold the valve when unseated in substantial coaxial relation with its seat while per-

mitting sufficient freedom of movement of the valve with respect to its seat, to facilitate its seating.

3. In a flushing valve mechanism for a flush tank provided with a flushing valve seat and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a guide having an elongated guiding passage therethrough, a lifting rod provided at its upper end with means for suspending it from the valve lifting means, and having its lower end connected with said guide so as to support the guide pendulously, with its guiding passage vertical, said valve stem extending loosely through said guiding passage, and being provided above the same with a stop to permit of lifting the valve from its seat, the weight of said guide tending to hold the valve, when unseated, in substantial coaxial relation with its seat, while permitting sufficient freedom of movement of the valve to facilitate its seating, said valve being provided with a depending guide extending loosely through the seat and of sufficient length to prevent it from being withdrawn from the seat when the valve is fully lifted, to positively prevent the valve from being accidentally moved laterally out of operative relation with its seat.

4. In a flushing valve mechanism for a flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, a pendulous guide comprising a block provided with an eccentrically located elongated guiding passage, said block being connected with the lower end of the lifting rod coaxially therewith so as to hold said guiding passage vertically and in substantial coaxial relation with the valve seat, means for preventing the rotation of said block, said valve stem extending loosely through said guiding passage in said block and being provided with a stop above the same, to engage the upper surface of the block and permit of lifting the valve from its seat, the weight of said block tending to hold the valve, when unseated, in substantially coaxial relation with its seat while permitting sufficient freedom of movement of the valve to facilitate its seating.

5. In flushing valve mechanism for a flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, and preventing its rotation with respect thereto, a pendulous guide secured to the lower end of said lifting rod and held from rotation with respect

thereto, said guide comprising a block provided with an elongated vertical passage substantially coaxial with the valve seat, said valve stem extending loosely through said guiding passage and being provided above the same with a stop to engage the upper surface of the block for lifting the valve from its seat, the weight of said guide tending to hold the valve, when unseated, in substantially coaxial relation with its seat, while permitting sufficient freedom of movement of the valve to facilitate its seating.

6. In a flushing valve mechanism for a flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, and preventing its rotation with respect thereto, a pendulous guide comprising a block having a centrally located vertical aperture therethrough to receive the lower end of the lifting rod, said block and lifting rod being provided with co-operating means for preventing the rotation of the block with respect to the lifting rod, and said block being provided with a vertically disposed elongated guiding passage coaxial with the valve stem when in seated position, said valve stem engaging said guiding passage loosely and revolubly, and being provided with an enlargement above said block to engage the valve to be lifted, the weight of said guide tending to hold the valve, when unseated, in substantial coaxial relation with its seat while permitting sufficient freedom of movement of the valve to facilitate its seating.

7. In a flushing valve mechanism for a flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided with a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, and preventing its rotation with respect thereto, a pendulous guide comprising a block of non-corrodible material provided with a central vertical passage to receive the lower end of the lifting rod, and vertically guiding passages on opposite sides of said central passage, said lifting rod being provided with an upwardly extending part engaging one of said guiding passages to prevent the rotation of the block with respect to the lifting rod, the valve stem extending loosely and revolubly through the other of said guiding passages and being provided with an enlargement above said block to enable the valve to be lifted from its seat the weight of said guide tending to hold the valve, when unseated, in substantially coaxial relation with its seat while permitting sufficient freedom of movement of the valve to facilitate its seating.

8. In a flushing valve mechanism for a flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided
5 with a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, a pendulous guide consisting of a block secured to the lower end of the lifting rod and
10 provided with a vertically disposed elongated guiding passage loosely engaging the valve stem, said valve stem having an enlargement above said block, the said float valve being hollow and open at its lower end,
15 and composed of rubber, and being provided at its upper end with a vertical aperture frictionally engaging the valve stem, said valve stem being provided with a threaded portion below said aperture and a threaded
20 collar detachably engaging the valve stem, to prevent the downward movement of the valve thereon, and being enclosed within the interior of the valve.

9. In a flushing valve mechanism for a
25 flush tank, provided with a flushing valve seat, and valve lifting means, the combination with a flushing float valve provided with

a vertical stem, of a lifting rod, provided at its upper end with means for suspending it from the valve lifting means, a pendulous
30 guide consisting of a block secured to the lower end of the lifting rod and provided with a vertically disposed elongated guiding passage loosely engaging the valve stem, said valve stem having an enlargement above
35 said block, the said float valve being hollow and open at its lower end, and composed of rubber, and being provided at its upper end with a vertical aperture frictionally engaging the valve stem, said valve stem being
40 provided with a threaded portion below said aperture and a threaded collar detachably engaging the valve stem, to prevent the downward movement of the valve thereon, and being enclosed within the interior of the
45 valve, and a depending guide rod having a threaded portion at its upper end, screwed into said collar and extending through the valve seat to prevent the possibility of the valve from being moved out of operative
50 relation with the seat.

In testimony whereof I affix my signature.

PHILIP HAAS.