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Horad

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[54] **ADJUSTABLE VALVE FOR CONTROLLING THE AMOUNT OF WATER REFILLING A TOILET BOWL AFTER FLUSHING**

[76] Inventor: **Sewell D. Horad**, 2118 University Blvd., W., Silver Spring, Md. 20902

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Related U.S. Application Data

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[51] **Int. Cl.**[6] **E03D 1/00**; F16K 21/18; F16K 31/24

[52] **U.S. Cl.** **137/441**; 4/324; 4/366; 4/415; 137/410; 137/426; 137/436; 251/208

[58] **Field of Search** 4/324, 415, 366; 137/426, 441, 410, 436; 251/120, 205, 208

[56] **References Cited**

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Primary Examiner—George L. Walton

Attorney, Agent, or Firm—Millen, White, Zelano, & Branigan, P.C.

[57] **ABSTRACT**

An adjustable valve is inserted in a tubular connection extending between an inlet lien and overflow pipe in the flush tank of a flush toilet. By adjusting the rate of flow through the valve, the level of water standing in the toilet is determined.

8 Claims, 2 Drawing Sheets

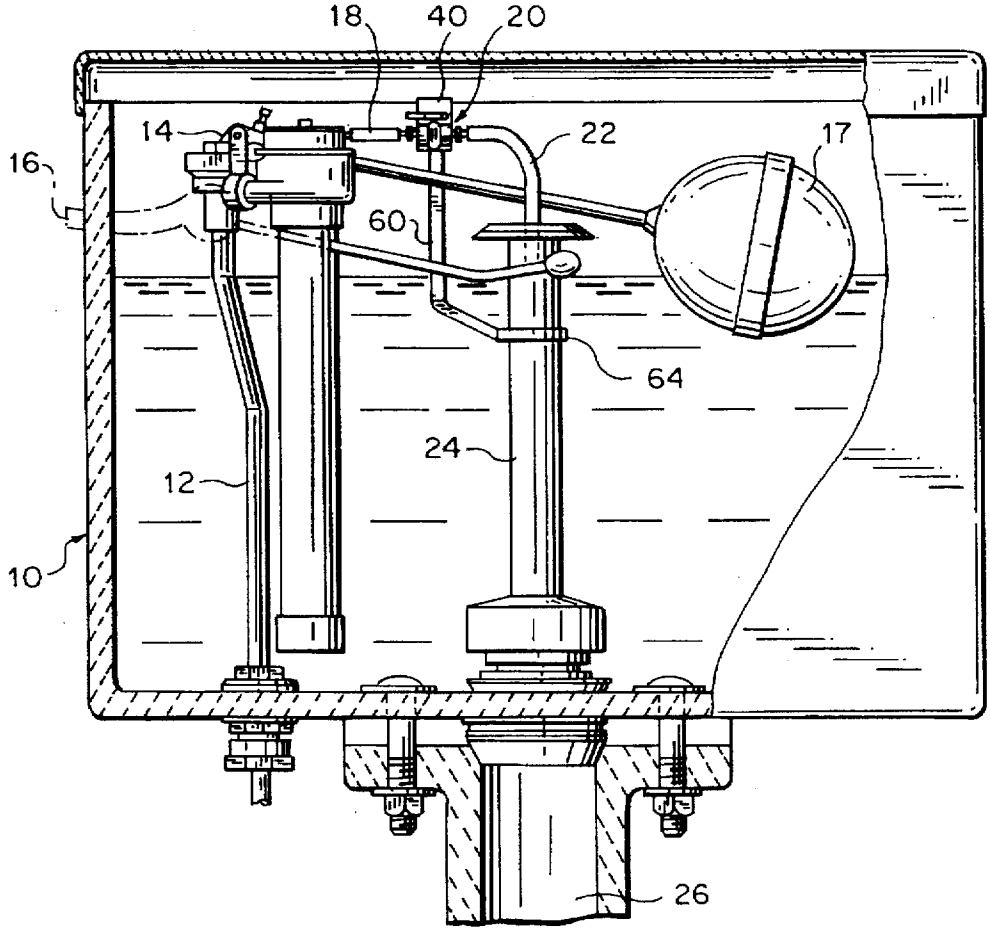


FIG. 1

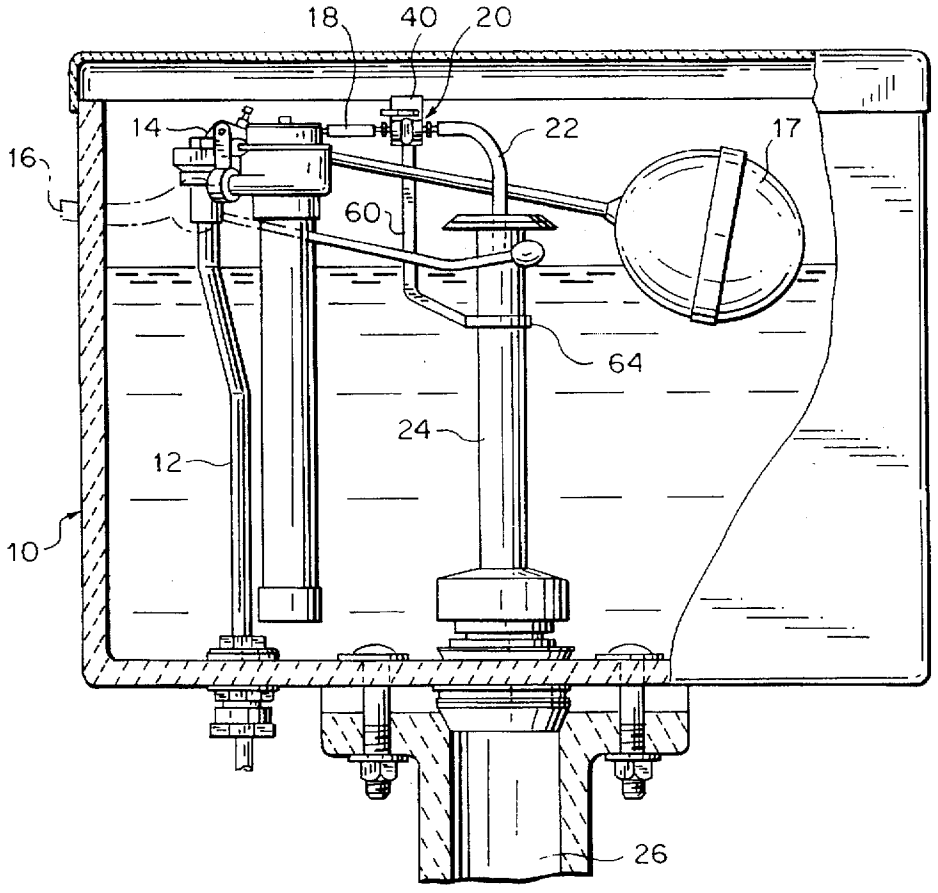


FIG. 2

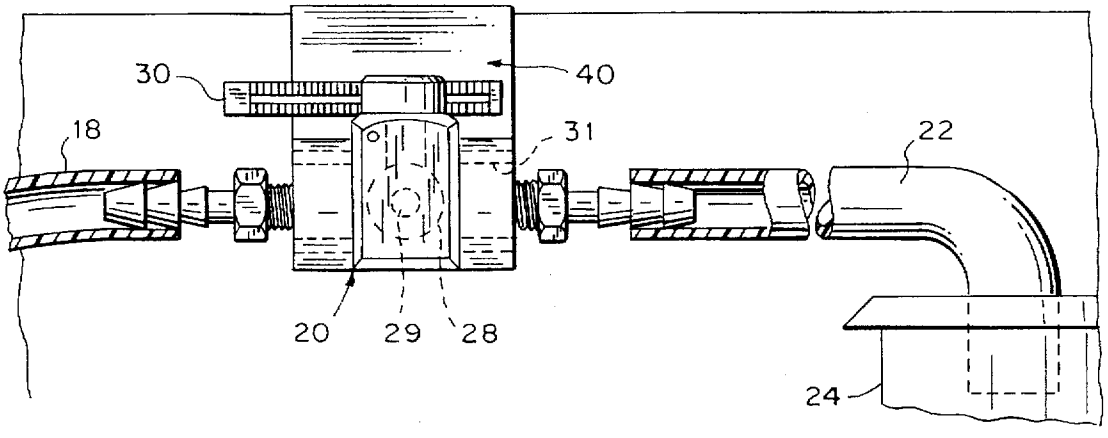


FIG. 3

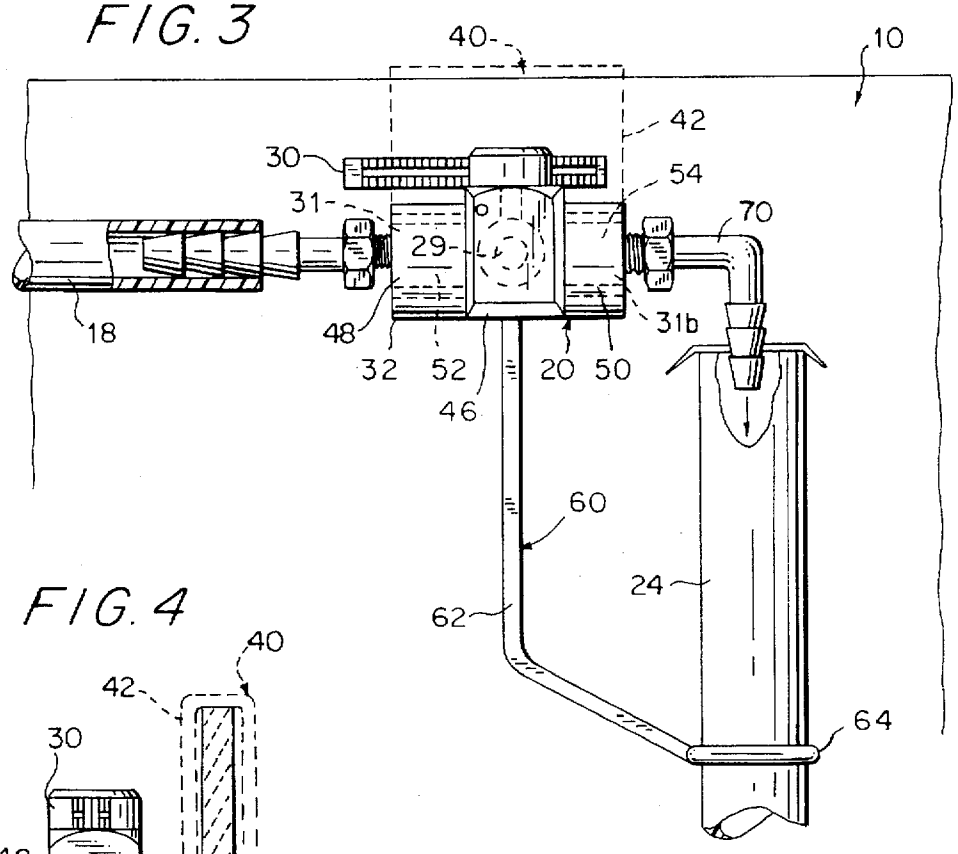


FIG. 4

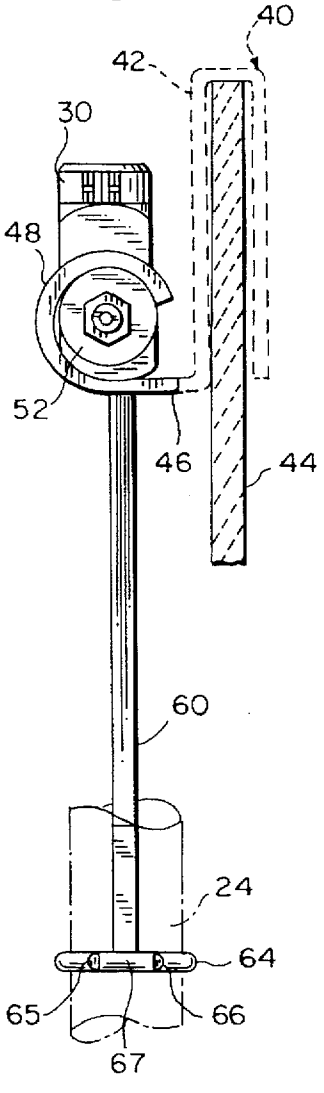
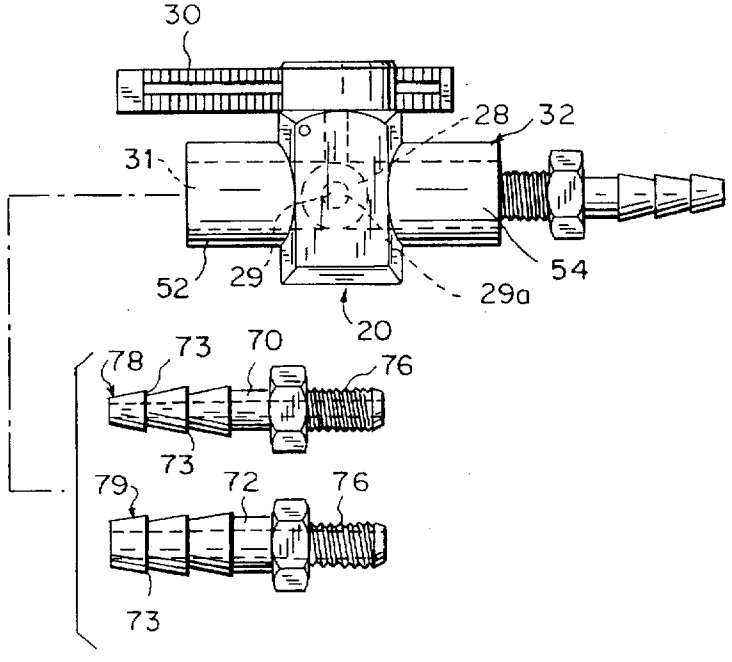


FIG. 5



ADJUSTABLE VALVE FOR CONTROLLING THE AMOUNT OF WATER REFILLING A TOILET BOWL AFTER FLUSHING

RELATED PATENT APPLICATION

U.S. Provisional application Ser. No. 60/006,196, filed Nov. 2, 1995.

FIELD OF THE INVENTION

The present invention relates to an adjustable valve for controlling the amount of water refilling a toilet bowl and, more particularly, to such a valve which adjusts the rate of flow of water refilling the toilet bowl.

BACKGROUND OF THE INVENTION

A concerted effort is now afoot to now conserve fresh potable water. Flush toilets use enormous amounts of water, consuming four to five gallons per flush. A lot of the water consumed is used to fill toilet bowls after flushing. Several quarts of water may be required to fill the bowl and, in many cases, this amount of water is unnecessary. The water level in some toilet bowls is so high that, on occasion, a person using the toilet gets wet when they sit. The present invention allows one to adjust the water level in the bowl to a suitable level which results in extensive water savings.

U.S. Pat. No. 3,086,546 includes an element for adjusting the rate of water flow to an overflow tank but the adjustment is hidden and not readily retrofitted.

SUMMARY OF THE INVENTION

In view of the aforementioned considerations it is a feature of the present invention to provide a new and improved apparatus for adjustably controlling the rate of water flow from a water inlet to an overflow pipe in a flush toilet.

In view of this feature and other features the present invention is directed to a valve which is inserted in a tubular connection between a flush tank inlet line and an overflow pipe. The valve is adjustable from a location outside of the tubular connection.

In a more specific aspect, the valve is a ball valve and, in a still more specific aspect, the valve is mounted in the tank by either a strut connected to the overflow pipe or by a bracket fitted over an upper edge of the flush tank.

Upon further study of the specification and appended claims, further objects and advantages of this invention will become apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other features and attendant advantages of the present invention will be more fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

FIG. **1** is a front view, with portions broken away, of a toilet bowl flush tank employing the present invention;

FIG. **2** is an enlarged view of a valve and associated mounting bracket configured in accordance with the principles of the present invention;

FIG. **3** is a view of a second embodiment of a valve of the present invention;

FIG. **4** is an end view of the valve of FIGS. **1–3**; and

FIG. **5** is a side view of the valve showing alternative screw-in nipples.

DETAILED DESCRIPTION

Referring now to FIG. **1**, there is shown a conventional flush tank **10** for a toilet bowl (not shown). The flush tank includes a water inlet line **12** and a conventional main valve **14** which is opened by an operating handle **16** and closed by a float **17**. The main valve **14** is connected by first a tube **18** to a secondary valve **20** configured in accordance with the principles of the present invention. The secondary valve **20** is connected by a second tube **22** to an overflow pipe **24** that is connected by a passage **26** to the toilet bowl (now shown). If the water level in the tank **10** rises above the top of the overflow pipe **24** due to a malfunction in the valve **14**, then the water drains down the overflow pipe **24** and into the toilet bowl where it passes through the drain line of the bowl and into the sewer system.

When the toilet is flushed, it is necessary to replenish water in the toilet bowl as well as the flush tank **10**. This is ordinarily accomplished by water from the inlet line **12** flowing through main the valve **14** and the tube **18** directly into the overflow pipe **24**. Thus, as the flush tank **10** fills, so does the toilet bowl. By filling the toilet bowl with water, sewer gases are blocked from venting through the toilet bowl into the lavatory or bathroom. Unfortunately, many toilet bowls fill to an unnecessarily high level, thereby wasting water and on occasion soaking portions of the person sitting on the toilet.

The secondary valve **20** of the instant invention prevents this by controlling the rate of water flow into the overflow pipe **24**. By reducing the rate of water flow into the overflow pipe **24**, the amount of water which can flow into the overflow pipe before the float **17** terminates the flow of water into the inlet tube **12** can be reduced substantially. This is because the reduced flow rate multiplied by time results in less water volume.

The secondary valve **20** is preferably a ball valve in which a spherical valve element **28** having a passage **29** rotated by an operator such as a handle **30** to align the passage **29** with inlet passage **31***a* and outlet passage **31***b* which are axially aligned in the valve body **32**. The amount of water in the toilet bowl is determined by observing the water level and adjusting the rate of flow through the valve **20** by turning the handle **30**.

The valve **20** may be supported in the tank **10** by a bracket **40** shown in solid lines in FIGS. **1** and **2** and dotted lines in FIGS. **3** and **4** which has a U-shaped support **42** that fits over the top of the tank wall **44** and a shelf **46** having a pair of arcuate retainers **48** and **50** that are fit around barrel portions **52** and **54** of the valve **20**. The bracket **40** is preferably made of a flexible plastic material so that the circular retainers **48** and **50** can be bent or deflected to easily position the valve **20** therein.

An alternative approach to the bracket **40** is a strut support **60**. The strut support **60** comprises a strut **62** which has a resilient clamp **64** at a first end thereof which clamps around the overflow pipe **24**, as is seen in FIG. **4**. Note in FIG. **4** that there are two ends **65** and **66** separated by a space **67**. Since the clamp **64** is resilient, it is spread to receive the pipe **24** and released to resiliently clamp therearound. At the top or second end of the strut **60**, a support plate **46** similar to the support plate that is used with the bracket **40**. When using the strut support **60**, the U-shaped retainer **42** is no longer needed. The clamp **64** is adjustable on the overflow pipe **24** so that it can be raised and lowered within the flush tank **10**

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to accommodate flush tanks of different heights. Accordingly, the position of the secondary valve **20** is variable within the flush tank **10**.

In the embodiment of FIG. **3**, the outlet is an elbow tube **70** that dispenses directly into the overflow pipe **24**. Accordingly, there is no need for no additional tubing such as the tube **22**.

Referring now to FIG. **5**, it is seen that the valve **20** can be furnished with alternative inlet nipples **70** and **72** each of which has a projecting end with annular barbs **73** which retain tubes **18** of various sizes on the valve **14** (see FIGS. **1**, **2** and **3**). The threaded ends **76** of the nipples **70** and **72** which are threaded into the body of the valve **20** have the same diameter, but the projecting ends **78** and **79** are of differing diameters so as to accommodate tubes **18** of different diameters.

The aforedescribed configuration for the valve assembly provides a easily installed convenient device for controlling the level of water in a toilet bowl.

From the foregoing description, one skilled in the art can easily ascertain the essential characteristics of this invention, and without departing from the spirit and scope thereof, can make various changes and modifications of the invention to adapt it to various usages and conditions.

What is claimed is:

1. An valve apparatus used in a flush toilet for controlling flow of water from a water inlet line through the valve apparatus and into a flush tank, wherein the water inlet line is connected to a main valve which controls water flow to refill the flush tank through a main valve outlet, while simultaneously diverting water to an overflow pipe, the overflow pipe being connected to a toilet bowl for filling the toilet bowl as water in the overflow pipe is replenished, the apparatus comprising:

a first tube extending from the main valve outlet;

a secondary valve connected to the first tube for selectively controlling the rate of water flow through the first tube by controlling the size of an opening through the secondary valve;

a second tube extending from the secondary valve to the overflow pipe;

an operator connected to the secondary valve, the operator being accessible from outside of the secondary valve for controlling the size of the opening through the secondary valve to thereby control the rate of water flow through the second tube to the overflow pipe and to the toilet bowl so as to control the level of water in the toilet bowl at the time the water inlet is shut off by the main valve; and

a removable support for the valve, wherein the support is a strut which has a first end and a second end, the first end being clamped to the overflow pipe and the second end being fixed to the secondary valve for holding the secondary valve at a position above the overflow pipe, wherein said support is variably adjustable along the overflow pipe so as to accomodate flush tanks of different heights.

2. The apparatus of claim **1**, wherein the secondary valve is ball valve and includes a spherical valve element with an opening therethrough formed about an axis, the valve element being turned by the operator to align the axis of the opening with axially aligned inlet and outlet passages in the valve element.

3. The apparatus of claim **2** further including a mounting bracket having a U-shaped support at one end which fits over the top rim of the flush tank and a coupling that is connected to the valve to support the valve in the tank at a position above the inlet of the overflow pipe.

4. The apparatus of claim **3**, wherein the secondary coupling is an arcuate retainer which fits around the valve.

5. The apparatus of claim **2** further including at least a pair of nipples, each having a first end of the same size for connecting to the inlet passage of the secondary valve and each having a second end of a different diameter for coupling with different diameter tube extending from the inlet line.

6. The apparatus of claim **5**, wherein the first ends of the nipples are threaded.

7. The apparatus of claim **1** further including a rigid L-shaped outlet nipple for connecting the valve outlet passages directly to the open end of the overflow pipe.

8. The apparatus of claim **7**, wherein the secondary second end of the strut includes an arcuate retainer which fits around the valve.

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