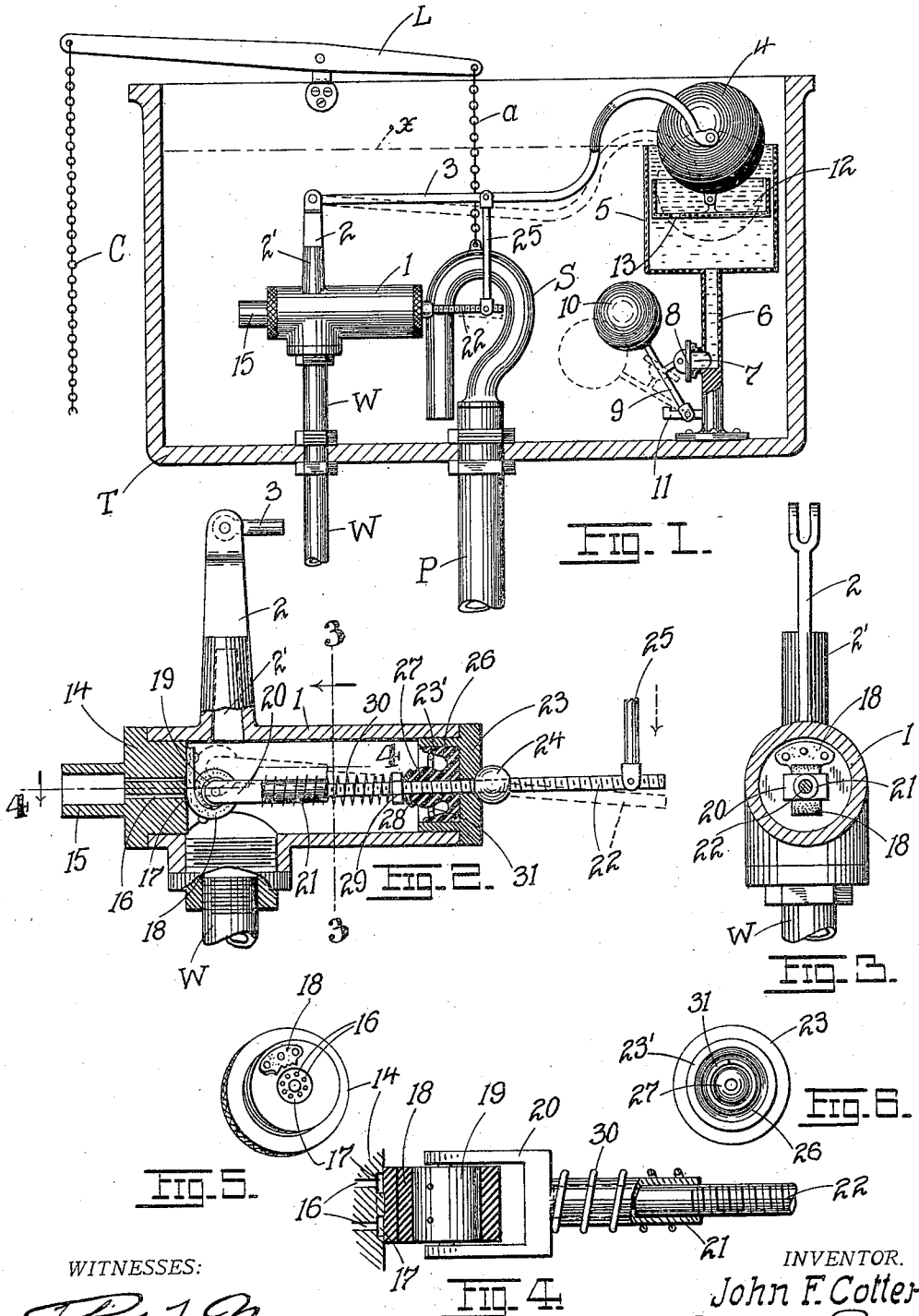


J. F. COTTER.
 FLUSH TANK VALVE.
 APPLICATION FILED SEPT. 27, 1907.

934,045.

Patented Sept. 14, 1909.



WITNESSES:

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JOHN F. COTTER, OF ST. LOUIS, MISSOURI.

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934,045.

Specification of Letters Patent. Patented Sept. 14, 1909.

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To all whom it may concern:

Be it known that I, JOHN F. COTTER, citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Flush-Tank Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in flush-tank valves; and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claims.

In the drawing, Figure 1 is a section of a flush-tank showing my invention applied thereto; Fig. 2 is an enlarged middle longitudinal section of the valve; Fig. 3 is a vertical cross section on the line 3—3 of Fig. 2; Fig. 4 is a horizontal section on the line 4—4 of Fig. 2; Fig. 5 is a perspective view of the inner end of the valve-seat; and Fig. 6 is an inner face-view of the packing ring for the operating stem of the valve.

The present valve while specifically designed for use in connection with flush tanks, may be made to serve as a faucet for general purposes, the object thereof being to control the discharge of water with the least amount of friction, thereby resulting in a very sensitive valve, since the pressure of the water due to the head, against the valve in no wise interferes with the free action of the latter.

The advantages of the invention will be better apparent from a detailed description thereof which is as follows:

Referring to the drawings, T, represents a flush tank, C, the chain, L, the lever connected at the outer end to the chain, the inner end being provided with a chain *a* from which the siphon S, is suspended.

P, represents the flush-pipe, the water-inlet pipe being represented by W.

The parts referred to are well understood and require no further description, as they form the principal features of every flush-tank on the market.

The valve casing 1 of my invention is provided with an arm 2 to which is pivotally coupled one end of the float-arm 3, the free end of the arm carrying a float 4 which in the present instance operates in an overflow receptacle 5 the bottom of the receptacle being connected to the bottom of the tank T by a tubular standard or pipe 6. The latter

is provided near its base with a lateral discharge nozzle 7 which is normally closed by a plug or disk 8 secured to the arm 9 of a supplemental float 10, the lower end of the arm 9 being pivoted to a bracket or arm 11 projecting from the pipe 6. The float 4 has suspended pivotally therefrom a pan 12 which plays freely in the overflow 5, the bottom of the pan being provided with a small orifice 13 to allow the contents thereof to discharge and prevent freezing, should the water in the overflow discharge and fail to fill at the proper time, in freezing weather.

The water supply pipe W taps the side of the casing 1 near one end thereof, said end being closed by a valve-seat or plug 14 provided with a discharge spout or pipe 15 with which communicate the open ended passages or ports 16, said ports likewise communicating with the interior of the valve-casing. As best seen in Figs. 2, 4 and 5, the inner ends of the ports 16 are slightly depressed below the plane of the inner face of the plug 14, the slight depression referred to forming a circular basin 17 over which the flexible leather (or other) valve piece 18 is adapted to seat. The outer end of this leather valve or strip 18 is secured to the inner face or seat of the plug 14 at a point radially beyond the basin 17 the strip being wound or wrapped about a cylindrical core 19 pivotally mounted between the arms of the fork 20 of a tubular socket 21, the said socket receiving loosely the inner end of a stem 22 passing axially through the valve-casing, and projecting a suitable distance beyond the flanged plug 23 which closes the opposite end of the casing. The stem 22 passes loosely through the plug 23, the outer face of the latter being suitably dished or scooped out around the opening through which the stem passes to afford a proper bearing for the spherical fulcrum-piece or nut 24 passed over the screw-threaded portion of the stem (Fig. 2). The outer end of the stem is coupled by a link 25 to the float-arm 3. The flanged portion 23' of the plug 23 houses a cup-shaped packing ring 26 from the center of which projects a rounded head 27 which forms a seat for a suitable washer 28 passed over the stem 22 and interposed between the head and the nut 29, the latter serving as one of the bearings for the expansion spring 30 coiled about the socket 21 and having its opposite end bearing against the base of the fork 20. The spring of

course serves to force the valve 18 well against its seat when the latter closes over the basin 17 and the ports 16 leading therefrom. The ring 26 receives an expansion
 5 coil 31 which serves to force the walls of the ring against the flanges 23' and thus insure a water-tight joint.

The operation of the device may be described as follows: Suppose the occupant of
 10 the closet pulls the chain and discharges the water from the tank through the pipe P in the usual manner, the water level being at the time even with the over-flow 5 as shown by dotted line *x* in Fig. 1. As the water
 15 escapes from the tank T its level will eventually drop to a point where it can no longer sustain the supplemental float 10, in which event the said float will drop, opening the nozzle 7 and allow the contents of the over-
 20 flow to run into the tank. Not until this overflow discharge has taken place, does the main float 4 drop, for the main float is supported by the water in the overflow. As long as the overflow is full, the water in the
 25 pan 12 does not weight it down as it is of the same specific gravity as the water in the overflow. As the body of water in the overflow is discharged, the weight of the pan 12 begins to assert itself (a mere trifle escaping
 30 through the orifice 13), and at once pulls down the float, as seen in dotted position in Fig. 1. The dropping of the float 4 acts on the link 25 and this in turn deflects the stem 22 about its fulcrum 24 as per dotted
 35 position in Fig. 2, the deflection of the stem lifting the projecting flap or section of the valve 18 normally seated over the basin 17 sufficiently to uncover the basin. The
 40 moment the basin 17 is thus uncovered the water from the pipe W which has already filled the casing 1 now rushes through the ports 16 and discharge pipe 15 into the tank and fills it, the flow continuing without
 45 abatement, until the level *x* is reached when it runs into the overflow 5 and fills it, and as it fills it, it picks up the main float 4, thus restoring the parts to the full position indicated in Fig. 2, the valve 18 again closing
 50 tightly under the action of the spring 30 and shutting off further supply. Of course as the water is rising in the tank T, it first picks up the float 10 which closes the discharge spout 7 before the water discharges into the overflow. In practice, the flap of leather
 55 constituting the valve may be said to roll or peel off its seat, this peeling taking place with very little resistance no matter what the water pressure may be against the valve. The peeling action is not directly against the
 60 water pressure, but rather at an angle thereto, and hence the action of the valve is accompanied with little resistance and friction.

It is apparent that the valve may be used

as a faucet for domestic purposes, by mounting it so that the nozzle 15 may point in proper direction. In that event the outer end of the stem 22 could be provided with a suitable handle of special design. When serving as a flush-tank valve, it remains fully
 65 open until the tank is full, which is not the case with float-valves ordinarily, the latter gradually closing as the water in the tank rises. Of course the overflow is indispensable to the success of the valve, since the float
 70 4 is not acted on until after the overflow has filled.

The arm 2 is preferably made hollow thereby providing an air-chamber 2' for cushioning the impact due to an inrush of
 80 water into the casing 1, said chamber communicating with the interior of the casing (Fig. 2).

Having described my invention, what I claim is:

1. In combination with a valve-casing having a discharge opening at one end, a valve-seat having opened ports communicating with said opening and with the interior of the casing respectively, a flexible valve-piece normally seated over the ports and having one end secured to the valve-seat at a point beyond the ports, a core about which the opposite end of the valve piece is wound and secured, a socket coupled to the core, a
 95 stem passing loosely through the opposite end of the valve-casing and having its inner end loosely received by the socket, a fulcrum piece secured to the stem outside the casing and engaging the latter, a packing for receiving the stem located at the opposite end of the casing, and an expansion spring coiled about the stem and bearing with its opposite ends against the base of the socket and the packing for forcing the valve to its seat, the
 100 parts operating substantially as, and for the purpose set forth.

2. In combination with a valve-casing having a discharge opening, a flexible valve-piece having one end fixed to one side of the
 110 adjacent end of the opening and normally spanning said opening, a flush-tank, and a stem fulcrumed to the terminal wall of the casing oscillating across the axis of the casing, and secured to the opposite or movable end of the valve-piece for automatically unrolling and for lifting the body of the valve-piece toward the fixed end and thereby uncovering said opening with the fall of the water in the flush-tank, substantially as set
 115 forth.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN F. COTTER.

Witnesses:

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 HELEN S. DAUGHERTY.