United States Patent [19]

Lanahan

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[45] **May 28, 1974**

[54] **ADJUSTABLE TOILET TANK FLUSH VALVE**

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[73] Assignee: **Dyna Logics, Inc.,** New Hartford, Conn.

[22] Filed: **July 17, 1972**

[21] Appl. No.: **272,363**

[52] **U.S. Cl.** ..... **4/67 A,** 4/57 R, 4/34, 4/37, 251/DIG. 4

[51] **Int. Cl.** **E03d 1/34,** E03d 5/02, E03d 5/10

[58] **Field of Search** ..... 4/67 R, 67 A, 57 R, 15, 4/61, 56; 251/DIG. 4

[56] **References Cited**

UNITED STATES PATENTS

420,327	1/1890	Blessing	4/61 X
614,648	11/1898	D'Este et al.	4/15
1,606,500	11/1926	Bodman	251/DIG. 4
2,096,807	10/1937	Hulbert	251/DIG. 4
2,741,776	4/1956	Christie et al.	4/57 R
3,320,622	5/1967	Wustner	4/67 A
3,590,395	7/1971	Wustner	4/56
3,638,499	7/1972	Saint-Andre	251/DIG. 4

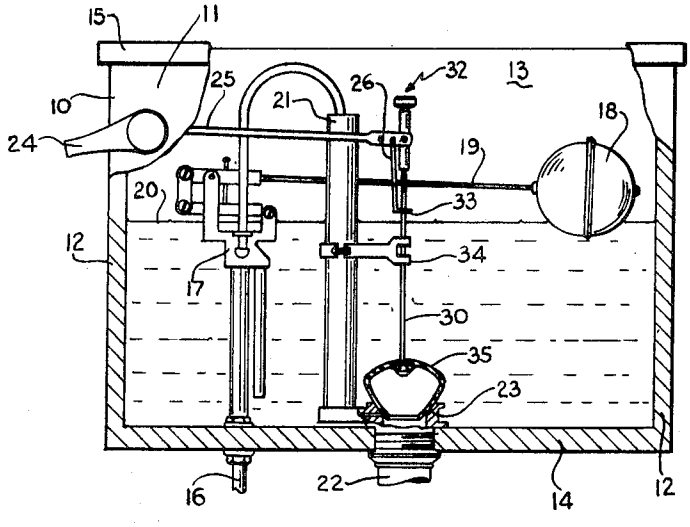
Primary Examiner—Henry K. Artis

Attorney, Agent, or Firm—Bruns & Jenney

[57] **ABSTRACT**

A flush valve has a hollow float valve open at the bottom and adapted to be lifted from its annular seat to discharge water from the tank. The lift mechanism includes a guided vertical tube secured to the float valve and carrying an adjustable air escape valve at its upper end, the tube connecting the interior of the float valve with the air escape valve.

1 Claim, 3 Drawing Figures



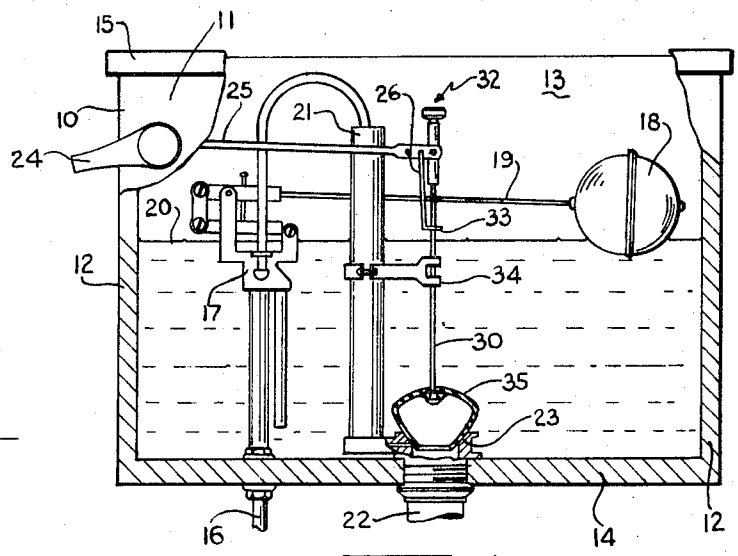


Fig. 1

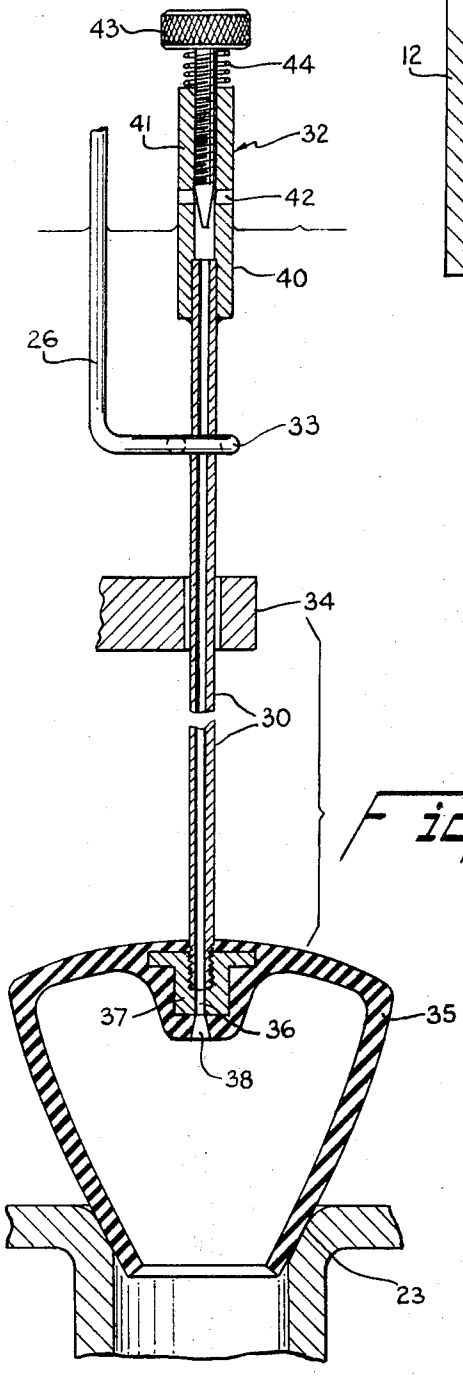


Fig. 2

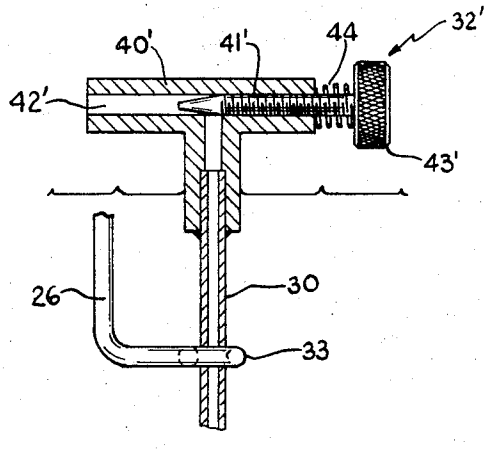


Fig. 3

ADJUSTABLE TOILET TANK FLUSH VALVE

BACKGROUND OF THE INVENTION

This invention relates to toilet tank flush valves having manual adjustment for adjusting the buoyancy of a float valve to control the amount of discharge of water from the tank.

Such adjustable valves have been known but many of them require complex structures which are difficult and expensive to make and install. Others require the use of flexible tubes which interfere with the guiding of the float valve back to its proper seat. None of the heretofore known adjustable valves provide structure whereby a conventional flush tank may be provided with an adjustable valve by the substitution of a few economically produced parts which are easily installed.

SUMMARY OF THE INVENTION

The present invention contemplates mounting a needle-valve controlled valve for venting air from the hollow interior of the float valve directly on the assembly of parts used to lift the float valve to initiate flushing rather than connecting the venting valve to the interior of the float valve by flexible tubing.

One of the most common types of flush valves employs a rod secured to the top of a hollow rubber-ball float valve to lift the float valve off its seat. A wire link, liftable by a lever, has a loop slideably engaged about the rod and engagable with a stop at the upper end of the float valve rod.

According to the invention a tube is substituted for the rod, the tube having a passage in communication with the interior of the float valve. The upper end of the tube has secured thereon a needle-valve controlled air escape or vent valve by which the flow of air from the tube may be adjustably controlled. The vent valve is conveniently larger than the tube thereby providing a stop engageable by the link loop.

When the float valve is raised it is full of air, its bottom being conventionally open and in communication with the discharge pipe. Being full of air it is buoyant and normally remains elevated until the water is completely, or almost completely, drained from the tank.

In order to save water in times of shortage, the vent valve may be adjusted to bleed air from the float valve so that it will sink back to its seated position when only part of the water in the tank has been discharged. The vent valve may be adjusted to control the amount of water discharged at each flushing by controlling the length of time taken to vent air from the interior of the float valve so that it loses buoyancy.

A new float valve may be provided for use with the substituted tube and vent valve or instructions may be given for the modification of the existing float valve. Such float valves have a metal portion embedded in the rubber at the top of the float already drilled and threaded for the reception of a threaded end of the rod. The substituted tube is threaded for reception in this threaded hole and all that remains is to drill a passage through the top of the float valve so that the inserted tube will be in communication with the interior of the float valve.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a view partly in elevation and partly in section of a toilet flush tank having an adjustable flush valve according to the invention;

FIG. 2 is a fragmentary, enlarged, view in longitudinal section of the adjustable flush valve shown in FIG. 1; and

FIG. 3 is a fragmentary view similar to FIG. 2 showing a modified form of vent valve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a conventional toilet flush tank 10 is shown having a front wall 11, side walls 12, back wall 13, bottom wall 14, and cover 15. A water supply pipe 16 is led through the bottom wall 14 in conventional manner and connected to the usual shut-off valve 17 controlled by the usual ball float 18 connected to valve 17 by the rod 19. Valve 17 is adjusted to shut off when the chosen water level 20 is reached. An overflow pipe 21 is provided and the usual delivery pipe 22 to the toilet bowl beneath is in sealed connection with the bottom wall 14 and is provided inside the tank with a valve seat 23 adapted to be closed by a conventional ball-like rubber float valve which, when raised, is filled with air and floats until almost all of the water in the tank has been discharged through the delivery pipe 22.

The usual flush handle 24 is provided connected through front wall 11 to mechanism, not shown, adapted to raise the lever 25 which is connected to the float valve which normally closes on the seat 23. Usually, the connection to the float valve includes a link 26 and a rod connected to the ball-like rubber float valve.

According to the present invention, a tube 30 is substituted for the usual rod and the ball-like rubber float valve is modified as will appear. The upper end of tube 30 terminates in an adjustable vent control or vent valve 32 which provides a stop engageable by the looped end 33 of link 26. The usual guide bracket 34 is provided, secured on the overflow pipe 21, for guiding tube 30 substantially axially of the seat 23.

Referring to FIG. 2, the float valve 35 is hollow and open at the bottom but is modified by drilling an extension 36 of the hole in the usual metal insert 37 at the top of the ball-valve into which tube 30 is threadedly inserted, as shown. A further extension 38 through the rubber portion at the end of extension 36 is drilled or reamed, when required, so that the passage through tube 30 is connected to the hollow inside of float vlave 35.

At its upper end, tube 30, after passing through guide bracket 34 and the looped end 33 of link 26, is secured by brazing or otherwise in a hole at one end of the tubular body 40 of the vent control valve 32. The other end of the passage through the tubular body is threaded and a needle valve 41 is threadedly engaged therein, the tapered end of the needle valve being adapted to progressively block or unblock an air exhaust passage 42 drilled transversely through body 40. Between the head 43 of the needle valve 41 and the upper end of body 40, a coil spring 44 extends around the needle valve for retaining the needle valve in its adjusted position.

In operation the needle valve is adjusted by trial and error. When handle 24 is turned, lever 25 is raised and

the looped end 33 of link 26 engages the lower end of the body 40 of the vent valve 32 elevating tube 30 and float valve 35.

As is usual, float valve 35 is raised and, being filled with air which has entered through its open bottom, floats in elevated position in the water in tank 10. Air escapes, however, through passages 38, 36, the passages through tube 30 and vent control body 40, past the needle valve 41 and out vent passage 42. When sufficient air has escaped, the float valve 35 loses its buoyancy and sinks to its seat 23. This closes the opening to the delivery pipe 22 before all of the water in tank 10 has escaped through pipe 22, thus saving on the aount of water used to flush the toilet. By turning needle valve 41 the amount of water used may be precisely regulated.

Should it be desired to use more water than that determined by the regulation of valve 41, the operator can hold the handle 24 in its operated position and hold the float valve 35 elevated until enough water has escaped from the tank 10.

By placing the vent control valve 32 on the end of tube 30, the need for flexible tubing is eliminated and lateral imbalance of the tube and float valve in its guide 34 is prevented. Moreover, by replacing the usual rod with the tube 30 and its attached valve 32 and modifying the float valve 35, an economically produced kit may be provided for modifying existing flush tanks.

Referring now to FIG. 3, a modified form of vent control valve 32' is shown which provides more clearance to prevent contact of the valve 32' with the tank cover 15. The valve body 40' is in the form of a T with one leg secured to tube 30. Another horizontally extending leg is threaded and carries the needle valve 41' while the opposite leg provides the vent passage 42'.

The vent control valve 32' operates exactly like valve 32 but, since the needle valve 41' extends horizontally, valve 32' occupies less vertically extending space at the top of tank 10.

I claim:

1. In a toilet flush tank a water saver arrangement consisting of means for partially filling the tank to a fixed refill level of water, a discharge outlet in the tank bottom having an annular valve seat within the tank adjacent the tank bottom, a hollow float valve of a diameter greater than the seat adapted to engage the seat to close the outlet and having an aperture in the bottom thereof of a diameter less than the diameter of the seat to admit air into the float valve for buoyancy when lifted from the seat, manually operable means for lifting the float valve from the seat including a vertically extending rigid tube secured at its lower end to the top of the float valve, means for guiding the tube for vertical movement in substantial axial alignment with the seat, and vent valve means for allowing air to escape to atmosphere in the upper region of the tank from the interior of the float valve to destroy the buoyancy of the float valve after a predetermined period subsequent to lifting the float valve: the improvement consisting of the vent valve being a manually adjustable needle valve secured to, and carried on, the upper end of the tube and having a vent passage normally above the water level, and the tube passage connecting the interior of the float valve to the needle-valve-controlled vent passage, the means for lifting the float valve being adapted to hold the float valve elevated from its seat until manually released, whereby a minimal amount of water regulated by the needle valve setting is normally used for flushing when the float valve lifting means is operated and immediately released and a greater amount of water is used when desired by operating the float valve lifting means and manually holding the lifting means in operative position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,812,545 Dated May 28, 1974

Inventor(s) John H. Lanahan

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Under Assignee: Dyna Logics, Inc., New Hartford, Conn. should be -- New Hartford, New York --.

In the Specification, Col. 3, line13, last word should be -- amount --.

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.