Oct. 2, 1934. F. M. HEATH 1,975,421

VALVE FOR FLUSH TANKS

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Fig. 1.

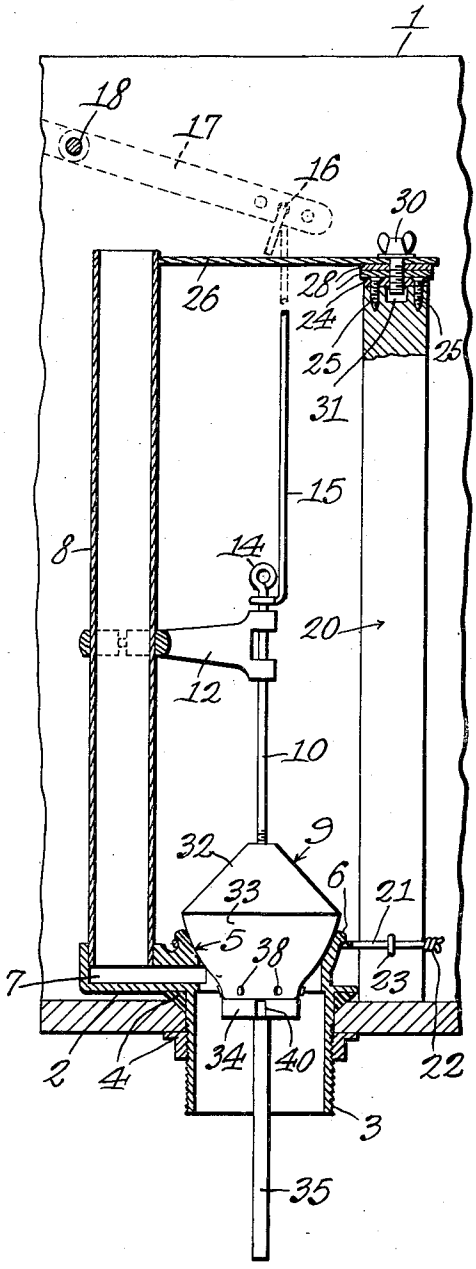
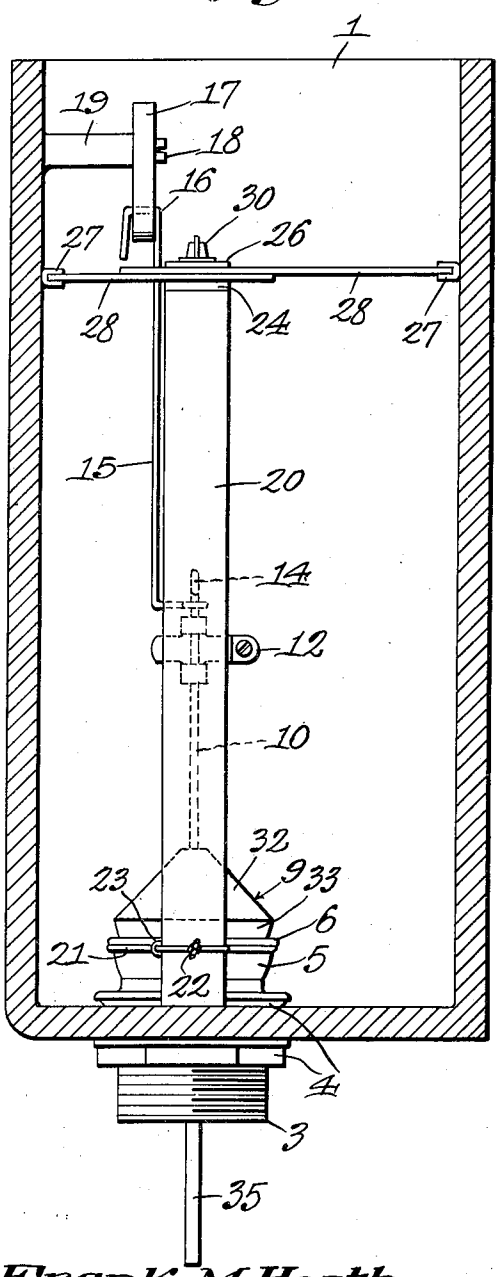


Fig. 2.



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Fig. 5.

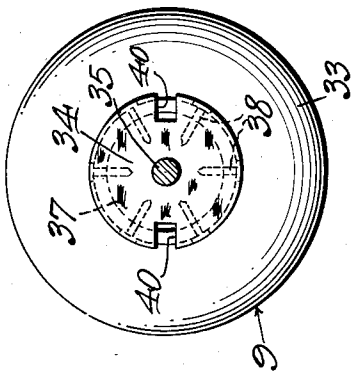


Fig. 8.

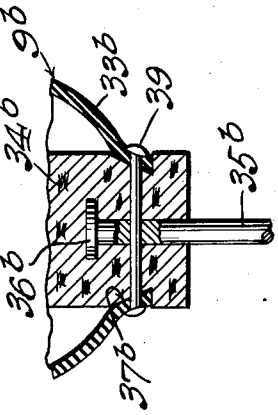


Fig. 4.

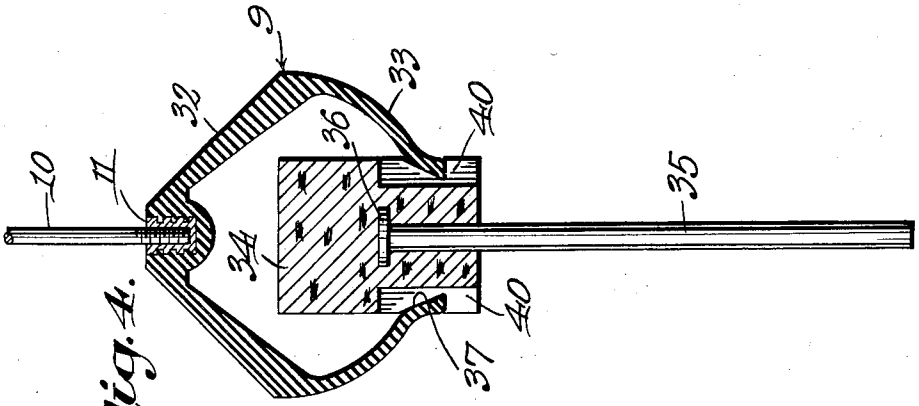
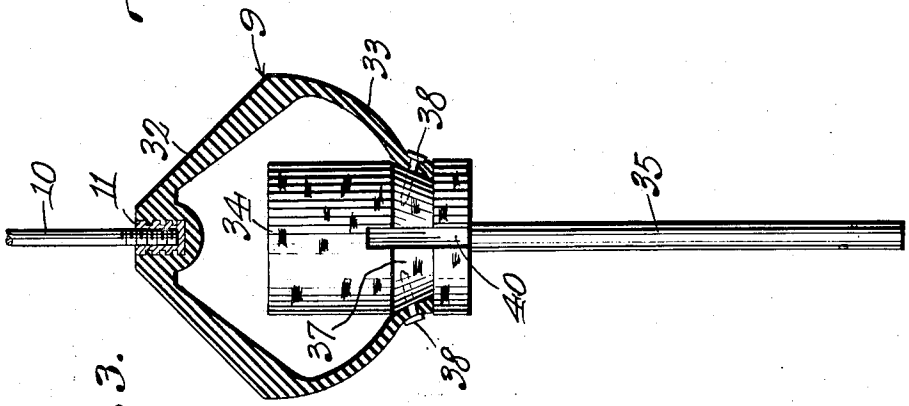


Fig. 3.



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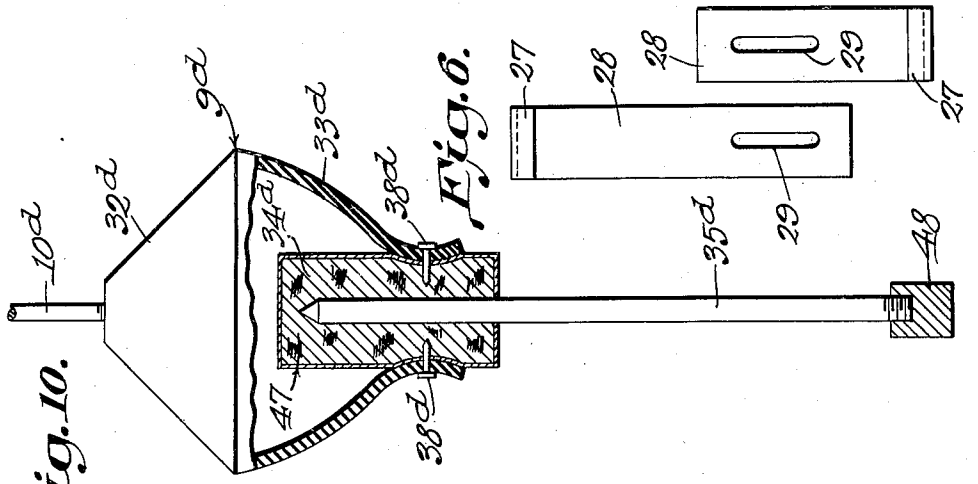
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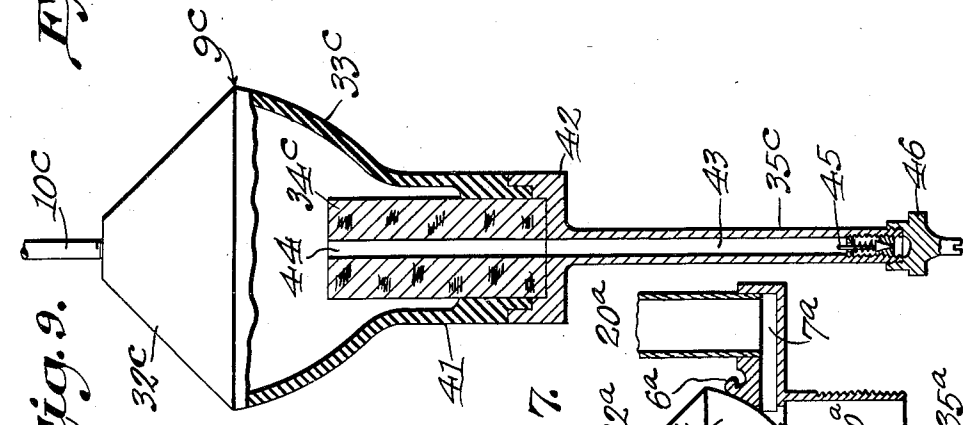
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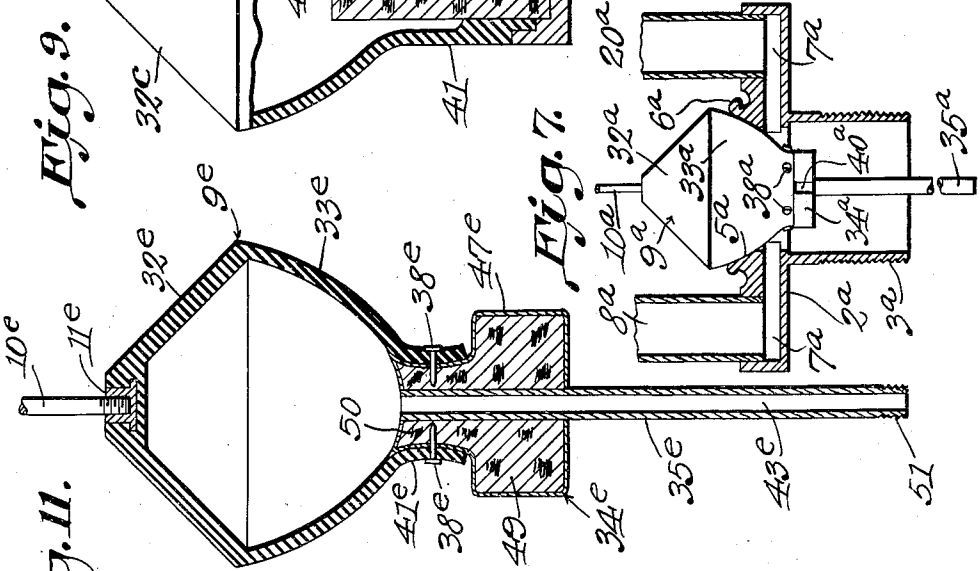
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VALVE FOR FLUSH TANKS

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Patented Oct. 2, 1934 1,975,421

UNITED STATES PATENT OFFICE

1,975,421

VALVE FOR FLUSH TANKS

Frank M. Heath, Silver Spring, Md.

Application January 3, 1934, Serial No. 705,156

10 Claims. (Cl. 4—56)

One object of this invention is to provide novel means for counteracting the irregularity in the flow of water to the valve seat of a flush tank, arising out of the presence of the overflow pipe. Another object of the invention is to supply a valve that seats better than valves heretofore provided, leakage between the valve and its seat being avoided. These objects will be explained more in detail, in the descriptive portion of this specification.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawings:

Fig. 1 shows in section, a device constructed in accordance with the invention, mounted in a flush tank, some parts being in elevation;

Fig. 2 is an elevation at right angles to Fig. 1, the tank being in section;

Fig. 3 is a sectional view of the valve and attendant parts, portions being in elevation;

Fig. 4 is a sectional view at right angles to the showing of Fig. 3;

Fig. 5 is a bottom plan of the device shown in Fig. 4, the pilot being in section;

Fig. 6 is a composite plan view showing the brackets employed in Fig. 2 to carry the upper end of the baffle that is complemental to the overflow pipe;

Fig. 7 is a vertical section showing a modification in the baffle;

Fig. 8 is a vertical section disclosing a modified means for holding the valve and the float together;

Figs. 9, 10 and 11 are vertical sectional views showing modifications in the valve, parts being in elevation in some instances.

The numeral 1 marks a flush tank of the kind commonly used on water closets. The numeral 2 designates a foot piece having an outlet 3 extended through the bottom of the tank 1 and secured water-tight therein by any suitable means shown at 4. The foot piece 2 has a valve seat 5, provided at its upper end with an outstanding bead 6. The foot piece 2 has a lateral passage 7, leading to the outlet 3, below the tank ball, valve or float, designated by the numeral 9, and cooperating with the valve seat 5. A vertical overflow pipe 8 is secured to the foot piece 2 and discharges into the tubular outlet 3, by way of the passage 7. The specific construction of the float valve 9 will be gone into hereinafter, but let it suffice to state at this point that a stem 10 is detachably assembled at 11 with the valve or float 9, the guide 12 receiving the stem 10 slidably, and the guide being detachably and adjustably mounted, in most instances, on the overflow pipe 8. At its upper end, the stem 10 has a head 14, forming a connection between the stem and a rectangular link 15 which may be pivoted at 16 to a lever 17, fulcrumed at 18 on a member 19 carried by the side wall of the tank 1.

The general operation of such a structure is well-known to those skilled in the art. When the valve 9 is raised by means of the stem 10, the link 15 and the lever 17, or by some other appropriate means, the valve 9 floats on the water in the flush tank 1, and the water runs out through the outlet 3. When the level of the water in the flush tank 1 has fallen low enough, the valve 9 comes again into engagement with the part 5.

The difficulty with a structure of the kind described is that the overflow pipe 8 is located to one side of the member 5, the water does not flow evenly from all directions into the member 5, because the lateral flow of the water from one direction is impeded by the overflow pipe 8, and the valve 9 does not always seat evenly and prevent leakage. It is proposed to overcome this difficulty by means of a baffle 20, which may be a rod, of the same diameter as the overflow pipe 8 and located diametrically opposite to it. It is clear that since the baffle 20 is provided, the retarding of the water on one side of the seat 5, by the overflow pipe 8, is offset by the baffle 20, the water will flow fairly and evenly into the open seat 5, and through the outlet 3, the valve 9 will seat squarely, and leakage will be prevented.

The baffle 20 preferably is parallel to the overflow pipe 8, and rests at its lower end on the bottom of the flush tank 1. The lower end portion of the baffle 20 is held tightly against the edge of the foot piece 2 by a securing means, such as a piece of wire 21, engaged around the seat 5, beneath the bead 6, the wire 21 being engaged around the baffle 20. The ends of the securing means 21 may be twisted together, as shown at 22, and the securing means may pass

through one or more eyes 23, such as staples, carried by the part 20.

The anchorage means for the upper end of the baffle 20 comprises a plate 24, held by securing elements 25 on the upper end of the baffle. A horizontal bracket 26 is secured at one end to the overflow pipe 8, and the opposite end of the bracket 26 overhangs the anchor plate 24 of the baffle 20. Oppositely-disposed U-shaped sockets 27 are mounted on the side walls of the flush tank 1, and the outer ends of retainers 28, preferably of different lengths, are detachably mounted in the sockets. The inner ends of the retainers 28 are overlapped on each other, on top of the anchor plate 24 carried by the baffle 20, and the retainers have registering longitudinal slots 29, through which passes a thumb screw 30, the head of the thumb screw engaging the uppermost retainer 28, and the lower part of the thumb screw being threaded into the anchor plate 24, the upper end of the baffle 20 having a recess 31 for the convenient reception of the lower end of the thumb screw. Some means other than the wire member 21, the bracket 26 and the retainers 28 may be provided, but the mechanism specified will be found efficient for the ends in view.

In Fig. 7, parts hereinbefore described have been designated by numerals previously used, with the suffix "*a*". The modification consists in replacing the solid baffle 20 of Fig. 1 with a tubular baffle 20*a*, which, in reality, is a duplicate of the overflow pipe 8*a*, an extra passage 7*a* for the pipe 20*a* being provided. The pipe or baffle 20*a* is directly assembled with the foot piece 2*a*, like the overflow pipe 8*a*, and the anchorage means 21—25—28—24—30 of Fig. 2 may be omitted.

Passing to a description of the tank ball, or valve 9, and referring to Figs. 3, 4 and 5, it will be seen that the upper part 32 of the valve 9 preferably is somewhat thicker and stiffer than its lower part 33, the valve 9 generally being made of resilient rubber. A float 34 is supplied and may be formed of any buoyant material. The float 34 may be made of cork scraps, so that it can be molded to the desired shape about the upper part of a pilot stem or weight 35, having some of the characteristics of a spike, including a head 36, molded into the float 34 and located about midway between the upper and lower ends of the float. The float 34 has a circumferential groove 37, of any desired shape, into which the neck of the lower part 33 of the valve 9 contracts, securing elements 38, such as tacks, being used to hold the valve 9 assembled with the float 34, most of the float 34 being located within the valve 9, as Fig. 3 will show. The securing elements 38 are added for the sake of security. Some may wish to omit them, or to use the single securing element 39 of Fig. 8, extended entirely through the float transversely. In Fig. 8, parts hereinbefore described have been designated by numerals previously used, with the suffix "*b*". The float, such as the float 34, has longitudinal, superficial, diametrically opposite slots 40, intersecting the circumferential groove 37 and forming inlets by which air can find its way into the valve 9.

The invention fills a long-felt need. For over a quarter century, attempts have been made to eliminate the waste of water resulting from leaky flush tank valves. The nearest approach to a successful structure, up to the present time, has been the ordinary hollow rubber bulb or toilet ball, with a hole in the bottom to admit air. The intent has been to produce a ball or valve which, when unseated or raised, would float on the water in the tank, or approach a floating condition as nearly as the stem, such as the stem 10 of Fig. 1, and the bracket 12 of that figure would permit. The chief trouble with the old arrangement referred to is that the weight of the stem is pushing downwardly when the ball is descending, an operation which is undesirable because the weight of the stem causes the ball to dodge about on or partly under the water, as the water flows away, and as the ball moves to its seat. It is clear that, in the old construction, the efficiency of the stem, as a means for seating the ball, is materially lessened.

It has been obviously intended that, as the ball nears its seat, the suction of the water should draw the ball firmly upon the seat, in water-tight relation thereto, but as is well known, that result is not always brought about. The ball does not seat firmly enough and leakage about the ball is almost sure to follow. In addition to the suction of the outflowing water, the ball needs some weight, applied not above the ball, but below it, so that the ball may move straight down and acquire a water-tight seat, the weight being rendered peculiarly efficient if the weight is located below the ball or valve. It should be carried in mind that, with the weight entirely above the valve, the valve has a tendency to oscillate laterally, or bob about, the stem binding in the bracket or guide, such as the part 12 of Fig. 1, friction being created, and the efficiency of the weight or stem, as a means for seating the valve, being impaired. Moreover, the ball or valve, in known constructions, may actually strike the overflow pipe 8, as the valve descends, a perfect seating being thereby rendered the more difficult. Finally, with known constructions, the valve tends to oscillate as it cooperates with the seat, thereby causing the ball or valve to strike in different positions, every time it seats, an uneven surface being produced in the valve or ball, at the place where it engages the seat, and a leakage or seepage resulting.

The difficulties above referred to have been overcome in the device forming the subject matter of this application. The pilot or stem 35 is heavier than the part 10 and is located at the bottom of the valve 9, exactly at the center thereof. There is a direct downward pull, as distinguished from a push, and the part 35 is so located that it operates clear of everything, and without friction. To attach a weight, such as the part 35, directly to the valve 9, would tend to defeat the object of the invention, in that the valve 9 would tend to close on the seat 5, as soon as the lever 17 is operated. The result would be that as soon as the lever 17 is released, the valve 9 would close before any appreciable amount of water had run out of the tank, or the operator would be compelled to keep the lever 17 in hand, as long as he desired the water to flow. This, in practice, is something that cannot be expected from the user.

In order to overcome the undesirable features last above enumerated, the pilot or weight 35 is mounted in the cork float 34, which is located, for the most part, as shown in Fig. 3, within the valve 9. The construction is such that if the structure shown in Fig. 3 is dropped into a bucket of water, by way of experiment, the member 34 floats, or approximately floats, the entire structure.

Generally stated, when the valve 9 is raised, no

buoyancy is lost, because the float 34 overcomes the weight of the pilot 35. The pilot 35, nevertheless, holds the device against oscillating. The structure floats in a steady position in the water, because the pilot 35 is at right angles to the lower surface of the float 34.

At the time when the suction through the outlet 3 overcomes the ability of the water remaining in the tank to float the valve 9, the lower part of the float 34, protruding below the valve 9, reduces the area of discharge through the outlet 3, accelerates the speed of the flowing water, and aids materially in seating the valve 9 on the part 5. This seating of the valve is enhanced by the presence of the part 34. Since there is not sufficient water in the outlet 3 to act on the part 34, that part no longer is a float, but, to a certain extent at least, is transformed into a weight, which aids in the seating of the valve 9.

Reverting to the baffle 20 of Fig. 1, the operation of this structure has been dealt with hereinbefore. The form shown in Fig. 1 is useful on a repair job, whereas the form shown in Fig. 7 represents a structure which is more perfectly adapted for use as a manufactured product.

In Fig. 9, parts hereinbefore described have been designated by numerals previously used, with the suffix "*c*". The float 34*c* is mounted in an elongated neck 41 of the valve, and to the reduced lower end of the neck 41 is attached a cap 42, abutting against the lower end of the float 34*c* and carrying the pilot 35*c*. The pilot 35*c* has a bore 43, communicating with a bore 44 in the float 34*c*. An outwardly closing check valve 45 is mounted in the lower end of the tubular pilot 35*c*. The check valve 45 enables air to be pumped into the float 9, to increase the rigidity of the float, and the check valve enables air to be exhausted to a slight extent from the valve 9*c*, if the check valve is held open during the exhausting step, the buoyancy of the valve 9*c* thereby being capable of regulation. The lower end of the part 35*c* may be closed by a detachable cap 46.

In Fig. 10, parts hereinbefore described have been designated by numerals previously used, with the suffix "*d*". The float 34*d* may have a waterproof covering 47, and a weight 48 may be threaded or mounted otherwise, detachably, on the lower end of the pilot 35*d*.

In Fig. 11, parts hereinbefore described have been designated by numerals previously used, with the suffix "*e*". In this form of the invention, the float 34*e* has an enlarged body 49, located below the float 9*e*, the body including a reduced portion 50 secured by the elements 38*e* to the depending neck 41*e* of the valve. The lower end of the pilot 35*e* is threaded at 51 to receive a weight. The structure of the weight is left to the taste of the manufacturer. The device depicted in Fig. 11 is not characterized by the perfect efficiency of operation which may be attributed to the article shown in Fig. 3.

What is claimed is:

1. A hollow, buoyant flush tank valve, provided at its upper end with a stem, a float in the lower end of the valve, and a depending pilot at the lower end of the valve, the pilot being of sufficient weight to overcome the weight of the stem, and the float adding buoyant stability to the valve and preventing the valve from seating prematurely due to the weight of the pilot.

2. The device of claim 1, wherein the upper end of the pilot is mounted in the float.

3. The device of claim 1, wherein the pilot is tubular to afford an air inlet for the valve.

4. The device of claim 1, wherein the pilot is tubular, to form an air passage communicating with the valve, and a check valve carried by the pilot and controlling said passage.

5. A flush tank valve comprising a hollow body having an opening in its lower end, a float held in the opening, the major part of the float being within the body, and a depending pilot stem having its upper end mounted in the float.

6. A flush tank valve comprising a hollow resilient body having an opening in its lower end, a float in the opening and having a circumscribing groove into which the body is contracted, and a depending pilot stem having its upper end mounted in the float.

7. A flush tank valve comprising a hollow body having an opening in its lower end, a float held in the opening, and a depending pilot stem having its upper end mounted in the float, the float having a passage constituting an air inlet for the body.

8. The flush tank valve of claim 7, wherein the passage is a superficial longitudinal slot in the float.

9. The flush tank valve of claim 7, wherein the float has a circumscribing groove in which the body is engaged, the float having an air inlet for the body, said air inlet being a superficial longitudinal slot formed in the float and extended across the groove.

10. In a device of the class described, a hollow tank valve, a float extended within the valve at the lower end of the valve, and a depending weight assembled with the lower portion of the valve.

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