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TOILET DISCHARGE VALVE CONTROL APPARATUS

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The present invention relates generally to valves and more particularly to a novel and improved toilet discharge valve control apparatus.

Practically all the toilet bowls in use today are equipped with a flushing tank and a discharge valve for controlling the flow of water from the flushing tank. The amount of water required for an effective flushing action varies in accordance with the configuration and size of the individual toilet bowl. In almost every instance however the conventional discharge valve control apparatus permits an excessive amount of water to flow from the flushing tank during a flushing operation.

It is a major object of the present invention to provide toilet discharge valve control apparatus which permits only the exact amount of water necessary for completing an effective flushing operation to be discharged from the flushing tank. In this manner a considerable saving of water may be effected.

Another object is to provide apparatus of the aforedescribed nature which permits the water to be discharged from the flushing tank at the same head as with conventional discharge valve control apparatus.

A further object is to provide apparatus of the aforedescribed nature which may be readily installed within a flushing tank in a minimum amount of time and effort by the ordinary householder. Such installation requires no special tools.

An additional object of the invention is to provide a novel toilet discharge valve control apparatus which effects a positive seating of the valve stopper whereby no water leakage will occur.

Yet a further object is to provide toilet discharge valve control apparatus that is useable as a replacement for the original discharge valve control apparatus furnished with the conventional toilet.

A still further object of the invention is to provide apparatus of the aforedescribed nature that is simple of design and rugged of construction whereby it may provide a long and trouble-free service life.

These and other objects and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment thereof, when taken in conjunction with the appended drawings wherein:

Figure 1 is a side elevational view of a preferred form of toilet discharge valve control apparatus embodying the present invention;

Figure 2 is a top plan view of said apparatus; and

Figures 3 and 4 are reduced side elevational views showing the mode of operation of said apparatus.

Referring to the drawings, the preferred form of toilet discharge valve control apparatus is shown mounted within the flushing tank of a conventional toilet. This tank has a bottom wall 10 wherein is mounted a discharge or flushing pipe 12 that is connected at its lower end with a toilet bowl (not shown) in a suitable manner. The upper end of the discharge pipe 12 terminates in a valve seat 14 that receives a stopper 16 whereby the flow of flushing

water is controlled. Formed below the valve seat 14 is a side extension 18 of the discharge pipe and rigidly supported thereby is a standard form of overflow pipe 20. The upper end of the overflow pipe 20 extends above the level of the water 21 contained within the flushing tank.

The stopper 16 may be made of conventional rubber construction and it is rigidly attached at its upper end to a vertically extending stopper rod 22. A metal weight 24 is disposed upon the stopper rod 22 immediately above the top of the stopper 16. This weight 24 renders the stopper 16 semi-buoyant rather than buoyant for a reason to be set forth hereinafter. The upper end of the stopper rod 22 is bent over at 26 for receiving the lower end of a chain or the like 28 that is attached at its upper end to the actuating handle (not shown) of the toilet.

The discharge valve control apparatus includes a horizontally extending bracket, generally designated 30, one end of which is formed with a clamp 32 that is affixed to the overflow pipe 20. The elevation of the bracket 30, relative to the overflow pipe 20, may be adjusted by means of a screw 34 carried between bifurcations 36 formed on the clamp 32 as indicated in Figure 2. Tightening and loosening of the screw 34 serves to control the diameter of the overflow pipe-encircling bore 38 of the clamp 32. The free end of the bracket 30 is formed with a vertically extending bore 40 of somewhat greater diameter than that of the stopper rod 22 whereby the latter is freely movable vertically with respect to the bracket. The free end of the bracket is also integrally formed with an upwardly extending saddle element 42 having a recessed portion 44 wherein the stopper rod 22 is movable.

A generally vertically extending pivot arm, generally designated 46, is supported at its upper portion to the intermediate portion of the bracket 30 by means of a horizontal pivot pin 48. The upper end of this pivot arm 46 is integrally formed with a generally horizontally extending finger 50. This finger 50 includes a friction shoe 52 at its free end. The portion of the pivot arm below the bracket 30 is formed with a plurality of vertically spaced holes 54 that are equi-distantly separated.

A metallic, generally rectangular float 56 is connected to the pivot arm 46 by means of a horizontally extending fork element 58. The fork element 58 includes bifurcations 60 that encompass the overflow pipe 20 and are rigidly secured, as by welding, at their left-hand ends to the float 56. The opposite end of these bifurcations 60 merge into a pair of bored connection elements 62 which are secured to the pivot arm 46 as by bolt and nut combinations 64, or the like. The free ends of the connection elements 62 are so spaced that the bores 66 thereof may be aligned with any two of the bores 54 of the pivot arm 46, as indicated in Figure 1.

In operation, the parts of the discharge valve control apparatus will normally be disposed as indicated in Figures 1 and 2, the stopper 16 being held seated in the valve seat 14. When it is desired to flush the toilet bowl the stopper rod, and hence the stopper 16, are raised as indicated in Figure 3 whereby water 21 will flow downwardly into the discharge pipe 12 from within the flushing tank. The stopper 16 will be maintained in a raised position because of the frictional engagement of the shoe 52 with the stopper rod 22 within the confines of the saddle element 42. This frictional engagement will continue so long as the float 56 is in a buoyant condition, that is so long as the level of water 21 is above the float. During this frictional engagement the saddle element 42 will provide a rigid backing for the stopper rod 22.

Referring now to Figure 4, as the water 21 flows downwardly through the discharge pipe 12 its level will gradually drop until it falls below the top of the float 56. At this time the float 56 will sink and thereby allow the pivot arm 46 to pivot in a counterclockwise direction from its

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normal position to the position shown in this figure. Such pivoting of the pivot arm 46 moves the friction shoe 52 to the left and upwardly away from the stopper rod 22. The stopper rod will then drop under the combined influence of the weighted stopper 16 and the suction of the water flowing downwardly past the valve seat 14. Once the stopper 16 engages the valve seat 14 it will remain firmly seated in place.

The exact water level at which flow through the discharge pipe is stopped may be controlled both by the elevation at which the bracket member 30 is secured to the overflow pipe 20 and the choice of spaced holes 54 utilized to connect the bracket member 58 to the pivot arm 46. These adjustments may both be accomplished by even an unskilled householder utilizing solely a screw-driver once the exact amount of water required for complete effective flushing of the particular toilet bowl has been determined. It should be noted that the use of a weighted stopper 16 substantially eliminates the danger that the stopper rod 22 might stick while in a raised position and thereby permit water to leak into the discharge pipe.

While there has been described hereinbefore what is presently considered to be the preferred embodiment of the present invention, it will be apparent that various modifications and changes may be made with respect thereto without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. Toilet valve discharge control apparatus for use with a discharge pipe having a valve seat and an upstanding overflow pipe, a stopper that normally seats upon said valve seat and an upstanding stopper rod, comprising: weight means for rendering said stopper semi-buoyant; a support bracket that is affixable to said overflow pipe and is formed with means for vertically slidably receiving said stopper rod; a pivot arm pivotally carried by said bracket and having a friction shoe integrally formed at its upper end that is engageable with said stopper rod for restraining the latter in a raised position, said pivot arm including a generally vertical portion that extends downwardly from its point of connection with said bracket; a float; and, a generally horizontally extending fork element having bifurcations that encompass said overflow pipe and are secured at their free ends to said float, the opposite end of said fork element being connected to the vertical portion of said pivot arm.

2. Toilet valve discharge control apparatus for use with a discharge pipe having a valve seat and an upstanding overflow pipe, a stopper that normally seats upon said valve seat and an upstanding stopper rod, comprising: weight means for rendering said stopper semi-buoyant; a support bracket having a clamp at one of its ends that is attachable to said overflow pipe, said bracket being formed with a vertical bore at its opposite end for slidably receiving said stopper rod, said bracket also being formed with a saddle element at its opposite end that extends upwardly from said bore so as to guide said rod; a generally vertically extending pivot arm pivotally secured to the intermediate portion of said bracket for pivotal movement in a vertical plane, the upper portion of said arm being integrally formed with a friction shoe

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that is engageable with said stopper rod adjacent said saddle element so as to retain said rod in a raised position, said pivot arm including a vertical portion that extends downwardly from said bracket; a float; and, a generally horizontally extending fork element having bifurcations that encompass said overflow pipe and are secured at their free ends to said float, the opposite end of said fork element being connected to the vertical portion of said pivot arm.

3. Toilet valve discharge control apparatus for use with a discharge pipe having a valve seat and an upstanding overflow pipe, a stopper that normally seats upon said valve seat and an upstanding stopper rod, comprising: a metal weight carried by said stopper rod above said stopper for rendering the latter semi-buoyant; a support bracket having a clamp at one of its ends that is attachable to said overflow pipe, said bracket being formed with a vertical bore at its opposite end for slidably receiving said stopper rod, said bracket also being formed with a saddle element at its opposite end that extends upwardly from said bore so as to guide said rod; an opening formed in said saddle element; a generally vertically extending pivot arm pivotally secured to the intermediate portion of said bracket for pivotal movement in a vertical plane, the upper portion of said arm being integrally formed with a friction shoe that is insertable through said opening so as to be engageable with said stopper rod and to thereby retain said rod in a raised position, said pivot arm including a vertical portion that extends downwardly from said bracket and is formed with a plurality of equi-distantly spaced vertically separated holes; a float; a generally horizontally extending fork element having bifurcations that encompass said overflow pipe and are rigidly secured to said float at their free ends, the opposite end of said bifurcations merging into a pair of connection elements, the latter being formed with bores that are so spaced as to be alignable with two of the holes of the vertical portion of said arm; and bolt and nut means that may be inserted through said holes and said bores so as to interconnect said fork element and said pivot arm.

4. Toilet valve discharge control apparatus for use with a discharge pipe having a valve seat and an upstanding overflow pipe, a stopper that normally seats upon said valve seat and an upstanding stopper rod, comprising: weight means on said stopper rod rendering said stopper semi-buoyant; a support bracket that is vertically adjustably affixable to said overflow pipe and is formed with a vertical bore that slidably receives said stopper rod; a pivot arm pivotally carried by said bracket for movement in a vertical plane; a friction shoe integrally formed at one end of said pivot arm and engageable with said stopper rod adjacent said bracket; and a float mounted on the opposite end of said pivot arm.

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