

May 27, 1958

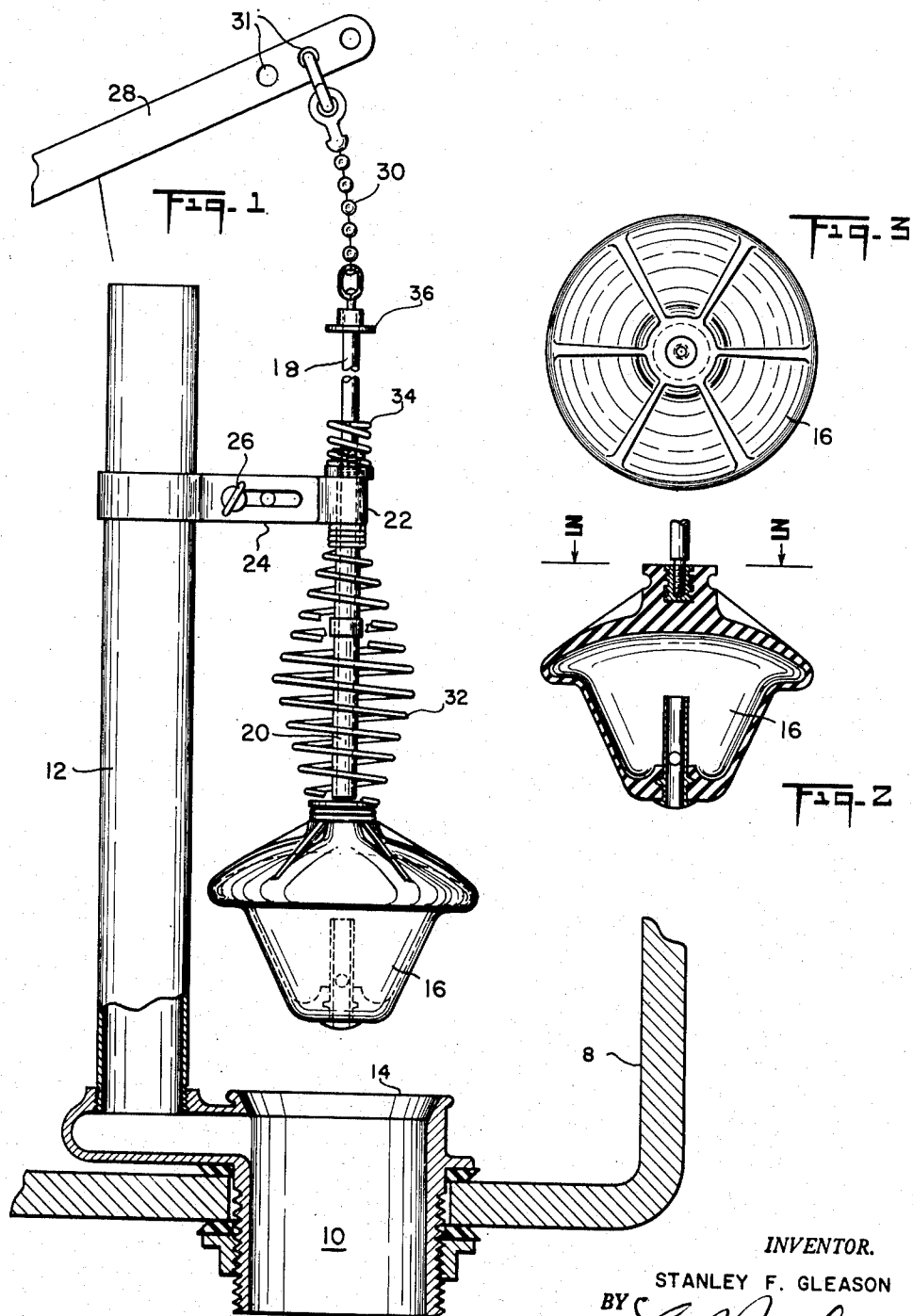
S. F. GLEASON

2,835,900

OPERATING MECHANISM FOR TOILET FLUSH TANK VALVE

Filed Sept. 13, 1955

2 Sheets-Sheet 1



INVENTOR.

STANLEY F. GLEASON

BY

Ernie Neale

ATTORNEY

May 27, 1958

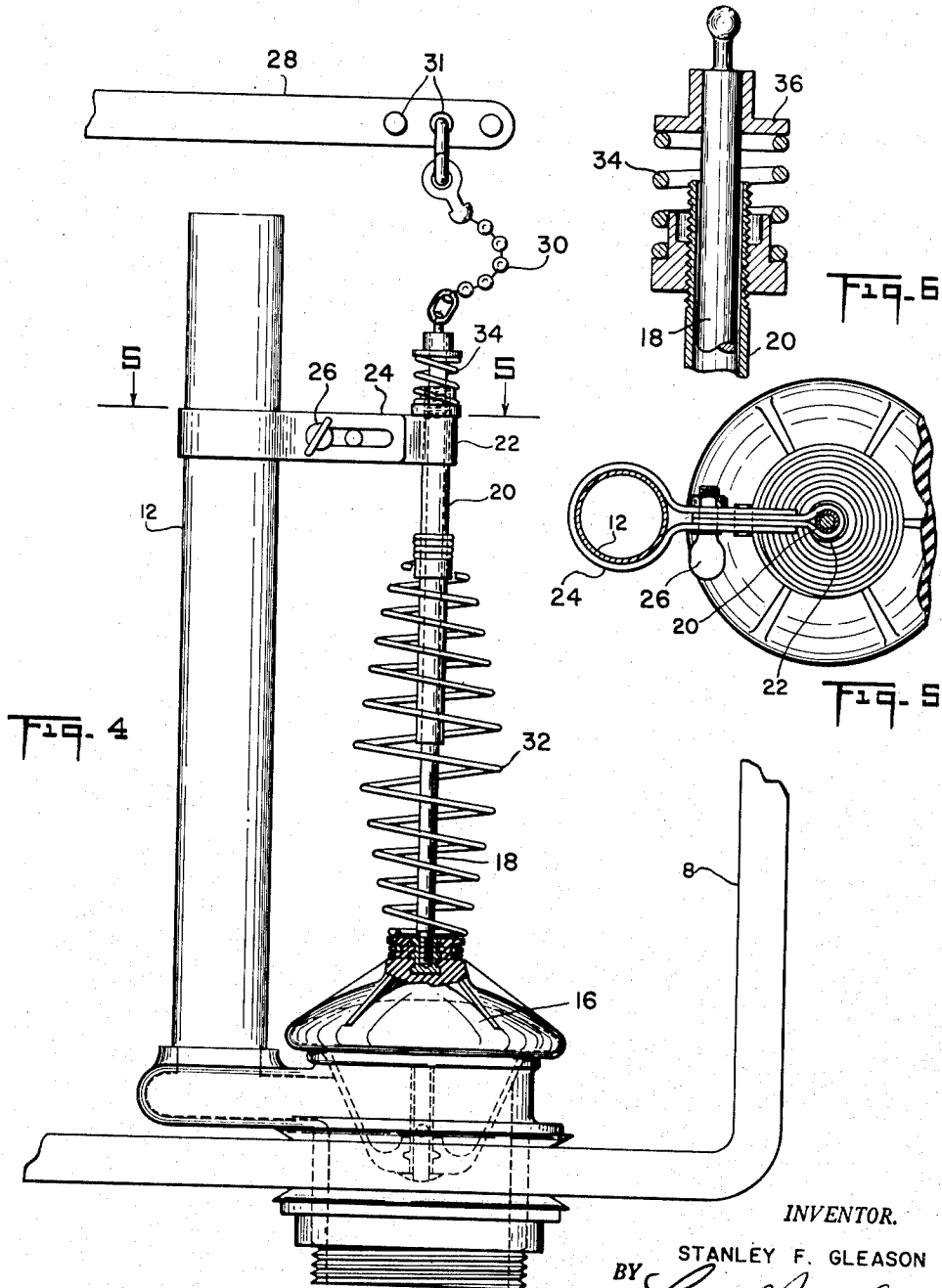
S. F. GLEASON

2,835,900

OPERATING MECHANISM FOR TOILET FLUSH TANK VALVE

Filed Sept. 13, 1955

2 Sheets-Sheet 2



INVENTOR.

BY STANLEY F. GLEASON

Louis Nechio

ATTORNEY

1

2,835,900

OPERATING MECHANISM FOR TOILET FLUSH
TANK VALVE

Stanley F. Gleason, Philadelphia, Pa.

Application September 13, 1955, Serial No. 534,132

6 Claims. (Cl. 4—67)

My invention relates to improvements in the valve operating mechanism of a toilet flush tank.

Conventional flush tanks have a capacity of eight gallons and are completely emptied at each flushing. I have discovered that, in all but the most exceptional cases, the toilet can be satisfactorily flushed with about four gallons of water, and that the remaining four gallons are needed only to furnish the necessary head and velocity for the first four gallons which must flow from the tank to the sewer to effect the flushing. In other words, the flow of the last four gallons from the tank to the sewer represents a waste of water which, in view of the increasing shortage of water can be quite serious, especially in congested areas.

It is therefore an object of the invention to produce an improved valve operating mechanism whereby the amount of water which flows from the tank to the sewer for each flushing is reduced by about one half without sacrificing the function or the advantage of the head, or static pressure which is produced by that portion of the water in the tank which, according to my invention, is not allowed to flow to the sewer.

As stated, there are exceptional cases in which the entire water content of the flush tank is needed for effective flushing.

It is, therefore, a further object of the invention to produce a mechanism of the type referred to which can be manually controlled so as to permit complete evacuation of the tank when needed.

In conventional tanks, the ball valve is carried by a thin lift rod which is loosely guided by a ring carried by the overflow pipe, said lift rod being raised by the operating arm when the outside handle is turned. Common experience shows that this arrangement does not guarantee positive seating of the ball valve and this experience has caused inventors to resort to various expedients such as fluting the ball valve, or providing it with a pendant extension, and so on.

It is, therefore, a still further object of the invention to produce an improved valve operating mechanism which positively insures proper seating of the ball.

In apartment houses and in other installations where the water head, or the induced suction, is high, the ball valve often gets jammed into the upper end of discharge pipe far beyond the extent necessary to insure adequate closure of the pipe with the result that it becomes difficult, if not impossible to lift the ball from its seat without damage to the ball valve, or to the operating mechanism, or both.

It is, therefore, a still further object of the invention to produce an improved valve operating mechanism whereby the movement of the ball valve into the upper end of the pipe leading from the flush tank is limited to that needed for proper seating of the valve.

A still further object is to produce an improved valve operating mechanism which is durable, which is easy to

2

make and install and which is relatively free of maintenance costs.

These and other objects are attained by my invention as set forth in the following specification and as shown in the accompanying drawings in which:

Fig. 1 is a fragmentary view, partly in elevation and partly in vertical section showing my improved valve operating mechanism in the open, or flushing position.

Fig. 2 is a vertical section of the ball valve.

Fig. 3 is a top plan view of the ball valve looking in the direction of line 3—3 of Fig. 2.

Fig. 4 is similar to Fig. 1, but showing the parts in the closed, or non-flushing, position.

Fig. 5 is a sectional view looking in the direction of line 5—5 on Fig. 4.

Fig. 6 is an enlarged, vertical sectional view showing details of the upper portion of the lift rod.

In the drawings, 2 designates the lower portion of the flush tank, the bottom of which is provided with a pipe 10 which leads to a toilet bowl, not shown. The tank is also provided with an overflow pipe 12 which leads to pipe 10. The upper end of pipe 10 is turned to form a conical seat 14 for the usual ball valve 16. The ball valve is carried by a lift rod 18, which is raised by operating arm 28 when the handle, not shown, is turned.

According to my invention, the ball valve lift rod 18 is freely slidable in a guide sleeve 20 which is fixedly carried by loop 22 of a strap which is adjustably carried by yoke 24. As will be seen from Figs. 4 and 5, by loosening thumb screw 26, yoke 24 can be moved up or down on, and circumferentially, as well as radially, of, overflow pipe 12 so as to align guide sleeve 20 with valve seat 14 to insure proper seating of the ball valve. The upper end of lift rod 18 is connected to operating arm 28 by means of a flexible element 30 which engages one of the holes 31 in the end of the operating arm.

Ball valve 16 is normally biased downwardly by a compression spring 32 which encircles guide sleeve 20 and lift rod 18. Spring 32 is so calibrated as to move ball valve 16 to a position just short of full seating or full closing, the ball valve being moved to full closing position by gravity and by the action of the water in the tank.

The downward movement of the ball valve is limited to the extent necessary for full closing of the valve by a spring 34 which encircles lift rod 18 and is in the path of movement of flange 36 which is carried by the upper end of lift rod 18.

The operation is as follows: To flush the toilet bowl, the operating handle, not shown, is actuated to raise rod 18 and ball valve 16 and quickly released. Immediately upon release of the operating handle spring 32 moves ball valve 16 down to just short of closing position. It will be noted that, in the absence of spring 32, the ball valve will continue to float on the surface of the water in the tank and will not move down to closing position until the tank has been emptied. But, because spring 32 forces the ball valve close to seat 14, the pressure of the water above the ball valve and the entrainment resulting from the flow of water through pipe 10, will force the ball valve down against its seat. The arrangement and calibration of the parts is such that, if the operating handle is turned and released immediately, about one-half of the water in the tank will have flowed out of the tank before the ball valve has assumed its full closing position. If it is desired to use all the water in the tank, it is merely necessary to hold the operating handle in valve opening position instead of releasing it immediately.

By the time the ball valve has moved down far enough to insure full closing of the valve, flange 36 comes to rest on spring 34 which thus yieldably limits the movement of the ball valve relative to its seat and prevents the ball

valve from being jammed in the upper end of pipe 10. Spring 34 also counteracts some of the pressure exerted on the ball by the water in the tank to facilitate the raising of the ball valve by the operating handle.

Since lift rod 18 is guided in sleeve 20 over a large portion of its length, and since spring 32 moves ball valve 16 until at least the lower conical portion thereof has entered pipe 10, positive seating of the ball valve is assured.

The adjustable mounting of the lift rod by means of strap 24 and thumb screw 26 is important because flush tanks and overflow pipe assemblies are not completely standardized so that the distance between the center of the valve seat and overflow pipe or other support on which the lift rod is mounted vary somewhat. My adjustable mounting makes my control mechanism readily applicable to flush tanks of various types.

What I claim is:

1. A valve mechanism for use with a toilet bowl flush tank of the type which includes a discharge pipe leading from the bottom thereof to a toilet bowl, a valve seat between said discharge pipe and said tank, said mechanism including a ball valve for engaging said seat to stop the flow of water from said tank to said pipe, an actuating lever operative to raise said ball valve off said seat and a compression spring operable, when said ball valve is raised off said seat, to bias said ball valve back toward its seat, the force of said spring being sufficient to overcome the buoyancy of the ball valve to force the latter toward its seat in the presence of water in said tank, and the range of action of said spring being such that when the spring is fully distended, said ball valve does not fully engage said seat, whereby said ball valve moves to full seating position independently of said spring, and means for preventing the movement of the ball valve toward its seat beyond the extent necessary to insure full engagement of the ball valve with said seat.

2. The structure recited in claim 1 and a lift rod for carrying and moving said ball valve, a flange carried by the upper end of said lift rod, and a second spring disposed in the path of movement of, and engageable with, said flange, yieldably to limit the downward movement of said lift rod and said ball valve, the relation of said

second spring to said lift rod being such that said ball valve fully engages said seat before said second spring is engaged by said flange.

3. A toilet bowl flush tank and flow control valve mechanism including a valve seat in the bottom of said flush tank, a ball valve for engaging said seat to stop the flow of water from said tank, a lift rod carrying said ball valve, an actuating arm, lost motion means connecting the upper end of said lift rod to said operating arm, said arm being operative to lift said ball valve off said seat, a support within said tank, a guide sleeve carried by said support and through which said lift rod freely moves, a first compression spring normally biasing said ball valve back towards its seat when said ball valve is raised off its seat, and a second compression spring operable to limit movement of said ball valve toward said seat, said first spring being so calibrated as to be fully distended before said ball valve has fully engaged said seat, said ball valve being movable to full seating position independently of said first spring, and said second spring being so calibrated that, when said ball valve fully engages said seat, said second spring will yieldably resist further movement of said ball valve in the direction of said seat.

4. The structure recited in claim 3 in which said lost motion means is in the nature of a flexible element adjustably connecting the upper end of said lift rod to the end of said operating arm.

5. The structure recited in claim 3 in which said guide sleeve encloses a major portion of said lift rod in all positions thereof.

6. The structure recited in claim 3, in which said first and second spring are wound about said lift rod and a fixed abutment separating, and common to, both said springs.

References Cited in the file of this patent

UNITED STATES PATENTS

1,577,728	Katzin	Mar. 23, 1926
1,960,864	Brown	May 29, 1934
2,341,116	Owens	Feb. 8, 1944
2,528,441	Kolar	Oct. 31, 1950
2,602,934	McCormack et al.	July 15, 1952
2,625,691	Clifton	Jan. 20, 1953