This invention relates to an improvement in a flush tank for a conventional toilet or closet and in particular to a water economizer for providing a means to substantially reduce the amount of water used per flush.

Water is becoming more and more a critical commodity in our everyday life as a result of our water table decreasing over a long period of time. Also, a more important and immediate problem is shortage of water created during the drought seasons as a result of lack of rain. Therefore, it is a general object of this invention to provide economically the saving of water.

One of the most fruitful places where water can be conserved is in the flush water for a toilet. The standard flush tanks are designed so that a considerably larger amount of water is used than is normally required. In general, a small flush is required in the majority of cases as when flushing liquids and a full flush is required in only a minority of cases as when flushing solid matter. It is therefore an object of this invention to provide a means for controlling the amount of water used per flush so as to conserve water.

It is a further object of this invention to provide a water economizer for a toilet flush tank that is capable of permitting a flush from a minimum to a maximum amount according to the amount required.

Many attempts have been made in the past to provide a means for economizing on the amounts of water used for flushing toilets. These have either been too cumbersome and expensive, or could not be adapted to existing mechanical arrangements now being used. It is therefore another object of this invention to provide a device for use in conserving the amount of water used in flushing toilets that is readily adapted to the conventional existing flush tank arrangements, that can be fabricated easily and cheaply, and will operate efficiently.

It is a still further object of this invention to provide a float that is made of plastic material or other buoyant material, the float having an opening in the center thereof which is of sufficient size as to fit loosely on the vertical rod which carries the rubber valve, thereby permitting the float to slide freely with respect to the vertical rod without binding. These and other objects will become more apparent when read in the light of the accompanying drawings and specification wherein like parts have like numbers, and wherein the parts are described in the specification by specific name but it is intended that these names be applied as generically as the prior art will permit wherein:

Figure 1 is an elevational view of a standard conventional flush tank partly in broken section showing the position of the float before a flush.

Figure 2 is an isometric view of the float itself.

Figure 3 is a plan view of the float.

Figure 4 is a cross sectional view of the float.

Figure 5 is a view of the elements of the flush mechanism shown in discharge position.

Figure 6 is a front elevational view of the flush mechanism showing the position of the float and rubber valve after the water level has passed the original position of the float.

Figure 7 is a front elevational view of the flush mechanism showing the position of the float and rubber valve when the valve has bottomed.

Figure 8 is a front elevational view of the flush mechanism during refill of the flush tank showing the float slidingly working its way up the vertical stem with the increase in level of the water.

Referring to the drawings the numeral 10 generally designates a conventional water closet or flush tank. The flush tank 10 comprises the conventional flush tank mechanism for discharging and refilling the tank. The numeral 12 generally designates the float or economizer of a float or economizer made of a durable plastic or other buoyant material capable of withstanding corrosive effects of water. The float comprises a base portion 14 provided with a plurality of upwardly extending arms 16. The arms 16 extend upwardly beyond the bracket shown at 30 even when the float is in its lowered position as shown.

The base 14 of the float member 12 is maintained relatively thin at its center so as to permit the rubber valve 24 to rise to substantially the same position as when the float is not used. This can be accomplished by providing a recess 15 or the like in the center of the base.

The float 12 is provided with an opening 18 so that the float will fit loosely on the vertical stem 26, and is positioned between the rubber valve 24 and the bearing or fork 30. The fork 30 serves as a bearing so as to guide the vertical stem, thereby maintaining the alignment of the valve 24 with respect to its valve seat. Also, since the float is loosely mounted on the vertical stem 26 it is free to slide coaxially thereon without binding. It is noted therefore that the addition of the float 12 does not cause any binding tendency of the vertical stem 26 in the bearing 30, nor does it cause binding of itself on the stem 26.

The vertical stem 26 is loosely mounted in one end of the release link 36. The other end of the release link 36 is pivotally connected to the flush arm or trip lever 38. A normal float 40 is shown connected to a valve inlet which controls the amount of water that is admitted to the tank in the usual manner. Since such a float and its associated mechanism are well known in the art and forms no part of the invention, further description of this portion is not deemed necessary.

The water line of the tank is shown at 42 and represents the maximum amount the tank can be filled with water. The numeral 50 designates the water line at the various positions during the operation of the device which will hereinafter be explained more fully.

A base or valve seat housing 44 is shown in the bottom of the flush tank. This housing carries the vertical support or overflow pipe 34. The valve seat housing is further provided with a drain and valve seat 45 adapted to receive the float 24 therein to prevent the drainage of water. The drain from the tank is shown at 46 and empties into a normal flush outlet 48.

When it is desired to operate the flush tank, the operating lever is manually turned so as to lift the flush arm 38 thereby raising the release rod 36 valve stem 26 and the rubber valve 24 from its seat 45 to permit discharge of water. For minimum flush the operating lever is then released. The parts will take their position as shown in Figure 5 showing the water in the tank decreasing from the water line 42 to the water line 50. When the water line 50 decreases sufficiently to the position of the economizer or buoyant float valve 12 so as to uncover the legs or arms 16, the weight of the economizer float acting on the buoyant rubber valve 24 will cause both the float and valve to descend immediately.

The float 12 will descend together with the rubber valve 24 and will seat on the valve seat 45. It is noted
that the valve 24 will seat prematurely as compared to its normal operation. Normally all of the water will have drained from the flush tank before the rubber valve 24 will seat. However, the addition of the economizer float will cause the rubber valve to seat when only a portion of the water will have drained from the flush tank. After the valve has seated as shown in Figure 7 the economizer float 12 being buoyant will begin to rise with the incoming water as it fills the tank. This takes the weight off the rubber valve 24. This weight would tend to add to the force necessary to trip the operating lever if it was not removed. The weight of the float does not increase until the water has risen to a level sufficient to operate the trip handle since it is not normally carried by the rubber valve 24 or vertical stem 26. It is noted that this force can become exceedingly large due to the large moment arm generally found in such devices.

The weight of the float can be adjusted by various methods which are well known in the art, for example, screws or washers can be added to the base member. By adjusting the weight the minimum flush can be obtained since the rubber valve 24 will close earlier or later according to whether the weight is being added or subtracted.

When the point has been established for the minimum flush, any inbetween amount of flush can be obtained from the minimum flush to a maximum flush. The maximum flush, which would be when all of the water is drained from the flush tank, can be obtained by merely holding the operating handle in its down position until all of the water has drained. To obtain a flush between the minimum and maximum flush, the operating handle is held open or in a turned position until the desired amount of flush is obtained at which time it is released. The desired amount of flush becomes readily apparent when the contents in the bowl have been flushed down the drain. Thus it is seen that any amount from a minimum flush to a maximum flush can be readily obtained.

One of the novel desirable features of this invention is found in the fact that the device can be fabricated very easily and therefore very inexpensively, and is readily adapted to existing flush tanks. In order to install the float in an existing conventional tank the operating handle is turned and the float 40 is held in its top position so that all of the water above seat 45 is flushed from the tank. The float 40 can be held in this top position by any convenient method. Since the valve body is threadably secured to the stem 26 it is only necessary to unscrew the stem 26 from the valve 24 and slip the float 40 in position and screw the stem 26 back in place. By releasing the float 40 the device is ready for operation.

It is also noted that the center of gravity of the float and rubber valve is purposely made low so that its direction of fall will be along the axis of the vertical stem 26.

The conventional flush tank in use today has the tendency to leak. If the rubber valve were to seat properly initially, the leakage would not occur. Therefore the additional weight of the float economizer added to the rubber valve is sufficient to assist in proper seating so as to prevent the leaking. As pointed out above this additional weight is only used to properly seat the valve, but it rises with the entrance of water and does not increase the force necessary to trip the flush handle. Also, the added weight to the valve prevents the stem from binding in its guide thereby assuring proper seating and preventing leakage.

A very inexpensive water economizer can be readily adapted to conventional type flush tanks without modifying any existing parts. This arrangement serves to conserve water during drought seasons since it has been found that approximately one half of a full flush is all that is required for flushing liquids. Such savings in water would go a long way toward assisting in the urgent need for conserving water.

The specific embodiment shown has been described merely as an illustration of the invention and is not intended to be limited thereby. Inasmuch as many improvements and modifications may be made to the device within the spirit and intent of this invention, all such improvements and modifications are to be considered as equivalents and to be included within the scope of this invention.

Whereby I claim:

1. In combination with a flush tank, comprising a valve and valve seat, a valve stem, said valve being secured to said valve stem, guide means for said valve stem, lever means for lifting said valve from said valve seat to permit the discharge of water from said flush tank, a float slidably mounted on said stem between said guide means and said valve, said float rising coaxially on said valve stem with the rising of the water level in said tank while the valve is seated, said float being contigous to said valve when the water is discharged from the flush tank thereby cooperating with said valve to prematurely close the valve, and balancing means on said float to prevent binding of said float on said stem.

2. In a float for a flush tank, said float being buoyant and provided with an aperture sufficiently large so as to fit loosely on a vertical stem carrying a rubber valve, said float comprising a plurality of upright arms so that the float will move coaxially with the stem without binding forces being created between the stem and float.

3. In a float for a flush tank comprising a float having a base portion, upwardly extending buoyant arms integrally attached to said base member, said arms maintaining said base member in a horizontal position when immersed in a body of water.

4. In a float for a flush tank, said float comprising a base member having a central aperture therethrough sufficiently large so as to fit loosely on a vertical stem carrying a rubber valve, said base member having a plurality of buoyant arms extending upwardly so as to maintain substantial coaxial movement of the float with respect to the stem.

5. In a flush tank comprising a drain provided with a valve seat, a support member fixed to said tank, said support member being provided with a bearing in alignment with said drain, said bearing acting as a guide for a valve stem extending through said bearing, a buoyant valve member fixed to said valve stem and adapted to seat on said valve seat, a buoyant weight-member slidably mounted on said valve stem and positioned between said buoyant valve and said bearing, said buoyant weight member having sufficient weight to cause the buoyant valve to prematurely close the drain and having sufficient buoyancy to float upwardly with the water level when the valve has seated, said buoyant weight being provided with upwardly extending arms so as to maintain the float in a horizontal position thereby eliminating binding of the float on the stem.

6. In a float for a flush tank, said float comprising a substantially flat buoyant base member, buoyant means for retaining said base member in a horizontal position when immersed in a body of water, said buoyant means preventing binding of said base member during relative movement with respect to parts of said flush tank.

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