June 13, 1967 W. E. WUSTNER 3,324,482

ADJUSTABLE TOILET TANK FLUSH VALVE

Filed Jan. 11, 1966

FIG. 1

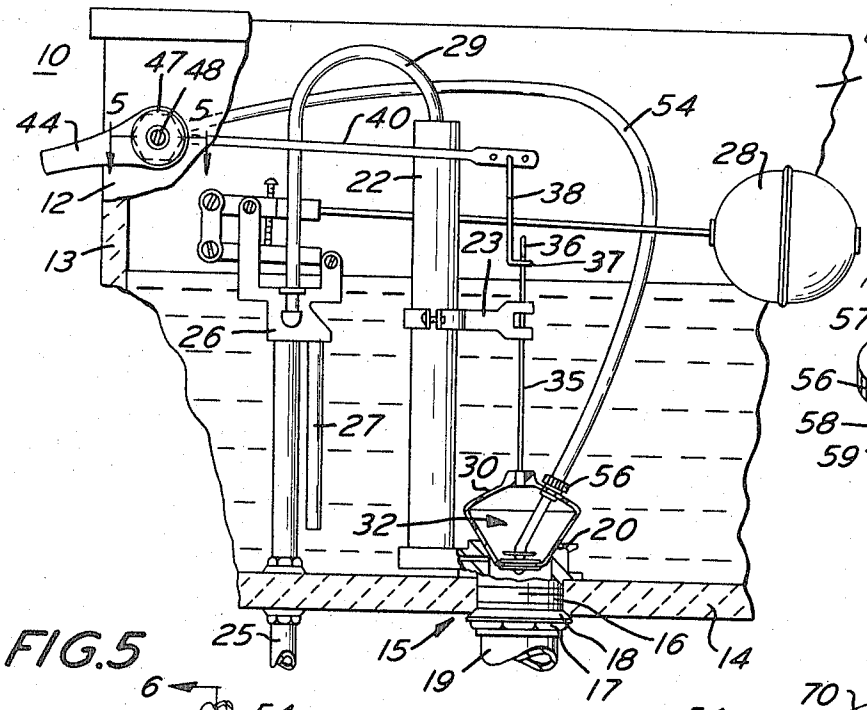


FIG. 2

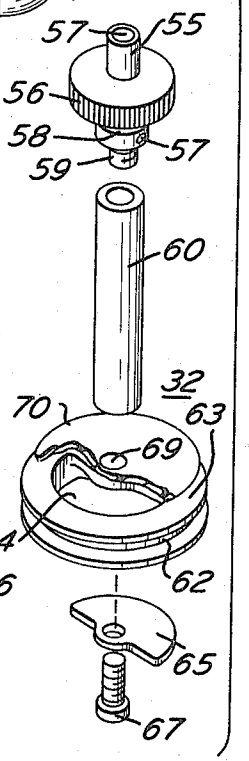


FIG. 5

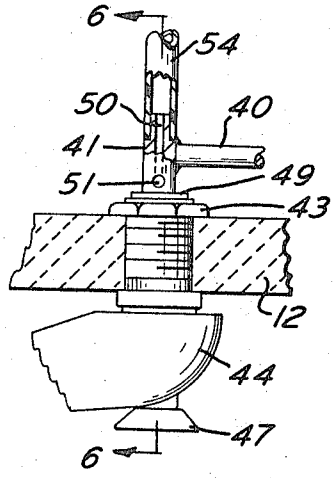


FIG. 3

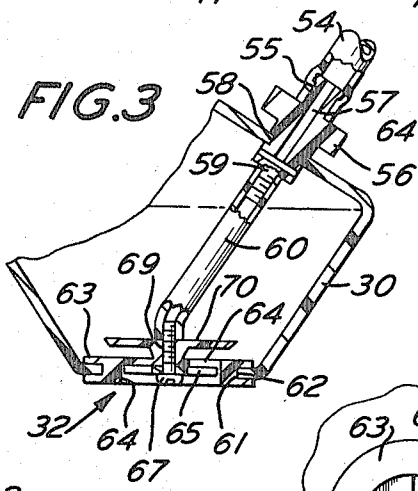
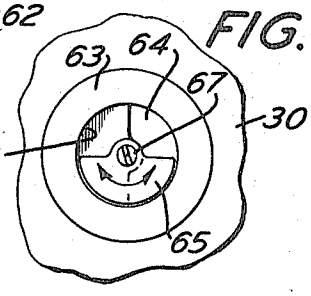


FIG. 4



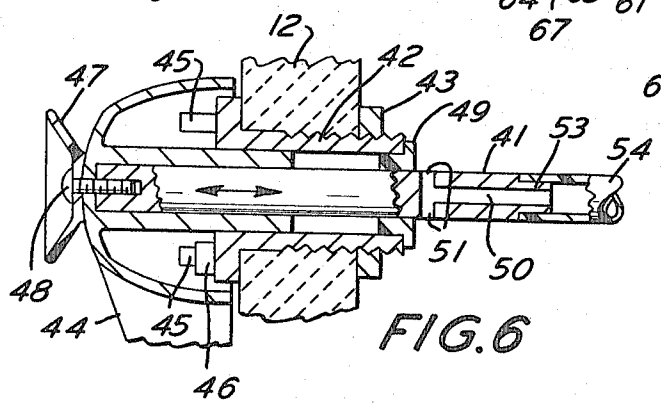


FIG. 6

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ADJUSTABLE TOILET TANK FLUSH VALVE

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7 Claims. (Cl. 4—57)

This invention relates to adjustable toilet tank flush valves.

In some areas and at some seasons of the year water shortages are serious and even necessitate imposing restrictions on water use.

It is the principal object of the present invention to provide an adjustable toilet tank flush valve which will permit of great saving of water by control of the discharge from the flush tank.

It is a further object of the present invention to provide a toilet tank flush valve which will permit of partial or complete discharge of the flush tank as desired.

It is a further object of the present invention to provide a toilet tank flush valve in which a ball valve is employed with an outlet fitting, the ball valve being equipped with simple but effective structure for controlled venting of the interior thereof and controlled water flow thereinto from the toilet tank whereby the buoyancy of the ball valve is varied and faster or slower seating is effected as desired.

It is a further object of the present invention to provide a toilet flush tank valve of the ball valve type having incorporated into the interior of the ball an adjustable valve for controlling the buoyancy of the ball by air discharge and water admission a manually accessible knob being provided exteriorly of the ball for effecting the adjustment.

It is a further object of the present invention to provide a toilet flush valve construction which can be employed with existing installations or which may be utilized for new construction.

It is a further object of the present invention to provide simple but effective venting provisions for a ball valve which controls the toilet tank flushing whereby the ball valve tends to fall to a seated position at a rate determined by the venting.

It is a further object of the present invention to provide a toilet flush valve construction with a manually operable control handle which upon slidable movement to one position provides full tank discharge by rendering the venting ineffective or upon slidable movement to another position provides only partial tank discharge as determined by the venting adjustment.

Other objects and advantageous features of the invention will be apparent from the description and claims.

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a view partly in elevation and partly in vertical section of a toilet flush tank having a preferred embodiment of the flush tank valve of the present invention incorporated therein;

FIG. 2 is an exploded perspective view of the vent control valve removed from the valve ball;

FIG. 3 is a fragmentary vertical sectional view on a larger scale than in FIG. 1 of the valve ball and vent control valve therein;

FIG. 4 is a bottom plan view of the valve ball of FIG. 3;

FIG. 5 is a fragmentary horizontal sectional view, enlarged, taken approximately on the line 5—5 of FIG. 1; and

FIG. 6 is an enlarged fragmentary vertical sectional view taken approximately on the line 6—6 of FIG. 5.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

In my prior application for Letters Patent filed May 25, 1965, Ser. No. 458,565, there is disclosed an adjustable flush tank valve. The present invention relates particularly to simplified and improved adjustable vent control valve mechanism for the ball valve.

The adjustable toilet flush tank valve construction of the present invention preferably includes, for use with a tank fitting, a hollow ball valve for controlling flow past a seat in the fitting. The valve ball, when raised from its seat, tends to float. Provisions are made for adjustably venting the interior of the ball valve so that water from the tank can enter the ball valve and the tendency of the valve ball to float is thus overcome so that it falls to its seat and shuts off further flow from the tank. The venting provisions preferably include an oscillatable normal operating handle slidable to venting or non-venting positions to control an air escape valve at the handle, and controlling the opening at the bottom of the valve ball, an adjustable vent control valve to regulate the entry of water into the valve ball.

Referring now more particularly to the drawings, a toilet flush tank **10** is shown, having a rear wall **11**, a front wall **12**, a side wall **13** and a bottom wall **14**.

A fitting **15** of well known type is provided having a threaded section **16** held in place by a nut **17** engaging a washer **18** and having a delivery pipe **19** communicating with the hopper (not shown) of the toilet, below the valve seat **20**.

The fitting **15** has an upright overflow pipe **22** of well known type carried thereby and connected below the valve seat **20** for discharge. A guide bracket **23** is adjustably mounted on the pipe **22** in a well known manner.

The tank **10** can have a water supply pipe **25** connected to a water supply valve **26** with a water delivery pipe **27** carried thereby and controlled by a float **28** in a well known manner, with a hush tube **29** extending down into the overflow pipe **22**.

The fitting **15**, as shown in FIG. 1 has a hollow valve ball **30**, of rubber or the like, which seats on the valve seat **20** to prevent delivery of water unless and until the valve ball **30** is raised from the seat **20**. The valve ball **30** has an adjustable vent control valve **32** mounted therein, the valve **32** being shown in detail in FIGS. 2, 3 and 4.

A valve ball actuator rod **35** extending upwardly from the valve ball **30** and guided by the guide bracket **23**, has an abutment **36** for engagement by an eye **37** of a link **38** which is pivotally engaged at its upper end in a lever **40**. The lever **40** is mounted on an actuating shaft **41** which extends through a threaded sleeve **42**. The sleeve **42** is held by a nut **43** on the front wall **12** of the tank **10**.

The shaft **41** has a manual operating handle **44** thereon accessible at the exterior of the front wall **12**. The shaft **41** is horizontally slidable in the sleeve **42** with the lever **40** serving as a stop for horizontal movement outwardly, the handle **44** having internal shoulders **45**. The shoulders **45** limit horizontal movement inwardly and two of which by engagement with a stop pin **46** on the sleeve **42** limit the turning movement of the handle **44** to the desired angle.

An auxiliary knob **47** secured to the handle **44** by a screw **48** can be employed to facilitate the horizontal positioning of the shaft **41**.

The sleeve **42** has an inserted collar **49** within which the shaft **41** is freely horizontally slidable.

The shaft **41** has a passageway **50** with terminal ends **51** movable with respect to the collar **49** for permitting air discharge therethrough when the terminal ends **51** are exposed or preventing air discharge when the terminal ends **51** are positioned inside and are shut off by the collar **49**.

The shaft **41** has a tubular extension **53**, communicating with the passageway **50**, on which an air vent flexible pipe **54** of synthetic plastic material is secured. The pipe **54** extends to a nipple **55** which extends from a manually operable knob **56** and within which an air vent passageway **57** is provided in communication with the interior of the valve ball **30**. The nipple **55** has a seating groove **58** within which the flexible wall of the valve ball **30** is seated. The nipple **55** has an extension **59**, which advantageously can be threaded or otherwise shaped for engagement of a flexible operating link **60**. The link **60** can be of flexible synthetic plastic tubing.

The vent control valve **32** is mounted at an opening **61** in the bottom of the valve ball **30** and is seated in a groove **62** in a body portion **63**, preferably of synthetic plastic material. The body portion **63** has a water inlet opening **64** which is controlled by a rotatable valve plate **65**, of the same material as the body portion **63** in a cylindrical plate receiving opening **66**. The arc through which the plate **65** extends is preferably slightly less than the arc of the opening **64** so as to avoid complete close off of the opening **64** and insure drainage of the valve ball **30** while the same is seated on the seat **20**.

A screw **67**, which may be of synthetic plastic material is in tight engagement in and serves to carry the plate **65**. The screw **67** extends through a journal opening **69** in the body portion **63** and into threaded engagement with the lower end of the link **60**. A spacer and baffle plate **70** is preferably interposed between the body portion **63** and the link **60** and is also preferably integral with the body portion **63**.

The mode of operation will now be pointed out.

Assuming that tank **10** is filled with water to a level determined by the float **28**, if now is is desired to flush the toilet, the handle **44** is operated for this purpose.

If it is desired to discharge the entire contents of the tank **10** the handle **44** is moved horizontally outwardly so that the radial vent opening **51** is closed by the collar **49**.

Upon turning of the handle **44** and the shaft **41** to which it is connected the lever **40** through the link **38** and actuator rod **35** will rise the valve ball **30** from its seat and permit water to be discharged through the fitting **15** in a conventional manner.

The valve ball **30** will be buoyed up in the usual manner and will fall with the falling water level in the tank **10**. The valve ball **30** will not be vented and will retain its maximum buoyancy.

If it is desired to discharge only part of the contents of the tank **10** and thereby conserve water, the handle **44** is moved horizontally inwardly (see FIGS. 5 and 6) to position the vent opening **51** clear of the collar **49**.

Upon turning of the handle **44**, the valve ball **30** is raised from its seat **20** as before. The valve ball **30** will, by reason of the position of the opening **47**, have air discharged from the interior thereof through the air vent passageway **57**, the nipple **55**, the flexible pipe **54**, the passageway **50** and passageway terminals **51**.

At the same time, and dependent upon the setting of the valve plate **65** with respect to the opening **64** water will enter the valve ball **30** through the vent control valve **32** and reduce the buoyancy of the valve ball **30**. The valve ball **30** will thus move to close position and engage the seat **20** before the entire contents of the tank **10** has been discharged.

The knob **56** permits of turning the valve plate **65** for adjustment of the rate of delivery of water into the interior of the valve ball **30**.

After the valve ball **30** has been seated on the valve seat **20** any water therein will be drained out through opening **64** so that upon the next actuation of the handle **44** either maximum or limited flushing can be selected and carried out.

Upon the completion of the desired flushing action water will be supplied to the tank **10** through the water supply valve **26** to bring the level in the tank **10** back to that determined by the float **28**.

The knob **56** can be manually operated from the outside of the ball **30**, and through the flexible link **60** to determine the portion of the opening **64** available for admission of water to the interior of the ball **30**.

I claim:

1. A toilet flush valve construction comprising
- a discharge valve fitting having a seat,
- a valve member for engagement with said seat and having a hollow interior portion and an opening in the bottom thereof,
- manually operable members for moving said valve member from said seat including an actuating member connected to said valve member; and
- means for controlling the buoyancy of said valve member,
- said means including an air vent connection to the interior of said valve member, and
- members for controlling the delivery of water from the tank into the interior of said valve member,
- said last members including a body portion at said bottom opening of said valve member,
- said body portion having a water inlet opening communicating with the interior of said valve member,
- a rotatably positioned member carried by said housing for controlling, and
- an adjusting member for said last member carried by said valve member in offset relation to said actuating member,
- and an operating connection between said adjusting member and said rotatably positioned member.

2. A toilet flush valve construction as defined in claim **1** in which
- said valve member is a ball, and
- said body portion has a groove, and
- said valve member has a portion in engagement in said groove.

3. A toilet flush valve construction as defined in claim **1** in which
- said rotatably positioned member is a sequential plate.

4. A toilet flush valve construction as defined in claim **1** in which
- said valve member is a ball,
- said adjusting member is carried by an upper side wall portion of said ball, and
- said operating connection is a flexible tube.

5. A toilet tank flush valve construction as defined in claim **1** in which
- said body portion has a baffle member disposed interiorly of said valve member,
- said body portion has a cylindrical receiving opening in the lower portion thereof and
- said rotatably positioned member is a sequential plate mounted in said receiving opening.

6. A toilet tank flush valve construction as defined in claim **1** in which
- said valve member is a ball,
- said body portion has a cylindrical receiving opening in the lower portion thereof,
- said rotatably positioned member is a sequential plate mounted in said receiving opening,
- said adjusting member is carried by an upper side wall of said valve member and includes a manually operable knob, and
- said operating connection is a flexible tube connected to said knob.

7. A toilet flush valve construction as defined in claim 1 in which

said valve member is a ball with a wall portion,

said adjusting member is carried by an upper wall portion of said ball,

said adjusting member includes a nipple portion and a rotatable manual actuator,

said adjusting member has said air vent connection extending therethrough,

said operating connection is a flexible tube, and

said rotatably positioned member is a plate carried in said body portion.

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